PRACTICAL

HUMAN ANATOMY

A

WORKING-GUIDE FOR STUDENTS OF MEDICINE

AND A

READY-REFERENCE FOR SURGEONS AND PHYSICIANS

BY

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To

JOHN A. WEISSE, M.D.

MY FATHER,

THIS WORK IS DEDICATED

WITH THE WARMEST FILIAL AFFECTION, AND A DEEP SENSE OF GRATITUDE FOR HIS PERSONAL GUIDANCE OF MY EDUCATION.

PREFACE.

THIS work was commenced with a desire—after an experience of nearly twenty years in study, actual dissections, and the teaching of anatomy—to produce a practical working-guide for the student at the cadaver, and a ready-reference book, which would take the place of the cadaver, for practitioners of surgery and medicine.

The plan of the work embraces the following points:

1st, the division of the body into *practical dissections;*

2d, the giving, in *dissection-paragraphs*, the progressive steps by which the several parts, involved in a dissection, are to be systematically displayed;

3d, the guidance, by lines across the parts in the Plates—called *section-lines*—to the points where they are to be cut, for their reflection, in order to advance to a succeeding stage of the dissection;

4th, the indication, by *numbering the parts of the dissections*, of the order in which they are exposed;

5th, the description of the parts, in *descriptive-anatomy paragraphs*, as they are brought into view;

6th, the adherence, in expressing the relations of parts, to a well-defined nomenclature of *general* and *special anatomical terms;*

7th, the illustration of the anatomy of the regions and viscera of the body by Plates, *with the names of the parts printed upon them or at the sides of the Figures with indicating lines to them*—the *dead-anatomy* is thus presented to the student, and the *living-anatomy* to the surgeon and physician.

The dissections have been planned, as far as practicable, to give all the attachments of included muscles.

Each dissection has been completely described and illustrated, irrespective of the contiguous dissections upon which it may encroach.

The bones of the body have not been described in detail; their practical relations to the anatomical elements of the several dissections are shown in the Plate illustrations of their surfaces with the areas they afford for muscle attachments; together with their presentation in the progressive steps of the dissections.

The attachments of muscles are given without any distinction as to their being the *origin* and *insertion* of the same; it is more natural and clear to enumerate the attachments only.

The illustrations include the following:

153 full-page, original, Plates;
51 Plates, of 132 original Figures;
6 full-page Plates selected from standard authors;
9 Plates, of 25 Figures selected from standard authors;
Plate 56, of one original and two selected Figures;
Plate 66, of one original and one selected Figure;
15 original text Figures.

The original Plates and Figures were sketched and drawn by Mr. Maximilian Cohn from dissections by the author.

The illustration and description of the complete distribution of the sympathetic nervous system, and of the lymphatic system, have not been given, as they do not come within the scope of the work. The dissection of the globe of the eye, and of the auditory apparatus have been omitted.

No reference has been made to surgical and medical or applied anatomy, as it is deemed best to do *one thing at a time.* Moreover, the systematic mastery of the anatomy of the body places one in a position to make practical applications of the same, to the elucidation of surgical, medical, and obstetrical problems; and to read, appreciatively, the special works on surgical and medical anatomy.

That which can be demonstrated to the unaided eye is the province of anatomy; therefore, the structure of parts, requiring the aid of the microscope, has not been alluded to, as it belongs to Histology.

The practitioner of surgery and medicine, in the absence of a cadaver to refer to, has been much in need of illustrations of anatomy, that would present him a progressive series of dissections of a region or organ about which he desired information. To meet this want has been one of the aims in the preparation of this work, special attention having been given to those regions and organs which claim frequent surgical and medical care. To this end also the Contents and Index have been so elaborated as to facilitate the finding of the Plate illustrations and text descriptions of any part.

Too much cannot be said in praise of the comparatively wonderful artistic skill displayed by Mr. Maximilian Cohn, in his faithful reproductions of nature, given us in the Plates and Plate Figures; and the clearness of his lettering of the same. The illustrations are photographic in their representations of nature, and are works of art in themselves.

Thanks are due to the Moss Engraving Co. for the care which has been bestowed upon the photo-engraving and the printing of the Plates.

Nature has been the text-book, to which reference has always been made; but, a due respect for the labors of our fathers and of our contemporaries has been kept in view.

The original intention was to illustrate this work by selections from the illustrations of standard authors, simply adapting and lettering the same to fulfil our purpose. After having carried out this scheme to the extent of some 300 photo-Plates and 150 electrotypes, the plan was abandoned, because it was found impracticable to accomplish the object of the work therewith, and *the cadaver was resorted to.*

Errors and omissions, no doubt, may be found in the text and Plates, but should any, *of whatever nature*, appear to a reader, his personal communication of the same to the author will be regarded as a kindness.

The manifold difficulties and disappointments that have been met with, in the evolution of this volume, are only for a private ear. The desired end will have been attained, if the fruits borne of years of time, thought, and labor are: that it enables the student of medicine to acquire, more readily and thoroughly, a knowledge of human anatomy; and proves a companion to the surgeon and the physician, to keep them in mind of the practical facts of anatomy.

51 West 22d Street,
New York City, December, 1885.

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PRACTICAL HUMAN ANATOMY.

INTRODUCTION.

It is, for the following reasons, of the greatest importance that the dissector read this introduction, carefully, before commencing his dissections: first, that he may be prepared to use this work to the greatest possible advantage; second, that he may have a general appreciation of the anatomical elements that he is to meet with; third, that he may obtain a general idea of how to dissect the several parts which enter into the make-up of the body; fourth, that he may know the relative importance of the parts exposed in a given dissection, and thereby be guided, as to which to preserve and which to cut away, as he progresses.

WORKING PLAN.

Dissector's Use of this Work.—The following course should be pursued with a given dissection: *first*, read, consecutively, the numbered descriptive-anatomy paragraphs (in large type), referring to the Plates as directed therein; *second*, read, continuously, the dissection paragraphs (in small type), referring to the Plates as indicated therein; *third*, dissect in strict accordance with the directions given in the dissection paragraphs; *fourth*, verify dissections by the Plates and by the text of the descriptive-anatomy paragraphs.

Plate References.—When a given Plate, say 51, is referred to in a descriptive-anatomy paragraph heading, the dissector is to continue to work with Plate 51, until another Plate or other Plates, say 52, or 55, 57, and 59, is or are referred to, in a subsequent descriptive-anatomy paragraph heading; then, it or they become the Plate or Plates to be worked with.

Of Right and Left Parts.—In the dissection and descriptive-anatomy paragraphs, and in the Plates, only the parts of one side are referred to or illustrated; the dissector must make the necessary transposition, which his dissection may require.

Section Lines on the Parts.—Particular attention is called to *the black lines crossing parts in the plates;* they indicate the points where parts are to be sectioned, that the same may be reflected. *A part is only to be sectioned, at that stage of the dissection, where it is so directed in a dissection paragraph;* if parts are sectioned out of order, it leads to incompleteness in the work done. Dissection directions will sometimes state that muscles, etc., are to be reflected, while in the Plate, worked by, they are cut short or even cut away. *The dissection directions are to be followed without regard to the Plates;* the latter are drawn to show parts to the best advantage.

Reproduction of Plates.—In using the Plates as guides to dissection, it must not be supposed by the dissector that he is to reproduce them severally on the subject. They are to be referred to as indicated in the descriptive anatomy and dissection paragraphs. The same part may appear in several Plates, from different points of view, but, collectively, they afford a clearer idea of the part, and its relations, than could be given in a single Plate.

Abnormalities.—In the descriptive-anatomy paragraphs no references are made to abnormalities; for these, one of the standard text-books on descriptive anatomy may be consulted. The Plates present the normal anatomy.

Terms of Relation.—The *general terms* used in describing the relations of parts in the dissections, are as follows: *anterior* and *posterior*, refer to those surfaces of the body, respectively; *superior* and *inferior*, as toward the head or feet; *external* and *internal*, relatively to the median line of the body. *Special terms*, applicable to special dissections, will be given in their proper places.

DISSECTING INSTRUMENTS.

Dissecting Instruments, Plate 1.—Experience has proved, that the following instruments, etc., will meet all the wants of the dissector, and in some respects, better than the contents of the conventional dissecting case: a pair of modified Coxeter forceps, two scalpels, a pair of sharp-pointed curved scissors, chain-hooks, thumb-pins, clasp-pins, two probes, and a scalpel strop. As contained in their case (1), they fulfil the ends of *compactness*, *usefulness* and *economy*.

Forceps.—The forceps (2) is the "Coxeter forceps," modified by having its head cut square across, so that, when the closed blades are held in the hand, it may be used to strip muscles apart, etc.

Scalpels.—Each scalpel has a thick handle; a portion of the blade forms a shank to the knife, which strengthens the instrument, facilitates its manipulation, and limits its cutting portion to its available edge. One of the scalpels (3) has a rounded end, and a very convex cutting edge, which continues to the end of the blade; this scalpel is adapted for coarse work, such as reflecting flaps of skin, etc., and clearing fasciæ and muscles. The pointed scalpel (4) has a very convex cutting edge, and is intended for delicate work on nerves and vessels. These two knives will fulfill all the requirements of dissection.

Curved Scissors.—The sharp-pointed curved scissors (5) presents nothing peculiar. As an instrument for the dissector, it should be much more used than it is; after a little practice, it can with great advantage, in many instances, be made to take the place of the scalpel. As a scissors, it answers all the needs of a straight pair.

Chain-Hooks.—The chain-hooks (6) have blunt points, and the chain is very strong.

Thread.—The dissector should provide himself with *coarse linen thread*, and a needle for the same. Flaps may be advantageously reflected by threads tied into perforations at their borders. Loops of thread passed around vessels, nerves, etc. —with their ends tied—will be found useful in holding them off.

Probes.—These (7) are used to demonstrate ducts, vessels, sheaths of tendons, etc.

Scalpel Strop.—This (8) will be found very convenient; one's knife is continually dulled, while dissecting; but a few passes of the scalpel over the strop will sharpen it.

A saw, chisel, hammer and hook, costotome, intestine scissors, etc., required by the dissector, constitute a part of the furniture of a practical anatomy room.

GENERAL RULES FOR DISSECTION.

Division of a Cadaver.—A cadaver may be divided into *sections* to be worked by five, six, or eight dissectors. A body assigned to five, one takes the head and neck, two take the upper extremities and thorax, and two the lower extremities, the pelvis, and the abdomen. A subject, apportioned to six, one works the head and neck, one the trunk (thorax, abdomen, and pelvis), two work the upper extremities, and two the lower extremities. A body, dissected by eight, there will be two to the head and neck, two to the trunk (thorax, abdomen, and pelvis), two to the upper extremities, and two to the lower extremities.

Object of Dissection.—*The object of dissection is to separate parts, not to cut them.* With the separation of parts is included the removal from their surfaces of fibrous tissue of investiture—as membranes, areolar tissue, fasciæ, inter-muscular septa, and vessel-sheaths.

Rules for Dissection.—There are three rules to be followed to make a good dissector:

First.—*Know what you are to look for.* This knowledge is attained by having previously read a description of the parts to be found in a given region.

Second.—*Work slowly and thoroughly.* To fulfil this rule, do not allow yourself to work without system or method, but follow the progressive steps of a given dissection, as laid down in the book, which you have selected to guide you.

Third :—*Never let your knife cut when you do not know what it is about to divide.*

Review of a Dissection.—When finishing work replace parts, as nearly as possible, in their normal relations, so that on resuming work, they may be removed in their relative order ; this affords repeated reviews of a dissection.

How to Keep a Dissection.—Re-apply skin flaps ; lay on the part the refuse tissue from the dissection ; cover with a *dampened* piece of muslin ; and, outside of all, wrap a piece of dry muslin or oil-silk.

SPECIAL RULES OF DISSECTION.

Anatomical Elements.—By an anatomical element, borrowing the term from chemical nomenclature, is to be understood a structural part of the body, such as the skin, a muscle, etc. The anatomical elements entering into the construction of the regions of the body are: *epidermis*, *skin*, *subcutaneous tissue*, *superficial fascia*, *intermuscular septa*, *muscles*, *bursæ*, *synovial sheaths of tendons*, *deep fasciæ*, *arteries*, *veins*, *lymphatic vessels*, *lymphatic glands*, *nerves*, *viscera*, *ducts*, *mucous membrane*, *serous membrane*, *ligaments*, *fibro-cartilages*, *cartilages*, and *bones*. All these elements are not present in every region of the body, and some are only found in special regions.

Epidermis.—The epidermis or cuticle claims the respect of the dissector as a useful portion of the skin to him : where the epidermis is removed, the evaporation, that takes place, causes the skin and subjacent tissues to become hard, dry, and matted together, so as to interfere materially with dissection.

Skin.—The skin or derma varies very much as to thickness, in the different regions. In making skin incisions, care should be taken, that the skin alone is cut through, as subcutaneous vessels, nerves, and even the muscles may be divided, and mar, in consequence, subsequent dissection.

DISSECTION.—The position of the knife, in making an incision through the skin or any other membrane, should be vertical to the surface (Fig. 1, Plate

2); in this position, the knife should be steadied, by the little finger resting upon the surface, and driven by the index finger at its shank; it should be drawn, as thus held, from the initial point to the terminus of the incision, the point only of the knife cutting the tissue. In reflecting flaps of skin, or other membranes (fascia, etc.), they should be commenced (Fig. 2, Plate 2) by pinching up the initial flap with the forceps, and incising the subcutaneous tissue, so as to raise the skin alone; as soon as there is sufficient flap to enable it to be grasped, it should be held taut in the fingers (Fig. 3, Plate 2) at about two inches from its attached margin; the scalpel should be held lightly with its blade flat on the subcutaneous tissue, its cutting edge at a right angle to the skin; in this position the strokes should be made in long sweeps, never allowing the cutting edge to actually touch the skin. It is not a cutting that is effected, but a scratching with the edge of the knife, which parts the taut fibrous framework of the subcutaneous tissue, thus allowing the skin to be raised from the surface beneath. Never cut away a portion of reflected skin, as it is the best possible protective covering to dissected parts.

Subcutaneous Tissue.—The subcutaneous tissue is more or less loaded with fat, and has embedded in it vessels and nerves. In some regions it can be split into two layers, which may be designated as the *superficial and the deep layer of the subcutaneous tissue*. This nomenclature avoids the confusion, which arises, if the subcutaneous tissue is called superficial fascia, and its layers superficial and deep fascia, or superficial and deep layers of the superficial fascia.

Subcutaneous Veins.—The veins, found in the subcutaneous tissue, occupy a superficial plane, and are distinguished because of the dark color, imparted to them by blood clot within.

DISSECTION.—The subcutaneous veins should be raised free from the tissue in which they are embedded, so as to lie loosely thereon.

Subcutaneous Nerves.—The subcutaneous nerves lie in a plane beneath the veins, and, as a rule, contiguous to and parallel with them.

DISSECTION.—They may be found by scratching through the subcutaneous tissue, at a right angle to the course of the nerves (Fig. 4, Plate 2); thus the subcutaneous tissue is displaced and the resistant nerve-cord becomes apparent; once recognized, at a given point, the nerve may be raised with the forceps and stripped out from its bedding with the point of the scalpel (Fig. 5, Plate 2), or with scissors. Having recognized the subcutaneous veins and nerves, the subcutaneous tissue, as flap or otherwise, may be cut away from the area of the dissection region. The subcutaneous veins and nerves may be divided and reflected as may be directed.

Superficial Fascia, Fig. 1, Plate 3.—The superficial fascia of a region is a sheet of fibrous tissue, which covers the superficies of the muscles; it is continuous over the whole body, and here and there will be seen to form special thickenings, annular ligaments, etc., to subserve the office of bands of protection and inclusion, to bind down tendons, or insure firm packing of subjacent parts.

DISSECTION.—Incisions of fascia should be made (the same as skin incisions) parallel with the fibres of the subjacent muscles. Flaps of fascia should be reflected, the same as the skin, the strokes of the blade of the scalpel should be parallel with the muscle fibres (Fig. 6, Plate 2). In reflecting the fascia from off a group of muscles, it will be noted that, at each intermuscular space, a continuity of the fascia with fibrous tissue in the intermuscular space exists; it is therefore necessary to cut through this fibrous tissue septum, in order to expose the adjacent muscle. In certain regions, the subjacent muscles are attached to the under surface of the fascia; at these areas, no attempts should be made to raise the fascia, but the same may be left upon the muscle, by cutting the fascia at the circumference of the attached portion. *Reflections of fascia should not be cut away.*

Intermuscular Septa, Figs. 2 and 3, Plate 3.—The intermuscular septa are fibrous tissue walls, recognized above, in continuity with the deep surface of the superficial fascia. They occupy the interspaces between muscles, forming compartments (Fig. 2) for their lodgement, and completely isolating each from the other. In Fig. 3, the intermuscular septa are shown in a transverse section of a limb.

Muscles.—The voluntary muscles invest the bony framework, being attached to the bones, at both ends, so as to produce movements at their articulations, or as in the case of the muscles of the face—attached to bone at one end and the skin at the other—to produce the facial expressions. Structurally, a muscle consists of a framework of fibrous tissue, which is continuous between its attachments; the tendon and the aponeurosis (flat tendon of a broad muscle) are respectively the fibrous framework of the muscle continued by itself; the fleshy portion of the muscle has, in addition, the muscle structure, lodged in the interstices of the fibrous framework. Every muscle is supplied with arteries, veins, lymphatics, and nerves; the arteries and nerve or nerves are derived from contiguous trunks. The arterial and nerve supply should always be recognized, and the same traced to where they enter the muscle; their entrance will usually be found at the protected surfaces of the muscle.

Dissection.—In cleaning a muscle, never grasp it with the forceps, but let the tissue, to be removed from the muscle, be held off; the scalpel should be guided parallel with the muscle fibres (Fig. 6, Plate 2); the handle of the scalpel and the head of the forceps are excellent instruments to strip the sides of a muscle free from contiguous parts; but, in so doing, care must be taken not to break off nerves and vessels at their points of penetration into the muscle. In unpacking or separating muscles, lying in different planes or in contiguity in the same plane, they cannot be regarded as cleaned, until all their surfaces are freed of fibrous tissue.

Bursæ: Fig. 1, Plate 4; Plate 60.—A bursa is a fibrous-tissue bag, containing fluid, which is lodged upon a bony prominence, upon which skin or muscle plays; its object is to obviate undue irritation of the skin or muscle by pressure. The subcutaneous bursa over the patella (Plate 60), and the submuscular bursæ of the gluteus maximus and obturator internus (Fig. 1, Plate 4) are examples.

Dissection.—After recognition, a bursa may be cut away and its relations appreciated.

Sheaths of Tendons, Fig. 2, Plate 4.—Sheaths invest the long tendons of the limbs, for the isolation of the same, and the play of the tendons is facilitated by the sheaths being lined by serous membrane, which secretes synovia upon them to lubricate their surfaces. Examples of the synovial sheaths are well seen at the wrist and palm.

Dissection.—In the appreciation of the synovial sheaths of tendons, they should be opened at a given point and a probe inserted into them, along the tendon in both directions, to determine the extent of their investiture. After recognition, they should be stripped from the tendons with the curved scissors or scalpel.

Deep Fasciæ.—The deep fasciæ are specially thick septa or fasciæ, prolonged between the anatomical elements of a region, which form compartments for the grouping of muscles or the isolation of contiguous parts. They are also found lining the interior of cavities.

Dissection.—Their extent and points of attachment should be appreciated, after which, *if they interfere with subsequent dissection, they should be cut away.*

Arteries.—The arteries, when injected with substances such as plaster, wax, or rubber, are readily recognized, but when not so injected, they appear as flattened empty tubes. The smaller arteries are, as a rule, accompanied by two veins, called venæ comites, the larger ones by a single venous trunk.

DISSECTION.—The arterial trunks of a region should be first cleared of areolar tissue and sheath investitures; then their primary branches determined in the order of their size. All branches of distribution should be followed to the parts to which they distribute, and the anastomoses of branches should be recognized, where possible.

Veins.—The veins of the body are subcutaneous and comites. The subcutaneous veins are lodged, as their name indicates. The comites or deep veins accompany arteries; some of the deep veins are not comites. The venous channels (sinuses) within the cranium are not comites of arteries.

DISSECTION.—With a few exceptions, which will be noted, the subcutaneous veins do not require the dissector's attention; the venæ comites of the small arteries do not warrant preservation, as the recognition of the artery carries with it the appreciation of its companion veins; *the venæ comites of the small arteries may therefore be stripped away from them in the cleaning of the latter.* The large venous trunks run contiguous to the arteries, one to each, and their relations should be carefully noted; special directions will be given, when and how they are to be removed. *In dissecting arteries and veins the same rule holds as with muscles, viz.: that the vessels should not be raised by the forceps, but only the adventitious tissue and venæ comites (in the case of small arteries) are to be drawn away and cut from the surface of the vessel* (see the figure illustrating the cleaning of a muscle, Fig. 6, Plate 2), *the knife cutting parallel with the vessel, never across it.*

Nerves.—The nerve-trunks of a region will be found to run parallel with its vessels. If not immediately contiguous, they are not far removed. In appreciating a nerve it must be remembered that it is either motor, sensory, or mixed (containing both motor and sensory fibres). If a nerve is motor, its distribution will be to muscle only; if sensory only, it ends at an organ of special sense or the skin; if a mixed nerve, it will be found to have a deep distribution of its motor filaments to the muscles, and a superficial distribution of its sensory filaments to the skin. With the exception of a few nerves in the region of the head, which are either specially sensory or specially motor, the nerves of the body are mixed, having a deep muscle and a superficial skin distribution.

Dissection.—In exposing a nerve it should be first isolated for a short portion of its course, as with a subcutaneous nerve (see Fig. 4, Plate 2); then raise the nerve taut with the forceps (see Fig. 5, Plate 2), and with the sharp-pointed scalpel, held with its edge from you and cutting parallel with the nerve, strip out the nerve from the fibrous tissue, in which it is imbedded; as soon as enough of the nerve has been freed, it should be held in the fingers of the left hand and its stripping out continued. Observe the giving off of branches, those to the muscles, those communicating with contiguous nerves, and those to the skin, as the case may be. All the branches of a nerve should be traced to the parts, to which they distribute; the most delicate nerves, when once stripped out, will bear a great deal of handling, and the completeness of a dissection will more than reward the extra pains, taken to preserve them.

The dissector, in his general work, will be able to find, with but few exceptions, all the nerves shown in the plates. In a few of the plates, not original (Plate 33), the nerves were dissected out after the regional sections had been preserved, for a long time, in dilute nitric acid.

Lymphatic Glands.—Lymphatic glands are to be found in given situations in the body; when large they are evidence of a pathological condition, as in the perfect organism they may escape detection.

Dissection.—In the course of dissection it is sufficient to recognize the lymphatic glands as they may present, but it is needless to preserve them.

Lymphatic Vessels.—Lymphatic vessels are only recognized in special regions, viz.: the vicinity of the receptaculum chyli and along the left lymphatic or thoracic duct. They are, as a rule, so small elsewhere as to escape detection. Pictures illustrating them are drawn from specimens, where the lymphatic vessels have been injected by special methods necessary therefor.

Viscera.—The viscera of the body are certain organs, contained within the trunk and head; the directions for their dissection will be given in their proper places.

Dissection.—The anatomy of a viscus is complete in itself, therefore it may be removed from the body and kept in some preservative fluid—a solution of arsenite of soda or of chloride of zinc—for special dissection. Before removal of an organ from the body, its relations, the source of its arterial and nerve supply, the destination of its vein or veins, and its duct (if it has any) should be recognized, as far as practicable.

Ducts.—Ducts are the efferent canals from the secreting viscera, for the conveyance of the products of secretion; they are found only in the trunk and head regions of the body.

DISSECTION.—The relation of a duct, in situ, is to be first appreciated; then, its point of emergence from the viscus and its destination.

Mucous Membrane.—Mucous membrane lines all canals of the body with a surface outlet ; at these points the membrane will be found continuous with the skin.

Serous Membrane.—A serous membrane invests all opposed surfaces, which move upon each other, the exception being the cartilage surfaces of joints ; it covers all movable organs, and lines the interior of the cavities which contain them ; it lines the ligaments of the movable joints, and forms the sheaths of tendons. It secretes a lubricating fluid to facilitate friction and prevent irritating effects therefrom.

DISSECTION.—Mucous and serous membranes should be dissected from subjacent tissue ; a submucous and a subserous plane of areolar tissue may sometimes be demonstrated.

Bones.—The bones, which form the framework of a given dissection, should be considered, with reference: *first*, to the relations of their surfaces to the anatomical elements of the region ; *second*, to the areas of attachment of muscles. The regional dissections have been planned so as to include all the attachments of a given muscle, thereby facilitating the appreciation of its function.

DISSECTION.—After a dissection has been completed, the muscles should be cut from the bones, one by one, noting the areas of their attachments. In so doing, not only the situation of a given muscle attachment is to be seen, but also its relations to contiguous areas of other muscle attachments.

Joints.—The joints of the body are the points where bone surfaces are in contiguity ; they are complex in their construction, including: *bones*, *ligaments*, *cartilage*, *synovial* (serous) *membrane*, and *fibro-cartilage*. Joints are movable, partially movable, and immovable: a *movable joint* (elbow-joint), is constructed of bones covered with articular cartilage, and joined by ligaments lined by synovial membrane; if the joint is exposed to concussions (knee-joint), protection is afforded, from bone injury by the presence of movable plates of fibro-cartilage (interarticular), between the cartilage-covered articular surfaces of the bones. In other joints (hip-joint) the articular cavities are deepened by the rimming of their borders with immovable fibro-cartilage (circumferential). In the articulation of bones, which form partially movable joints (the vertebræ), cartilage and synovial membrane are wanting, and plates of immovable, fibro-cartilage (interosseous) are fixed between the articular surfaces (intervertebral discs); these latter points of bone articulation allow a slight motion of their surfaces upon each other. In the *immovable joints* (cranial and upper-jaw regions of the head) the articular surfaces of the bones are held in apposition: for the cranium, by the continuity of the exterior periosteum and the interior dura mater; for the upper-jaw region, by the continuity of the periosteum; ultimately, in both regions, the articulations between the bones are obliterated by the development of osseous tissue.

DISSECTION.—In the dissection of joints it is absolutely necessary that they should be moist and pliable; to keep them so, they should be kept covered by refuse tissue, with wrappings of wet muslin, and outside dry muslin or oil-silk. If they have dried from neglect, they should be soaked in water till the ligaments are again pliable. The cleaning of the surface of ligaments may be effected with curved scissors and subsequent scraping with a scalpel.

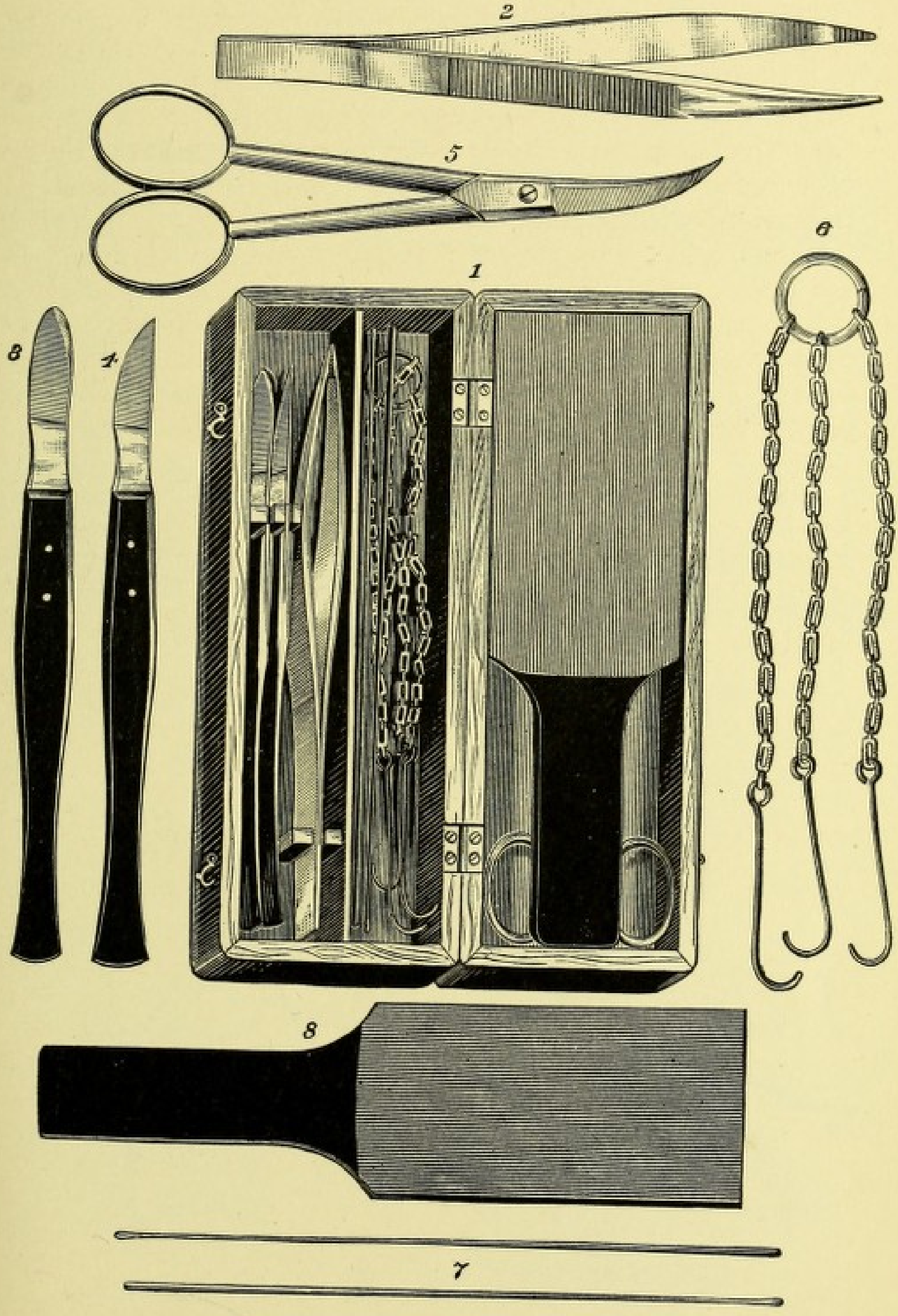

2
5
6
1
8
4
8
7

PLATE 2

FIG. 1

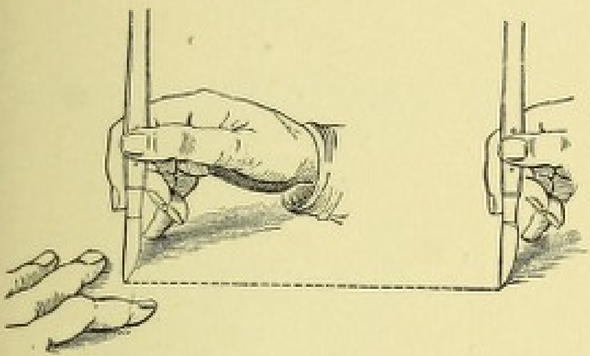


FIG. 2

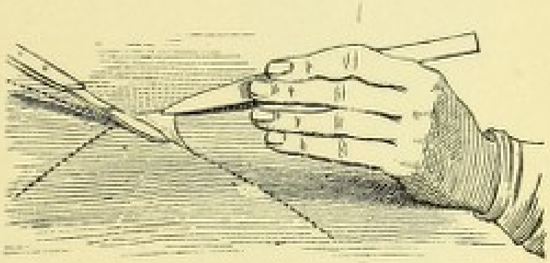


FIG. 3

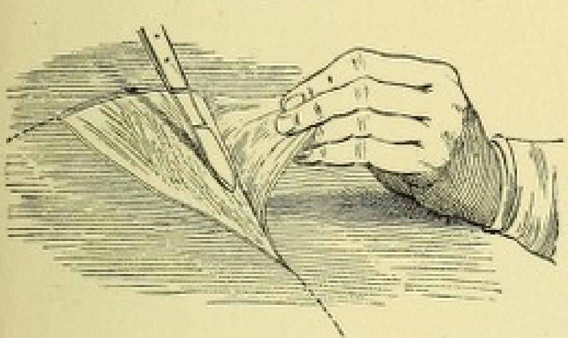


FIG. 4

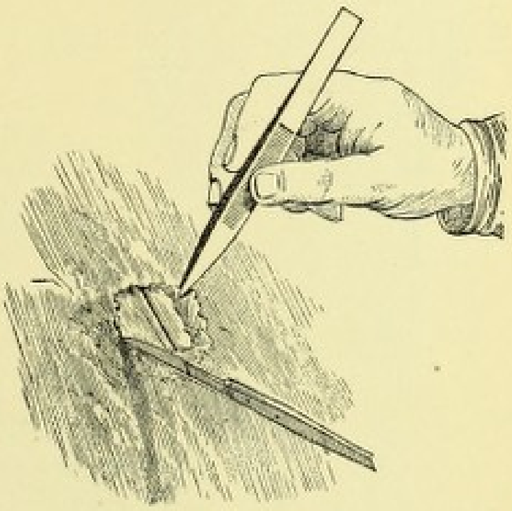


FIG. 6

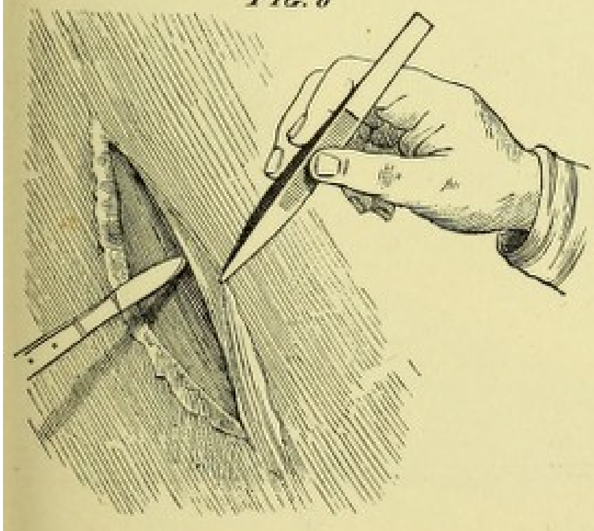
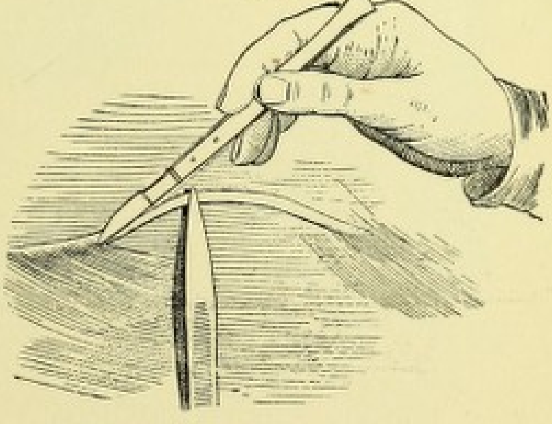


FIG. 5



M. Cohn, ad naturam del.

FIG. 2

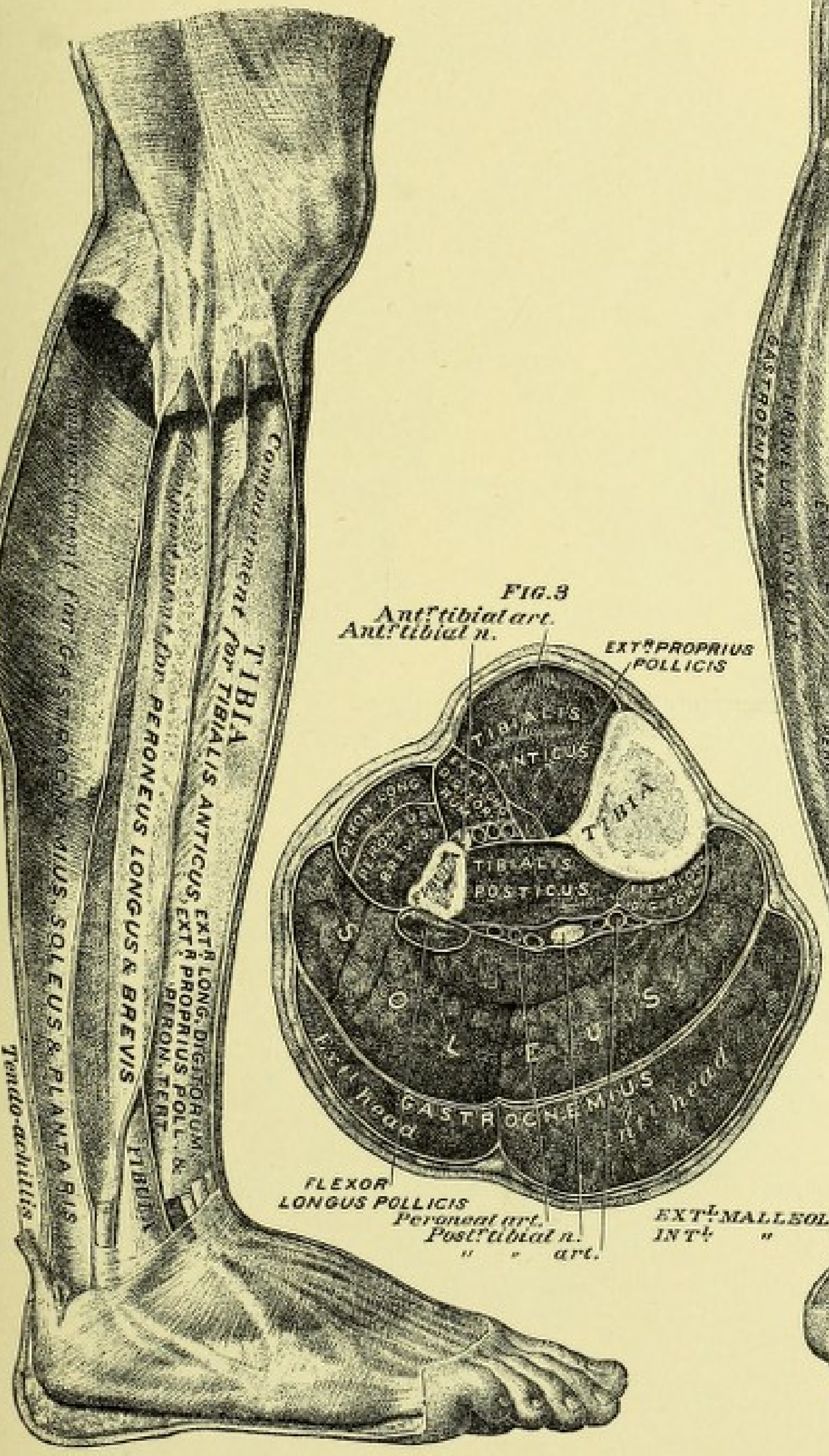

TIBIA
Compartment for TIBIALIS ANTICUS
EXTR LONG. DIGITORUM
EXTR PROPRIUS POLL. &
PERON. TERT.
Compartment for PERONEUS LONGUS & BREVIS
Compartment for GASTROCNEMIUS, SOLEUS & PLANTARIS
Tendo-achillis
FIBULA
FIG. 3
Antr tibial art.
Antr tibial n.
EXTR PROPRIUS POLLICIS
TIBIALIS ANTICUS
TIBIA
TIBIALIS POSTICUS
SOLEUS
GASTROCNEMIUS
Extl head
Intl head
FLEXOR LONGUS POLLICIS
Peroneal art.
Postr tibial n.
" " art.

FIG. 1

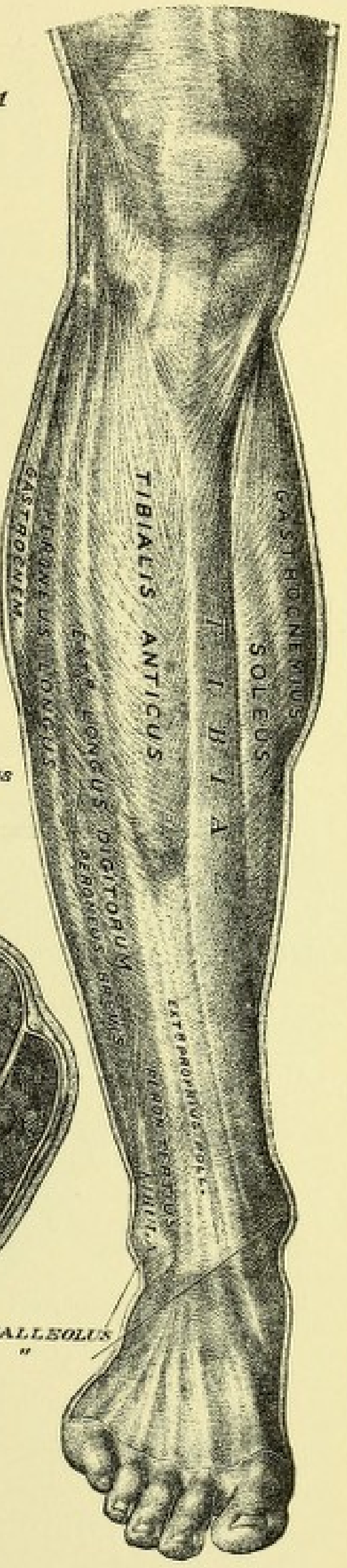

TIBIALIS ANTICUS
TIBIA
GASTROCNEMIUS
SOLEUS
GASTROCNEM.
EXTR PROPRIUS POLL.
EXTL MALLEOLUS
INTL "

FIG. 1

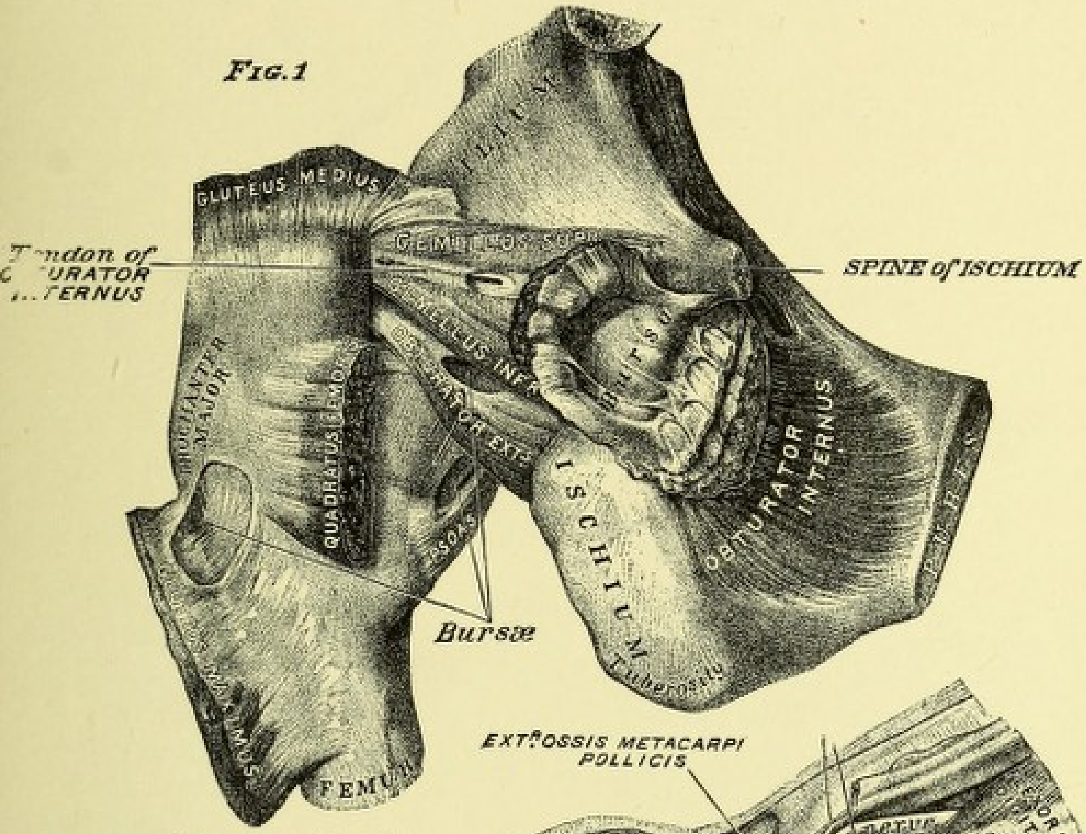
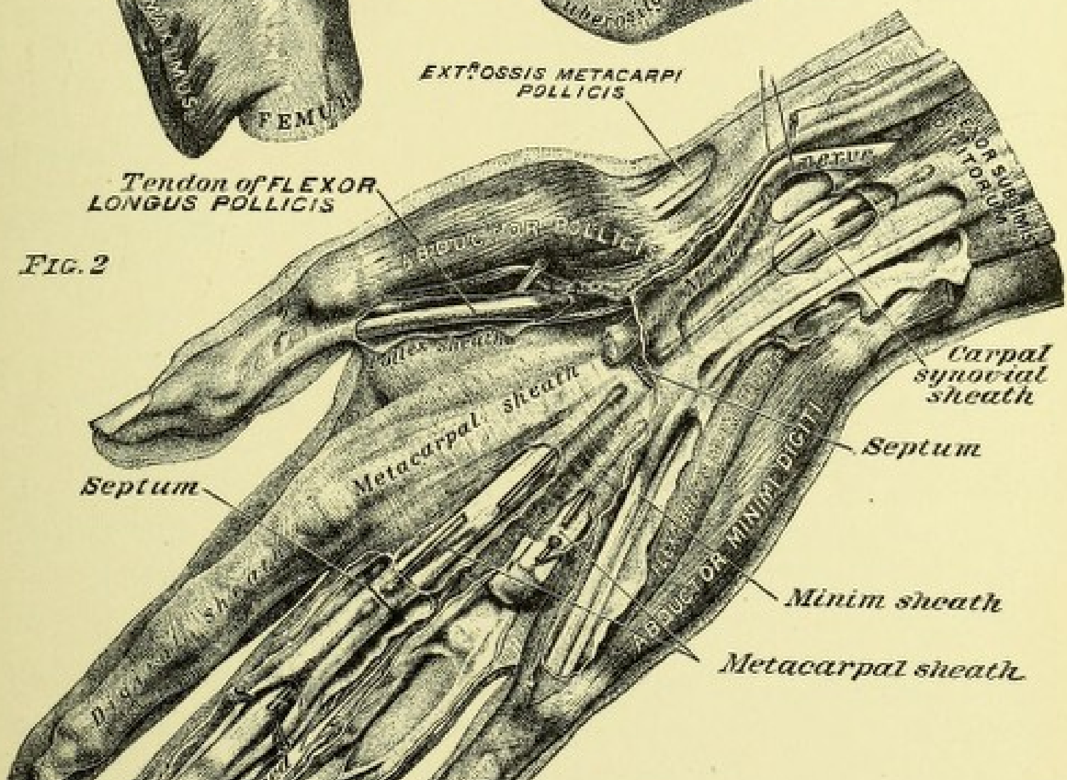

GLUTEUS MEDIUS
GEMELLUS SUPR
SPINE of ISCHIUM
GEMELLUS INFR
OBTURATOR EXTS
QUADRATUS FEMORIS
TROCHANTER MAJOR
PSOAS
OBTURATOR INTERNUS
ISCHIUM
Tuberositas
Bursæ
FEMUR

FIG. 2


EXTR OSSIS METACARPI POLLICIS
Tendon of FLEXOR LONGUS POLLICIS
ABDUCTOR POLLICIS
Pollex sheath
Metacarpal sheath
Carpal synovial sheath
Septum
Septum
ABDUCTOR MINIMI DIGITI
Minim sheath
Metacarpal sheath
Digital sheaths opened

TRUNK.

FIRST DISSECTION.

MALE PERINEUM.

Position of Body for Dissection.—Bring the subject to the end of the table, with the lower extremities hanging over; place a block under the pelvis and a second under the shoulders; flex the thighs upon the abdomen and the legs upon the thighs; pass a rope under the table and over the separated limbs, taking a turn around one or both; make the rope taut and tie it (Figure 1, page 14). Pass a steel sound into the bladder and tie the penis and scrotum to it.

Surface Appearances.—The following points are recognized by palpation: posteriorly, the coccyx on the median line; laterally, the tuberosities of the ischia, and extending anteriorly therefrom the rami of the pubic arch; posteriorly to the bis-ischiatic line the anus is located; in the urethral region, on the median line, is a swell formed by the corpus spongiosum of the penis; the exterior of the os pubis lodges the corresponding crus of the corpus cavernosum; from the area of the anterior surfaces of the ossa pubis are suspended the scrotum and the penis.

Terms of Relation.—The general terms (page 2); and the special terms *exterior* and *interior*—relatively to the skin surface and the pelvic cavity, respectively—will be used.

Perineum and its Boundaries, Plate 5.—The perineum includes all the soft parts, which close the inferior outlet of the pelvis or the space bounded by the bones of the pubic arch and the coccyx, and the following ligaments: the inferior pubic, anteriorly, and the right and left great sacro-sciatic, posteriorly and laterally.

Regions of the Perineum.—The perineum is divided by a transverse line, the bis-ischiatic, into a posterior and an anterior region; in the male they are called *rectal* and *urethral;* in the female *rectal* and *urethro-vaginal.* The rectal region is bounded by the bis-ischiatic line, anteriorly; the tuberosities of the ischia, the great sacro-sciatic ligaments and the coccyx, laterally and posteriorly. The *urethral* (male) or

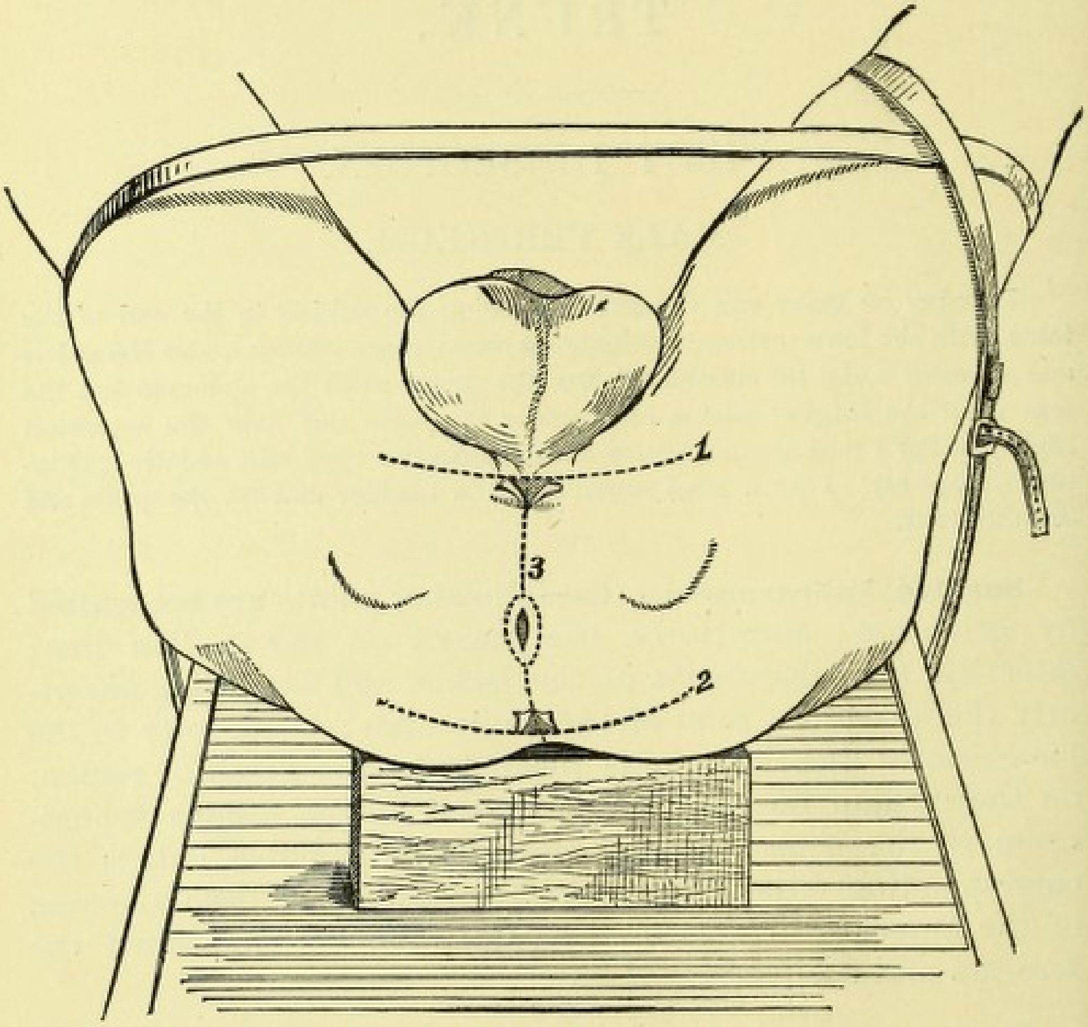


FIGURE 1.

urethro-vaginal (female) region has the bis-ischiatic line, posteriorly; the rami of the pubic arch—the ascending rami of the ischia and the descending rami and bodies of the ossa pubis—and the inferior pubic ligament, laterally and anteriorly.

Bones and Bone Areas.—The bones are: the coccyx and the pubic arch—parts of the os pubis and ischium of the right and the left os innominatum. To the internal surface and free borders of a ramus of the pubic arch will be found three lines of fascial attachment, which determine three planes of muscle attachments. The lines are: to the exterior surface and free border, the perineal fascia; to the interior free border and surface, the levator fascia (posterior layer of triangular ligament); to about the middle of the intervening surface between the borders, the triangular ligament (anterior layer). Between the perineal fascia and triangular ligament lines the crus penis or clitoridis and the ischio-cavernosus and superficial transversus perinæi muscles are attached. Between the triangular ligament and levator fascia lines are found the attachments of the deep transversus perinæi and constrictor urethræ muscles. In a plane interior to that of the levator fascia, and interior to the pubic ramus, the levator ani et prostatæ (male) or the levator ani et vaginæ (female) muscle presents. The osseous attachments of the compound levator muscle are to the interior surface of the body of the os pubis, anteriorly; the spine of the ischium, laterally; and the border of the coccyx near its apex, posteriorly. The coccygeus muscle is attached to the spine of the ischium and to the interior of the coccyx. The tip of the coccyx and its exterior surface afford attachment, respectively, to the sphincter ani and gluteus maximus muscles.

DISSECTION.—Make the skin incisions marked 1, 2, and 3, Fig. 1, and reflect flaps, laterally, beyond the tuberosities of the ischia, in which positions they may be fixed by thumb-pins.

1. Subcutaneous Tissue, Plate 6.—A plane of thick subcutaneous tissue, containing more or less fat, underlies the skin: it is continuous with that on the thighs and buttocks.

DISSECTION.—Clean the surface of the sphincter ani muscle, exposing its entire contour.

2. Sphincter Ani Muscle.—This muscle is in the subcutaneous plane surrounding the anus. It forms an oval muscle mass attached posteriorly to the tip of the coccyx; as it passes anteriorly it expands, by the divergence of its fibres, to surround the anus; it converges again in front of the anus, and terminates at the tendinous centre of the perineum.

DISSECTION.—Incise the subcutaneous tissue on the median line, anterior to the anterior attachment of the sphincter ani muscle, down to a layer of fascia, the perineal; then diverge incisions along the external borders of the muscle to the coccyx. Reflect flaps of subcutaneous tissue, similar to those of the skin; seek a subcutaneous nerve on the fascia lata, external to the ramus of the pubic arch.

3. **Inferior Pudendal Nerve.**—This nerve is a branch of the lesser sciatic, that becomes subcutaneous by piercing the fascia lata, external to the tuberosity of the ischium; it continues anteriorly, external to the urethral region, to distribute to the skin of the external and posterior surfaces of the scrotum. A branch perforates the perineal fascia to communicate with the anterior superficial perineal nerve.

Dissection.—Dig out the fat external to the anterior half of the sphincter ani muscle (by scratching through it with the point of the closed curved scissors and picking out the detached portions with the forceps), so as to determine the posterior edge of the perineal fascia.

4. **Perineal Fascia.**—This fascia constitutes the third plane of the urethral region. It is continued anteriorly from its base line, the bis-ischiatic fascial junction, over the subpubic portion of the penis, and is attached laterally to the exterior surface and free border of the ramus of the pubic arch. Beyond the urethral region it is continued into the dartos tunic of the scrotum. In the dissection of the inguinal region, the scrotum and the penis, we shall find this plane of fascia continued, superiorly, from the scrotum (dartos tunic), as the deep layer of the subcutaneous tissue of the groin and also as a dartos sheath of the penis.

Dissection.—Dig out the remaining fat from the ischio-rectal fossa. All strokes, whether of scratching or cutting, should be made at a right angle to the median line, as vessels and nerves, which cross the fossa from its ischial to its rectal wall, would otherwise be severed. Expose the inferior edge of the gluteus maximus muscle. In clearing the fat from the anterior portion of the levator fascia, be careful not to cut through it, but scrape the fat from it so as to preserve its attachment to the bis-ischiatic fascial junction.

5. **Gluteus Maximus Muscle,** Plate 7.—The inferior edge of this muscle passes from the side of the coccyx, across to and over the exterior surface of the tuberosity of the ischium. Over the muscle edge vessels and nerves (small sciatic branches and the fourth sacral nerve) curve to its exterior surface, for subcutaneous distribution.

6. **Ischio-Rectal Fossa.**—The fossa is located between the

ischium, externally, and the rectum, internally. Its actual walls are, externally, the inferior portion of the obturator fascia, covering the interior of the obturator internus muscle; internally, the levator ani portion of the levator fascia, covering the exterior of the levator ani portion of the levator ani et prostatæ muscle. Its superficial limits are, posteriorly, the inferior border of the gluteus maximus muscle; anteriorly, the base of the perineal fascia. Its shape is that of a wedge with its base at the skin, its sloping sides at the obturator and the levator fascia, respectively, while the junction of the two fasciæ forms the apex of the wedge and the bottom of the fossa.

7. Inferior Hemorrhoidal Artery, Plate 7.—This artery (vena comes), sometimes two, springs from the internal pudic artery in the external wall of the fossa; it bridges the fossa and breaks up into branches, which distribute to the levator and sphincter ani muscles and the skin about the anus.

8. Inferior Hemorrhoidal Nerve.—This nerve, sometimes two, arises from that portion of the pudic nerve which is located in the external wall of the fossa; it crosses the fossa and distributes to the sphincter ani muscle and the skin of the rectal region.

9. Obturator Fascia.—The inferior portion of this fascia forms the external wall of the ischio-rectal fossa, lining the interior surface of the obturator internus muscle, which, in turn, lies upon the interior of the ischium.

10. Levator Fascia.—The levator ani portion of this plane of fascia (*anal fascia* of authors) covers the exterior of the levator ani portion of the levator ani et prostatæ muscle, at the internal wall of the ischio-rectal fossa. This fascia is given off from the interior surface of the obturator fascia, which lines the ischio-pubic portion of the pelvic wall. It is attached anteriorly at the bis-ischiatic fascial junction, at the base of the triangular ligament.

DISSECTION.—Introduce the finger upon the obturator fascia, and distinguish beneath the same, on the obturator internus muscle, the pudic vessels and nerve as they pass anteriorly to the urethral region of the perineum. Follow the hemorrhoidal artery or nerve to the external wall of the fossa and incise the obturator fascia so as to expose the pudic vessels and nerve.

11. Pudic Nerve.—This nerve lies exteriorly to the artery, giving off the inferior hemorrhoidal nerve as described above. Posteriorly to the tuberosity of the ischium it gives off the posterior superficial and anterior perineal nerves, which pierce the perineal fascia, anteriorly to its base line of junction with the triangular ligament, that they may distribute, beneath the fascia, in and beyond the urethral region. The trunk of the nerve continues, anteriorly, interiorly to the triangular ligament.

12. Pudic Artery.—This artery (vena comes), having re-entered the pelvic cavity from the exterior of the spine of the ischium, runs in the external wall of the ischio-rectal fossa, where it lies interiorly to the pudic nerve, and passes, anteriorly, into the urethral region, interiorly to the triangular ligament. In its transit in the wall of the fossa, it gives off the inferior hemorrhoidal artery ; posteriorly or at times internally to the tuberosity of the ischium, it bifurcates into the superficial and the deep perineal arteries.

DISSECTION.—Section the perineal fascia (Plate 6), and reflect flaps of the fascia (Plate 7). Determine the superficial vessels, nerves, and muscles, interiorly to the perineal fascia.

13. Bisischiatic Fascial Junction, Plate 7, and Fig. 3, Plate 8.—This is located along the posterior border of the superficial transversus perinæi muscle. It is formed by the junction of the base of the perineal fascia, and the levator fascia, with the base of the triangular ligament.

14. Superficial Perineal Artery, Plate 7.—This artery (vena comes), a branch of bifurcation of the pudic, enters the urethral region of the perineum at its posterior external angle, sometimes posteriorly to the base of the triangular ligament, perforating the perineal fascia, at others interiorly to the triangular ligament, perforating it and the perineal fascia. It passes anteriorly, giving off the transverse perineal artery and muscle branches ; it also distributes to the scrotum.

15. Superficial Perineal Nerves.—The posterior superficial and the anterior superficial perineal nerves are branches of the pudic nerve ; they enter the ischio-rectal fossa and reach their plane of distribution by perforating the perineal fascia close to its base line. They supply the skin of the urethral region and scrotum. The posterior perineal nerve gives off branches for muscle distribution, and to supply the bulb of the corpus spongiosum.

16. Superficial Transversus Perinæi Muscle.—This muscle extends from the internal surface of the tuberosity of the ischium to the tendinous centre of the perineum.

17. Accelerator Urinæ Muscle.—This muscle is attached to the tendinous centre of the perineum and to a fibrous raphé on the median line. From this raphé its fibres pass externally and anteriorly, moulding themselves upon the half of the corpus spongiosum of the penis. Externally, it is attached to the exterior surface of the triangular ligament; anteriorly, its fibres pass, over the side of the corpus cavernosum of the penis, for attachment on the dorsum of the same.

18. Tendinous Centre of the Perineum, Plate 7, and Fig. 3, Plate 8.—This is a fibrous tissue centre, determined by the convergence of muscles and fasciæ, viz.: the sphincter ani, the superficial and deep transversi perinæi, the acceleratores urinæ and the levatores ani et prostatæ muscles; the right and left perineal fasciæ, the triangular ligament, and the right and left levatores fasciæ.

19. Ischio-Cavernosus Muscle (Erector penis), Plate 7.—This muscle is attached to the internal surface of the tuberosity of the ischium and to the crus of the corpus cavernosum of the penis.

DISSECTION.—Section the superficial perineal artery and nerves, and the inferior pudendal nerve (Plate 7), and reflect them anteriorly upon the scrotum. Section the ischio-cavernosi, superficial transversi perinæi, and acceleratores urinæ muscles (Plate 7), and reflect the portions of each. The tendinous centre of the perineum is not to be cut away.

20. Corpus Spongiosum of the Penis, Plate 8.—The subpubic portion of the corpus spongiosum of the penis occupies the median line of the urethral region. Its posterior portion, which expands into what is called the *bulb*, lies exterior to the triangular ligament and is invested by the acceleratores urinæ muscles; its anterior portion, or *body*, continues inferior to the corpora cavernosa; it forms the inferior longitudinal cylinder of the penis, and expands into the glans penis.

21. Crus of the Penis, Plate 7, and Fig. 3, Plate 8.—This is attached to the free surface of the pubic arch; it extends anteriorly, and internally, upon the exterior of the descending ramus and body of the os pubis. At the median line, exterior to the symphysis pubis, the right and left crus unite to form the corpora cavernosa of the penis, which are the superior longitudinal cylinders of that organ.

Dissection.—Hook the bulb of the corpus spongiosum internally and clear the surface of the triangular ligament, respecting vessels and nerves, which perforate the same.

22. Triangular Ligament, Fig. 1, Plate 8.—This ligament is a triangular sheet of dense fibrous tissue, attached to the rami of the pubic arch (see Bone Areas, p. 14). It occupies a plane interior to the muscles, described above, the corpus spongiosum and the crura of the penis. Its base has an attachment to the tendinous centre of the perineum, and with the perineal and levator fasciæ forms the bis-ischiatic fascial junction. It is pierced, near its base, externally, at times, by the superficial perineal artery, internally, by the artery of the bulb; toward its apex, by the deep perineal artery or its terminal branches; and by the dorsalis penis nerve and vein.

Dissection.—Cut one of the crura, from its attachment to the pubic arch, and hook it internally across the corpus spongiosum, then clear the vessels and nerve, that come through the triangular ligament.

23. Artery to the Corpus Cavernosum, Figs. 1 and 2, Plate 8.—This artery (vena comes) is the largest branch of bifurcation of the deep perineal; it divides into branches, which enter the deep surface of the crus of the corpus cavernosum.

24. Deep Dorsalis Penis Artery.—This artery is the smaller branch of bifurcation of the deep perineal; it passes, anteriorly, between the crus of the corpus cavernosum and the body of the os pubis.

25. Deep Dorsalis Penis Nerve.—This nerve is a continuation of the deep perineal nerve, exterior to the triangular ligament; it accompanies the artery of the same name.

26. Deep Dorsal Vein of the Penis.—The lateral surface of this vein presents, running internal to, and parallel with, the dorsal artery and nerve, upon the exterior of the body of the os pubis.

Dissection.—Section the triangular ligament (Fig. 1, Plate 8), and reflect its portions; laterally, to the pubic arch; posteriorly, so as to retain its continuity with the bis-ischiatic fascial junction; this will display the deep perineal vessels, and a portion of the deep perineal nerve. These elements will be found to lie upon the exterior surface of the deep transversus perinæi and the constrictor urethræ muscles.

27. Deep Perineal Artery, Fig. 2, Plate 8.—This artery (vena comes) is one of the branches of bifurcation of the pudic; it runs parallel with, and internal to, the pubic arch, in a plane interior to the triangular ligament; it bifurcates into the artery of the crus and the dorsalis penis artery, as described above.

28. Artery of the Bulb.—This artery (vena comes) is a branch of the deep perineal, which passes internally and anteriorly, to perforate the triangular ligament and distribute to the corpus spongiosum. As it enters the part it bifurcates into a posterior branch to the bulb and an anterior branch to the body.

29. Artery to Cowper's Gland.—In its course the artery of the bulb gives off a branch, which passes, internally and posteriorly, to a point posterior to the bulb of the corpus spongiosum, where it pierces the deep transversus perinæi muscle to distribute to the gland, which lies interior to the muscle.

30. Deep Perineal Nerve.—This nerve lies between the deep perineal artery and the ramus of the pubic arch; it runs for a portion of its course interior to the pubic arch attachments of the deep transversus perinæi and constrictor urethræ muscles; it is the branch of the pudic nerve, which continues the trunk into the urethral region; piercing the triangular ligament, it becomes the dorsalis penis nerve, as described above.

Dissection.—Section the deep perineal artery (Fig. 2, Plate 8), and reflect it and its branches internally across the corpus spongiosum; clear the surface of the muscles upon which the artery lies.

31. Deep Transversus Perinæi Muscle.—This muscle consists of transverse fibres, which run, parallel with and anterior to the base of the triangular ligament, from the tuberosity of the ischium, externally, to the tendinous centre of the perineum, internally.

32. Constrictor Urethræ Muscle.—This muscle is formed of transverse fibres, which are attached, externally, to the free surface of the pubic arch, anterior to the attachment of the preceding muscle ; internally, at the median line, they meet at a, more or less well marked, raphé, the fibres of the muscle of the opposite side, and surround the membranous portion of the urethral canal.

DISSECTION.—Unhook the crus and the corpus spongiosum ; restore the crus to its normal position ; hook the bulb of the corpus spongiosum a little anteriorly ; expose Cowper's glands, by dissecting off the fibres of the deep transversus perinæi muscles, as they converge to the tendinous centre of the perineum.

33. Cowper's Glands, Fig. 3, Plate 8.—These are two bodies, located in the urethral region of the perineum, interiorly to the fibres of the deep transversi perinæi muscles ; their ducts run, superiorly, parallel with, and exteriorly to, the wall of the urethra, to open at the floor of the bulbous section of the spongy portion of the urethral canal (page 2 ; Fig. 2, Plate 55).

DISSECTION.—Section the gluteus maximus muscle (Plate 7) and reflect the flap inferiorly. Section the constrictores urethræ and deep transversi perinæi muscles, antero-posteriorly, and reflect the portions, laterally ; the pubic arch attachment may be cut away. In removing this plane of muscle be careful not to injure a subjacent plane of fascia.

34. Great Sacro-Sciatic Ligament, Fig. 3, Plate 8, and Plate 9.—The inferior edge and a portion of the exterior surface of this ligament are brought into view ; the ligament extends from the border of the coccyx to the tuberosity of the ischium, in a plane interior to the gluteus maximus muscle.

35. Fourth Sacral Nerve.—This nerve perforates the great sacro-sciatic ligament, to wind over the inferior border of the gluteus maximus muscle, near the coccyx, for distribution to the skin of the coccygeal region.

36. Levator Fascia (anal fascia and posterior layer of the triangular ligament), Fig. 3, Plate 8.—This fascia, already partially shown in Plate 7, now presents as a plane of fascia common to both the rectal and urethral regions of the perineum.

It will be recognized as including, in one continuous fascia, the so-called *anal fascia* of the rectal region and the so-called *posterior layer of triangular ligament* of the urethral region. As the fascia covering the obturator muscle is called *obturator fascia*, this plane of fibrous tissue may be called *levator fascia* as it invests the exterior surface of the levator ani et prostatæ muscle. The levator fascia, externally, is given off as an *internal process from the obturator fascia*, inferior to the obturator fascia attachment of the levator ani et prostatæ muscle. It is thus given off inferior to "the white line" or the splitting of the pelvic fascia—from the interior of the body of the os pubis, anteriorly, to the spine of the ischium, posteriorly—into the obturator and recto-vesical fasciæ. From its external attachment it spreads to the median line, exterior to the levator ani et prostatæ muscle.

In the rectal region, the *levator ani portion* of this plane of fascia (*anal fascia*) forms the internal wall of the ischio-rectal fossa; it passes from its attachment to the obturator fascia and the spine of the ischium, externally; to the median line anterior to the anus—it is here attached to the tendinous centre of the perineum—to the wall of the rectum, to the median line between the anus and the coccyx, and to the coccyx, internally. Its posterior limit is at the inferior edge of the coccygeus muscle.

Continued from the obturator fascia on the interior of the pubic arch, the *levator prostatæ portion* of the levator fascia (*posterior layer of triangular ligament*) occupies the urethral region of the perineum; externally, it lines the interior surface, and springs from the interior lip of the internal free border, of the ramus of the pubic arch; internally, it reaches the median line, where it meets its fellow of the opposite side, and the two surround and give transit to the prostatic end of the membranous urethra. At its median line limit it attaches itself to the portion of the recto-vesical fascia which forms the prostatic capsule; and to the tendinous centre of the perineum. *At the bis-ischiatic fascial junction the levator fascia is attached, which attachment divides it into its levator ani and levator prostatæ portions.*

37. Membranous Portion of the Urethra, Plates 10, 11, and 12.—This portion of the urethral canal is located in the interval between the bulb of the corpus spongiosum, exteriorly, and the anterior extremity or apex of the prostate, interiorly; it is included between two planes of fascia, the triangular ligament (anterior layer), exteriorly, and the levator prostatæ portion of the levator fascia (posterior layer of triangular ligament), interiorly; it is surrounded by muscle tissue, contributed by the junction of the right and left constrictor urethræ muscles.

Dissection.—Dissect the levator fascia from the exterior surface of the levator ani et prostatæ muscle, leaving a rim of the fascia at the circumference of the pelvic outlet (Plate 9); distinguish the two portions of the muscle, and the convergence of the muscles, the right and the left, at their median-line raphe, posteriorly and anteriorly to the anus.

38. Levator Ani et Prostatæ Muscles, Plates 9, 45, and 46.—These muscles, the right and the left, close the outlet of the bony pelvis. A muscle, of a side, is attached, antero-posteriorly, as follows: externally, to the interior surface of an os pubis (levator prostatæ), to the open angle of the splitting of the pelvic fascia (into the recto-vesical and the obturator fasciæ), and to the spine of the ischium (levator ani); internally, to a median line raphe and to the tendinous centre of the perineum (levator prostatæ), to the wall of the rectum (levator ani), and to the coccyx. The *prostatæ* portions of the muscles present a subpubic interspace, which gives transit to the urethra, and then join to form a sling for the prostate. Their *ani* portions are separated for the outlet of the rectum, the *anus*.

The *levator ani portion of the muscle* plane occupies the rectal region of the perineum; externally, it is attached, antero-posteriorly, to the inferior open angle—the "white line"— of splitting of the pelvic fascia—from the interior of the body of the os pubis to the spine of the ischium—and to the spine of the ischium; internally, its fibres are attached, antero-posteriorly, to the tendinous centre of the perineum, to the wall of the rectum, to a median line raphé from the anus to the coccyx, and to the coccyx itself.

The *levator prostatæ part of the muscle* plane is formed by its anterior portion. It is attached, anteriorly, to the interior of the body of the os pubis, from which the fibres pass, posteriorly, parallel with the median line, to a point opposite the interval between the urethra and the anus; the fibres then curve to a median line raphé, which in turn is attached to the tendinous centre of the perineum. This median line junction of the right and left muscle is located inferior to the prostate, thus slinging it and elevating it when in action.

39. Coccygeus Muscle, Fig. 3, Plate 8, and Plates 9 and 10.—Only a limited portion of the inferior border of this muscle is brought into view, bridging between the spine of the ischium, externally, and the coccyx, internally. It lies in a plane interior to the sacro-sciatic ligament, and is met, anteriorly by the posterior border, of the levator ani portion, of the levator ani et prostatæ muscle.

DISSECTION.—The relations of the pelvic viscera, at the outlet of the pelvis, may now be determined, by sectioning the levatores ani et prostatæ muscles (Plate 9). Remove the internal portions of the opposite muscles, leaving a fringe of muscle (Plates 10 and 11), projecting external to the sphincter ani muscle (thus left, its attachment to the rectum can be appreciated, when the latter is specially dissected).

40. Recto-Vesical Fascia, Plates 10 and 46.—This fascia is situated interiorly to the levator ani et prostatæ muscle. It is given off as an internal process from the pelvic fascia at "the white line" or antero-posterior splitting of the pelvic fascia into recto-vesical and obturator fasciæ ; it covers the exterior surfaces of the rectum and bladder, forming a sling for their support at the outlet of the pelvis ; it forms the lateral and anterior true ligaments of the bladder, and surrounds the rectum inferior to the pelvic portion of the peritoneum.

DISSECTION.—To expose the portions of the viscera at the outlet of the pelvis, located exterior to the peritoneum, place a hook in the bulb of the corpus spongiosum and pull the prostate and bladder anteriorly ; dissect the rectum from the recto-vesical fascia septum and reflect it, posteriorly, until the entire contour of the prostate is exposed.

41. Recto-Vesical Fascia Septum, Plate 11.—The recto-vesical fascia projects a septum between the rectum, posteriorly and inferiorly, and the prostate, bladder, etc., anteriorly and superiorly.

DISSECTION.—Drag the prostate and bladder still more anteriorly, pull the rectum further out of the pelvic cavity, by dissecting it from the base of the bladder and reflecting it posteriorly. Dissect off the vesical layer of the recto-vesical fascia from the prostate (to which it will be found intimately adherent, as a fibrous capsule) ; reflect the fascia as a flap, posteriorly, from the prostate and the base of the bladder, upon the rectum, exposing the vasa deferentia, the vesiculæ seminales, and a venous plexus external to the latter.

At the base line of the vesiculæ seminales, recognize a thin fibrous tissue, peritoneum, bridging from the bladder to the rectum. In reflecting the flap of fascia, it will be found but loosely adherent to the base of the bladder; at the line of the vas deferens, the fascia splits to include this duct and the vesicula seminalis; external to the vesicula the fascia again becomes single, investing the venous plexus and bladder. Its investiture of both bladder and rectum stops at the peritoneal cul-de-sac.

42. Prostate, Plate 12.—The inferior convex surface of this organ presents—having the shape of a heart on a playing-card—its apex anteriorly; its base, posteriorly, with a cleft in it, for entrance of the ejaculatory ducts.

43. Peritoneal Recto-Vesical Cul-de-sac.—At the superior limit of the exposed portions of the rectum and bladder, the peritoneum will be seen to be reflected from one to the other, forming the bottom of a pouch of peritoneum, located between the two organs.

44. Trigone.—This name is given to a triangular area on the exterior surface of the base of the bladder—bounded by the peritoneal cul-de-sac at its base, the vasa deferentia laterally, and the cleft in the base of the prostate at its apex—because it is opposite the trigone area of the interior of the organ. Giving the same name to the two surfaces facilitates the appreciation of their relations.

45. Vasa Deferentia.—These ducts form the lateral limits of the exterior trigone area; they pass from the apices of the base line of the trigone, to the cleft in the base of the prostate. As they enter the prostate they receive the ducts of the vesiculæ seminales; the joining of the two ducts, on either side, form the two ejaculatory ducts.

46. Vesiculæ Seminales.—These organs lie external to, and parallel with, the vasa deferentia; they are club shape, with their clubbed ends, posteriorly, at the base line of the trigone; they converge, anteriorly, to the cleft in the base of the prostate, where, as seen above, they present ducts, which join the vasa deferentia.

47. Venous Plexus.—A plexus of veins presents, on either side, external to, and parallel with, the prostate and vesiculæ seminales; they are united by a transverse vein or veins along the base of the prostate, and they receive the dorsal veins of the penis. They are situated between the recto-vesical fascial septum and the bladder.

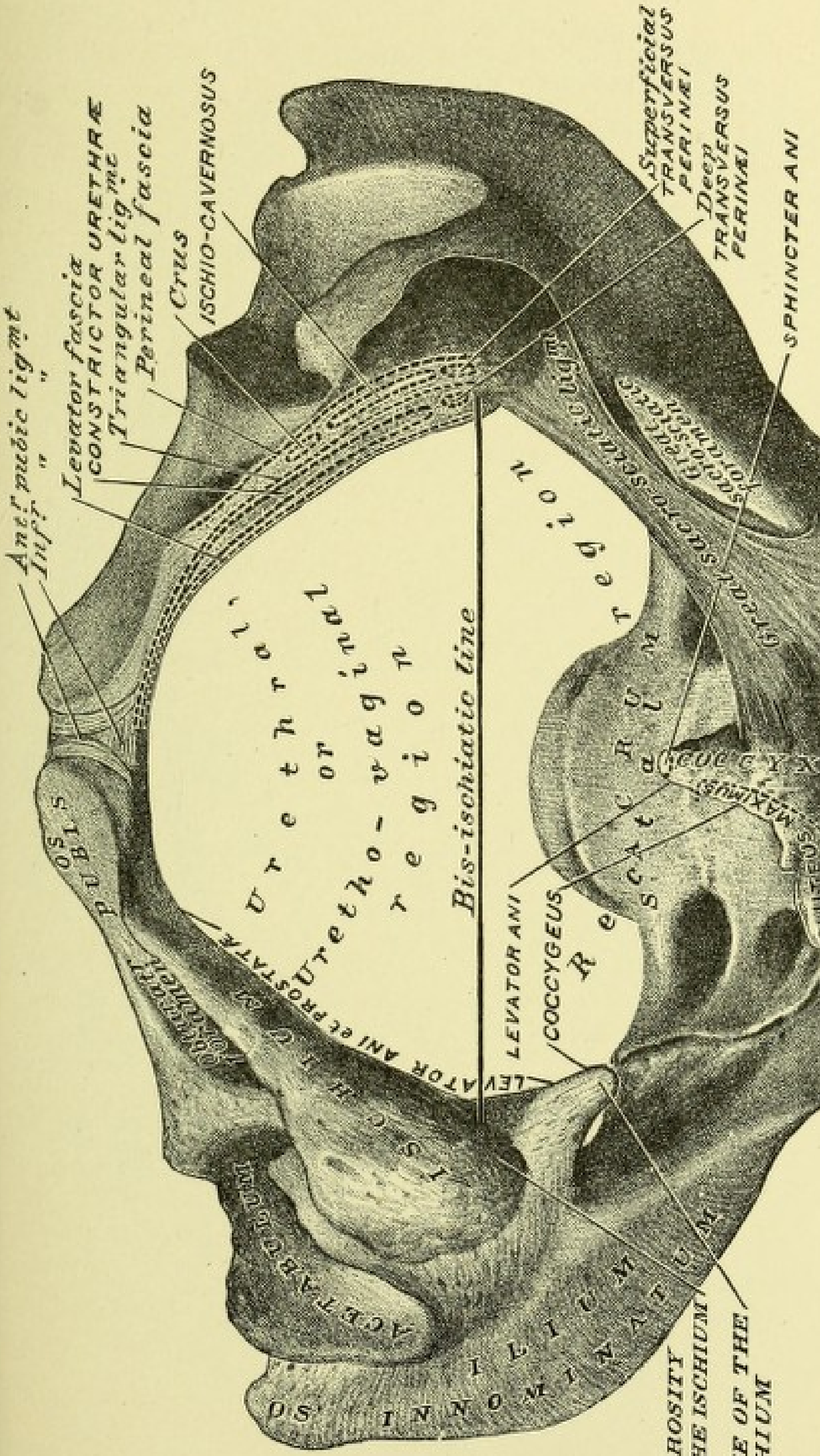
48. Rectum, Plates 11 and 12.—The third, and the anterior surface of the inferior part of the second, portions of the rectum are brought into view in the exposure of the viscera at the outlet of the male pelvis. The third portion is projected from the apex of the coccyx to the anus; it is surrounded by areolar tissue and fat, which are lodged, as we have seen, in the right and left ischio-rectal fossæ (page 16; Plate 6). A triangular, complex mass of tissue exists between the anterior surface of the third portion of the rectum, posteriorly, and the inferior surface of the prostate and the membranous portion of the urethra, anteriorly: the apex of the space is at the junction of the prostate and the rectum; its base is at the skin area between the anus and the scrotum; this portion is called the *surgical perineum*, as it is involved in perineal operations. The antero-superior surface of the second portion of the rectum is in contiguity with the prostate, the vesiculæ seminales, the vasa deferentia, and the bladder. The wall of the rectum presents longitudinal muscle-fibres for the entire circumference of the canal; as pulled out from the pelvis it appears, in the plates, much too broad at its superior end, thereby distorting it as to length.

49. Middle Hemorrhoidal Arteries, Plate 12.—The terminal branches of these arteries, the right and the left, are seen to distribute to the gut at its lateral surfaces.

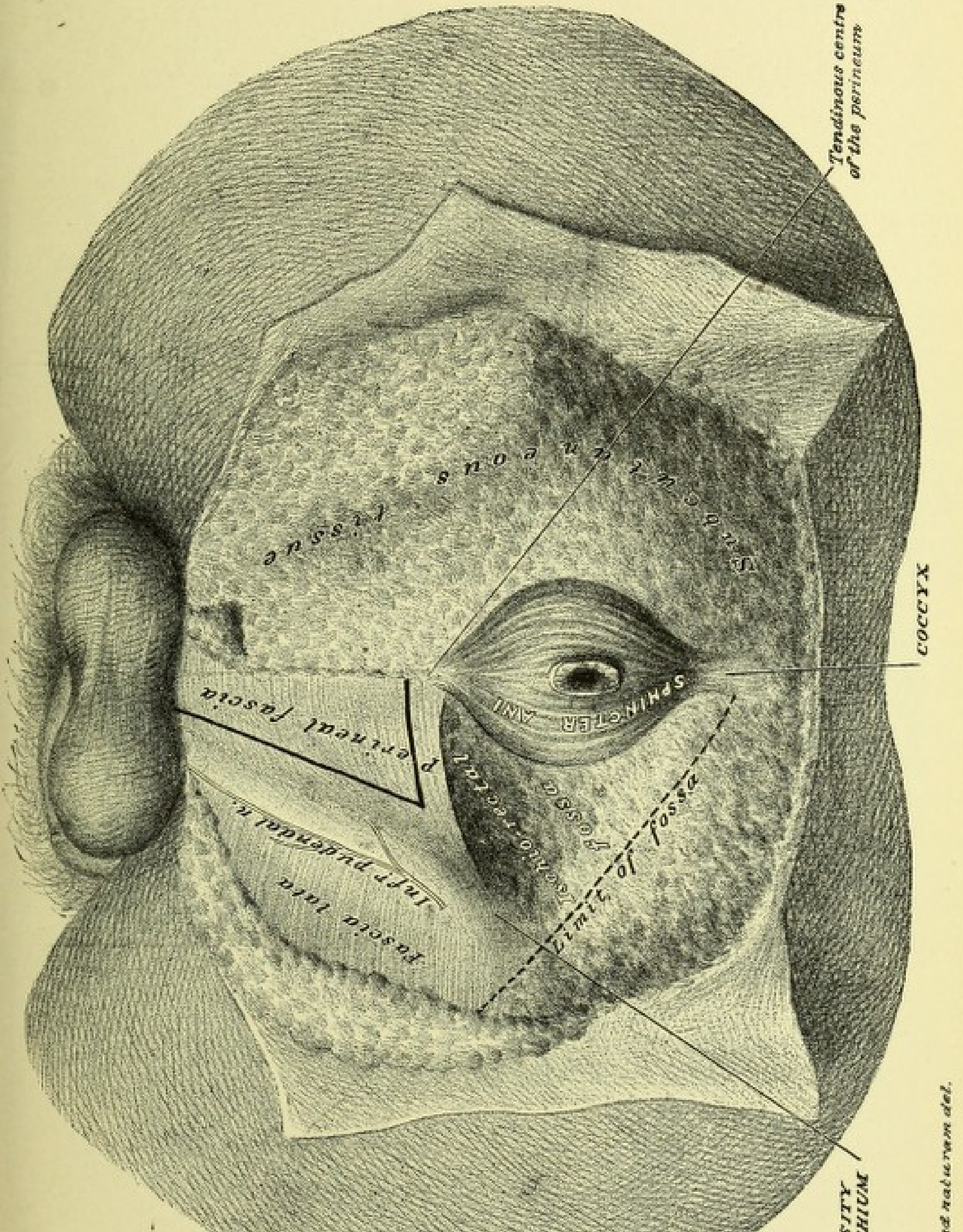
50. Male and Female Inferior Pelvic Outlets.—The inferior outlet of the male pelvis (Plates 9 to 12 inclusive) presents a marked contrast to the same outlet of the female pelvis (Plates 17, 18 and 19). The short transverse diameter and the narrow arch of the ossa pubis in the male give the effect of a greater antero-posterior diameter for the male; this, however, is not the case. Plate 5 represents the inferior outlet of a female pelvis; this selection was purposely made, because the female pelvic outlet is of more practical importance than the male, while it illustrates, for both sexes, the bone areas affording attachments to muscles and fasciæ. Of the muscle attachments in Plate 5 those given for the levator ani et prostatæ are also those for the levator ani et vaginæ.

Dissection.—The dissection of the perineum, the sub-peritoneal viscera, and portions of viscera, at the outlet of the pelvis, being now completed, the viscera should be returned to the pelvic cavity; the skin-flaps of the perineum should be brought together at the pelvic outlet, and the same sutured, by the continued suture, along the median line.

PLATE 5



M. Cohn, ad naturam del.


Tendinous centre
of the perineum
COCCYX
TUBEROSITY
of the ISCHIUM
M. Cohn, ad naturam del.
Subcutaneous
tissue
SPHINCTER ANI
Perineal fascia
Ischio-rectal
fossa
Limit of fossa
Infr pudendal n.
Fascia lata

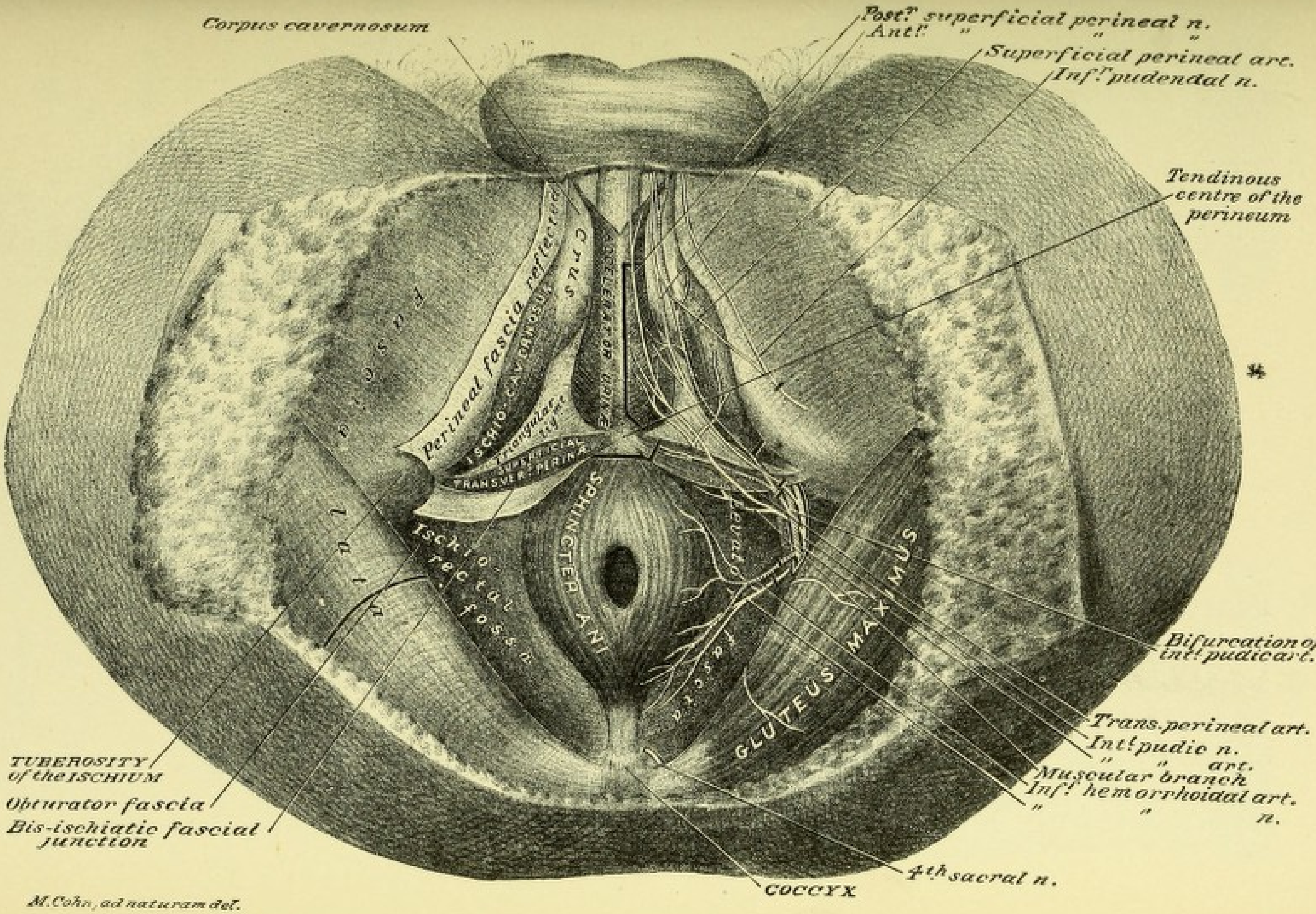

Corpus cavernosum
Post.r superficial perineal n.
Ant.r " "
Superficial perineal art.
Inf.r pudendal n.
Tendinous centre of the perineum
Bifurcation of int.l pudic art.
Trans. perineal art.
Int.l pudic n.
" " art.
Muscular branch
Inf.r hemorrhoidal art.
" " n.
4th sacral n.
COCCYX
TUBEROSITY of the ISCHIUM
Obturator fascia
Bis-ischiatic fascial junction
Fascia lata
Perineal fascia reflected
Crus
ISCHIO-CAVERNOSUS
ACCELERATOR URINÆ
Triangular lig.t
SUPERFICIAL TRANSVERSE PERINÆI
Ischio-rectal fossa
SPHINCTER ANI
Levator
fascia
GLUTEUS MAXIMUS
M. Cohn, ad naturam del.

PLATE 8

FIG. 1

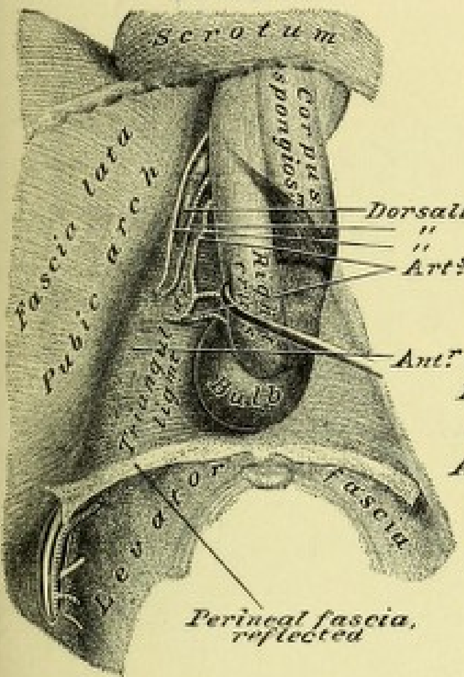


FIG. 2

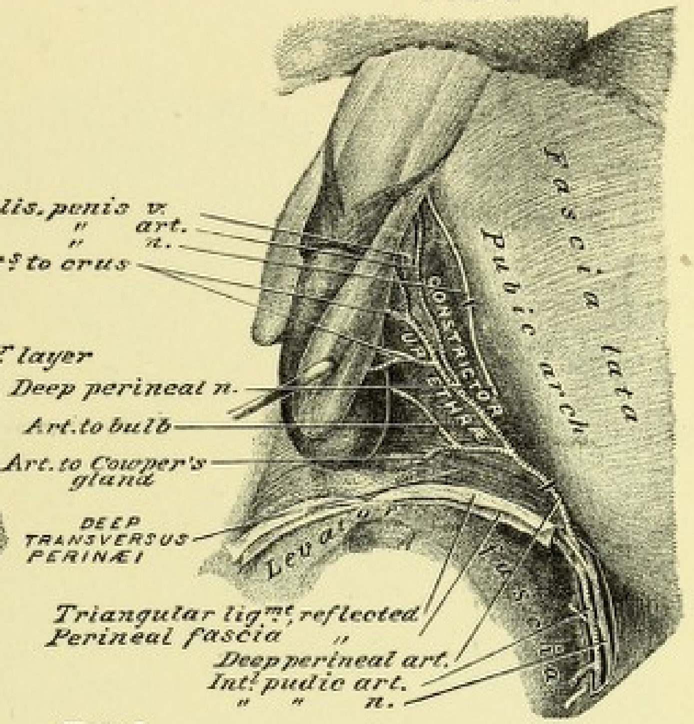
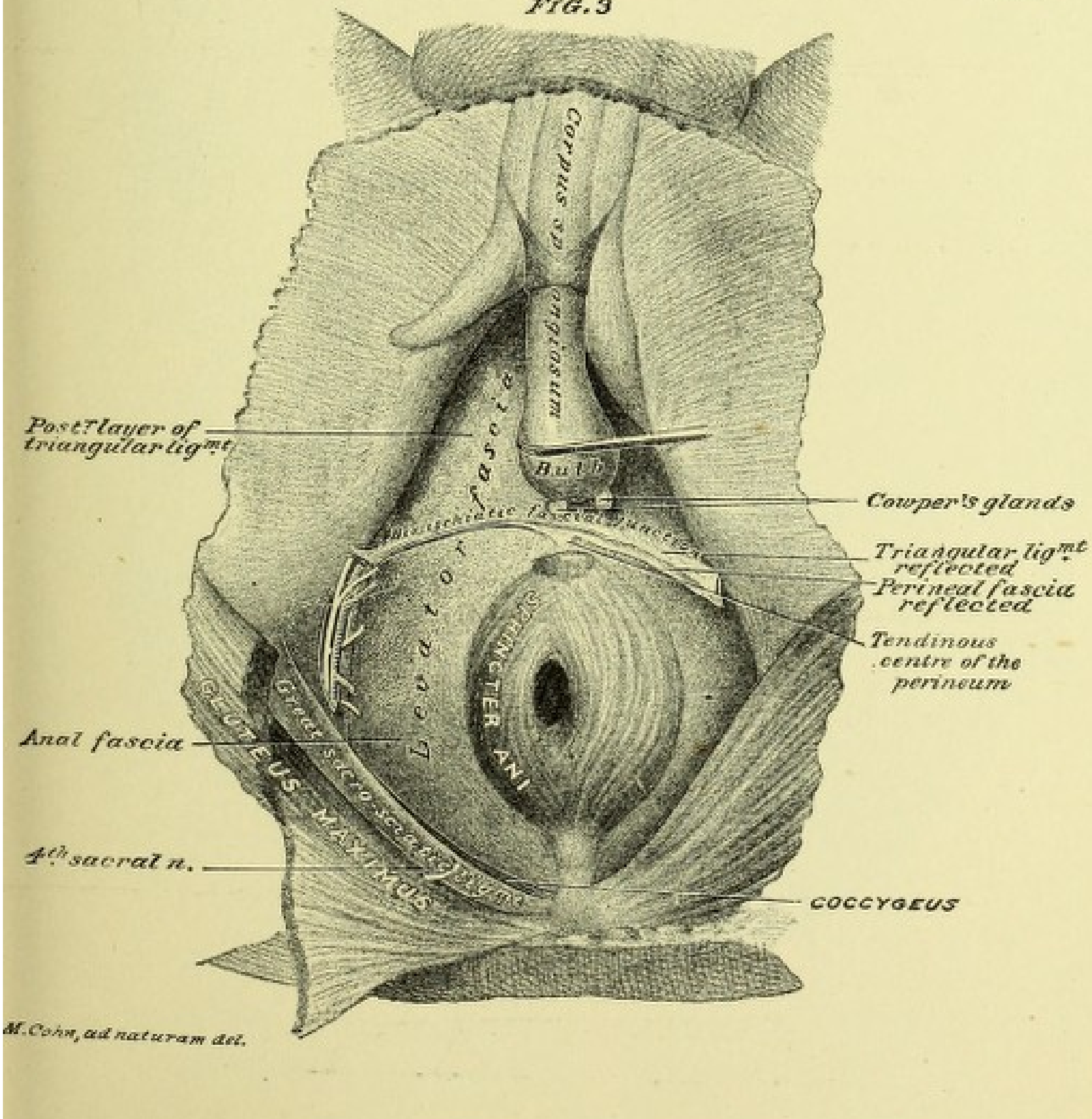
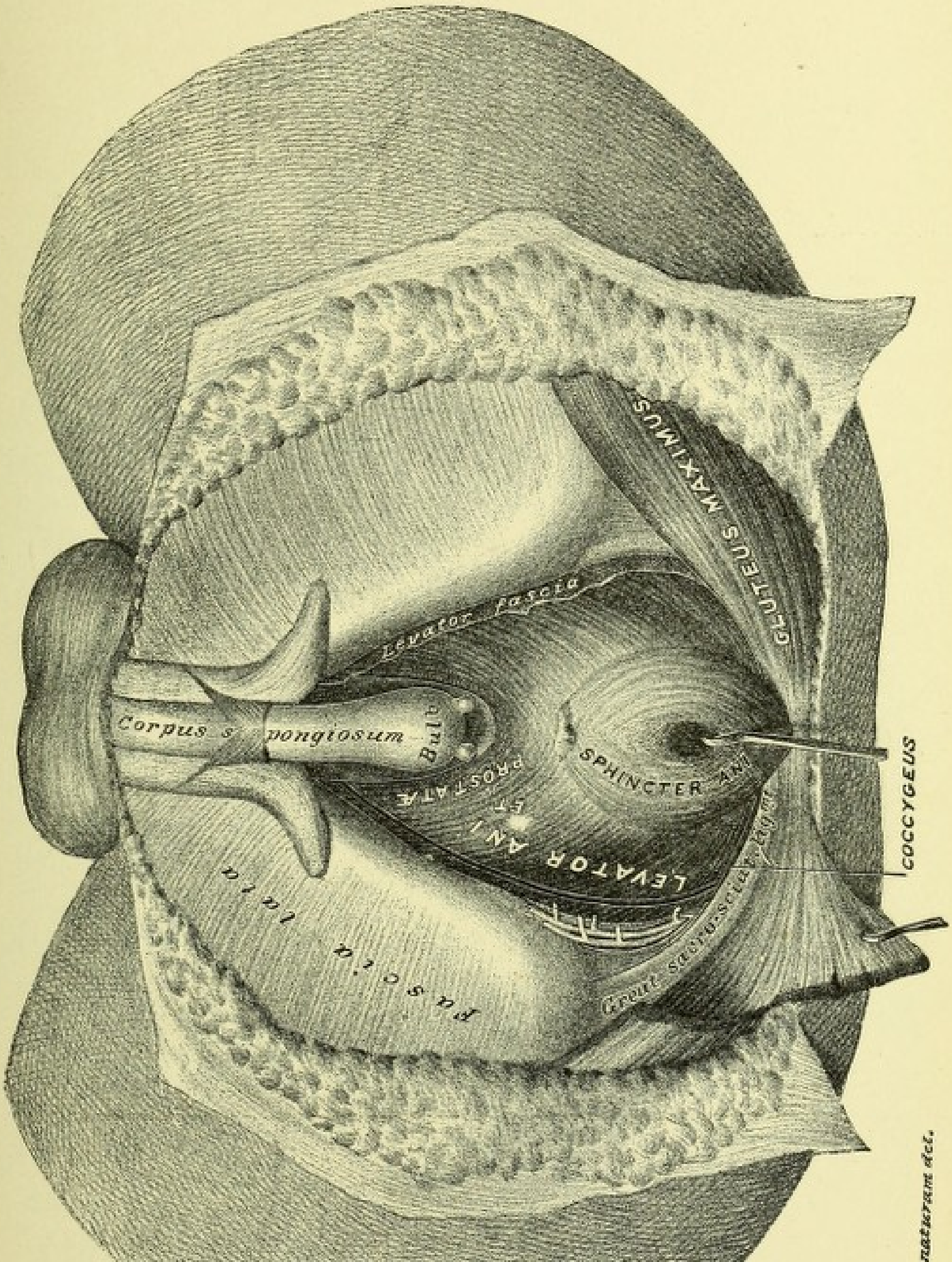


FIG. 3



M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

PLATE 10

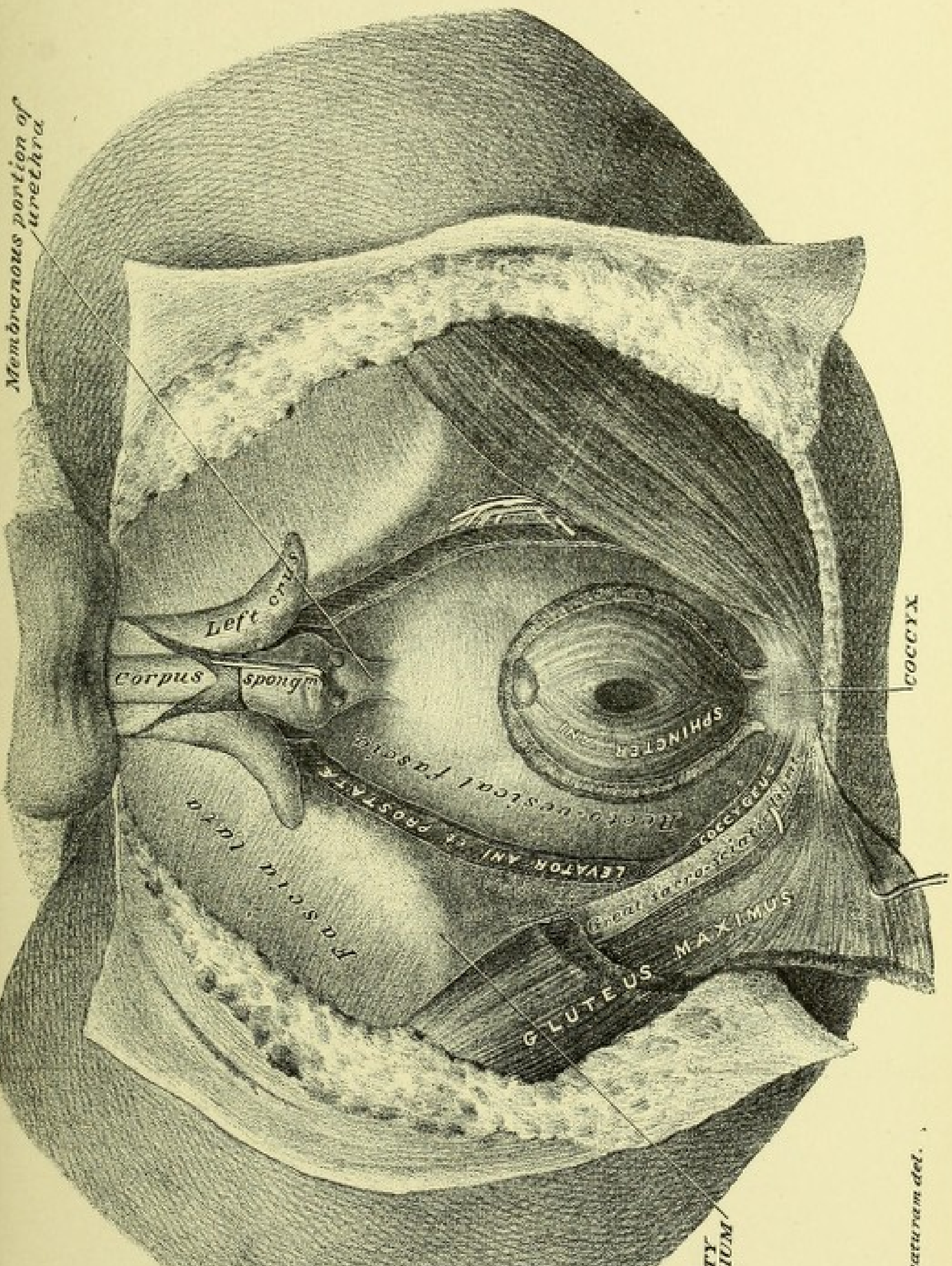
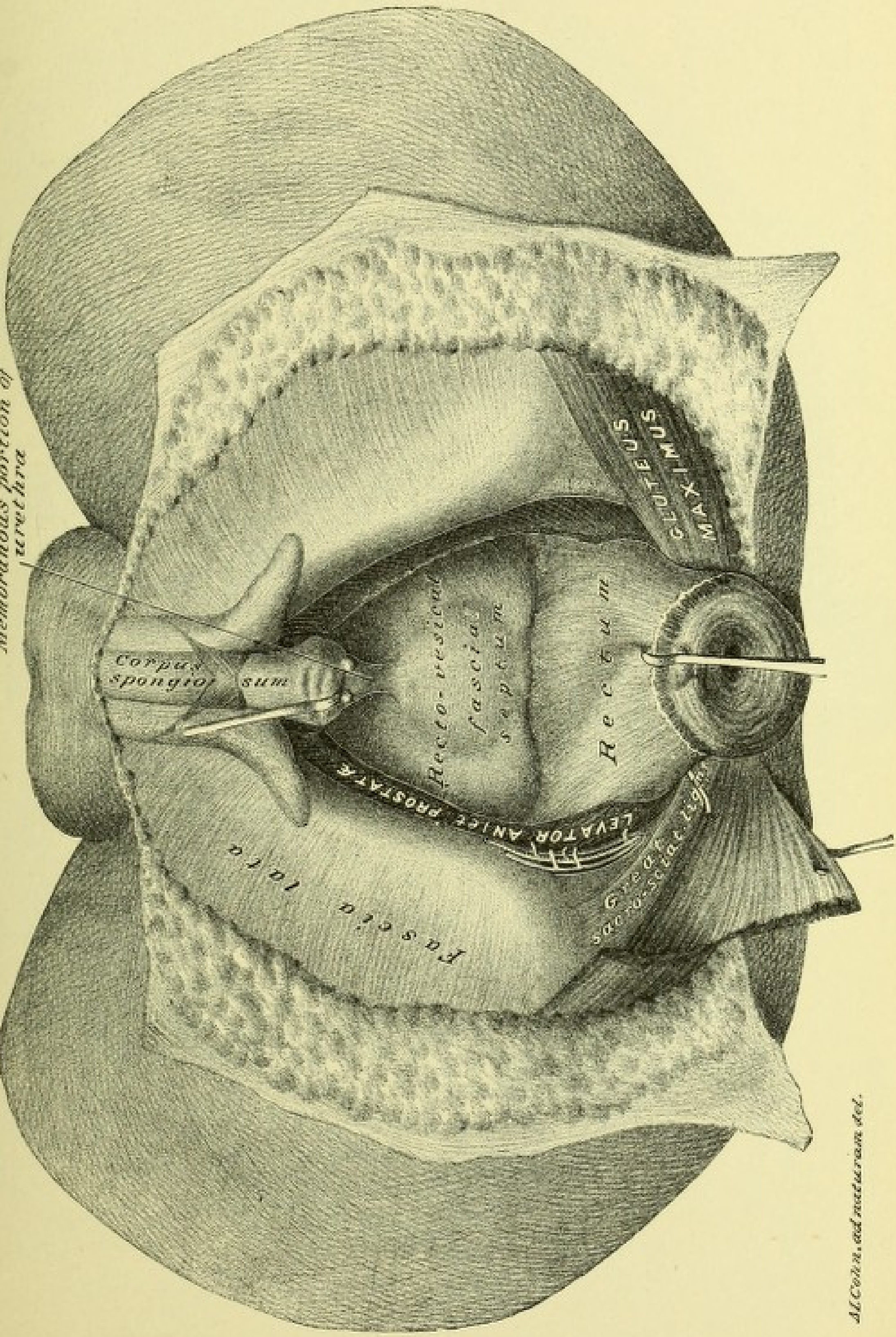
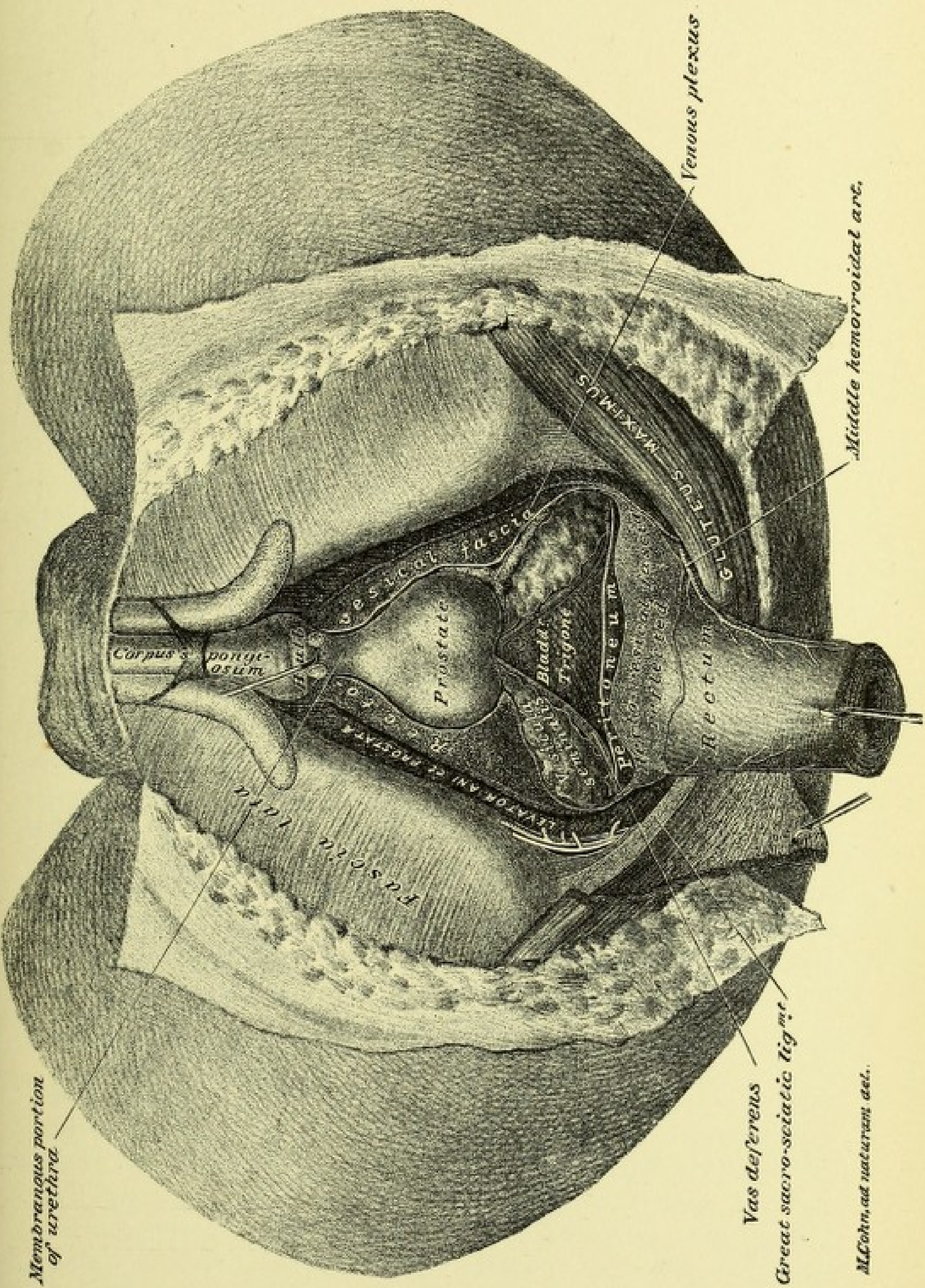

Membranous portion of urethra
Left crus
Corpus spongi
Recto-vesical fascia
LEVATOR ANI et PROSTATÆ
Fascia lata
SPHINCTER ANI
COCCYGEUS
GLUTEUS MAXIMUS
COCCYX
TUBEROSITY of the ISCHIUM
M. Conn. ad naturam del.

PLATE II



A. I. Cohn, ad naturam del.


Venous plexus
Middle hemorroidal art.
GLUTEUS MAXIMUS
Vesical fascia
Prostate
Bladder Trigone
Peritoneum
Rectum
Corpus spongiosum
Fascia lata
Membranous portion of urethra
Vas deferens
Great sacro-sciatic ligmt.
M.Cohn, ad naturam del.

SECOND DISSECTION.

FEMALE PERINEUM.

POSITION OF THE BODY FOR DISSECTION, Figure 2 (page 31).—Place the subject in the same position as for dissection of the male perineum, page 13.

Regional Appearances.—Palpation recognizes the same bone contours as in the male; see Male Perineum, page 13. As compared with the male, the region presents the following differences: in the greater diameters of the pelvic outlet; in the anus being located nearer the coccyx; and in the external genitalia.

Terms of Relation.—See Male Perineum, page 13.

Perineum and its Boundaries, Plate 5.—The female perineum includes all the soft parts, closing the outlet of the pelvis. It is bounded by bones and ligaments, as in the male; see Male Perineum, page 13.

Regions of the Female Perineum.—The transverse or bis-ischiatic line of the pelvic outlet divides the female perineum into the *rectal* region, posteriorly, and the *urethro-vaginal region*, anteriorly; see Male Perineum, page 14.

Bone-Areas.—See Male Perineum, page 14.

External (exterior) Genitalia.—These parts occupy the urethro-vaginal region of the perineum and the anterior surfaces of the ossa pubis; they collectively form the *pudendum*, which presents, antero-posteriorly, the *uro-genital furrow*. They include: *a*, Mons veneris; *b*, Labia majora; *c*, Clitoris; *d*, Labia minora; *e*, Vestibule; *f*, Meatus urinarius; *g*, Vaginal orifice; *h*, Orifices of the ducts of the vulvo-vaginal glands; *i*, Fourchette; *j*, Fossa navicularis; *k*, Vulvo-vaginal glands and their ducts (described page 38).

a. Mons Veneris.—This is the area upon the exterior surface of the symphysis pubis and the bodies of the ossa pubis; it is a cushion of adipose tissue, covered by skin; in the adult the skin presents a growth of hair.

b. Labia Majora.—These are two antero-posterior lips, analogues of the halves of the male scrotum, which are divided, on the median line, by the *uro-genital furrow.* Posteriorly, the labia are joined to form the *posterior commissure;* anteriorly, they are approximated only, and are, respectively, continued into the inguinal region of a side. Externally, a labium is covered by skin, which, in the adult, is furnished with hair; internally, or in the uro-genital furrow, its surface is covered, exteriorly, by skin, and interiorly, by mucous membrane. The skin lining of the furrow is richly supplied with sebaceous glands; the mucous-membrane lining is continued into the vagina, urethra, and ducts of the vulvo-vaginal glands.

c. Clitoris.—This is located at the anterior of the uro-genital furrow; it is the analogue of the male penis, from which it differs in size, and in not being tunnelled by the urethra.

d. Labia Minora.—These are two folds of mucous membrane, which form the analogue of the skin and prepuce of the male penis. Anteriorly, they join upon the anterior of the clitoris, to form its prepuce; posteriorly, they diverge into two labia, which merge into the anterior halves of the uro-genital-furrow surfaces of the labia majora.

e. Vestibule.—This is a triangular area of mucous membrane at the middle of the floor of the uro-genital furrow; it has: the clitoris, at its apex, anteriorly; the vaginal orifice, at its base, posteriorly; the labia minora, at its sides.

f. Meatus Urinarius.—This, the outlet of the urethra, presents on the median line of the vestibule, anteriorly to its base.

g. Vaginal Orifice.—This is located: posteriorly to the vestibule; anteriorly to the posterior commissure of, and between the posterior halves of, the labia majora. It may be occluded by a membrane—the *hymen*—or rimmed by the remnants of the same—the *carunculæ myrtiformes.*

h. Orifices of the Ducts of the Vulvo-Vaginal Glands.—These openings are located exterior to the plane of the hymen or carunculæ myrtiformes, upon the internal surfaces of the labia majora, about opposite the middle of the antero-posterior diameter of the vaginal orifice.

i. The Fourchette.—This is a band of mucous membrane, which bridges between the labia majora, exteriorly to the posterior border of the vaginal orifice.

j. The Fossa Navicularis.—This is a depression, located between the fourchette and the posterior commissure of the labia majora.

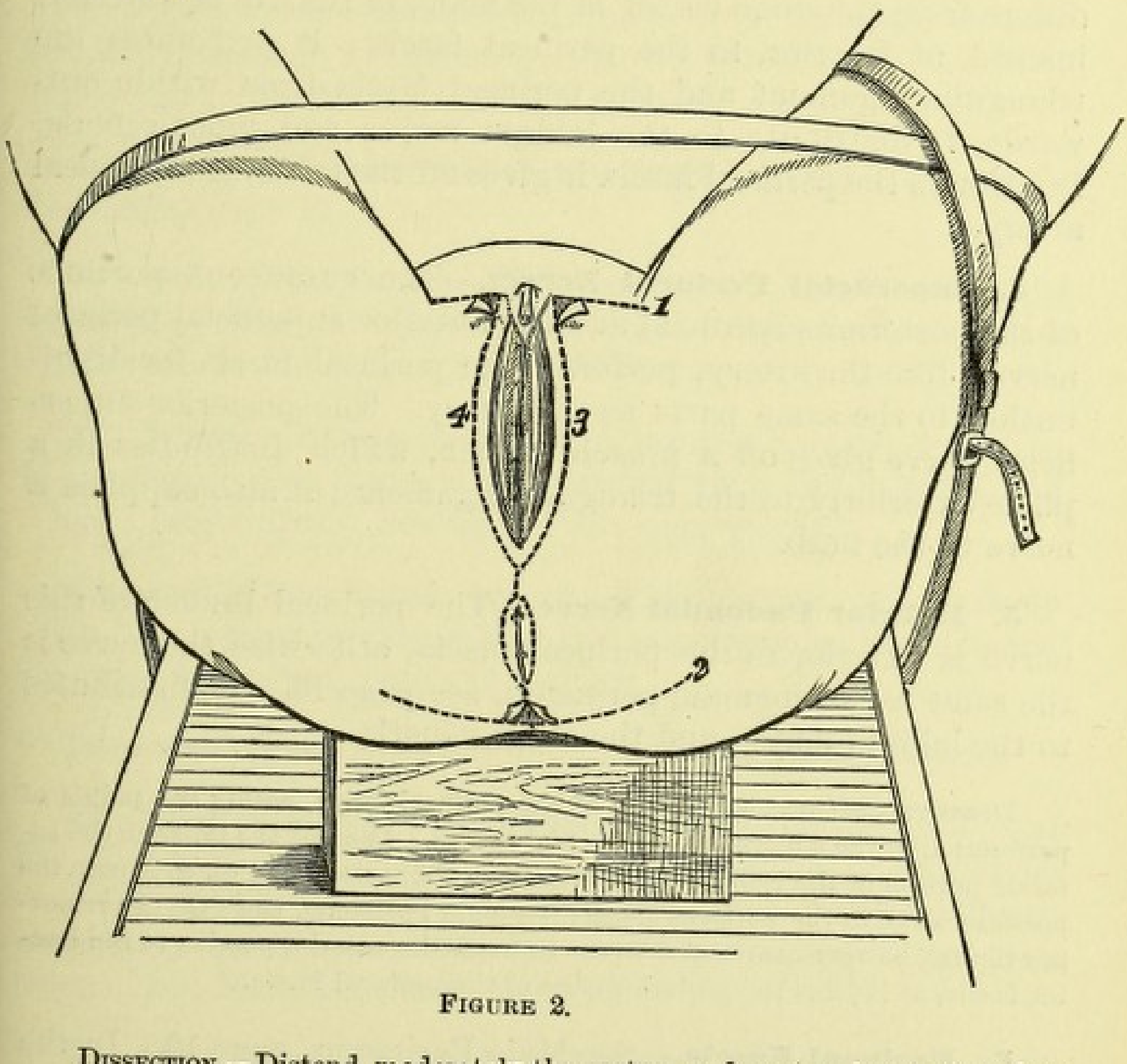


FIGURE 2.

DISSECTION.—Distend moderately the rectum and vagina, by stuffing them with oakum. Close the labia majora, posterior to the clitoris, by six or eight interrupted sutures; also, the anus by two or three sutures. Make the skin incisions 1, 2, 3, and 4, indicated in Fig. 2; reflect flaps of skin over the tuberosities of the ischia, pinning them to the thighs.

1. Subcutaneous Tissue.—A plane of subcutaneous tissue presents as in the male (Plate 6), but containing more fat.

DISSECTION.—Clear the surface of the sphincter ani muscle. Expose the superficial perineal artery and nerves in the urethro-vaginal region; also, the inferior pudendal nerve, external to the region.

2. Sphincter Ani Muscle, Plate 13.—The muscle presents as in the male, except that the muscle mass, constituted by the right and left halves, is more circular, making it shorter antero-posteriorly; it is located nearer the coccyx.

3. Superficial Perineal Artery.—This artery (vena comes) differs from the same vessel in the male, in that it is exterior, instead of interior, to the perineal fascia; it perforates the triangular ligament and the perineal fascia from within outwards, to distribute to the labium majus and mons veneris. Interior to the perineal fascia it gives off the transverse perineal artery.

4. Superficial Perineal Nerves.—The cutaneous portions of the posterior superficial and the anterior superficial perineal nerves, like the artery, perforate the perineal fascia for distribution to the same parts as the artery. The posterior superficial nerve gives off a muscle branch, which distributes in a plane exteriorly to the triangular ligament; it also supplies a nerve to the bulb.

5. Inferior Pudendal Nerve.—The perineal branch of this nerve is exterior to the perineal fascia, otherwise the nerve is the same as in the male perineum, see page 16. It distributes to the labium majus and the mons veneris.

DISSECTION.—Clear the surface of the perineal fascia, noting the points of perforation of the superficial vessels and nerves. Dig out the fat from the anterior portion of the ischio-rectal fossa, as in the male (Plate 6), to expose the posterior edge of the perineal fascia; see Male Perineum, page 16. In removing the fat, be very careful not to cut through the anterior portion of the levator fascia, as it joins the posterior edge of the perineal fascia.

6. Perineal Fascia.—See Male Perineum, page 16. In the female, this fascia, in addition to the lateral and posterior attachments of the male, forms a layer of the labium majus, and passes, anteriorly, into the inguinal region, to be continuous with the deep layer of its subcutaneous tissue. Upon the labium it presents dartos muscle fibres, thus bearing out the analogy of a labium to the half of the male scrotum. Its posterior border, as it forms the anterior superficial boundary of the ischio-rectal fossa, will be noticed to dip more posteriorly than in the male, for attachment to the tendinous centre of the perineum.

DISSECTION.—Section the superficial perineal artery and nerves, also the inferior pudendal nerve posteriorly, and reflect them anteriorly. Complete the removal of the fat from the ischio-rectal fossa, as in the male perineum, see page 16.

7. Gluteus Maximus Muscle.—See Male Perineum, page 16.

8. Ischio-Rectal Fossa.—This fossa, in the female, is broader and less deep than in the male; therefore its shape is less that of a wedge. See Male Perineum, page 16.

9. Inferior Hemorrhoidal Artery and Nerve.—See Male Perineum, page 17.

10. Obturator Fascia.—The portion of this fascia that forms the external wall of the ischio-rectal fossa, has less depth than in the male. See Male Perineum, page 17.

11. Levator Fascia (levator ani portion or anal fascia).—In the female, this fascia is less vertical than in the male, and it has a larger area. See Male Perineum, page 17.

12. Pudic Nerve and Artery.—These parts are similarly located, and may be exposed in the same way as in the male. See Male Perineum, pages 17 and 18.

DISSECTION.—Section and reflect the perineal fascia (Plates 13 and 14).

13. Bis-Ischiatic Fascial Junction, Plates 14 and 17, and Fig. 3, Plate 16.—This transverse line of meeting of the fasciæ of the perineum differs from the male, in that, it extends more posteriorly for attachment to the tendinous centre of the perineum. See Male Perineum, page 18.

14. Superficial Transversus Perinæi Muscle, Plate 14.—See Male Perineum, page 19. It differs in the female in being much less developed, and passes more posteriorly to reach the tendinous centre of the perineum.

15. Sphincter Vaginæ Muscle.—This muscle is the analogue of the accelerator urinæ muscle in the male. Examining one-half of this (so-called) sphincter, it will be found to extend from a broad posterior extremity, at the angle of continuity of the bases of the perineal fascia and triangular ligament; at the median line, posteriorly, some of its fibres converge with its fellow of the opposite side, to the tendinous centre of the perineum. Passing anteriorly, it forms a plane of the labium majus, at the side of the vaginal orifice, and narrows as it advances; finally, it winds over the lateral surface of the corpus cavernosum of the clitoris, on the dorsum of which it is attached. The relations of the halves of the sphincter vaginæ muscle to the clitoris determine its being the analogue of the accelerator urinæ muscle. See Male Perineum, page 19.

16. Tendinous Centre of the Perineum.—This point is situated more posteriorly in the female; it is, as in the male, the common point of convergence of the muscles and fasciæ of the perineum. See Male Perineum, page 19.

17. Ischio-Cavernosus Muscle (Erector Clitoridis).—It is less developed than its analogue in the male, otherwise it is similar to it. See Male Perineum, page 19.

DISSECTION.—Section the ischio-cavernosus muscle (Plate 14) at its ischial attachment, and reflect it anteriorly.

18. Crus of the Clitoris.—Same attachments and course as the crus of the male penis, though much smaller. See Male Perineum, page 20.

DISSECTION.—Section the superficial transversus perinæi muscle (Plate 14) and reflect it over the ischial tuberosity. Expose the muscular branch of the superficial posterior perineal nerve beneath the muscle.

19. Muscle Branch of the Superficial Posterior Perineal Nerve.—This branch is given off as the trunk of the nerve passes to its superficial plane of distribution. It distributes: exteriorly to the triangular ligament, to the superficial transversus perinæi, sphincter vaginæ, and ischio-cavernosus muscles; interiorly to the triangular ligament, to the deep transversus perinæi, and the constrictor urethræ muscles.

DISSECTION.—Section the halves of the sphincter vaginæ muscle (Plate 14) and reflect them anteriorly, preserving their anterior extremities in relation with the corpora cavernosa of the clitoris. Take out the three anterior sutures of the labia; dissect off the mucous membrane from the vestibule; cut away the labia minora from the labia majora and from the clitoris; cut away the anterior halves of the labia majora.

20. Bulb of the Vagina, Fig. 1, Plate 15.—This presents in two lateral portions, one on either side of the vaginal orifice; they are nearly as broad as the halves, respectively, of the sphincter vaginæ muscle; they extend to about the middle of the antero-posterior diameter of the vaginal orifice; they lie between the sphincter vaginæ muscle and the triangular ligament. The portions are broad posteriorly, narrowing as they advance anteriorly, to where they unite in the submucous plane of the vestibule of the pudendum, forming what is known as the pars intermedia. This vestibular portion of the bulb surrounds the meatus of the urethra, reaching to the vaginal margin of the vestibule. In the position in which the clitoris is fixed, in the illustration, the vestibular portion would seem to continue along the inferior surface of the corpora cavernosa of the clitoris, and to cap the same at their extremities, thereby forming a glans clitoridis. (The portion of the bulb which passes from the pars intermedia to the glans clitoridis, is not, strictly speaking, continuous in structure with the bulb, but it presents a number of vessels, which continue from the pars intermedia to the glans.) The bulb of the vagina is the analogue of the male corpus spongiosum. In the female it is perforated by the urethra in its vestibular portion, and bears somewhat similar relations to the clitoris as does the corpus spongiosum to the penis.

Dissection.—Hook half of the bulb of the vagina and the corresponding crus of the clitoris (the latter having been detached from the pubic arch) across the median line, so as to expose one-half of the triangular ligament; note the vessels and nerves that perforate the ligament.

21. Triangular Ligament, Figs. 1 and 2, Plate 15.—This ligament is attached as in the male; see Male Perineum, page 20. It has a much larger area in the female, owing to the greater space between the rami of the pubic arch. Anteriorly, it is perforated by the urethra, as in the male; posteriorly, by the vagina, to which it is attached, interior to the plane of the bulb of the vagina. Posterior to the vaginal orifice, its base line, at the bis-ischiatic fascial junction, is in continuity with the perineal and levator fasciæ ; it is attached to the tendinous centre of the perineum ; at the latter joint it is more posterior than in the male.

22. Artery of the Bulb, Fig. 2, Plate 15 ; Fig. 3, Plate 16.—This artery (vena comes) perforates the triangular ligament, to distribute as its name implies.

23. Deep Perineal Artery, Fig. 2, Plate 15, and Plate 17.—This artery (vena comes) pierces the triangular ligament, passes anteriorly, and bifurcates into the artery of the corpus cavernosum and the deep dorsalis clitoridis artery.

24. Artery of the Corpus Cavernosum, Fig. 2, Plate 15.—This artery (vena comes) enters the interior surface of the crus clitoridis ; it sends a branch to the vicinity of the meatus urinarius.

25. Deep Dorsalis Clitoridis Artery, Fig. 2, Plate 15 ; Figs. 2 and 3, Plate 16.—This branch passes, anteriorly, between the crus and the os pubis, to reach the base of the suspensory ligament of the clitoris (page 37).

26. Deep Perineal Nerve, Plate 17.—This nerve pierces the triangular ligament to become, exteriorly, the deep dorsalis clitoridis nerve, which accompanies the last-described artery.

Dissection.—Restore the crura, the bulb, and the sphincter vaginæ muscles to their normal position ; apply a hook into the free end of the clitoris, and extend it horizontally. Make a median-line incision through the skin of the dorsum of the clitoris and the mons veneris ; then reflect skin flaps.

27. Superficial Dorsalis Clitoridis Vessels and Nerves, Fig. 1, Plate 16.—These vessels and nerves are located on the dorsum and lateral surfaces of the clitoris, in its subcutaneous plane. A superficial dorsalis clitoridis artery (vena comes) is a branch of a superior external pudic artery. A superficial dorsalis clitoridis nerve is contributed by an ilio-hypogastric nerve.

Dissection.—Remove the superficial dorsal vessels and nerves of the clitoris ; trace the anterior tendinous extremities of the sphincter vaginæ muscles to the dorsum of the clitoris, then cut them away and expose the elastic suspensory ligament and sheath of the clitoris.

28. Sphincter Vaginæ Muscles, Plate 14.—The anterior tendinous ends of these muscles wind over the external surfaces of the corpora cavernosa of the clitoris, for attachment to the dorsum of that organ.

29. Elastic Suspensory Ligament and Elastic Sheath of the Clitoris, Figs. 1 and 2, Plate 16.—This triangular, elastic-tissue ligament is attached to the symphysis pubis, from which it suspends the clitoris; it is continued upon it as an elastic sheath.

DISSECTION.—Make a dorsal, median-line, incision through the elastic sheath of the clitoris. Reflect lateral flaps of the same, exposing the deep dorsalis clitoridis arteries, vein, and nerves. Trace these vessels and nerves to the base of the organ.

30. Deep Dorsalis Clitoridis Artery.—This artery emerges upon the dorsum of the clitoris, by a lateral opening in the base of the suspensory ligament; it is lodged between the elastic sheath and a corpus cavernosum of the organ.

31. Deep Dorsalis Clitoridis Vein.—This single vein is lodged in the furrow between the corpora cavernosa; it leaves the dorsum of the clitoris by a middle opening in the base of its suspensory ligament.

32. Deep Dorsalis Clitoridis Nerve.—A deep nerve reaches the dorsum of one side of the clitoris, by the same lateral opening in the base of the suspensory ligament as does an artery; it advances upon a corpus cavernosum, parallel with the artery, to distribute to its glans and prepuce.

DISSECTION.—Detach the suspensory ligament and cut the vessels and nerves as they enter its base; cut away the clitoris and bulb of the vagina. Replace the stumps of the deep vessels and nerves of the clitoris upon the exterior of the ossa pubis (Fig. 3, Plate 16). Make transverse sections of the clitoris and compare its structure with that of the penis, of which it is the analogue, viz.: the cylinders of the corpora cavernosa; and the vessels and tissue occupying the place of the corpus spongiosum and glans of the male penis (page 98; Fig. 2, Plate 56). Section the triangular ligament, as the perineal fascia was sectioned (Plate 13); reflect a flap posteriorly, which should preserve its junction with the perineal fascia and the tendinous centre of the perineum (Fig. 3, Plate 16); reflect the other two flaps to the pubic arch and the vaginal wall, respectively.

33. Artery of the Bulb, Fig. 3, Plate 16.—This artery (vena comes), is a branch of the deep perineal, as it lies (in the female) in a deeper plane. It perforates the constrictor urethræ, as well as the triangular ligament, to reach its distribution. This branch, in turn, gives off the *artery to the vulvo-vaginal gland.*

34. The Deep Perineal Artery and Nerve.—These perforate the constrictor urethræ muscle from an interior plane.

Dissection.—Clear the subjacent muscles of the urethro-vaginal region.

35. Deep Transversus Perinæi Muscle.—See Male Perineum, page 21.

36. Constrictor Urethræ Muscle.—See Male Perineum, page 22. Its external attachment is as in the male; the anterior portion bridges from one ramus to the other, as a fold of muscle anterior to the urethral canal; a second portion converges to the urethral canal at the meatus, and to the vaginal wall.

Dissection.—Remove the remaining sutures from the posterior portion of the labia majora. Find the orifice of the duct of the vulvo-vaginal gland upon the internal surface of the posterior half of the labium majus, and pass a fine probe into it; then track the probe to the gland, which in turn may be exposed by cutting away a portion of the deep transversus perinæi muscle.

37. Vulvo-vaginal Glands.—These glands (*k*. External genitalia, page 29) are the analogues of Cowper's glands of the male. A gland (the size of a small white bean) is located in the plane between the deep transversus perinæi muscle and the levator fascia (page 39), externally to the posterior extremity of the bulb of the vagina; its duct passes, internally, to its opening at the internal surface of the posterior half of a labium majus, exteriorly to the orifice of the vagina.

Dissection.—Section and reflect a flap of the gluteus maximus muscle, as in the dissection of the male perineum, see page 22.

38. Great Sacro-Sciatic Ligament.—See Male Perineum, page 22.

39. Fourth Sacral Nerve.—See Male Perineum, page 22.

Dissection.—Section the fibres of the deep transversi perinæi and constrictores urethræ muscles, and reflect them to the urethra and vagina, internally, and the pubic arch, externally. Preserve the attached portions of the perineal fascia and the triangular ligament at the bis-ischiatic fascial junction, and also the tendinous centre of the perineum.

40. Deep Perineal Artery, Plate 17.—This artery (vena comes) is located interiorly to the ramus of the pubic arch and the plane of the deep transversus perinæi and constrictor urethræ muscles.

41. Deep Perineal Nerve.—This nerve accompanies the last-described artery.

42. Levator Fascia (Levator ani portion or *anal fascia*, and levator vaginæ portion or *posterior layer of the triangular ligament*).—This plane of fascia is analogous to that of the male (see Male Perineum, page 22); it differs from it in that the fascia is perforated, on the median line, by the vagina, to the circumference of which it is attached. In the female, the meeting of its two portions, at the bis-ischiatic fascial junction, is located more posteriorly than in the male.

DISSECTION.—Dissect off the levator fascia, and the tissues forming the bis-ischiatic fascial junction, from the muscle plane interiorly to it (Plate 18), tracing the fascia to the obturator fascia; section and cut away the deep perineal artery and nerve. Dissect away the tendinous centre of the perineum, so as to display the median-line raphe between the muscles interiorly to it.

43. Levator Ani et Vaginæ Muscles, Plate 18.—These muscles, right and left, are the analogues of the levator ani et prostatæ muscles of the male (page 24, Plate 9). The *ani* portions or the middle and posterior parts of the muscles are the same as in the male (page 24). The *vaginæ* portions or the anterior parts of the muscles are attached to the interior surfaces of the bodies of the ossa pubis; they are projected posteriorly, being separated by a subpubic interval, which gives transit to the urethra and the vagina; their fibres run parallel until they approach the interval between the vaginal and rectal outlets, when they curve, internally, to be attached to a fibrous, median line, raphe—the exterior of the raphe is attached to the tendinous centre of the perineum. The levator vaginæ portions of the muscles support the posterior wall of the vagina, at its outlet, as the levator prostatæ supports the prostate.

DISSECTION.—Section the levator ani et vaginæ muscle (Plate 18) and reflect its internal portion to the median line—anteriorly and posteriorly to the rectum—and to the coccyx; at these points the muscle may be cut away. The part of the muscle, that converges to the rectum, may be disposed of as in the male (page 25).

44. Coccygeus Muscle.—See Male Perineum, page 25.

45. Recto-vesical Fascia, Plate 19.—This plane of fascia is nearly the same as in the male (page 25; Plate 10). The right and left portions of the fascia form, as in the male, a sling, at the outlet of the pelvis, to support the viscera there presenting. In the female it differs from the male, in that it is perforated by the vagina.

DISSECTION.—Section the recto-vesical fascia upon the rectal and vaginal walls, and reflect it, externally, to the pubic arch and the ischium. Note the close union of the rectal and vaginal outlets; also, the same of the urethral and vaginal outlets. Display the areolar tissue and vessels between the fascia and the presenting viscera. Dissect the visceral outlets apart sufficiently to demonstrate the three canals: urethral, vaginal, and rectal.

46. Outlets of the Pelvic Viscera and the Perineal Body, Plates 13 to 19, inclusive.—The urethra, vagina, and rectum present in order, antero-posteriorly (Plate 19). The situation of the *so-called perineal body*, between the vaginal and rectal outlets, is occupied by the parts which converge to form the tendinous centre of the perineum (Plates 13 to 17, inclusive), and the raphe between the *vaginæ* portions of the levatores ani et vaginæ muscles (Plate 18). Interiorly to these parts the outlets of the vagina and rectum are intimately approximated.

DISSECTION.—Remove the oakum from the vagina and rectum. Put a hook into the urethra and drag it anteriorly; dissect the antero-superior wall of the vagina from it, inferiorly; once started the separation of the two canals is easily effected. As the separation progresses drag upon the urethra, anteriorly, and the vagina, posteriorly, until the base of the bladder is brought into view.

47. Urethra, Fig. 1, Plate 20.—The female urethra or urinary canal is about one inch and one-half long; it forms a nipple-like projection from the bladder. The canal may be dilated with the finger, so as to enter the bladder.

48. Bladder.—The base of this organ is quite thin, as compared with the opposed vaginal wall; the two will have been found loosely adherent by the intervention of a delicate areolar tissue. Its lateral surfaces present some small arterial branches.

49. Ureters.—These ducts will be seen to enter the bladder, approaching the same obliquely from without inwards and forwards; their points of entrance are about one inch and one-half apart. Before entering the bladder they are located between the superior wall of the vagina and the base of the bladder.

50. Superior Wall of the Vagina.—The wall of this canal is thick and smooth, and its muscle structure evident; at its lateral borders are the vaginal arteries.

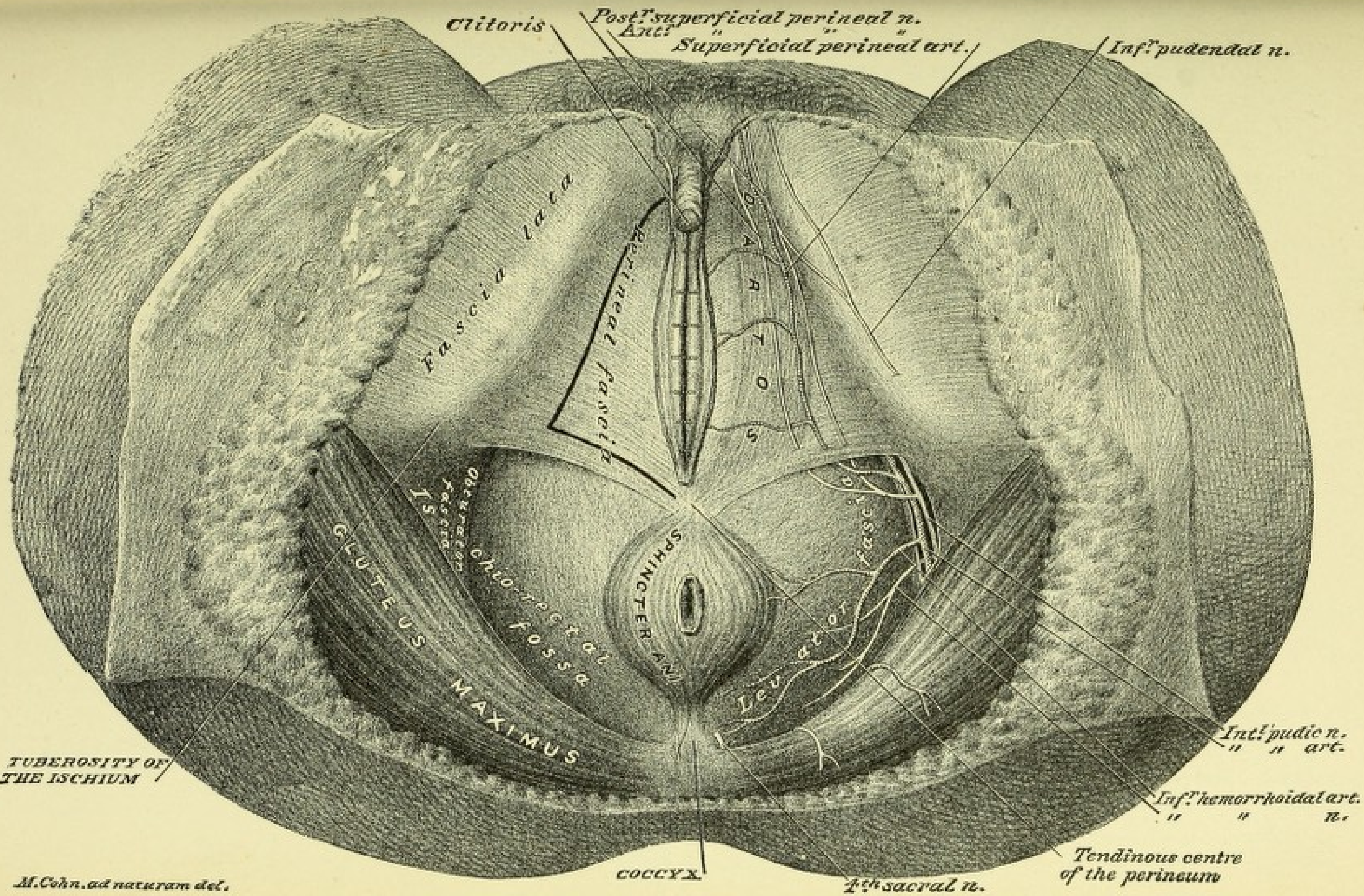
DISSECTION.—Restore the bladder, urethra, and superior wall of the vagina to their normal positions. Insert a hook into the posterior part of the circumference of the vaginal outlet, and pull the same anteriorly; dissect off the opposite rectal wall. For a distance of about one inch and one-half, interiorly to the tendinous centre of the perineum, the vagina and rectum are intimately adherent, allowing of no sliding of their applied walls upon each other. Beyond their exterior adherent portions the two canals are loosely held together by areolar tissue, thus admitting of the sliding of one canal wall upon the other. As the dissection progresses the vagina should be pulled anteriorly, the rectum posteriorly and out of the pelvis. When about five inches of the superior wall of the rectum have been exposed, a septum of membrane, peritoneum, will be seen reflected from the rectum to the vagina. Note, on either side of the interior portion of the exposed rectum, the middle hemorrhoidal arteries; also, the vaginal arteries at either side of the vagina.

51. Inferior Wall of the Vagina, Fig. 2, Plate 20.—This wall of the vagina presents little difference from the superior, except that a larger number of veins ramify in its substance.

52. Rectum (Superior wall).—This wall of the rectum presents the peculiar muscular structure of this portion of the large intestine, namely, that of longitudinal fibres; it is quite thick, though not as thick as the opposite vaginal wall.

53. Recto-Vaginal Cul-de-Sac of Peritoneum.—The membranous cul-de-sac, brought into view, interiorly, at the upper part of the exposed portions of the rectum and vagina, is formed by the peritoneum; it is the bottom of the recto-vaginal or Douglas' cul-de-sac. By passing the finger into the vagina, the reflection of the peritoneum from the vaginal to the rectal wall, one inch or more below the attachment of the vagina to the posterior surface of the uterus, is demonstrable; if the peritoneal cul-de-sac be opened, and a finger of the other hand introduced at the opening, the two fingers will be separated by peritoneum, inferiorly, and vaginal wall, superiorly.

DISSECTION.—The organs should be crowded back into the pelvic cavity; the skin flaps of the perineum approximated and sewed together on the median line.


Clitoris
Postr. superficial perineal n.
Antr. " " "
Superficial perineal art.
Infr. pudendal n.
Fascia lata
Perineal fascia
DARTOS
SPHINCTER ANI
Obturator fascia
Ischio-rectal fossa
GLUTEUS MAXIMUS
Levator fasc.
TUBEROSITY OF THE ISCHIUM
Intl. pudic n.
" " art.
Infr. hemorrhoidal art.
" " n.
Tendinous centre of the perineum
COCCYX
4th sacral n.
M. Cohn. ad naturam del.

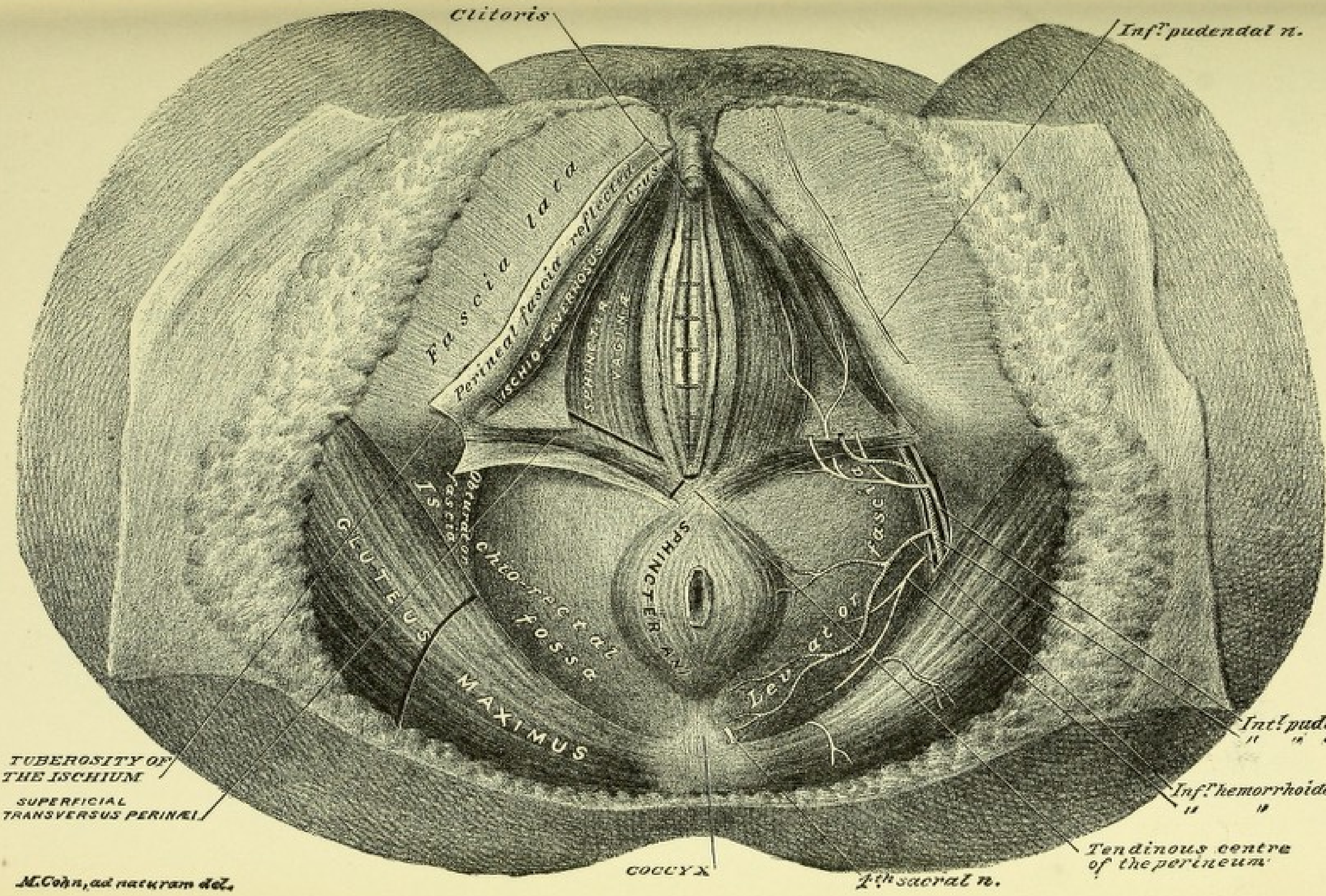

Clitoris
Infr. pudendal n.
Fascia lata
Perineal fascia reflected
ISCHIO-CAVERNOSUS
Crus
SPHINCTER VAGINÆ
Obturator fascia
Ischio-rectal fossa
SPHINCTER ANI
Levator fascia
GLUTEUS MAXIMUS
Intl. pudic n.
" " art.
Infr. hemorrhoidal art.
" " n.
Tendinous centre of the perineum
TUBEROSITY OF THE ISCHIUM
SUPERFICIAL TRANSVERSUS PERINÆI
COCCYX
4th sacral n.
M. Cohn, ad naturam del.

FIG. 1

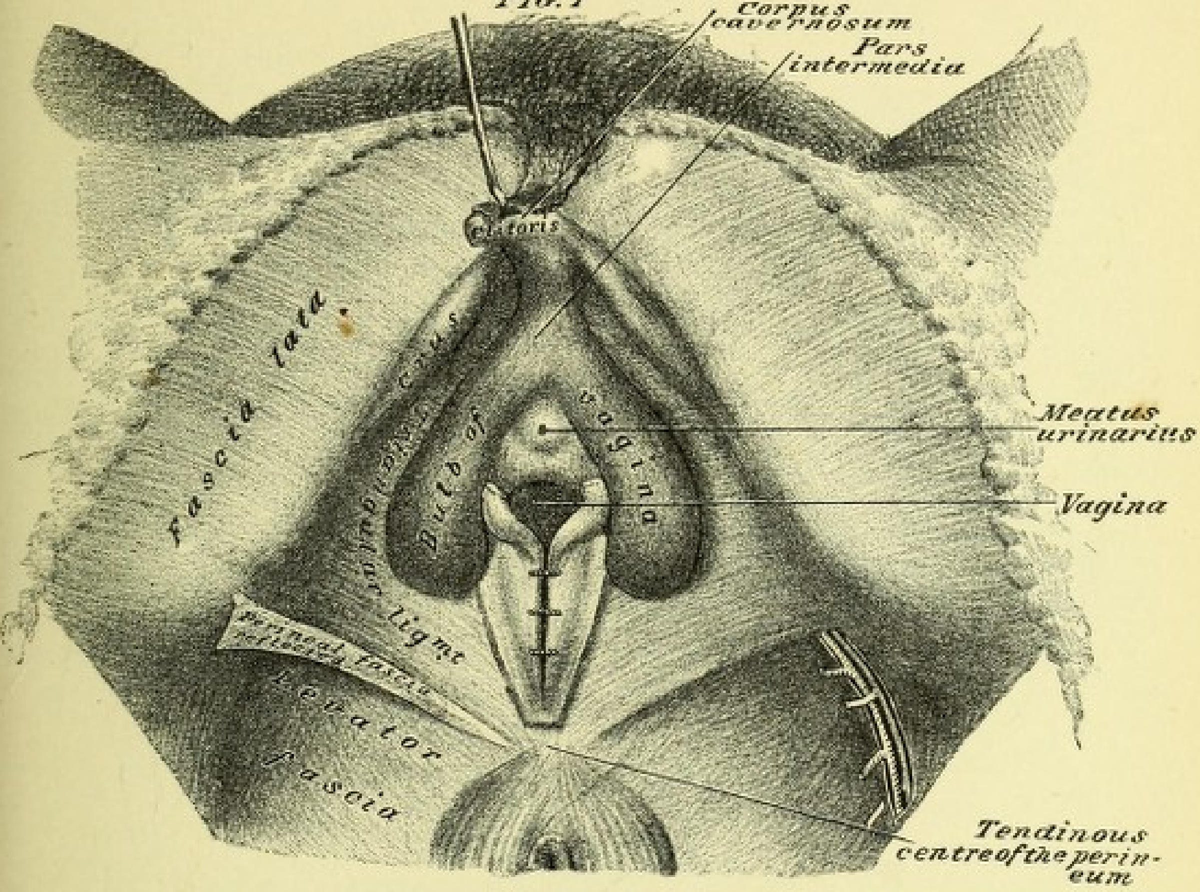
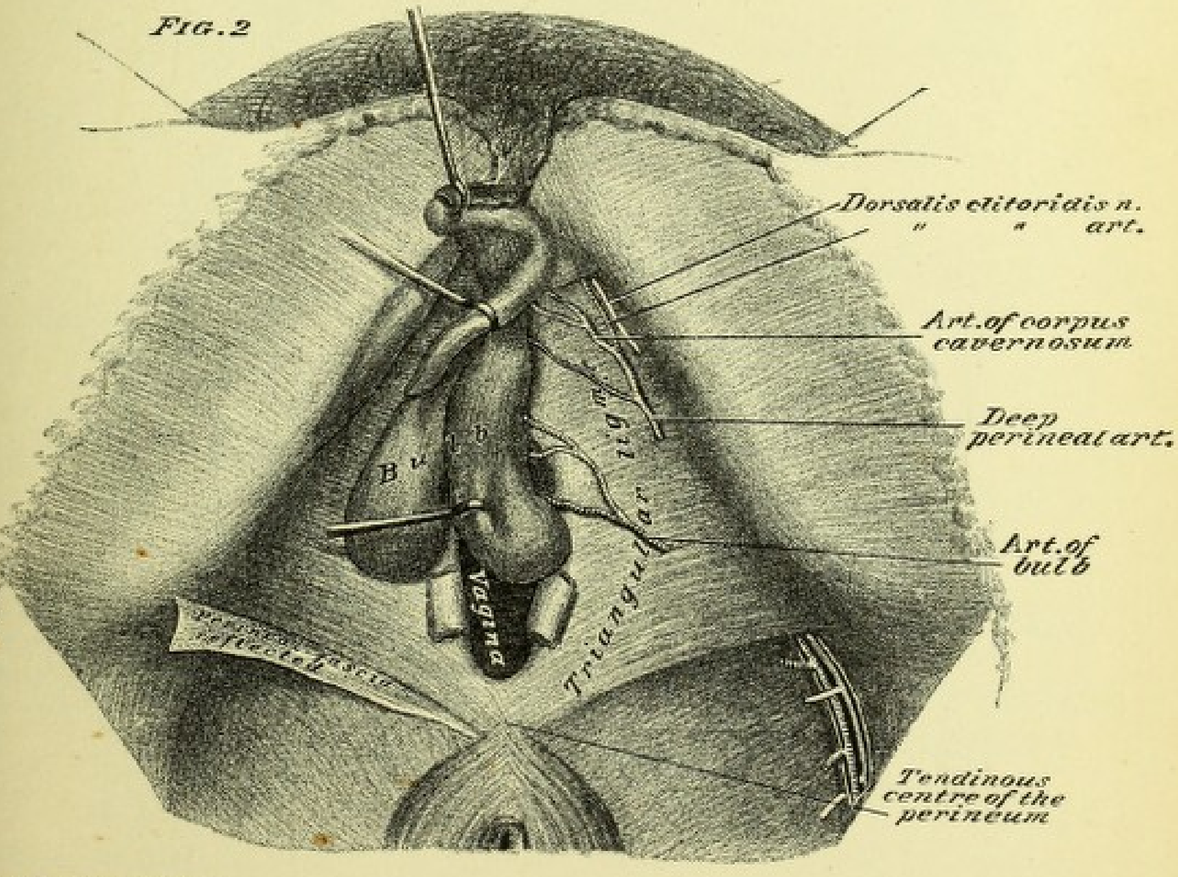


FIG. 2



Cohn, adnaturam del.

FIG. 1 FIG. 2

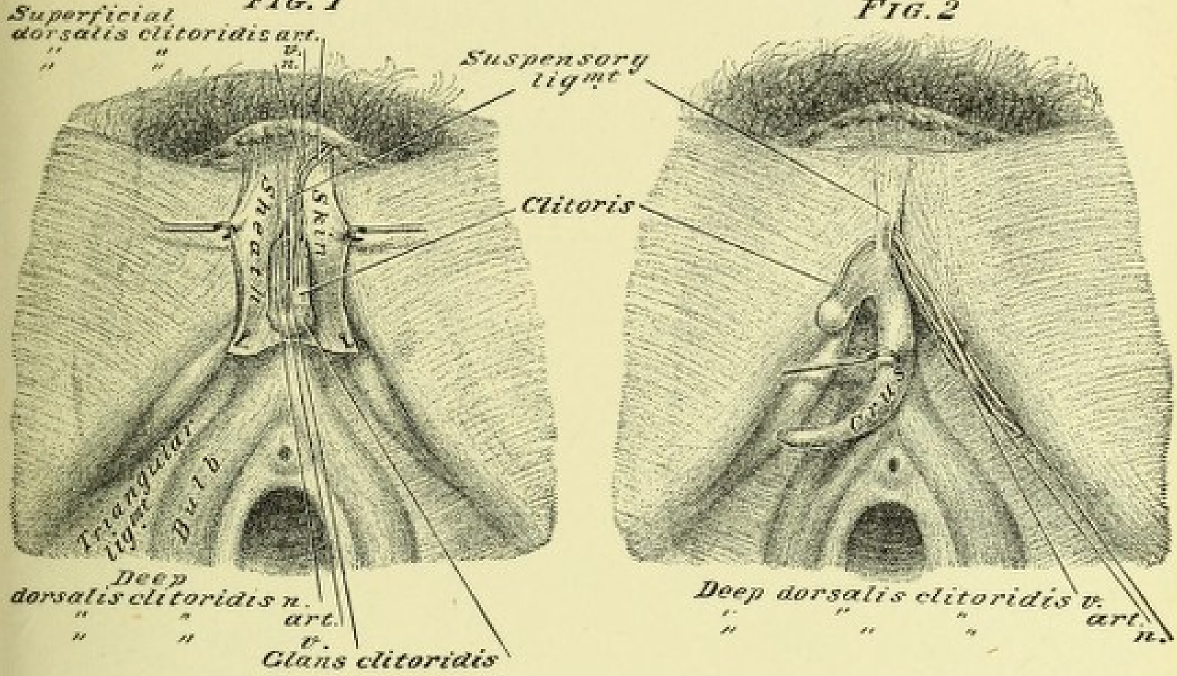
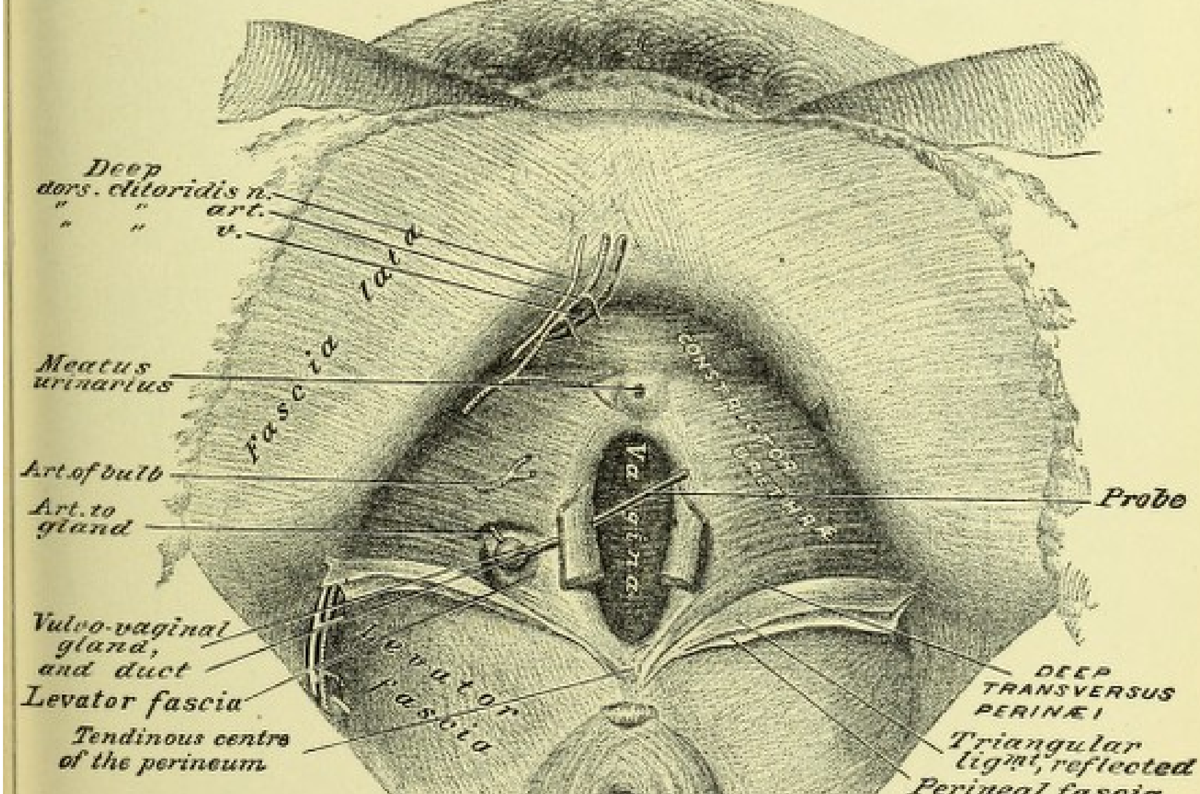


FIG. 3



M. Cohn, ad naturam del.

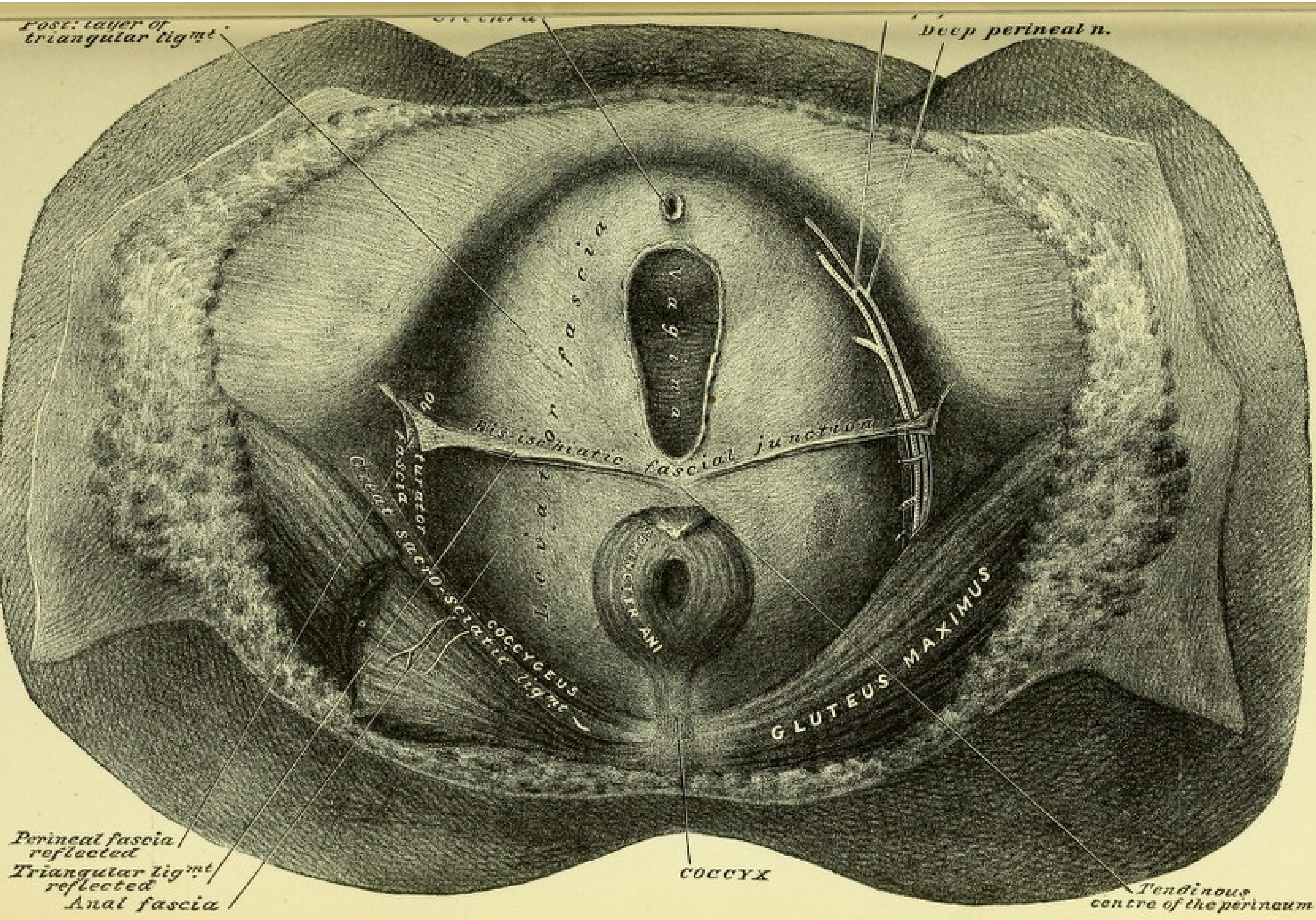


PLATE 17

M. Cohn, ad naturam del.

PLATE 18

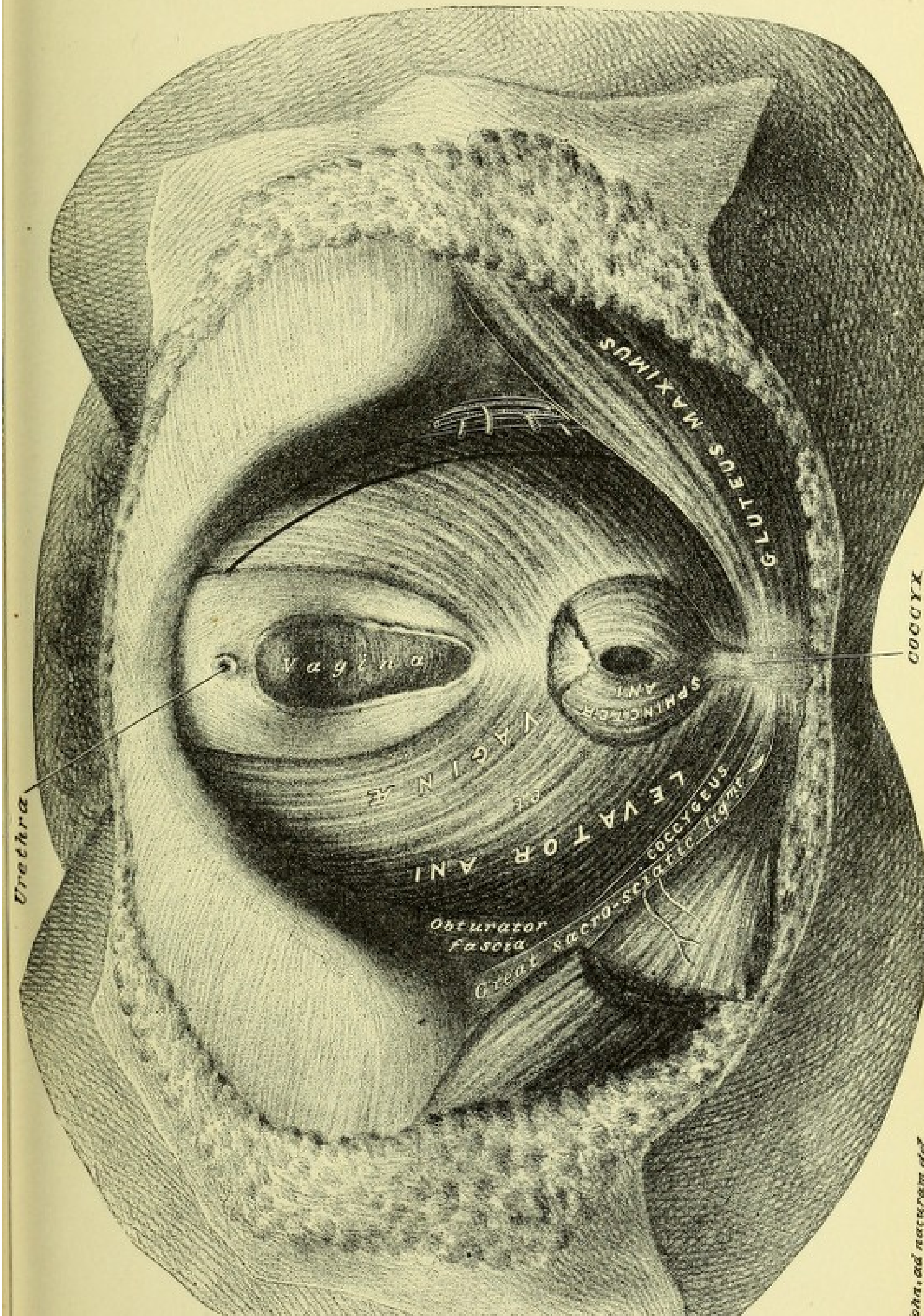


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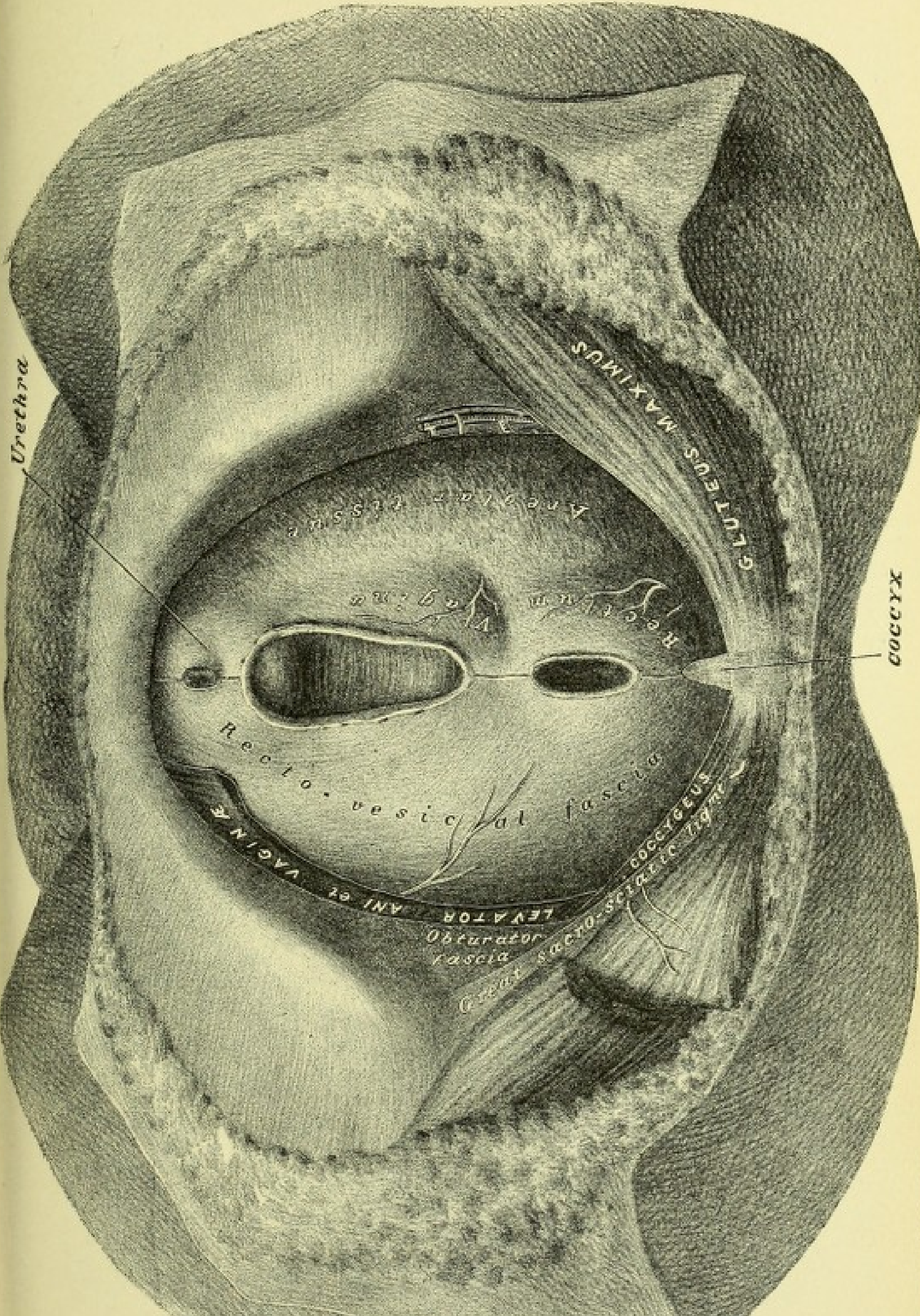
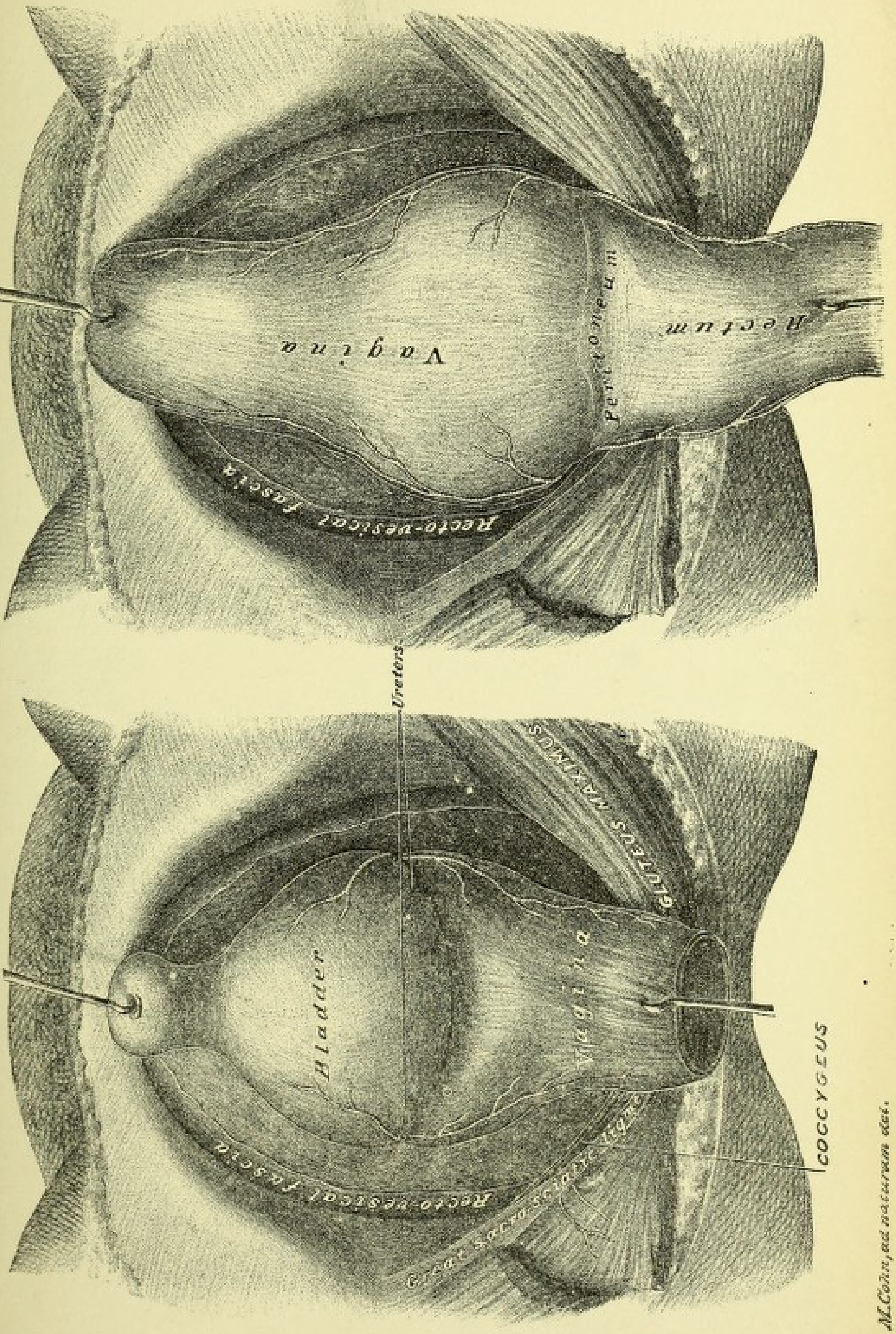
PLATE 19



M. Cohn, ad naturam del.

FIG. 2

FIG. 1



M. Cohn, ad naturam del.

THIRD DISSECTION.

ANTERO-LATERAL AREAS OF THE ABDOMINAL PARIETES.

DISSECTION.—The body should be placed lying upon the back, with a block under the shoulders and one under the pelvis.

Terms of Relation.—The following terms will be used to designate the *Areas* of the abdominal wall: *Anterior*, *Lateral* and *Antero-Lateral.* The words *Interior* and *Exterior* will indicate proximity to the abdominal cavity, and to the skin, respectively.

Bones and Cartilages, Plates 21 and 42.—The anterior halves of, and the cartilages of, the six inferior ribs (right and left), the ensiform cartilage of the sternum, the crest of the ilium and the superior surface of the ossa pubis of the right and the left os innominatum, form the osseous framework of this dissection. All these bones and cartilages afford attachments to muscles.

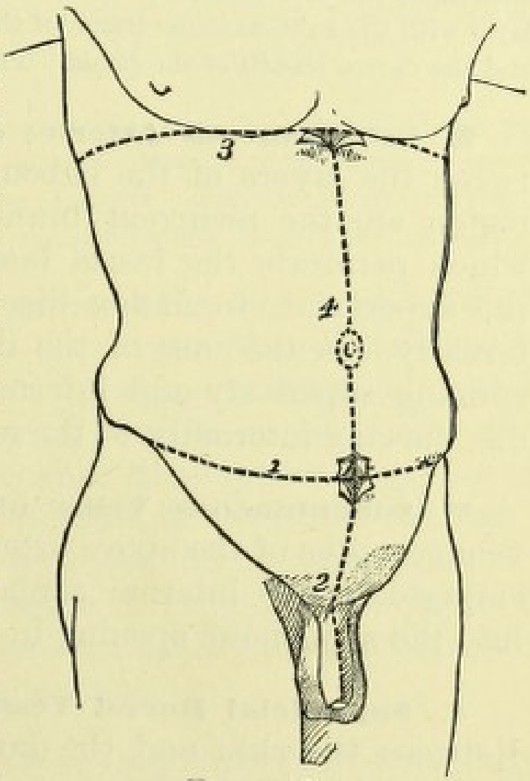


FIGURE 3.

DISSECTION.—Extend the penis horizontally by fixing a hook into the prepuce; then fix the other two hooks, of the chain-hooks, into the lower limbs. Make the skin incisions, 1 and 2 of Fig. 3; skin incision 1 will be referred to as the *Bis-Iliac Incision;* skin incision 2 as the *Median-Line Incision.* Reflect a skin flap, inferiorly, upon the thigh, to which it may be pinned. This form of flap, from this region, will be called an *Inguinal Flap.* Hook the skin sheath of the penis, externally.

1. Subcutaneous Tissue, Plate 22.—The subcutaneous tissue is more or less loaded with fat. This plane of tissue passes continuously to contribute to the dartos sheath of the penis and the dartos tunic of the scrotum. The inguinal area of the subcutaneous tissue of the abdominal wall may be easily divided into two layers, the superficial and the deep, between which vessels ramify. Note, the perforation of the superficial layer, external to the root of the scrotum and penis, by the superficial penile and scrotal branches of the superficial external pudic vessels; also, the perforation of the same, superior to the root of the penis, by the superficial penile branches of the ilio-hypogastric nerve.

DISSECTION.—Make the bis-iliac incision on one side, and the median-line incision down to the root of the penis, through the superficial layer of the subcutaneous tissue. Reflect an inguinal flap of the superficial layer, being careful to preserve the perforating penile and scrotal vessels and nerves, by slitting through the layer, so as to retain their continuity from their trunks to their distributions; carry the flap from the face of the anterior superior region of the thigh, so as to expose the saphenous opening in the fascia lata. The vessels between the superficial and deep layers will be found a guide to the separation of the two planes of tissue. Note, the continuity of the superficial layer with the subcutaneous tissue of the thigh, the dartos tunic of the scrotum and the dartos sheath of the penis. Pin the flap to the thigh with the skin.

2. Subcutaneous Arteries of the Inguinal Region.—Between the layers of the subcutaneous tissue of the inguinal region are the recurrent branches from the femoral artery, which perforate the fascia lata, below the line of the groin: the superficial circumflex iliac, extending superiorly and externally over the crest of the ilium; the superficial epigastric, running superiorly and internally; the superior external pudic, curving internally to the root of the penis or clitoris.

3. Subcutaneous Veins of the Inguinal Region.—The venæ comites of the above arteries may be traced to where they empty into the internal saphenous vein, before its entrance into the saphenous opening in the fascia lata.

4. Superficial Dorsal Vessels and Nerves of the Penis.—Between the skin and the dartos sheath of the penis the superficial dorsalis penis artery, branch of the superior external pudic, runs longitudinally upon the dorsum of the penis, from the base to the glans. The vena comes, sometimes quite large, anastomoses with the deep dorsalis penis vein, and continues to the superior external pudic vein. The ilio-hypogastric nerve distributes dorsal branches to the organ.

DISSECTION.—Section the superficial dorsalis penis vessels and nerves at the root of the penis, and dissect them off of the dartos sheath.

5. **Dartos Sheath of the Penis.**—This sheath is in continuity with the superficial and deep layers of the inguinal subcutaneous tissue; it is also continuous with the dartos tunic of the scrotum. It differs from the inguinal subcutaneous tissue planes, in being free of fat and in having involuntary muscular fibres in its structure. It is separated by loose areolar tissue from the subjacent elastic tissue sheath of the organ, thus allowing of its sliding upon the latter.

DISSECTION.—Expose the suspensory ligament of the penis; make a median-line incision on the dorsum of the penis, through the dartos sheath, and reflect a flap externally; follow the suspensory ligament to the penis.

6. **Suspensory Ligament and Sheath of the Penis.**—This so-called ligament, composed of elastic tissue, is attached to the median line of the pubes. It passes, inferiorly, upon the body of the penis, to which it contributes an elastic sheath, which is thickest around the root of the organ.

DISSECTION.—Make a median-line incision on the dorsum of the penis, through the elastic sheath, from the glans to the base of the organ; dissect off the sheath, so as to expose the deep dorsalis penis vessels and nerves, and show their relations to the openings at the attached base of the ligament.

7. **Deep Dorsalis Penis Artery.**—The artery, of a side, has been described in a part of its course (see Male Perineum, page 20). In the dissection of the male perineum it was left, passing, anteriorly, between the exterior surface of the body of the os pubis and the crus of a corpus cavernosum (Figs. 1 and 2, Plate 8). It enters upon the dorsum of the penis, through the attached base of the suspensory ligament, by an opening at the side of the median line; thence it runs, longitudinally forward, upon the dorsum of the organ, distributing branches to the corpus cavernosum and the glans.

8. **Deep Dorsalis Penis Nerve** (see Male Perineum, page 2).—This nerve accompanies the last-described artery to the suspensory ligament; it enters upon the dorsum of the penis by

the same opening in the suspensory ligament; it continues to the glans, to the mucous membrane of which it is distributed.

9. Deep Dorsalis Penis Vein.—This vein (sometimes two) is lodged on the median line of the dorsum of the penis, passing from the glans to the suspensory ligament, where it enters a middle opening. It then continues, posteriorly, upon the exterior of the os pubis; it enters the pelvic cavity by perforating the triangular ligament; it then bifurcates, the branches emptying respectively into the venous plexus, right and left, at the sides of the prostate and base of the bladder.

Dissection.—Make the bis-iliac and median-line incisions through the deep layer of the subcutaneous tissue; reflect an inguinal flap, inferiorly, upon the thigh, carrying the superficial inguinal vessels with it; pin the flap to the thigh.

10. Deep Layer of the Subcutaneous Tissue of the Inguinal Region.—This plane of tissue continues below the line of Poupart's ligament, to be attached to the fascia lata, at an oblique line from the anterior superior spinous process of the ilium to the scrotum; the attachment runs between Poupart's ligament and the saphenous opening. In the male, it is continuous with the dartos tunic of the scrotum and penis; in the female, with that of the labium majus. This plane of tissue is continued from the perineal fascia of the perineum; advancing, anteriorly, the latter becomes the dartos tunic of the scrotum (posterior and anterior surfaces) or of the labia majora (female); from the dartos tunic of scrotum or labium it is directly continuous with the layers of the subcutaneous tissue of the inguinal region.

Dissection.—Make skin incisions 3 and 4 of Fig. 3 (page 43), and reflect a flap of the skin, externally, well off the lateral area of the abdomen. Incision 4, with 2, completes the median-line incision.

11. Subcutaneous Tissue, Plate 24.—The superior anterolateral area of the subcutaneous tissue presents but a single layer. It is in this plane of the parietes that the subcutaneous nerves of the abdomen ramify.

Dissection.—Make incision 3 and median-line incision 4, of Fig. 3, in the subcutaneous tissue plane, and reflect lateral flaps corresponding to those of the skin; preserve, as long as possible, the cutaneous nerves and vessels at their points of emergence.

12. Cutaneous Nerves of the Abdominal Parietes, Plate 23.—These nerves, from the inferior intercostal nerves, perforate the superficial fascia. They become subcutaneous at the following points: laterally, at the rib attachments of the obliquus externus muscle; anteriorly, toward the median line. The lateral nerves bifurcate into posterior and anterior branches. The anterior present two rows of emergence: the external divide as do the lateral; the internal do not divide.

13. Superficial Fascia.—This plane is a very thin layer of fibrous tissue upon the exterior of the obliquus externus muscle; it is continued from the thoracic parietes, superiorly; it is attached, inferiorly, to the crest of the ilium, Poupart's ligament and the body of the os pubis. In the inguinal region it is strengthened by loops of fibrous tissue, with their convexities directed toward the pubes, the arciform or intercolumnar fibres.

Dissection.—Dissect off the superficial fascia from the obliquus externus muscle, being careful to preserve the portion of it that springs from the pillars of the opening in the aponeurosis of the muscle, to invest the spermatic cord. Trim away the inguinal flaps of subcutaneous tissue along the line of the groin.

14. Fibrous Tissue Markings of the Abdominal Parietes, Plate 24.—These markings are: the linea alba, at the median line, from the symphysis pubis to the ensiform cartilage of the sternum—upon this line is the umbilicus; the lineæ semilunares, curving, superiorly, from opposite the spines of the ossa pubis to the anterior extremities of the cartilages of the tenth ribs; the lineæ transversæ cross between the linea alba and the lineæ semilunares, at, and superior to, the umbilicus.

15. Obliquus Externus Muscle, Fig. 1, Plate 21 and Plate 24.—This forms the exterior muscle plane of the antero-lateral area of the abdominal parietes. Superiorly, it is attached to the exterior surfaces of the lateral area of the seven or six inferior ribs; the superior four or five attachments interdigitate with digitations of the serratus magnus muscle; the inferior three attachments interdigitate with digitations of the latissimus dorsi muscle. From the two inferior ribs the muscle fibres pass, inferiorly, to the crest of the ilium; from its superior four or five rib attachments the fibres pass inferiorly and internally. The latter portion of the muscle forms an aponeurosis at the anterior area of the abdomen, which continues as a single plane to the linea alba, from the sternum to the symphysis pubis. Superiorly, the pectoralis major muscle—its inferior portion—is attached to the exterior of the aponeurosis. The inferior edge of the aponeurosis bridges from the anterior superior spinous process of the ilium to the spine of the os pubis, forming Poupart's ligament; it is also attached to the linea ilio-pectinea—on the superior surface of the horizontal ramus of the os pubis—external to the spine of the os pubis, forming Gimbernat's ligament. External and superior to the pubic attachment to the spine of the pubis, a deficiency presents in the aponeurosis—a slit-like opening—the *pubic* (external) abdominal ring. This opening has a superior and an internal border, and an inferior and external border, known as the pillars of the ring. A little superior and internal to the pubic ring the aponeurosis is perforated by the ilio-hypogastric nerve (Plate 23).

16. External Spermatic (Intercolumnar) Fascia.—From the pillars or borders of the pubic (external) abdominal ring, the superficial fascia upon the exterior of the obliquus externus muscle projects this fascial investiture upon the spermatic cord (male) or round ligament of the uterus (female).

Dissection.—Incise and open the external spermatic fascia upon the cord, exposing the subjacent investiture of the same.

17. Spermatic Cord (male) or **Round Ligament of the Uterus** (female).—The cord or ligament with its investments passes through the pubic (external) abdominal ring, also the ilio-inguinal nerve.

Dissection.—Incise the aponeurosis of the obliquus externus (Plate 24) by the median-line and bis-iliac incisions (2 and 3, Figure 3; page 43); reflect an inguinal flap of the same (Plate 25).

18. Pubic (External) Abdominal Ring, Plate 25.—The interior surface of this so-called ring shows its true character, viz.: a splitting or separation of the fibres of the aponeurosis of the obliquus externus. The pillars of the ring are well defined upon this surface.

DISSECTION.—Incise the obliquus externus muscle (Plate 24) as follows: at its lateral area, from the eleventh rib to the ilium, and along the crest of the ilium; at its rib attachments, dissect out its digitations from the interdigitations of the serratus magnus muscle. Reflect a flap of the superior antero-lateral area of the muscle, internally, to a line beyond the linea semilunaris; fold the portion of the muscle into a longitudinal roll at the side of the median line (Plate 25).

19. Intermuscular Septum.—A thin layer of fibrous tissue separates the obliquus externus from the obliquus internus muscle.

20. Ilio-hypogastric Nerve.—This nerve emerges through the obliquus internus muscle, internal to the anterior superior spinous process of the ilium; it continues exterior to the muscle, internally, to where it perforates the aponeurosis of the obliquus externus muscle, as before shown.

21. Ilio-inguinal Nerve.—This emerges through the obliquus internus muscle; it runs upon the muscle, parallel with and nearer to Poupart's ligament than the last named nerve. It emerges at the pubic (external) abdominal ring, with the spermatic cord (male) or round ligament of the uterus (female).

DISSECTION.—Clear the intermuscular fibrous tissue from the surface of the obliquus internus muscle.

22. Obliquus Internus Muscle, Fig. 1, Plate 21, and Plate 25.—This forms the second antero-lateral muscle plane of the abdominal parietes. It is attached: posteriorly, to the lumbar aponeurosis; inferiorly and externally, to the anterior two-thirds of the mid-space of the crest of the ilium and to the external half of Poupart's ligament; superiorly, to the cartilage of the twelfth rib, the eleventh rib, and the cartilages of the eleventh, tenth, and ninth ribs; internally, to the linea alba by the aponeurosis of the muscle—this splits at the linea semilunaris, to sheath the rectus, and then unites at the linea alba. Its middle Poupart ligament fibres are attached to the exterior of the tendon of the transversalis, externally to the inferior of the linea semilunaris. Its inferior Poupart ligament fibres (male) loop, inferiorly, to invest the spermatic cord upon its antero-external surfaces, returning, superiorly, to be attached to the anterior surface of the body of the os pubis. These looped fibres form what is called the *cremaster muscle.* In the female the looping of these inferior fibres of the obliquus internus muscle does not occur; the muscle fibres simply separate to give transit to the round ligament of the uterus, and pass, internally, to be attached to the conjoined tendon and the os pubis.

Dissection.—Dissect the ilio-hypogastric and ilio-inguinal nerves superiorly and reflect them externally. Make an incision through the fibres of the obliquus internus muscle from the anterior superior spinous process of the ilium to the linea semilunaris, a second through its fibres, attached to Poupart's ligament (Plate 25). Reflect the included inguinal portion of the muscle to the linea semilunaris. In the male trace the middle Poupart ligament fibres to the exterior of the conjoined tendon portion of the transversalis abdominis muscle; and the inferior fibres as they form the cremasteric loops upon the spermatic cord. In the female note the absence of cremasteric loops and the unbroken plane of the muscle. Incise the muscle as follows: from the eleventh rib to the ilium, and along its crest attachment; also below its attachments to the eleventh rib and its cartilage. Reflect a flap, internally, of the superior antero-lateral portion of the muscle to the linea semilunaris; throw the flap over the reflected obliquus externus muscle. The guides to the plane of intermuscular fibrous tissue, separating the obliquus internus from the transversalis abdominis muscle, are the vessels and nerves ramifying between these muscles. Remove the fibres of the obliquus internus to the conjoined tendon, noting, that they are inserted into the exterior surface of the transversalis portion of the tendon. Dissect off the cremasteric loops from the spermatic cord.

23. Intermuscular Septum.—A plane of fibrous tissue forms a septum between the obliquus internus and the transversalis abdominis muscles, in which vessels and nerves ramify.

Dissection.—Differentiate the nerves and arteries in the fibrous tissue plane, and dissect off the latter from the antero-lateral area of the transversalis abdominis muscle.

24. Deep Vessels and Nerves of the Parietes, Plates 26 and 27.—These vessels and nerves are the terminal branches of the four inferior intercostal arteries and nerves, which continue to the median line; they may be traced, internally, to where they penetrate the sheath of the rectus abdominis muscle. They supply the antero-lateral muscles and skin of the abdominal parietes. The ilio-hypogastric and ilio-inguinal nerves, branches of the first lumbar nerve, also present.

25. Deep Circumflex Iliac Artery, Plate 27.—This artery (vena comes) is a branch of the external iliac. It perforates the transversalis abdominis, near the anterior superior spinous process of the ilium, to wind, externally and superiorly, over the crest of the ilium, exteriorly to the muscle.

26. Transversalis Abdominis Muscle, Plates 27 and 42.—This forms the third antero-lateral muscle plane of the abdominal parietes. Its attachments are: to the interior surfaces of the cartilages of the six inferior ribs—interdigitating with digitations of the diaphragm ; to the lumbar aponeurosis, by which it is attached to the transverse processes of the lumbar vertebræ ; to the anterior three-fourths of the interior portion of the crest of the ilium ; to the external third of Poupart's ligament ; to the linea alba, by the aponeurosis of the muscle, which commences at the linea semilunaris ; and to the os pubis by the conjoined tendon.

27. Conjoined Tendon.—This is formed by the converging of the inferior Poupart ligament fibres of the transversalis abdominis muscle and the middle Poupart ligament fibres of the obliquus internus muscle, to a common point of attachment on the linea ilio-pectinea, externally and interiorly to the spine, and to the superior surface of the body, of the os pubis. The fibres of the obliquus internus are attached to the exterior of the aponeurosis of the transversalis. The tendon is located externally to the inferior end of the linea semilunaris, in a plane interiorly to the spermatic cord (male) or round ligament of the uterus (female), as it passes through the pubic (external) abdominal ring ; at its linea-ilio-pectinea attachment it lies interiorly to Poupart's and Gimbernat's ligaments.

DISSECTION.—Replace the flaps of the obliquus internus and externus muscles ; make an incision parallel with, and midway between, the linea alba and the linea semilunaris, through the aponeurosis of the obliquus externus and the exterior layer of the splitting of the aponeurosis of the obliquus internus. Reflect lateral flaps to each linea, respectively, exposing the rectus abdominis and the pyramidalis abdominis muscles.

28. Pyramidalis Abdominis Muscle, Plates 28 and 42.—This small, triangular, muscle lies exteriorly to the inferior portion of the rectus abdominis, at the side of the median line. At its base it is attached to the superior border of the body of the os pubis ; its fibres pass, superiorly, to its apex, at the linea alba, where it is attached about a third or a half of the distance from the symphysis pubis to the umbilicus.

29. Rectus Abdominis Muscle.—This muscle, as its name implies, is straight fibred ; it is attached, inferiorly, to the superior surface of the body of the os pubis from the symphysis to the spine ; superiorly, to the exterior surfaces of the ensiform cartilage of the sternum, and the cartilages of the seventh, sixth and fifth ribs. The muscle fibres are intersected at and above the umbilicus by three fibrous portions, which determine the lineæ transversæ ; the latter are attached to the exterior layer of the sheath of the muscle.

30. Sheath of the Rectus Abdominis Muscle, Plate 28.—This invests the abdominal portion of the muscle, between its pubic and thoracic attachments. It is formed by the aponeuroses of the antero-lateral muscles of the abdominal parietes. The aponeurosis of the obliquus externus continues to the linea alba from the ensiform cartilage to the symphysis pubis. The aponeurosis of the obliquus internus splits at the linea semilunaris into two layers for the superior three-quarters of the muscle portion ; one layer passes exteriorly to the muscle and interiorly to the aponeurosis of the obliquus externus ; the other layer passes interiorly to the muscle. Internally to the muscle the two layers reunite at the linea alba. For the inferior quarter of the abdominal portion of the rectus abdominis muscle, the aponeurosis of the obliquus internus does not split, but, as a single layer, passes to the linea alba, exteriorly to it. The aponeurosis of the transversalis abdominis, for the superior three-fourths of the abdominal portion of the muscle, continues to the linea alba, interiorly to the muscle and the interior layer of the split aponeurosis of the obliquus internus ; for the inferior quarter of the muscle portion, it passes to the linea alba exteriorly to the muscle. The exterior portion of the sheath of the rectus is formed thus: from without inward, for its superior portion, by the aponeurosis of the obliquus externus and the exterior layer of the obliquus internus ; for the inferior quarter, of its abdominal portion, by the aponeuroses—in single layers of each—of the obliquus externus and internus, and the transversalis abdominis muscles. The interior portion of the sheath is deficient at the inferior quarter of the abdominal portion of the muscle ; for the superior three-quarters, it is formed—from without inward—by the interior layer of the aponeurosis of the obliquus internus and the aponeurosis of the transversalis abdominis muscle. The interior layer of the sheath is attached, superiorly, to the inferior borders of the seventh and eighth costal cartilages and the ensiform cartilage of the sternum.

31. Linea Semilunaris.—This fibrous line is contributed to by the superposition of the aponeuroses at the external edge of the rectus abdominis muscle.

32. Linea Alba.—This line is formed by the intersection of the aponeuroses of the three pairs of antero-lateral muscles, at the median line, from the symphysis pubis to the ensiform cartilage of the sternum, between the internal borders of the recti muscles.

DISSECTION.—Remove the pyramidalis abdominis muscle. Trace the nerves exterior to the transversalis abdominis muscle into the substance of the rectus abdominis muscle (Plate 26). Trace the deep epigastric artery and its branches, superiorly, through the rectus abdominis muscle, and determine their anastomoses with the superior epigastric branch of the internal mammary; preserve these arteries within the sheath, by cutting away the substance of the muscle tissue between them (Plate 28). Note the course of the spermatic cord, or of the round ligament of the uterus between the inferior edge of the transversalis abdominis muscle (Plate 27) and Poupart's ligament, upon the portion of the transversalis fascia there presenting. Cut away the obliquus externus and internus muscles, external to the lineæ semilunares; trim the aponeurotic flaps of the exterior portions of the sheaths of the recti muscles close to the lineæ semilunares and the linea alba. Cut the intercostal nerves and vessels close to their emergence from between the ribs. Cut the circumflex iliac arteries at their points of penetration of the transversalis abdominis muscles. Section the transversalis abdominis muscle: along the inferior border of the eleventh rib and the borders of the cartilages of the three lower ribs; from the eleventh rib to the ilium; along the crest of the ilium; and at its Poupart ligament attachment. Reflect an antero-lateral flap of the transversalis abdominis muscle, internally, to the linea semilunaris, where it may be cut away.

33. Transversalis Fascia.—This fascia lines the transversalis muscle; it is thick and well defined at its inguinal portion, but much less so superiorly; it continues, internally, to the linea alba, interior to the sheath of the rectus abdominis muscle.

34. Iliac (internal) Abdominal Ring.—This so-called ring is the point of emergence through the transversalis fascia of the spermatic cord or of the round ligament of the uterus; it is situated superior to the middle of Poupart's ligament. A process of the transversalis fascia is projected, like the tube of a funnel, inferiorly, upon the cord or the ligament, as the *internal spermatic* (*infundibuliform*) *fascia.*

DISSECTION.—Make an incision through the transversalis fascia from the anterior superior spinous process of the ilium to the linea semilunaris. Reflect a partial inguinal flap, so as to expose the interior of the iliac (internal) abdominal ring. The guide to the reflection of this flap of fascia is the deep epigastric artery, which lies in the plane of the subserous areolar tissue between the fascia and the peritoneum. Note the transit of the elements of the spermatic cord into the funnel tube process (internal spermatic fascia) upon the cord.

35. Subserous Areolar Tissue.—This is a plane of loose fibrous tissue, between the transversalis fascia and the peritoneum. Inferior to the umbilicus, it allows the peritoneum to be readily separated from the transversalis and iliac fasciæ; superior to the umbilicus, it is very little developed, thereby rendering the separation of the peritoneum much more difficult.

36. Deep Epigastric Artery.—This artery (vena comes) is a branch of the external iliac, which reaches the anterior parietes of the abdomen through the subserous tissue exterior to the peritoneum. It runs internal to the iliac (internal) abdominal ring, superiorly and internally, to where it enters the sheath of the rectus abdominis muscle—about on the bis-iliac line. Within the sheath it passes superiorly, through the contained muscle, and anastomoses with the superior epigastric artery; the latter artery is one of the terminal branches of the internal mammary artery, which enters the superior part of the rectus muscle, from the thorax.

DISSECTION.—Slit up the internal spermatic (infundibuliform) fascia (Plate 28), so as to expose the spermatic cord. Distinguish the elements of the spermatic cord, and trace the same beneath the peritoneum into the iliac fossa.

37. Elements of the Spermatic Cord.—These are: the vas deferens, a hard, well-defined duct; the spermatic veins, arteries and nerves. The vas deferens winds abruptly, internally, behind the deep epigastric artery, to pass into the pelvic cavity beneath the peritoneum; the vessels and nerves continue, superiorly, between the peritoneum and the iliac fascia.

FIG. 1

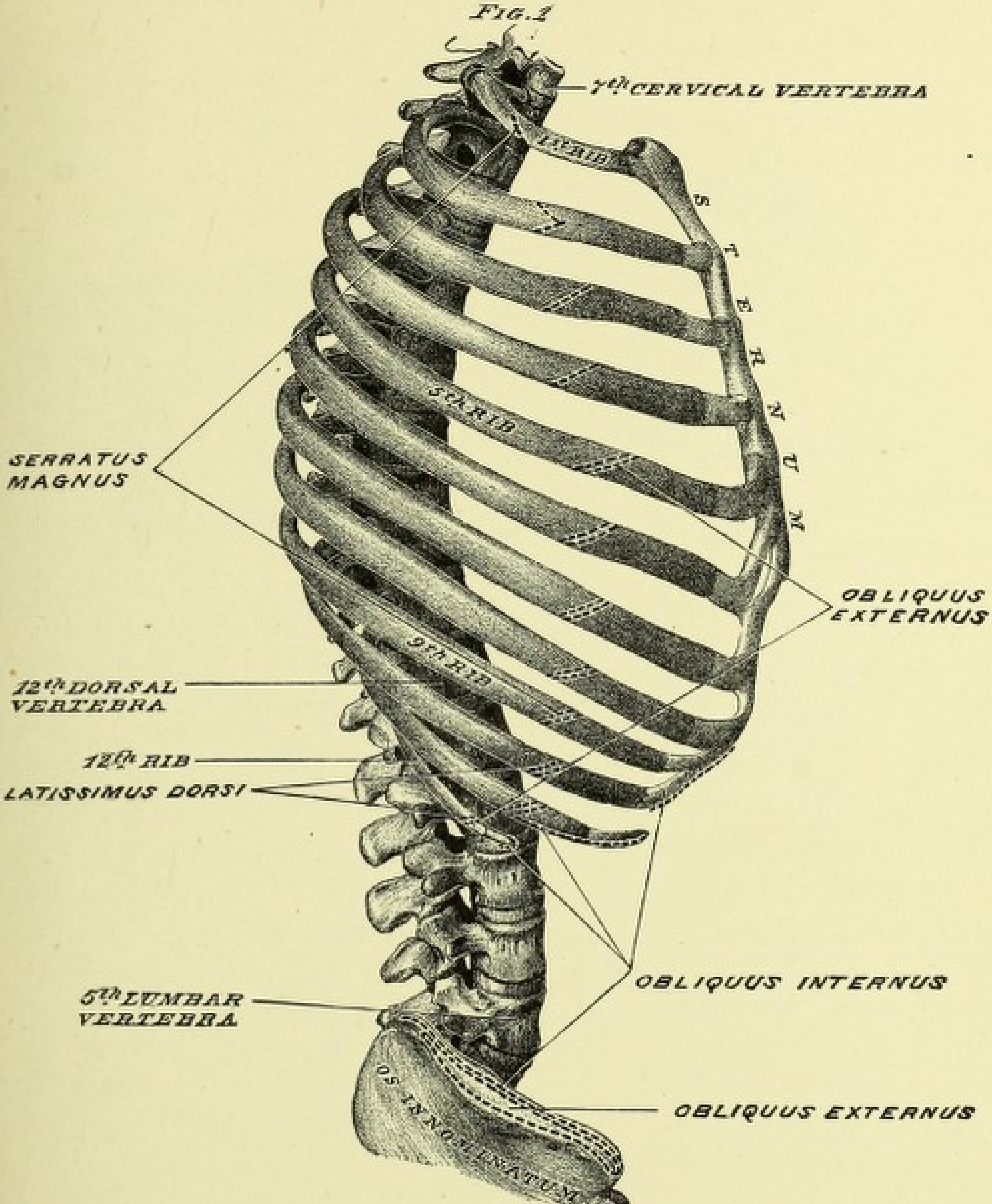
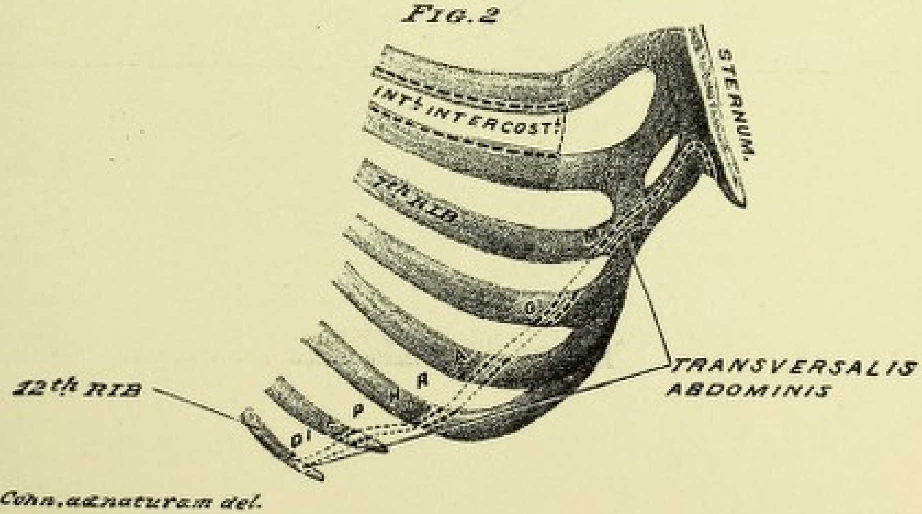


FIG. 2



M. Cohn, ad naturam del.

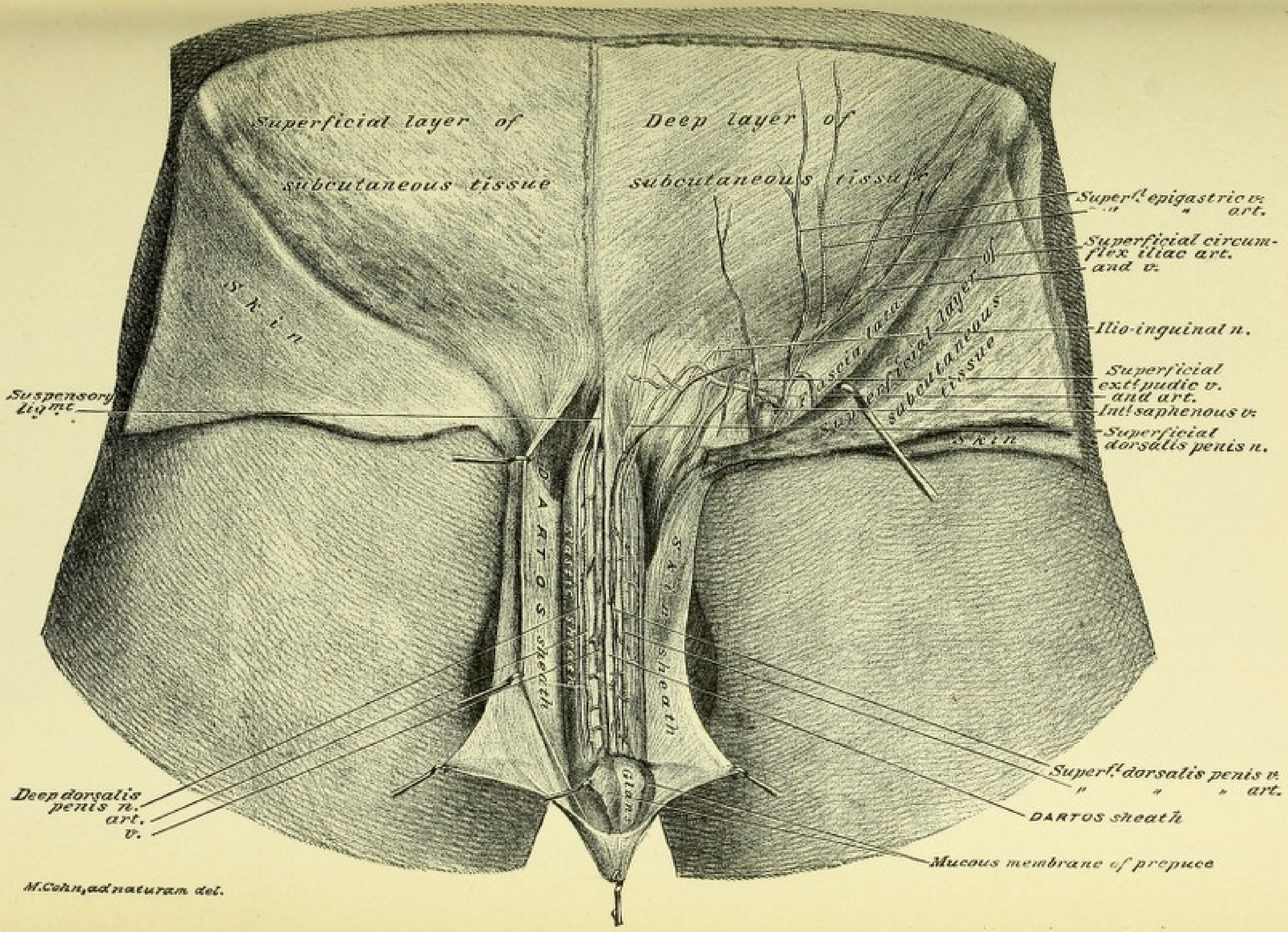
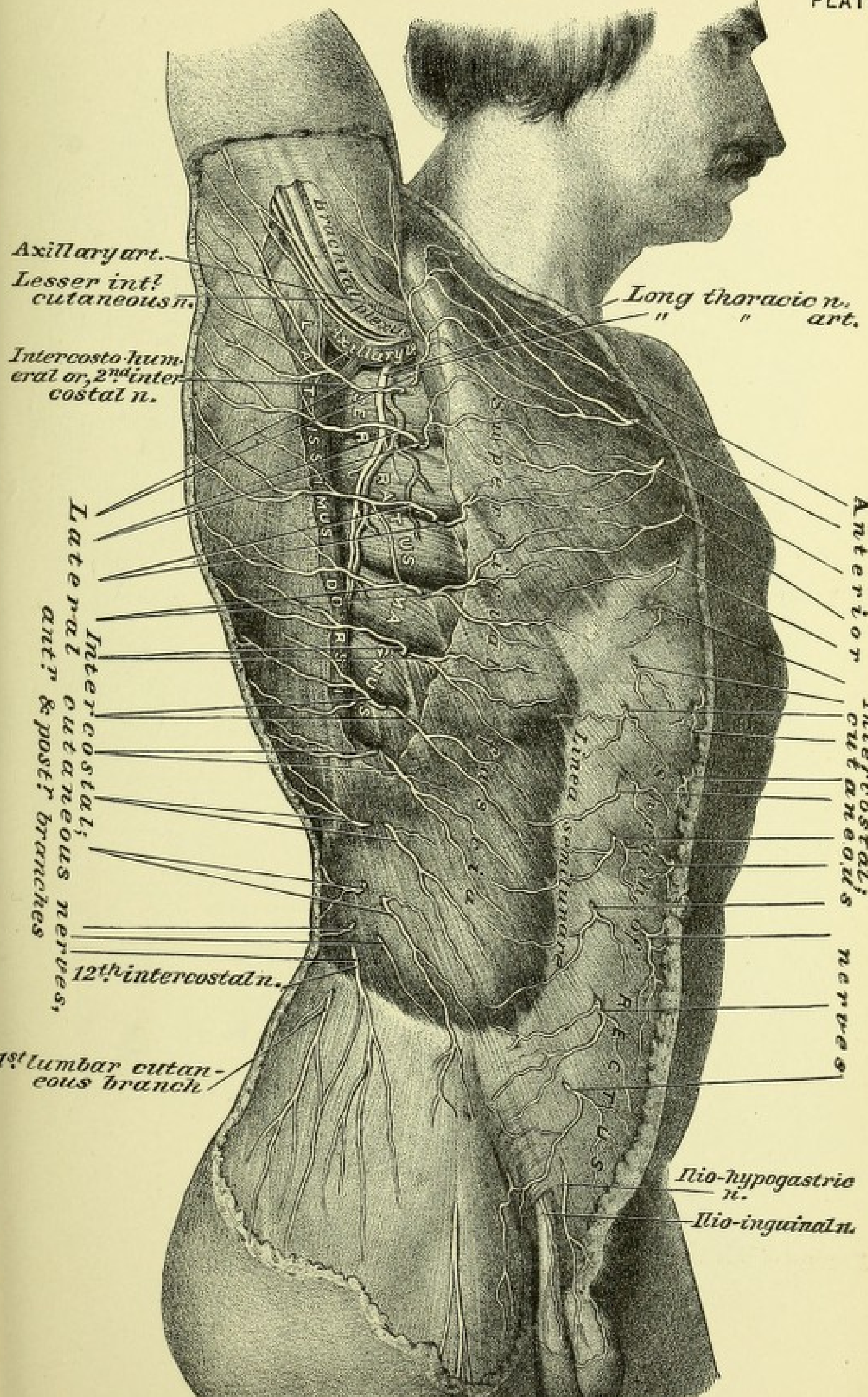
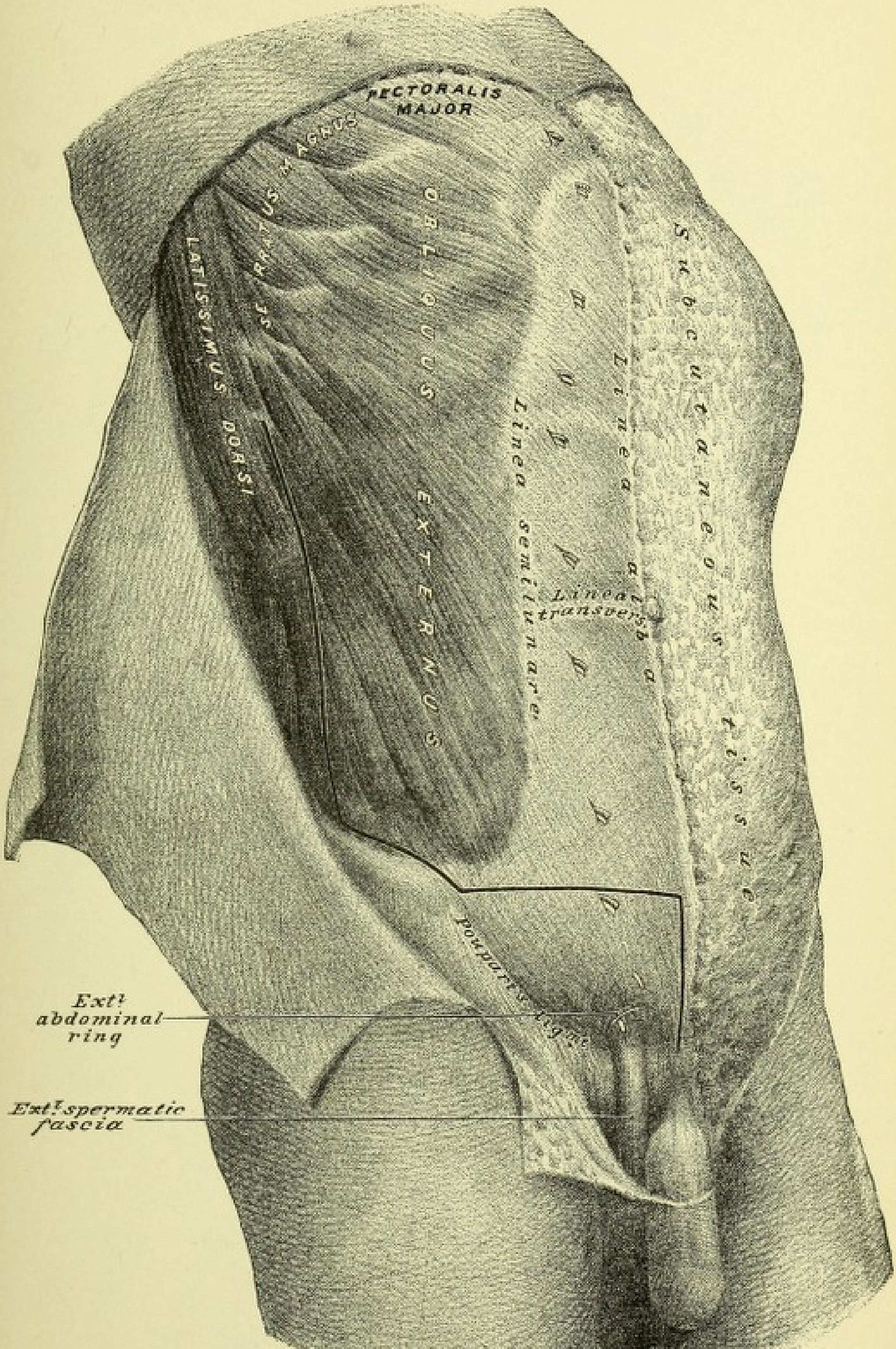

Superficial layer of
subcutaneous tissue
Deep layer of
subcutaneous tissue
Skin
Superf'l epigastric v.
" " art.
Superficial circumflex iliac art. and v.
Ilio-inguinal n.
Fascia lata
Superficial layer of subcutaneous tissue
Superficial ext'l pudic v. and art.
Int'l saphenous v.
Skin
Superficial dorsalis penis n.
Suspensory lig'mt
DARTOS sheath
Elastic sheath
Skin sheath
Glans
Deep dorsalis penis n.
art.
v.
Superf'l dorsalis penis v.
" " " art.
DARTOS sheath
Mucous membrane of prepuce
M. Cohn, ad naturam del.

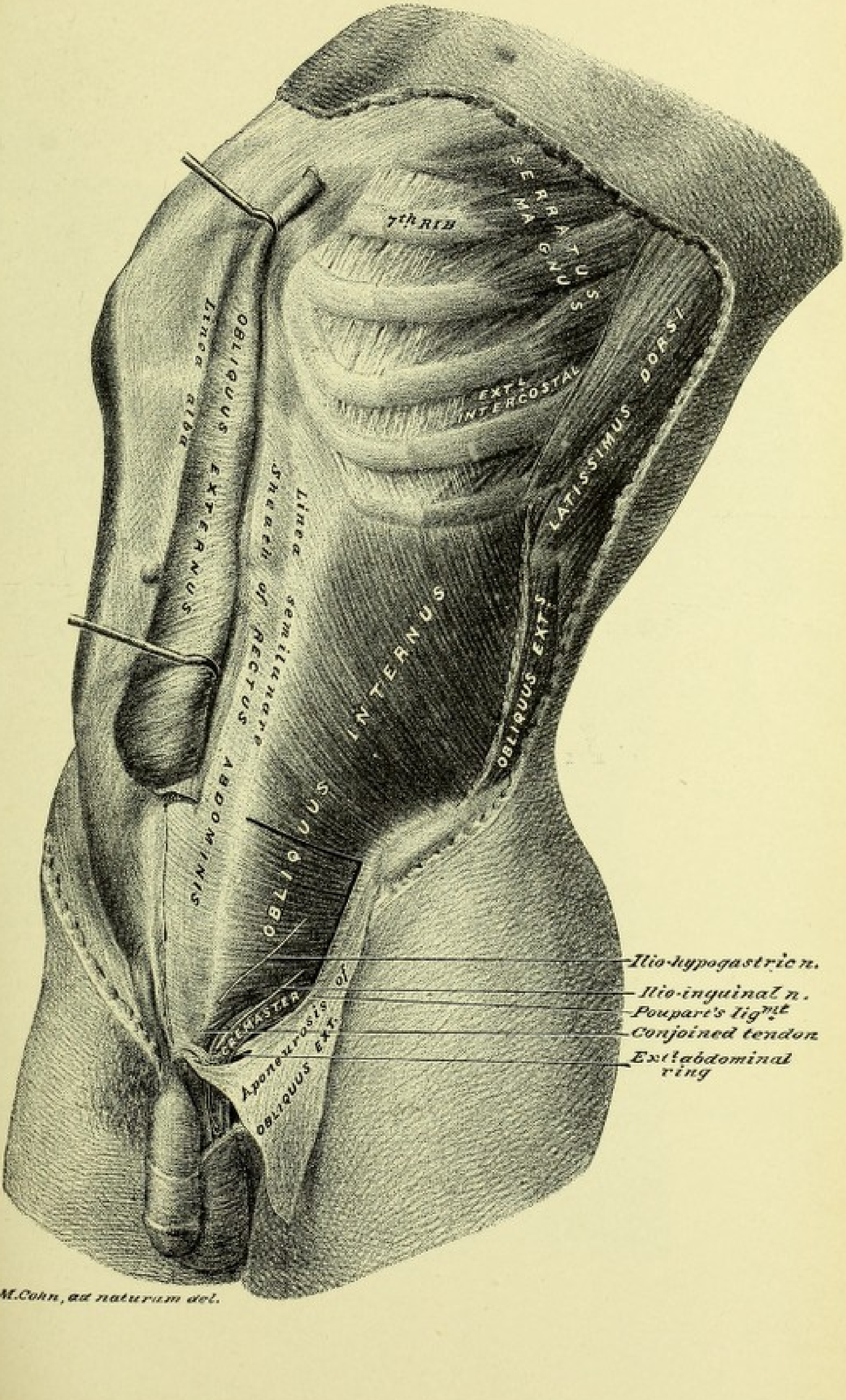
PLATE 23



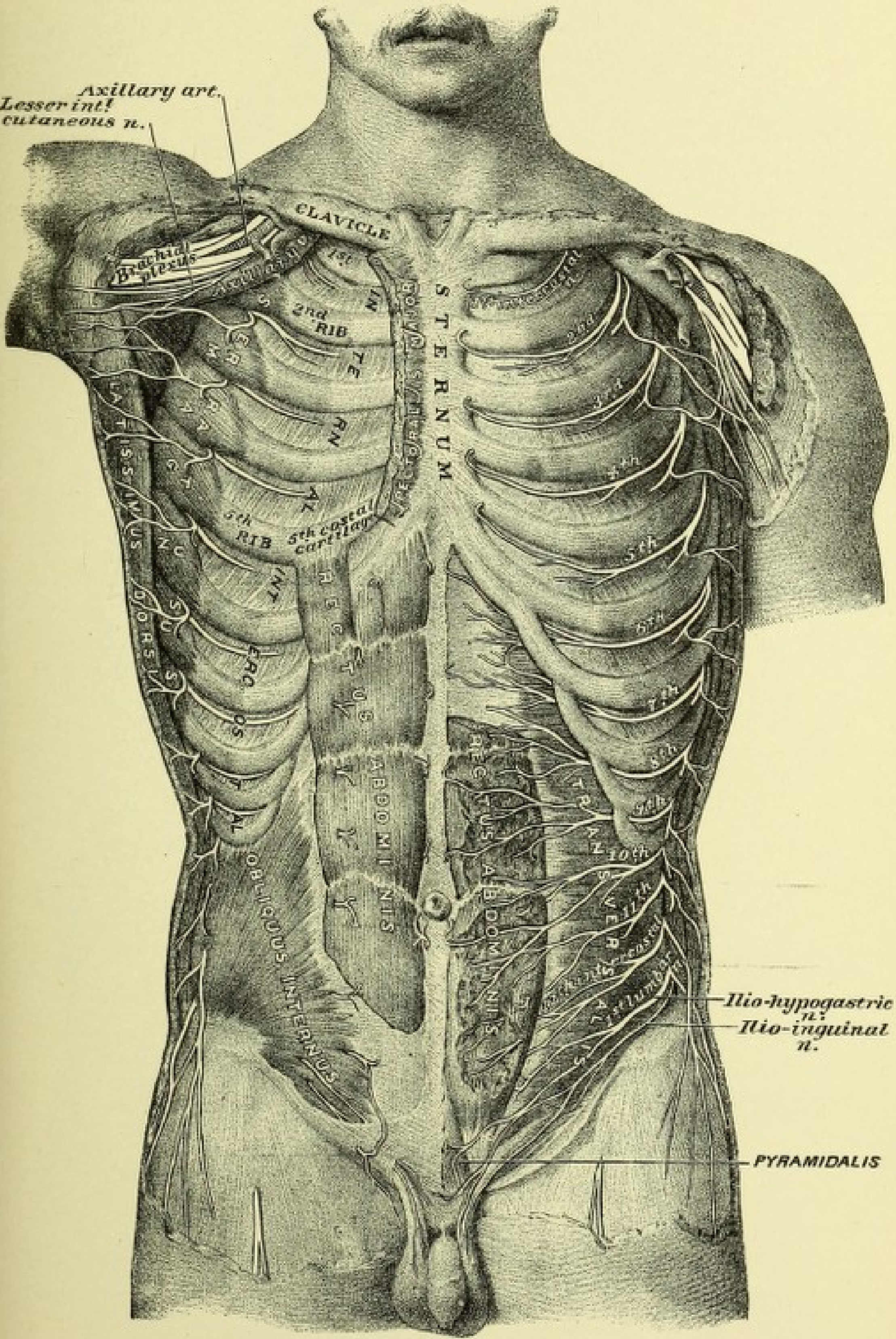
Axillary art.
Lesser int! cutaneous n.
Intercosto-humeral or, 2nd inter costal n.
Long thoracic n.
" " art.
Lateral Intercostal; cutaneous nerves, ant!r & post!r branches
12th intercostal n.
1st lumbar cutaneous branch
Anterior Intercostal cutaneous nerves
Ilio-hypogastric n.
Ilio-inguinal n.
Linea semilunaris

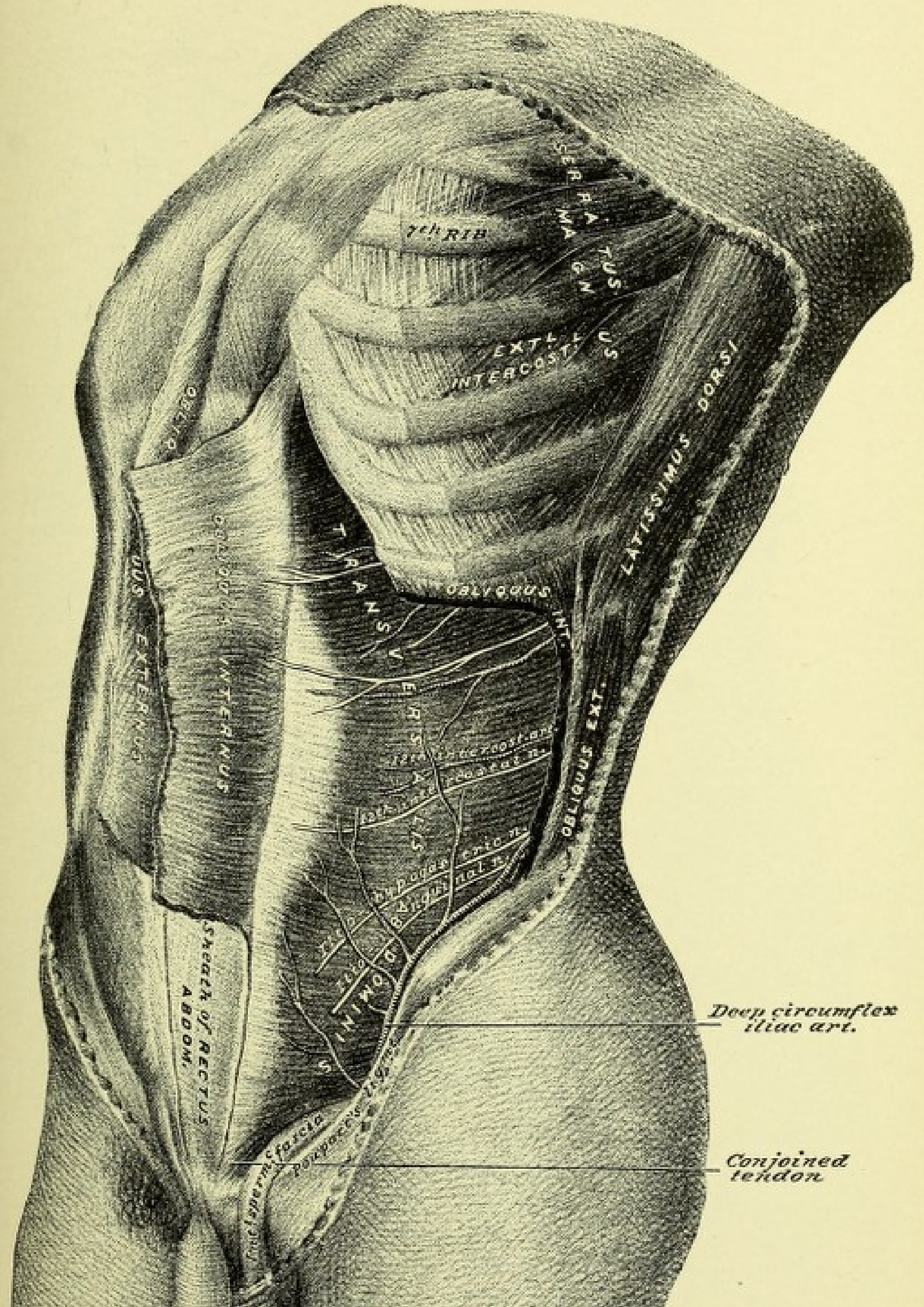


M Cohn, ad naturam del.

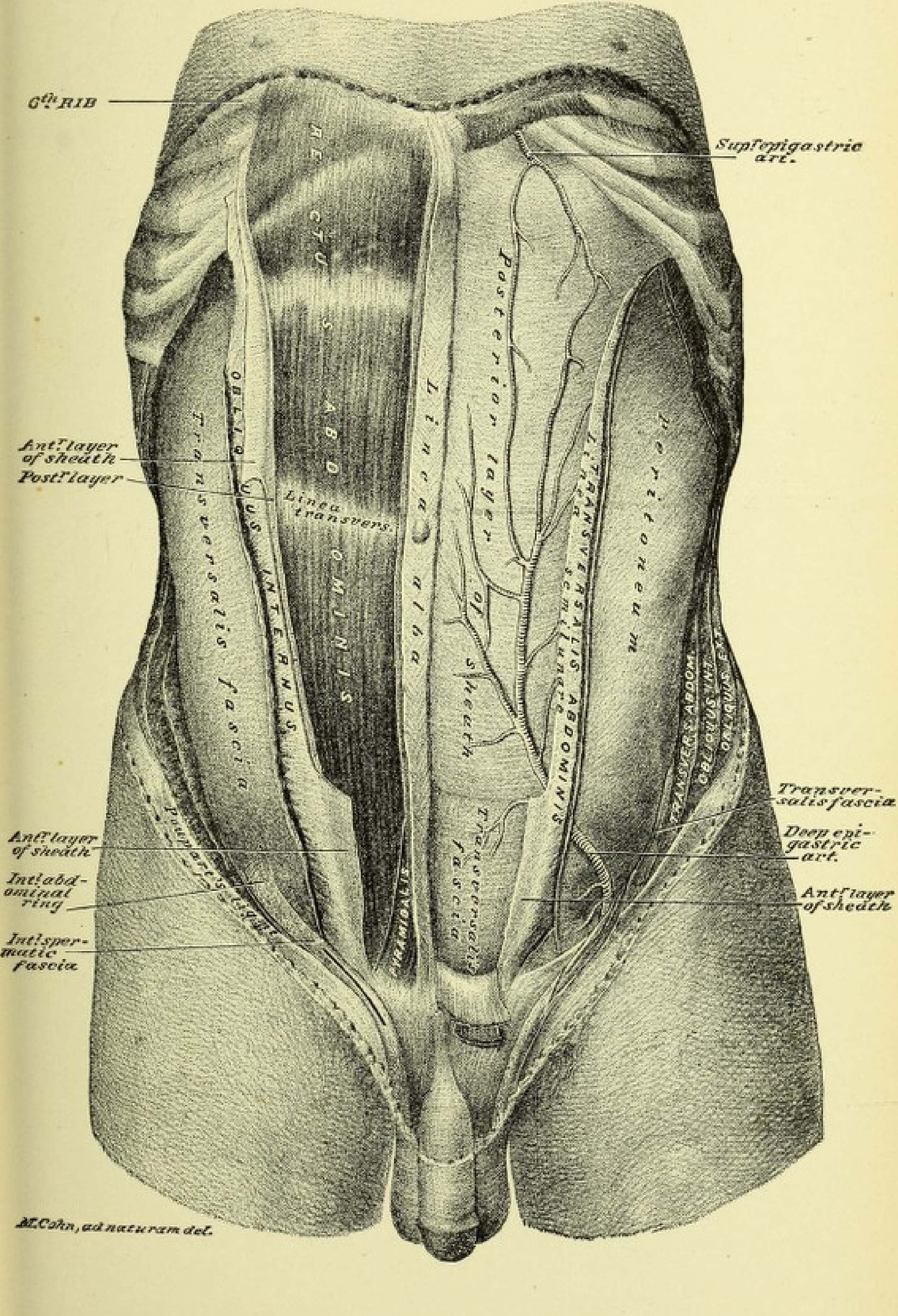


M. Cohn, ad naturam del.


Axillary art.
Lesser int! cutaneous n.
Brachial plexus
CLAVICLE
STERNUM
2nd RIB
5th RIB
5th costal cartilage
RECTUS ABDOMINIS
OBLIQUUS INTERNUS
RECTUS ABDOMINIS
TRANSVERSALIS
Ilio-hypogastric n.
Ilio-inguinal n.
PYRAMIDALIS



M. Cohn, ad nat. del.


6th RIB
Supr. epigastric art.
RECTUS ABDOMINIS
Posterior layer of sheath
Linea alba
Peritoneum
Ant. layer of sheath
Post. layer
Linea transvers.
OBLIQUUS INTERNUS
Transversalis fascia
TRANSVERSALIS ABDOMINIS
Linea semilunaris
Transversalis fascia
Transversalis fascia
Deep epigastric art.
Ant. layer of sheath
Ant. layer of sheath
Int. abdominal ring
Poupart's ligt.
Int. spermatic fascia
PYRAMIDALIS
M. Cohn, ad naturam del.

FOURTH DISSECTION.

ABDOMINAL VISCERA IN SITU.

DISSECTION.—Clear the antero-lateral areas of the parietal layer of the greater peritoneum, by removing the interior portion of the sheath of the rectus abdominis muscle, right and left, and the transversalis fascia. Be careful in dissecting off the transversalis fascia from the peritoneum, that the latter be not torn into; indeed, the superior portion of the fascia may be left upon the peritoneum. Dissect out and preserve, *in situ*, the obliterated fœtal vessels and duct, which lie between the transversalis fascia and the peritoneum.

1. Obliterated Urachus, Plate 29.—This is located along the median line from the umbilicus to the fundus of the bladder, in the plane of the subserous areolar tissue exterior to the peritoneum. In adult life it is a fibrous cord, which serves the purpose of a superior ligament to the bladder.

2. Obliterated Hypogastric Arteries.—These are located in the same plane of subserous tissue; they diverge from the umbilicus, right and left, inferiorly, to the hypogastric region, where they dip into the pelvic cavity, exterior to the peritoneum, to become continuous with the superior vesical branches, right and left, of the anterior trunks of the internal iliac arteries.

3. Greater and Lesser Peritoneum, Plates 29, 30 and 31. —These are two distinct serous membranes, which form two distinct serous cavities, which invest the sub-diaphragmatic portions of the digestive apparatus, etc., to insure their mobility upon each other in performing their respective functions and in their induced motions by respiration, etc.

DISSECTION.—Section the antero-lateral or parietal layer of the greater peritoneum (Plate 29), to the left of the median line, from the ensiform cartilage of the sternum to a point just below the umbilicus; make a second section, transversely, to the left, from the inferior end of the first; reflect the flap upon the exterior of the left lower ribs, to which it may be pinned. Demonstrate the cavity of the greater peritoneum by passing the hand and arm into it:

to the right, superiorly, recognize the broad and round ligaments of the liver ; at the middle and to the left is the stomach, with the spleen capping its fundus ; inferiorly, is the great omentum, through which the contour of the transverse colon may be felt. Introduce the hand beneath the great omentum and feel—in the middle—the convolutions of the small intestine and the under surface of the transverse colon; to the right, the ascending colon and cæcum ; to the left, the descending colon and the sigmoid flexure ; inferiorly, the superior contours of the pelvic organs. Return the hand out of the cavity along the interior of the antero-lateral or parietal layer of the greater peritoneum.

4. Greater Peritoneum and Cavity of the Greater Peritoneum, Plates 30, 31, 32, 34, 35, and 37.—The greater peritoneum is spread, and forms its cavity, as follows: it invests the anterior of the inferior concave surface of the diaphragm (Plate 31) ; passes from the diaphragm to the stomach, by the œsophagus, and to the antero-superior surface of the liver—as the broad (Plate 30), the anterior layer of the coronary and the lateral ligaments ; from the anterior of the liver it passes to its postero-inferior surface ; from the latter surface it bridges to the lesser curvature of the stomach, as the antero-superior layer of the anterior portion of gastro-hepatic omentum ; thence it spreads over the anterior surface of the stomach (Plate 31). From the greater curvature of the stomach it bridges to the transverse colon—the anterior of two layers of serous membrane ; from the colon it is dropped (Plate 31), and then returns upon itself—*great omentum*—to the inferior surface of the transverse colon, from which it is projected to the posterior wall of the abdomen (Plate 31). At the right of the posterior wall of the abdomen it covers the duodenum, the ascending colon, and cæcum (Plate 34)—forming the ascending meso-colon and the meso-cæcum. To the left it is projected, from the line of attachment of the *mesentery* (Plate 34), as its right layer, which reduplicates by investing the jejunum and ileum ; it returns upon itself, to its line of attachment, as the left layer of the *mesentery*. To the left of the mesentery attachment it spreads to the descending colon and sigmoid flexure (Plate 35)—forming the descending meso-colon and the meso-sigmoid. From the meso-cæcum, to the right, the meso-sigmoid, to the left, and the mid-portion of the posterior of the abdominal wall, it passes into the pelvic cavity (Plates 35 and 37), covering the superior portions of the pelvic viscera—forming the meso-rectum, and ligaments of the uterus and bladder. From the fundus of the bladder (posteriorly to the urachus and the obliterated hypogastric arteries), by the external layer of the meso-cæcum and ascending meso-colon (at the right), and by the external layer of the meso-sigmoid and descending meso-colon (at the left), it is reflected to line the interior of the antero-lateral parietes of the abdomen (Plate 31) and returns thereby to the inferior surface of the diaphragm.

5. Broad Ligament of the Liver, Plate 30.—This, formed by two layers of the greater peritoneum, makes a scythe-shaped ligament, attached as follows: by its base to the anterior convex surface of the liver; by its convexity to the diaphragm and the interior of the right anterior wall of the abdomen; by its apex to the umbilicus; its concavity is a reduplicated free edge, from the umbilicus to the notch at the inferior border of the liver.

6. Round Ligament of the Liver.—This, the obliterated umbilical vein, is lodged, within the reduplicated free edge of peritoneum, at the concavity of the broad ligament, passing into the notch at the inferior border of the liver.

Dissection.—Cut the round and broad ligaments at their attachments to the abdominal parietes, and allow them to drop back upon the liver (Plate 30). Section the peritoneum—parietal antero-lateral portion—transversely to the right, and inferiorly along the left of the median line and reflect flaps. Make a transverse cut through the peritoneum between the greater curvature of the stomach and the transverse colon (Plate 30); introduce the hand into the cavity of the lesser peritoneum and feel the following: inferiorly, the transverse colon; posteriorly, the pancreas crossing the vertebral column; superiorly and anteriorly, to the left, the entire postero-inferior surface of the stomach, to the right, the portion of the lesser peritoneum, which forms the postero-inferior layer of the gastro-hepatic omentum (Plate 31). Find the foramen of Winslow (the orifice of communication of the cavity of the lesser with that of the greater peritoneum, the border of the orifice being the line of continuity of the two serous membranes): the left hand in the cavity of the lesser peritoneum, its index finger passed to the postero-inferior surface of the liver, and directed transversely, and to the right, at a point posteriorly to the hepatic vessels, will enter the foramen; the right hand in the cavity of the greater peritoneum posteriorly to the right lobe of the liver, its index finger passed to the left, parallel with and posteriorly to the gall-bladder, will enter the foramen or meet the finger of the left hand, before introduced.

7. Lesser Peritoneum and Cavity of the Same, Plate 31.—The lesser peritoneum is spread, and forms its cavity, as follows: its anterior portion invests the postero-inferior surface of the stomach ; superiorly to the stomach, it forms the posterior layer of the gastro-hepatic omentum ; inferiorly to the stomach, it spreads as the posterior layer of the two layers of serous membrane between the greater curvature of the stomach and the transverse colon ; its posterior portion covers the anterior surface of the pancreas and the abdominal vessels ; and lines the antero-superior surface of the portion of the greater peritoneum from the inferior of the transverse colon to the posterior wall of the abdomen.

8. Great Omentum or Peritoneal Apron, Plates 30 and 31.—This, reduplication of the greater peritoneum, hangs in the cavity of the greater peritoneum from the transverse colon. It spreads over the small intestine, hanging lower on the left than on the right side. Superiorly, it spreads, to the right and left, upon the ascending and the descending portions of the colon, respectively.

9. Liver, Plate 30.—This organ is located interiorly to the right lower ribs and the end of the sternum, and projects interiorly to the left lower costal cartilages. The lower half of its left lobe bridges between the right and the left ribs in the epigastric region, covering the lesser curvature of the stomach.

10. Gall-Bladder.—The fundus of the gall-bladder presents below the free border of the liver, to the right of the notch, at about the extremity of the cartilage of the right tenth rib.

11. Stomach.—This viscus lies posteriorly to the left lobe of the liver, and interiorly to the left lower ribs and cartilages. Its inferior border projects below the left lobe of the liver.

12. Small Intestines.—Convolutions of this intestine will be found projecting from beneath the inferior border of the outspread great omentum or peritoneal apron.

Dissection.—Raise the great omentum, and reflect it, superiorly, upon the anterior face of the thorax ; carry the transverse colon upward with it.

13. Small Intestine, Plate 32.—This, the second portion of the subdiaphragmatic part of the alimentary canal, consists of three divisions: the duodenum, the jejunum and the ileum (respectively, one, eight and twelve feet long). The jejunum and ileum, *in situ,* hang toward the left inguinal region.

14. Transverse Meso-Colon.—This is the projection of peritoneum from the posterior wall of the abdomen to the transverse portion of the colon.

Dissection.—Collect the ileal and jejunal portions of the small intestine in the hands, and holding them off from the posterior abdominal parietes, the portion of the greater peritoneum, the mesentery, by which they are swung in the abdominal cavity, is demonstrable. Reflect the ileum and jejunum of the small intestine to the left.

15. Mesentery, Plate 34.—This is formed by two layers, right and left, of the greater peritoneum, which are attached across the interior of the posterior wall of the abdomen, from the left of the body of the second lumbar vertebra to a point opposite the right sacro-iliac articulation: the right layer spreads from its attachment, to its peripheral investment of twenty feet of the small intestine (the jejunum and ileum); the left layer returns from the intestine, narrowing to its attachment. The length of the mesentery between its attachment and the intestine varies from one and a half to six inches. Between the layers of the mesentery are lodged the superior mesenteric artery and its branches to, their venæ comites from, the lymphatic vessels from, and the nerves to, the jejunum and ileum of the small intestine; also, the mesenteric lymphatic glands.

Dissection.—Incise the right layer of the mesentery along the line of its attachment, and dissect the same, to the left, from off the superior mesenteric vein; trace the vein and its branches.

16. Superior Mesenteric Vein.—This vein lies to the right of and—with the small intestine swung to the left—anterior to the superior mesenteric artery. It is formed by the veins from the ileal and jejunal portions of the small intestine; the ileo-colic, colica dextra and colica media veins of the large intestine also contribute to it. The trunk, with the mesenteric artery, lies upon the duodenum; both appear between the latter and the body of the pancreas.

DISSECTION.—Cut the mesenteric vein at the trunk and dissect the branches off from the subjacent arteries (leave the stump of the vein as in Plate 34). Include a length of eight or ten inches of the small intestine between two ligatures, and inflate it with the blow-pipe. Trace the branches of the superior mesenteric artery; also the intestinal branches of the sympathetic nerve.

17. Abdominal Portion of the Sympathetic Nervous System, Plate 33.—In the course of the dissection of the arteries in the abdominal cavity, the plexuses and branches of this portion of the sympathetic nervous system will be exposed. (The Plate is introduced here, that the dissector may recognize these nerves as he meets with them upon the arteries; except as a special dissection it is not necessary to preserve them.)

18. Superior Mesenteric Artery, Plate 34.—This artery, branch of the abdominal aorta, emerges from between the pancreas and duodenum and enters between the layers of the mesentery. The trunk is directed obliquely to the right inguinal region, where it terminates by anastomosing with the ileal branch of the ileo-colic artery. From the left of the trunk are given off the intestinal branches to the jejunal and ileal portions of the small intestine; these latter, branching continuously, become the *rami intestini tenuis*, which distribute to the two surfaces of the intestine, whose walls they penetrate.

DISSECTION.—Incise the posterior layer of the peritoneum, forming the transverse meso-colon, inferior to the raised transverse colon—take the plane of the arteries beneath it as the guide of the layer—and dissect off the posterior layer of the meso-colon, exposing the colica media artery, branch of the superior mesenteric.

19. Colica Media Artery.—This artery (vena comes) is given off from the right side of the superior mesenteric, near its emergence from between the pancreas and the duodenum; soon after its origin it gives off the colica dextra branch. The trunk bifurcates into a right and left branch, which distribute to the transverse colon; the left branch anastomoses with the colica sinistra artery of the descending colon.

20. Colica Dextra Artery.—This branch (vena comes) of the last described artery extends to the right, bifurcating to distribute to the ascending colon. The superior branch anastomoses with the right branch of the colica media.

21. Ileo-colic Artery.—This is the second artery (vena comes), given off from the right side of the superior mesenteric trunk. It bifurcates into a superior and an inferior branch: the superior distributes to the commencement of the ascending colon, anastomosing with the inferior branch of the colica dextra; the inferior distributes to the cæcum and the terminal portion of the ileum, and anastomoses with the trunk of the superior mesenteric artery.

DISSECTION.—Tie the ileum with two ligatures at about four inches from the colon, and section the gut between them; with the straight scissors the ileum and jejunum of the small intestine may be stripped into a basin, by cutting the rami intestini tenuis and the mesentery, close to and parallel with the gut; the duodenum reached, apply two ligatures to the superior end of the jejunum, and section the intestine between them. Section the superior mesenteric artery the same length as the vein, and remove its trunk and branches. Trim away the great omentum or peritoneal apron from the transverse colon and the superior portions of the ascending and descending colon, respectively; also from the greater curvature of the stomach. Dissect away the transverse meso-colon (anterior layer) from the transverse colon. Spread the large intestine as in Plate 35. Follow the distribution of the inferior mesenteric artery, by dissecting off the peritoneum from the left side of the posterior wall of the abdomen, and reflecting the anterior layer of the meso of the sigmoid flexure.

22. Large Intestine, Plates 34 and 35.—This portion of the alimentary canal is divided into the cæcum, the colon and the rectum. The cæcum, lodged in the superior part of the right iliac fossa, and completely invested by peritoneum, is inferior to the ileo-colic opening—the latter at the junction of the cæcum and colon. From the cæcum is appended a blind tube, the appendix vermiformis, which curls inferiorly and is suspended by a special meso; as located it has two flexures to the left. The colon is subdivided into the ascending, the transverse and the descending; the ascending colon for its first half, is fixed to the interior of the right posterior wall of the flank, by the ascending meso-colon. The superior half of the ascending colon, the transverse colon and the superior half of the descending colon are suspended by the transverse meso-colon and the great omentum and have the greatest possible mobility; the inferior half of the descending colon is fixed to the interior of the left lumbar region by a meso-colon; the sigmoid flexure is a coil of the descending colon, which is suspended by a long meso, by which it is made susceptible of great mobility and distention. The rectum continues the large intestine into the pelvic cavity.

23. Inferior Mesenteric Artery, Plate 35.—This artery (vena comes), a branch of the abdominal aorta, lies to the left of the vertebral column exterior to the peritoneum. Its colica sinistra branch distributes to the descending portion of the colon, bifurcating into an ascending and a descending branch: the ascending anastomoses with the left branch of the colica media (page 60); the descending anastomoses with the sigmoid branch. The sigmoid branch supplies the sigmoid flexure of the colon; its distribution is similar to that of the rami intestini tenues (see page 60, and Plate 34). The superior hemorrhoidal is the terminal portion of the trunk; it distributes to the superior part of the rectum, passing into the pelvic cavity upon the gut, between the layers of the meso-rectum of the pelvic portion of the greater peritoneum.

Dissection.—Dissect off the posterior layer of the lesser peritoneum from the anterior surface of the pancreas, trimming it away at the superior edge of the oblique portion of the duodenum; by this the head of the pancreas will be exposed in the curve of the duodenum. Hook up the left lobe of the liver against the costal cartilages and sternum; open the anterior layer of the gastro-hepatic omentum, and cut it away from the lesser curvature of the stomach, and from the opposite posterior inferior surface of the liver. Determine the parts, contained between the layers of the gastro-hepatic omentum.

24. Cœliac Axis, Plates 35 and 36.—This arterial axis presents superior to the lesser curvature of the stomach; where it trifurcates into: the gastric or coronary, which passes to the left and superiorly; the splenic, which is directed to the left and inferiorly; the hepatic, which runs to the right.

25. Gastric or Coronary Artery.—This artery (vena comes) distributes to the stomach. Reaching the left of the lesser curvature of that organ, it bifurcates: the left branch distributes to the œsophageal extremity of the stomach, anastomosing with the œsophageal arteries; the right curves along the lesser curvature of the stomach, to anastomose with the pyloric branch of the hepatic.

26. Splenic Artery.—This artery (vena comes) disappears posterior to the stomach in the direction of the organs it supplies.

27. Hepatic Artery.—This trunk is directed to the right, superior to the pyloric end of the stomach; it gives off the gastro-duodenal and the cystic (to the gall-bladder) arteries, after which it divides into branches, which enter the transverse fissure of the liver.

Dissection.—Trace the cystic artery to the gall-bladder; dissect off the peritoneum from the exposed surface of that organ, from its fundus to its apex; find the cystic duct and follow it to the ductus communis choledochus; clear the surface of the exposed portion of the latter duct. Raise the branches of the hepatic artery and clean the surface of the vena portæ, lodged to the left of the ductus communis choledochus.

28. Cystic Artery.—This artery (vena comes), branch of the hepatic or gastro-duodenal, bifurcates and distributes to the gall-bladder, beneath its investiture of peritoneum.

29. Cystic Duct.—This is a short duct, from the apex of the gall-bladder, to the ductus communis choledochus; it joins the latter at an acute angle.

30. Ductus Communis Choledochus.—The right and left hepatic ducts meet and form the hepatic ducts proper; the latter is joined by the cystic duct, and the two determine the ductus communis choledochus. It courses in the right portion of the gastro-hepatic omentum, and disappears posterior to the first or ascending portion of the duodenum.

31. Stomach.—This organ occupies the left hypochondriac region, extending to the right into the epigastric region. It is swung in the abdominal cavity: to the left, by the œsophagus as the latter pierces the diaphragm, and by a reflection of peritoneum to the diaphragm; to the right, from the liver, by the gastro-hepatic omentum. The mobility and independence of the organ is insured, as before shown, by the cavity of the lesser peritoneum posterior to it. Its œsophageal extremity, or point of continuity with the œsophagus at the diaphragm, is situated superiorly and to the left; its pyloric extremity or the pylorus is to the right and continuous with the duodenum. To the left of the œsophagus is its fundus or larger end, which tilts superiorly against the diaphragm; the pyloric valve guards its communication with the first portion of the duodenum. Its varying calibre and its elevation to the left, superiorly, determine its superior and inferior curvatures: the former is a concavity directed superiorly and to the right; the latter is a convexity directed inferiorly and to the left. It will be remembered, that its anterior surface is covered by a layer of peritoneum, contributed by the greater peritoneum, while its posterior surface has a peritoneal investiture, furnished by the lesser peritoneum. At its fundus the spleen is adapted to the right concave surface of the latter; the peritoneum bridges between the two organs—the gastro-splenic omentum—and invests the free convex surface of the spleen. The peritoneal surface investments of, and the apposition of the spleen to, the stomach—determine the absence of serous membrane at the curvatures and fundus of the organ. It is at these points, that vessels and nerves enter and leave the viscus: along the lesser curvature is the anastomosing arterial loop of the gastric and pyloric arteries; along the greater curvature is the circuit of the anastomosing gastro-epiploica dextra and sinistra arteries; the vasa brevia, branches of the splenic artery, are at the fundus. Along this circumferential arterial distribution arteries and nerves enter the walls of the organ; veins and lymphatics leave them.

32. Duodenum.—This, the first portion of the small intestine, is continued from the pylorus of the stomach. It is somewhat the shape of a fish-hook, with its convexity directed to the right and inferiorly, its concavity open superiorly and to the left. The first or ascending portion of the duodenum—forming the short barbed end of the hook—is directed from the pylorus of the stomach to the right, and is inclined superiorly and posteriorly (in Plates it will be observed to have sagged inferiorly). The second or descending portion—forming the curve of the hook—has a direction obliquely from above downwards and to the left. The third, transverse or oblique portion—forming the shank of the hook—rises obliquely from right to left, crossing the median line just above the bifurcation of the abdominal aorta; at the left of the vertebral column, it is continued by the jejunum of the small intestine. Its most dependent point lies upon the anterior surface of the inferior half of the quadratus lumborum muscle, a little above the posterior extremity of the crest of the right ilium. *In situ*, the first portion of the duodenum impinges upon the liver and the gall-bladder; the posterior surface of the descending portion rests upon the right kidney; the concavity of this intestinal segment receives the head of the pancreas; the transverse colon is superposed upon its anterior surface.

Dissection.—Inflate the stomach and duodenum by means of the blow-pipe; introduce the latter into the anterior wall of the duodenum. Pull the right half of the stomach superiorly, and to the right, upon the anterior surface of the right costal cartilages and the ensiform cartilage of the sternum. Dissect the first and half of the second portion of the duodenum from the head of the pancreas; in so doing drag upon the stomach, superiorly, by a loop of string around the pylorus, until it and the duodenum assume the position shown in Plate 36. Trace the gastro-duodenal artery and its branches, also the ductus communis choledochus. Pull aside the left inferior costal cartilages. Clear the anterior surface of the pancreas, noting its relations to the duodenum, superior mesenteric vessels, the splenic artery and vein and the spleen itself. Remove the anterior portion of the gastro-splenic omentum; reflect the spleen externally, and note the terminal branches of the splenic artery.

33. Pancreas.—This organ lies transversely and obliquely across the abdomen: its right extremity is included in the concavity of the duodenum; its body rests upon the mesenteric vessels; its tail crosses over the left kidney, the tip of the former impinging upon the spleen. The inferior border of its head overlaps the anterior surface of the commencement of the third or oblique portion of the duodenum. Anteriorly, the stomach and the transverse colon are superposed upon it.

34. Gastro-Duodenal Artery.—This artery (vena comes) is the largest branch of the hepatic. It curves, inferiorly, posterior to the first portion of the duodenum. It gives off the pyloric artery, and bifurcates into the gastro-epiploica dextra and the superior pancreatico-duodenal arteries.

35. Pyloric Artery.—This branch (vena comes) of the gastro-duodenal or the hepatic artery curves to the left, along the lesser curvature of the stomach, and anastomoses with the gastric or coronary artery.

36. Gastro-Epiploica Dextra Artery.—This vessel (vena comes) curves to the left, along the greater curvature of the stomach, anastomosing with the gastro-epiploica sinistra, branch from the splenic artery.

37. Superior Pancreatico-Duodenal Artery, Plate 36.—Curving inferiorly, from its origin, this artery (vena comes) passes along the concavity of the duodenum and the head of the pancreas, to anastomose with the inferior pancreatico-duodenal, branch of the superior mesenteric artery.

38. Inferior Pancreatico-Duodenal Artery.—This artery (vena comes) passes from the right of the superior mesenteric artery, where its trunk lies posterior to the head of the pancreas. It is directed, inferiorly and to the right, between the pancreas and the oblique portion of the duodenum, to the right of the superior mesenteric vein. Between the pancreas and the duodenum it anastomoses with the last described artery.

39. Spleen, Plates 35 and 36.—For the present, the dissector should determine the location of the spleen as it caps the fundus of the stomach ; its relations to the tail of the pancreas ; and its lodgment anterior and external to the left suprarenal capsule and the superior half of the left kidney.

40. Splenic Artery.—This trunk, branch of the cœliac axis, runs to the left, posterior to the superior border of the body and tail of the pancreas. (In the plate the artery is somewhat displaced above the organ, by the sagging of the pancreas and the raising of the artery to clean it.) In its course the artery distributes branches to the pancreas, and the gastro-epiploica sinistra is given off from it. Thence it continues to distribute the splenic branches proper, from which, in turn, the vasa brevia or its gastric branches pass to the fundus of the stomach.

DISSECTION.—Hook the superior border of the pancreas anteriorly, to discover the splenic vein ; clean the same, noting its contributing branches, etc.

41. Splenic Vein, Plate 48.—This vein will be found posterior to the body and tail of the pancreas, running to the right to meet the superior mesenteric vein to form the vena portæ. In its course this vein will be seen to receive the trunk of the inferior mesenteric vein.

42. Gastro-Epiploica Sinistra Artery, Plate 36.—This artery (vena comes), branch of the splenic, curves to the right, along the greater curvature of the stomach to anastomose with the gastro-epiploica dextra, as before shown (page 65).

43. Ductus Communis Choledochus.—This duct, already recognized in a part of its course, can now be followed to where it enters the duodenum; if care be taken, the junction of the pancreatic duct with it—emerging from the head of the pancreas—may be discovered.

Dissection.—Restore the stomach and duodenum to their normal positions. Raise the cut distal portion of the sigmoid flexure of the colon out of the pelvic cavity, and pin it into the left iliac fossa, making the rectum taut. Remove with a sponge any fluid, that may be lodged between the pelvic organs.

44. Male Pelvic Organs, *in situ*, Fig. 1, Plate 37.—The superior contours of these organs will be found to include the rectum, to the left, posteriorly, and the bladder anteriorly. Between the two is the recto-vesical cul-de-sac of the peritoneum.

45. Male Pelvic Reflections of the Greater Peritoneum, Plate 29 and Fig. 1, Plate 37.—The greater peritoneum is reflected from the interior of the anterior abdominal parietes—interior to the obliterated urachus and hypogastric arteries—to the middle and sides of the fundus of the bladder (page 55); from the fundus of the bladder it continues, posteriorly, over its superior and lateral contours to its posterior surface; it descends to the base line of the exterior trigone area of the bladder (Male Perineum, page 26, Plate 12), where it is reflected to the anterior surface of the rectum, forming the recto-vesical cul-de-sac. This cul-de-sac is bounded, laterally, by crescentic folds of the peritoneum, the plicæ semilunares, which bridge between the two organs. The serous membrane rises upon the surface of the antero-lateral walls of the rectum—more on its right than its left side. To the right of the rectum—the superior part of its second portion—it is reflected to the posterior wall of the pelvic interior, forming the right portion of the meso-rectum, which continues, laterally and superiorly, upon the right iliac vessels. From the left side of the rectum—the superior part of its second portion—it passes to the left side of the pelvic interior, forming the left portion of the meso-rectum, which in turn continues, superiorly, over the left iliac vessels into the iliac fossa. The meso-rectum is thus the portion of the greater peritoneum, by which the second portion of the rectum is fixed to the posterior and left lateral walls of the pelvic interior. The first portion of the rectum—from a point opposite the left sacro-iliac articulation to the anterior of the second piece of the sacrum—is swung by the continuation of the meso-sigmoid folds of the greater peritoneum (Plate 35). It is between the latter layers, that the superior hemorrhoidal branch of the inferior mesenteric artery continues to the rectum (Plate 35).

46. Retzius' Space, Plate 31.—The anterior surface of the bladder is not covered by peritoneum ; the latter is reflected from the former posterior to the point of continuity of the urachus with the bladder. A space exists bounded, posteriorly, by the anterior surface of the bladder ; anteriorly, by the interior surfaces of the symphysis pubis and the os pubis, right and left. This is Retzius' space (Adolph Retzius, a Swedish anatomist) ; it contains loose areolar tissue, and has, below the level of the inferior border of the symphysis pubis, surrounding the neck of the bladder, a venous plexus, which continues, posteriorly, to the sides of the prostate and vesiculæ seminales.

47. Rectum, Fig. 1, Plate 37.—This portion of the large intestine continues from the sigmoid flexure of the colon, at a point about opposite the left sacro-iliac articulation. Its first and the superior part of its second portion present, *in situ*, as we look into the pelvic cavity from above.

48. Bladder.—This organ varies in its position at different ages: in the child, it is almost an abdominal organ, being located largely above the brim of the pelvis ; in the adult, it becomes a pelvic organ, being lodged below the brim of the pelvis. In the adult male—except when distended—it is located between the symphysis pubis and the bodies of the ossa pubis, anteriorly, and the rectum, posteriorly.

49. Female Pelvis, Fig. 2, Plate 37.—As compared with the male, the female pelvic diameters are all much greater ; the increased capacity of the pelvic cavity affords lodgment for the internal female genitalia, viz.: the vagina, the uterus, the Fallopian tubes, the ovaries, etc.

50. Peritoneum of the Female Pelvis.—As in the male, the peritoneum reaches the fundus of the bladder from the interior of the anterior parietes of the abdomen, guided thereto by the obliterated urachus (Plate 29). From the fundus of the organ it passes to its posterior surface, from which it is reflected to the body of the uterus. This reflection determines the vesico-uterine cul-de-sac of the peritoneum. The peritoneum upon the anterior surface of the uterus spreads laterally therefrom—forming the anterior layer of the broad ligament—to the interior of the lateral wall of the pelvis. Folding over the fundus of the uterus it covers its posterior surface and continues inferiorly upon the posterior surface of the inferior wall of the vagina, from which it is reflected to the anterior surface of the superior wall of the rectum, forming the recto-vaginal or Douglas' cul-de-sac of the peritoneum (Female Perineum, page 41). From the postero-inferior surface of the uterus and vagina the peritoneum spreads laterally, as the posterior layer of the broad ligament of the uterus, to the interior of the lateral walls of the pelvis; from this posterior layer of the broad ligament the right and left ovaries swing free. Continuing upon the rectum, the peritoneum invests it as in the male (page 67).

51. Female Internal Genitalia.—These are the uterus, the Fallopian tubes, the round ligaments—included between the two layers of the right and left broad ligaments—and the ovaries—hanging from the posterior surfaces of the broad ligaments. They are all lodged in the pelvis between the bladder, anteriorly, and the rectum, posteriorly. The uterus projects superiorly, supported upon the vagina; the Fallopian tubes, the right and the left, curl posteriorly and internally, posterior to the uterus, enclosing the right and the left ovary, respectively; from out of the pelvic cavity the right and the left round ligaments of the uterus rise over the brim of the pelvis, anterior to the uterus, to reach the right and left iliac or internal abdominal rings (Abdominal Parietes, page 53).

52. Female Bladder.—In the female the bladder is broader than in the male; in other respects the organs are alike (page 68). The special relation of the organ in the female is to the uterus posteriorly; at the anterior surface of the supravaginal portion of the neck of the uterus the bladder is attached by connective tissue; it is separated from the body of the uterus by the vesico-uterine cul-de-sac of the greater peritoneum.

53. Female Rectum.—This is located so much like the male rectum, that the description of the lodgment of the latter (page 68) will answer for both.

Dissection.—Drag down the stomach from the left; apply a ligature at its œsophageal extremity and cut above the ligature. Turn out the stomach and the spleen from the left. Dissect loose the pancreas and duodenum on their posterior surfaces. Replace the stomach, duodenum, pancreas and spleen. Follow up the vena cava inferior to the posterior surface of the right lobe of the liver; apply a ligature to it above the renal veins, and cut the vessel. Drag down the liver from the right; determine the antero-superior layer of the coronary and the two lateral ligaments of the liver; with the curved scissors cut these ligaments close to the diaphragm. Continuing to drag on the liver, recognize with the finger the vena cava, as it pierces the diaphragm at the caval opening; pass a ligature around it and cut the vessel below it. Cut the remaining postero-inferior layer of the coronary ligament with the curved scissors, close to the diaphragm. Cut the trunk of the cœliac axis, and the stump of the superior mesenteric artery. Remove the stomach, duodenum, pancreas and liver, *en masse*. Remove the peritoneum from the abdominal aorta, the common, the external and the internal iliac arteries; in so doing note the nerves of the plexuses of the sympathetic (Plate 33), which ramify upon the arteries.

54. Abdominal Aorta, Plate 38.—This arterial trunk enters the abdominal cavity opposite the body of the twelfth dorsal vertebra, between the crura of the diaphragm; the latter are applied to its lateral surfaces. It continues on the vertebral column to the fourth lumbar vertebra, where it bifurcates into the right and the left common iliac arteries. In its course it gives off distributing branches: the two phrenic, the cœliac axis, the two suprarenal, the superior mesenteric, the two renal, the two spermatic or the two ovarian, the inferior mesenteric, the four pairs of lumbar and the sacra media.

55. Cœliac Axis.—This arterial axis springs from the anterior face of the aorta, and trifurcates as before described (page 62).

56. Suprarenal Arteries. — These arteries (venæ comites) branch, right and left, to the respective suprarenal capsules.

DISSECTION.—Clear the surfaces of the right and left suprarenal capsules.

57. Suprarenal Capsules.—These organs are lodged upon the surfaces of the right and left crus of the diaphragm, respectively. They are triangular in shape, their apices tilted to the median line, their bases capping the superior convex ends of the kidneys.

58. Superior Mesenteric Artery.—This, like the cœliac axis, is a median-line branch of the abdominal aorta; it distributes as before described (page 60).

DISSECTION.—Clear the surface of the vena cava from its origin, inferiorly, to its point of section, superior to the renal veins. Note the veins, that it receives in its course; follow the renal veins from the kidneys.

59. Vena Cava Inferior.—This venous trunk lies to the right of the vertebral column; it is formed by the junction of the right and left common iliac veins, at the right of the fifth lumbar vertebra; it receives the sacra media, the lumbar, the right spermatic or the right ovarian, the renal, the suprarenal, the phrenic and the hepatic veins.

60. Renal Veins.—These vessels pass from the kidney, right and left, to the vena cava; the left, longer than the right, receives the left spermatic or the left ovarian vein.

DISSECTION.—Hook the renal veins anteriorly, and trace the renal arteries to their distribution. Dissect the kidneys free of remaining fat.

61. Renal Arteries.—These arteries pass, right and left, from the aorta to the kidneys, respectively; their short trunks break up into branches, which enter the hilus of the organ; one of the superior branches of each artery distributes a branch to the suprarenal capsule of the side.

62. Kidneys.—These organs are located on either side of the vertebral column. The inferior portion of a kidney lies upon the superior half of a quadratus lumborum muscle; its superior convex end inclines to the vertebral column, and rests upon the interior of the ligamentum arcuatum externum (Plate 43) and the diaphragm above it; where it lies upon the latter muscle, it is located opposite the twelfth rib and the eleventh intercostal muscle and rib—the right kidney rises to the inferior border of the eleventh rib, while the left reaches its superior border. Its external border is convex and projects beyond the external border of the quadratus lumborum muscle; its inferior convex end inclines a little, externally—higher upon the left than upon the right side; its internal and thickest border presents an inferior and a superior convexity, divided by a concavity—the hilus of the organ—where the arteries and nerves enter, and the veins, lymphatic vessels and the ureter leave the organ; its anterior surface is smooth and convex.

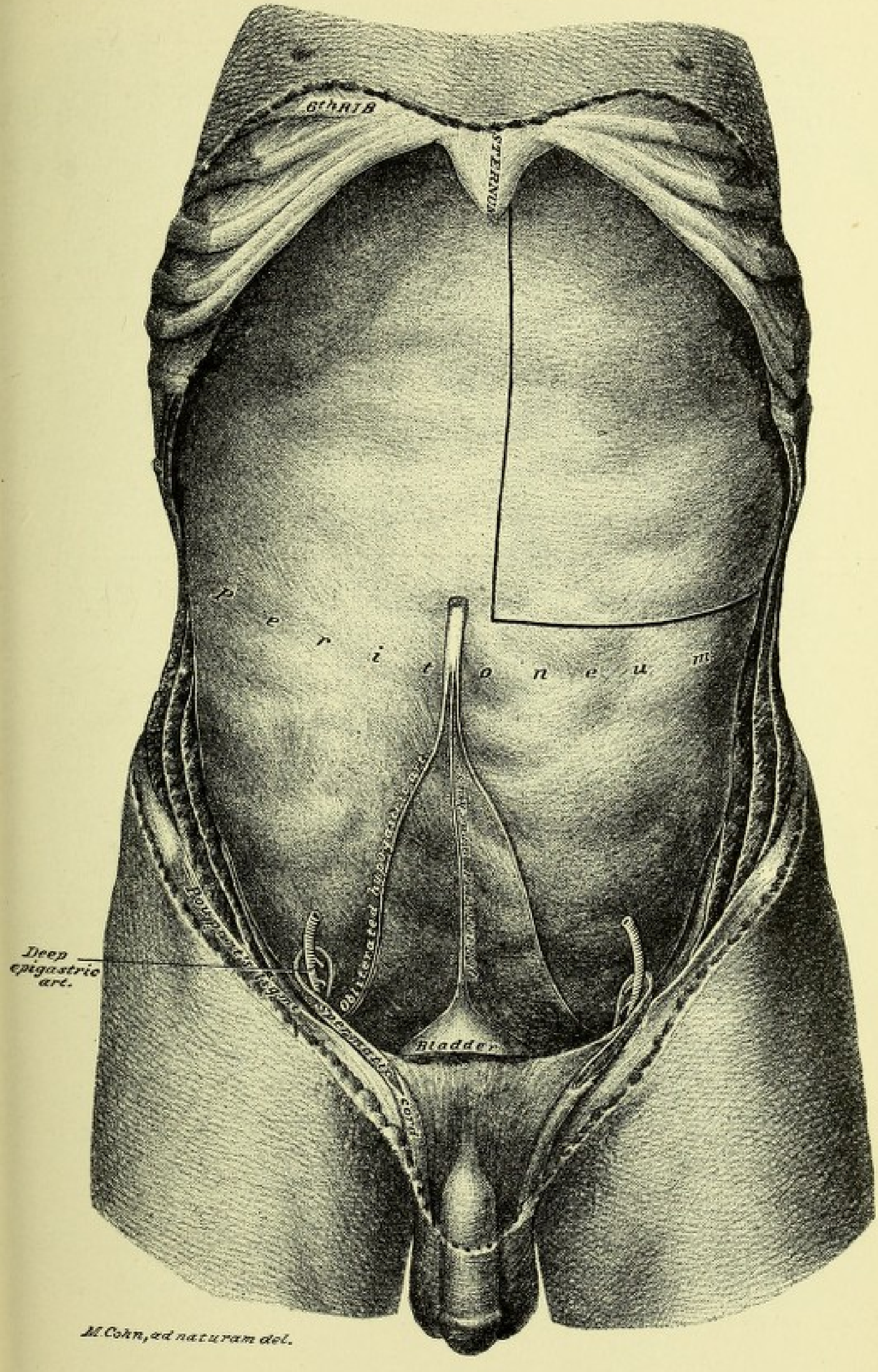
DISSECTION.—Trace the ureters from the kidneys, inferiorly, into the pelvis.

63. **Ureters.**—These are the ducts of the kidneys. A ureter is about fifteen inches long; it leaves the hilus of a kidney, posterior to the plane of the artery; it continues, inferiorly and internally, upon the anterior surface of the quadratus lumborum, the psoas magnus and the psoas parvus muscles, posterior to the spermatic or the ovarian vessels; it reaches the external iliac artery, passing across its anterior surface, near the bifurcation of the common iliac, and enters the pelvic cavity upon the interior of its lateral wall.

64. **Spermatic (of the Male) and Ovarian (of the Female) Arteries.**—These arteries spring as a pair, in the respective sexes, one from either side of the aorta, inferior to the origins of the renal branches. A spermatic artery (vena comes) passes, inferiorly and externally, upon the psoas magnus and parvus muscles to the groin, where it leaves the abdominal cavity by the iliac or internal abdominal ring. An ovarian artery (vena comes) passes inferiorly to the iliac fossa; it enters the pelvic cavity, crossing the external iliac artery, to reach the interior of its lateral wall, between the anterior and posterior layers of peritoneum, which form a broad ligament of the uterus.

65. **Spermatic and Ovarian Veins.**—The right and left veins differ: the right spermatic and ovarian empty, at an acute angle, into the vena cava inferior; the left can be traced to where it enters, at a right angle, into the left renal vein.

66. **Inferior Mesenteric Artery.**—This artery (vena comes), a single branch, passes to the left of the vertebral column, and distributes as before described (page 62).



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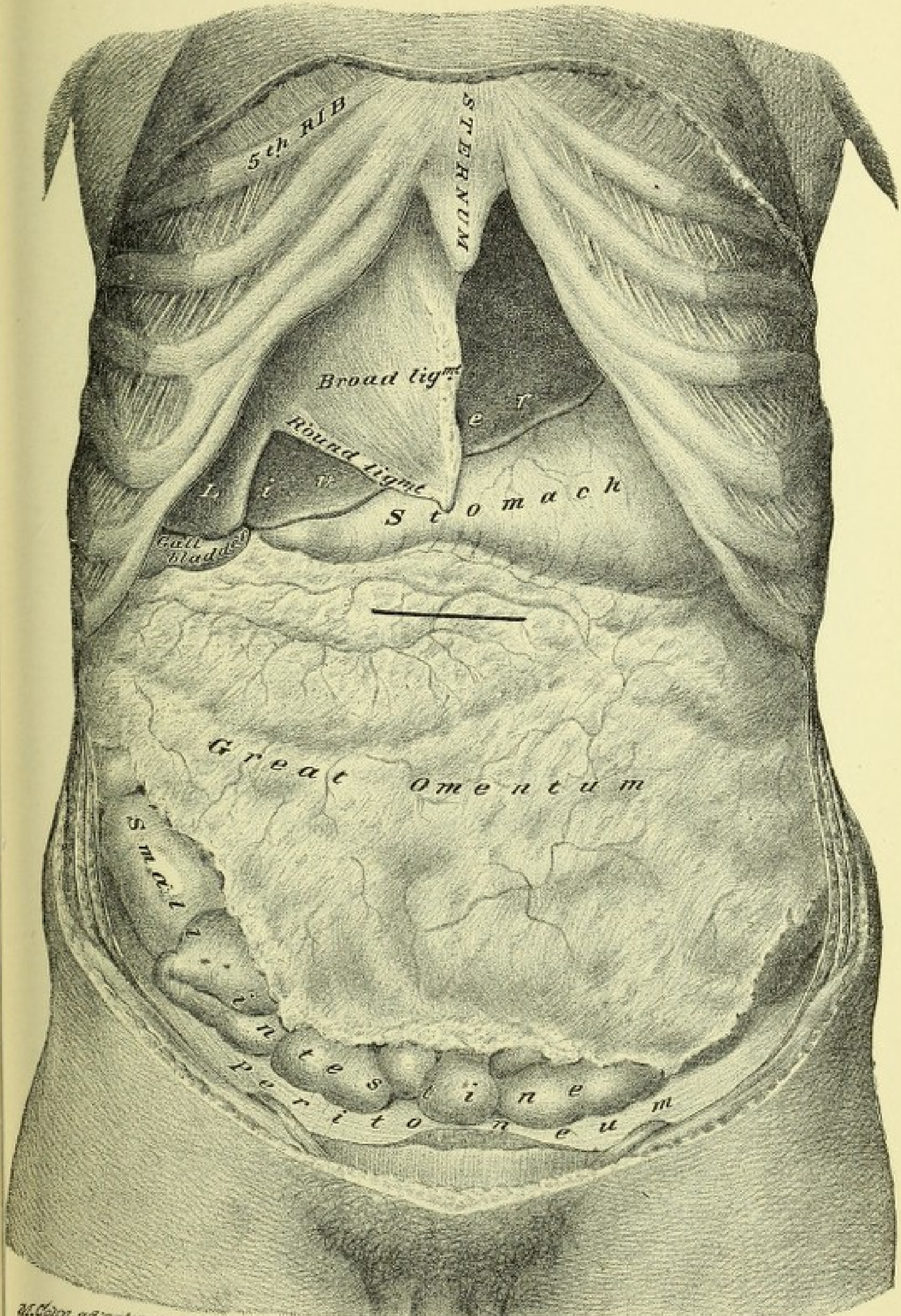
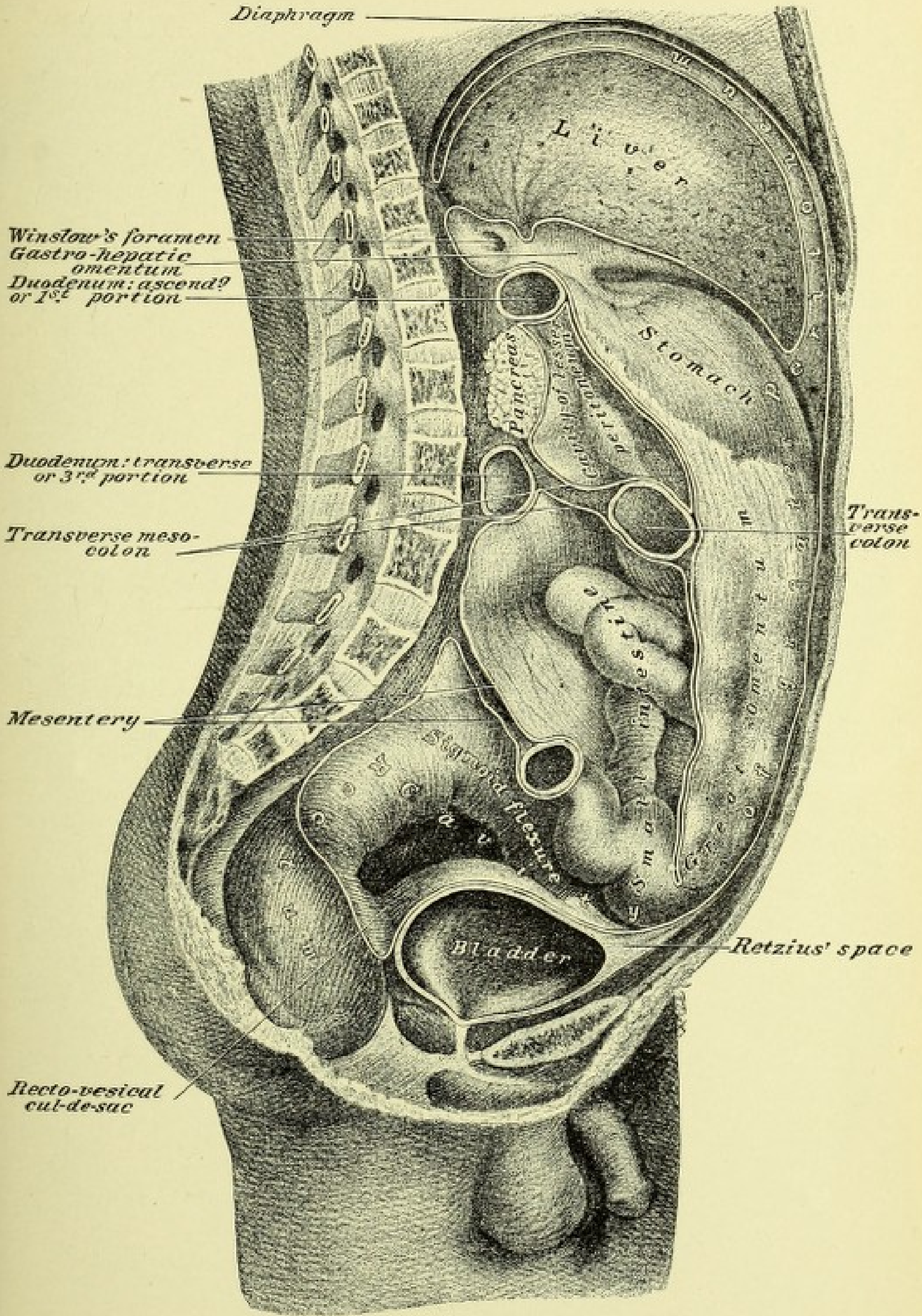
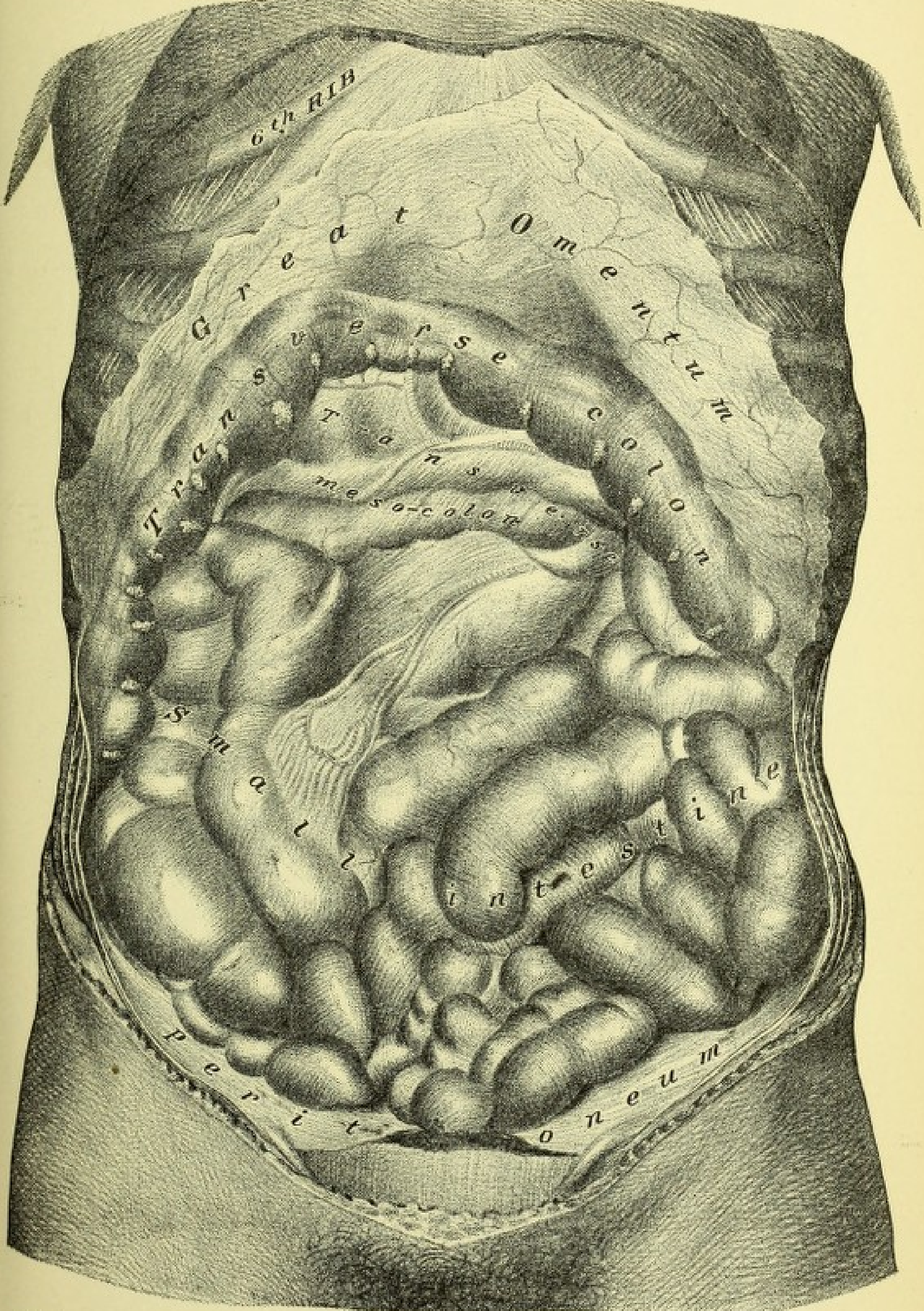

5th RIB
STERNUM
Broad ligmt
Round ligmt
L i v e r
Gall bladder
S t o m a c h
Great Omentum
Small intestine
peritoneum
M. Cohn, ad naturam del.


Diaphragm
Winslow's foramen
Gastro-hepatic omentum
Duodenum: ascend? or 1st portion
Duodenum: transverse or 3rd portion
Transverse meso-colon
Mesentery
Recto-vesical cul-de-sac
Trans-verse colon
Retzius' space
Liver
Stomach
Pancreas
Bladder
Sigmoid flexure



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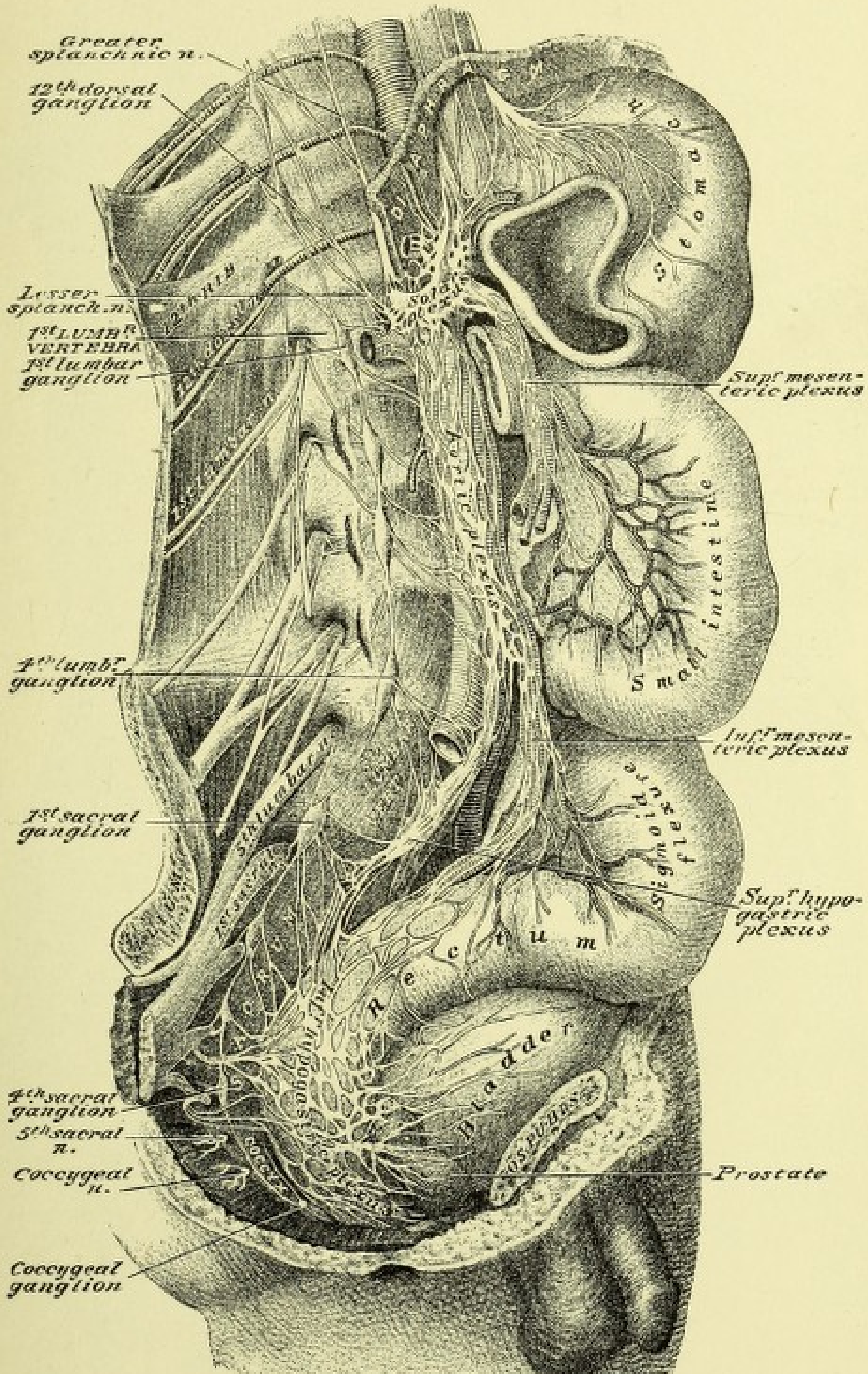
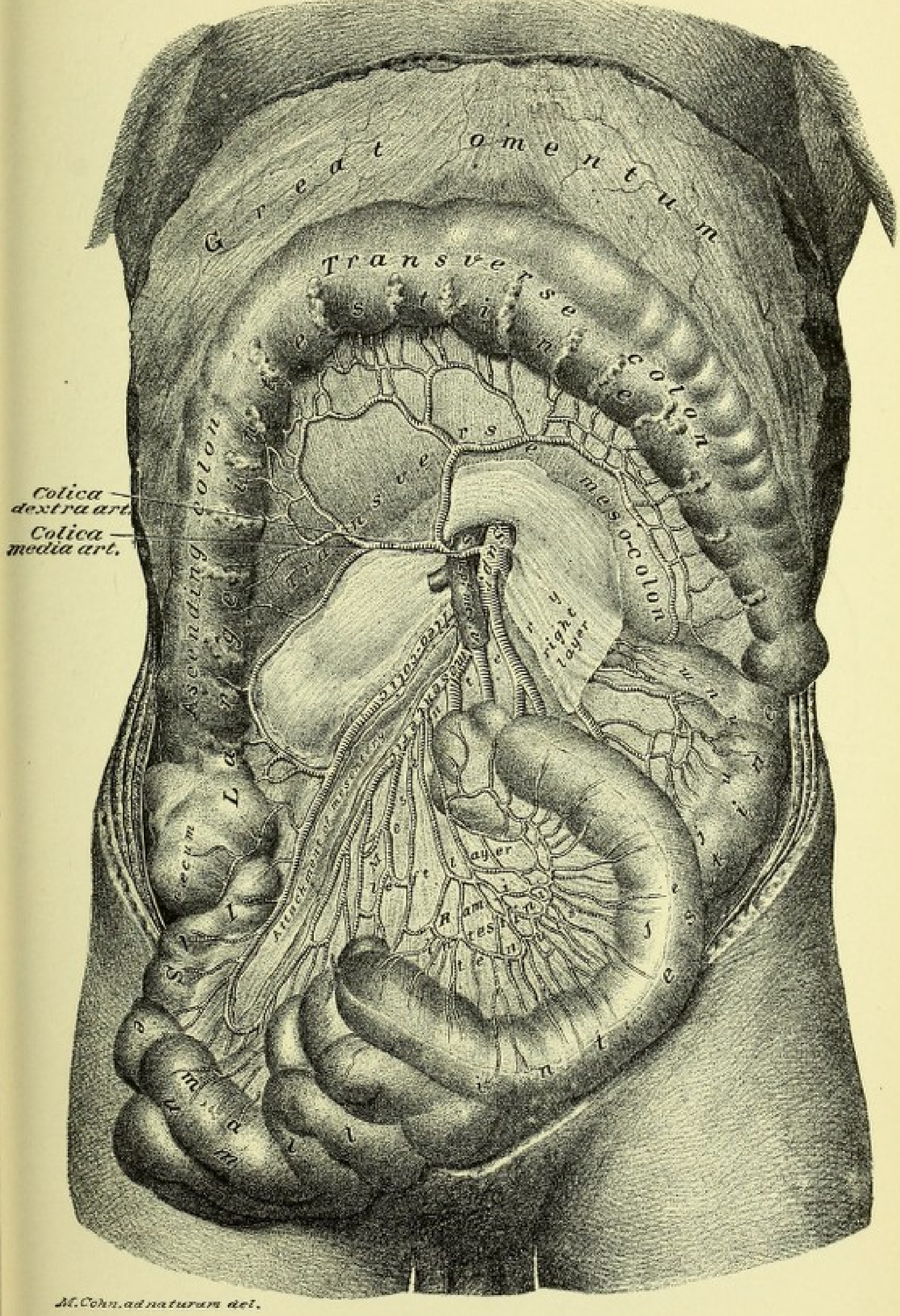

Greater splanchnic n.
12th dorsal ganglion
Lesser splanch. n.
1st LUMBR. VERTEBRA
1st lumbar ganglion
4th lumbr. ganglion
1st sacral ganglion
4th sacral ganglion
5th sacral n.
Coccygeal n.
Coccygeal ganglion
Supr. mesenteric plexus
Infr. mesenteric plexus
Supr. hypogastric plexus
Prostate
Stomach
Small intestine
Sigmoid flexure
Rectum
Bladder
Aortic plexus



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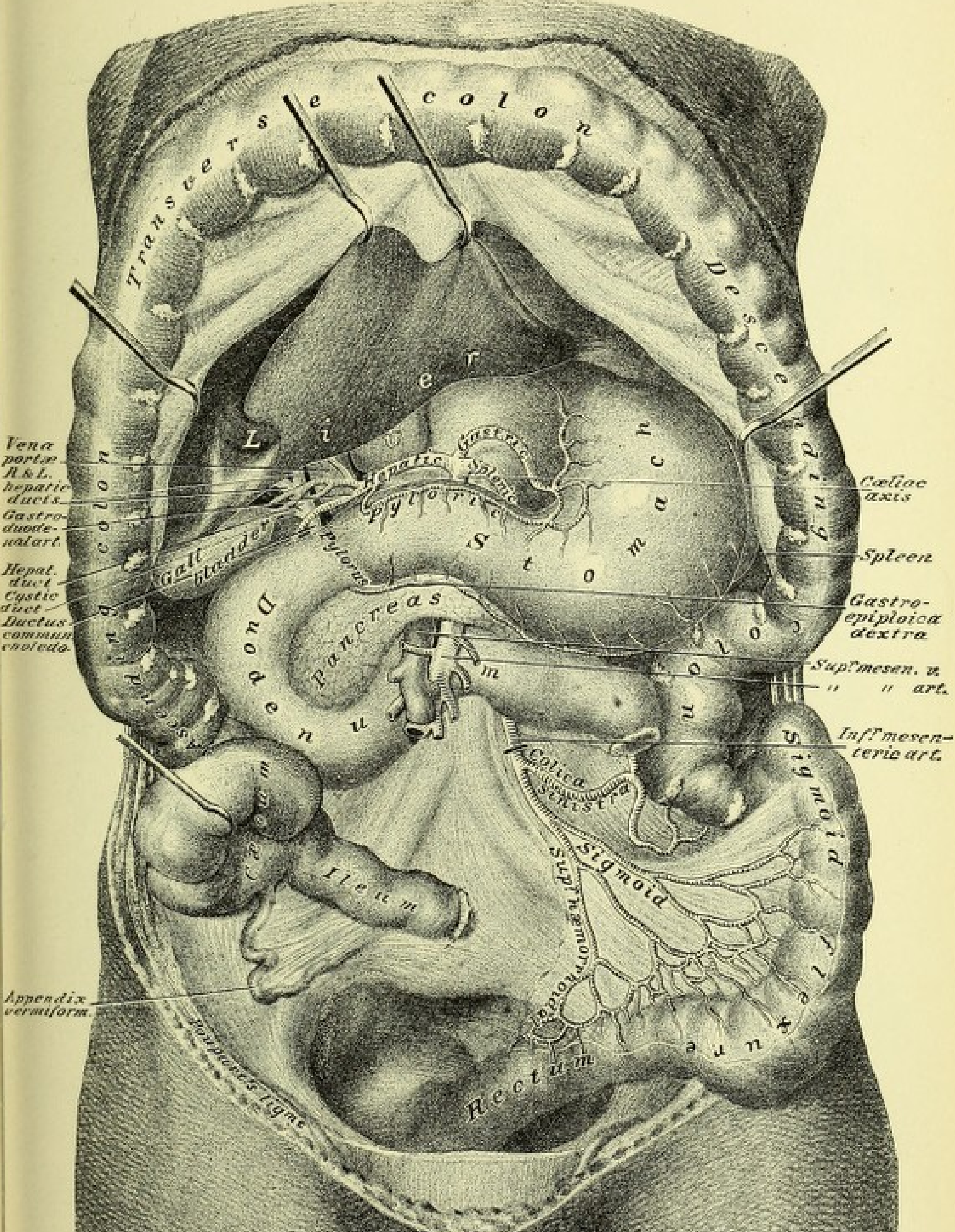

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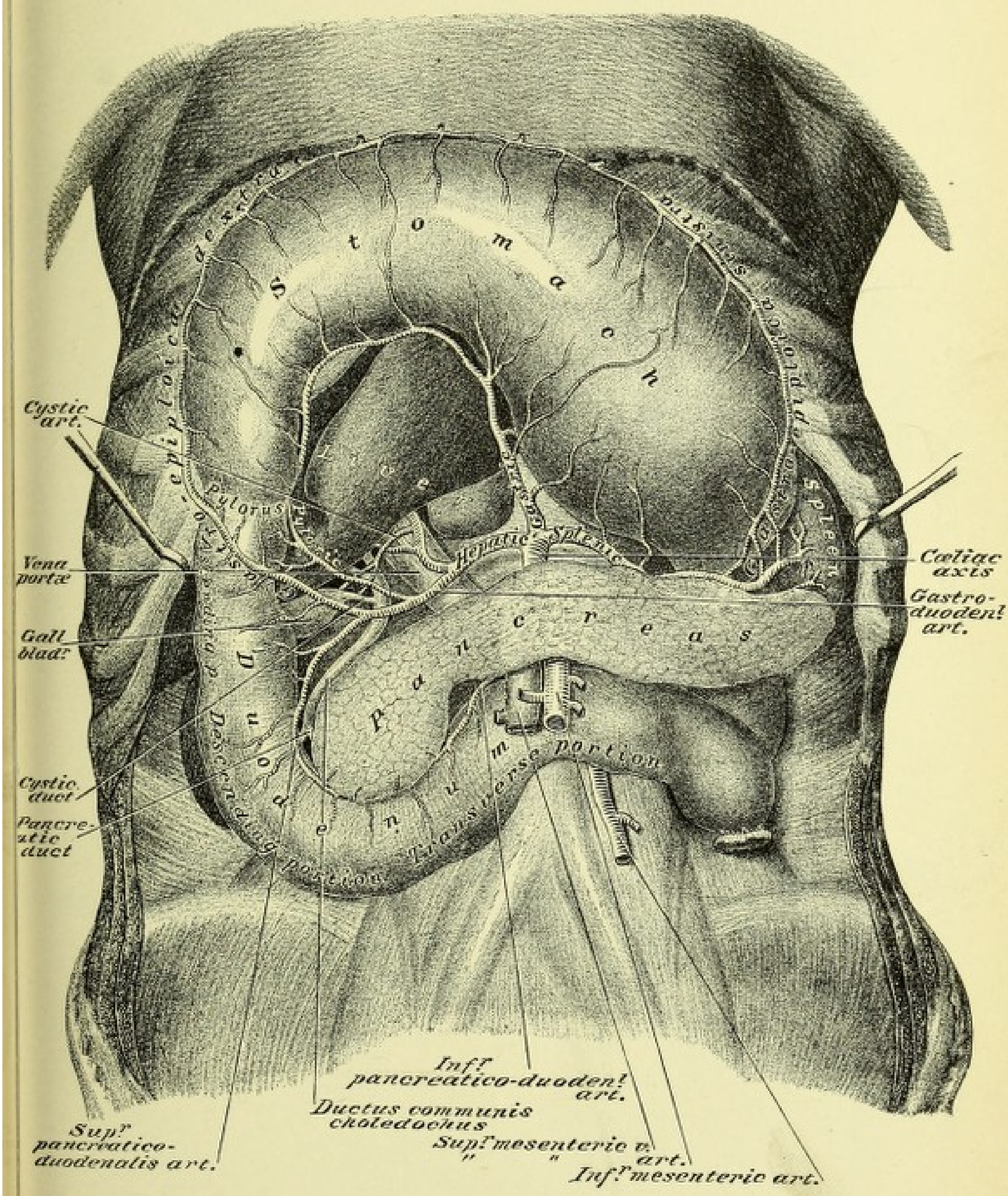

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FIG. 1

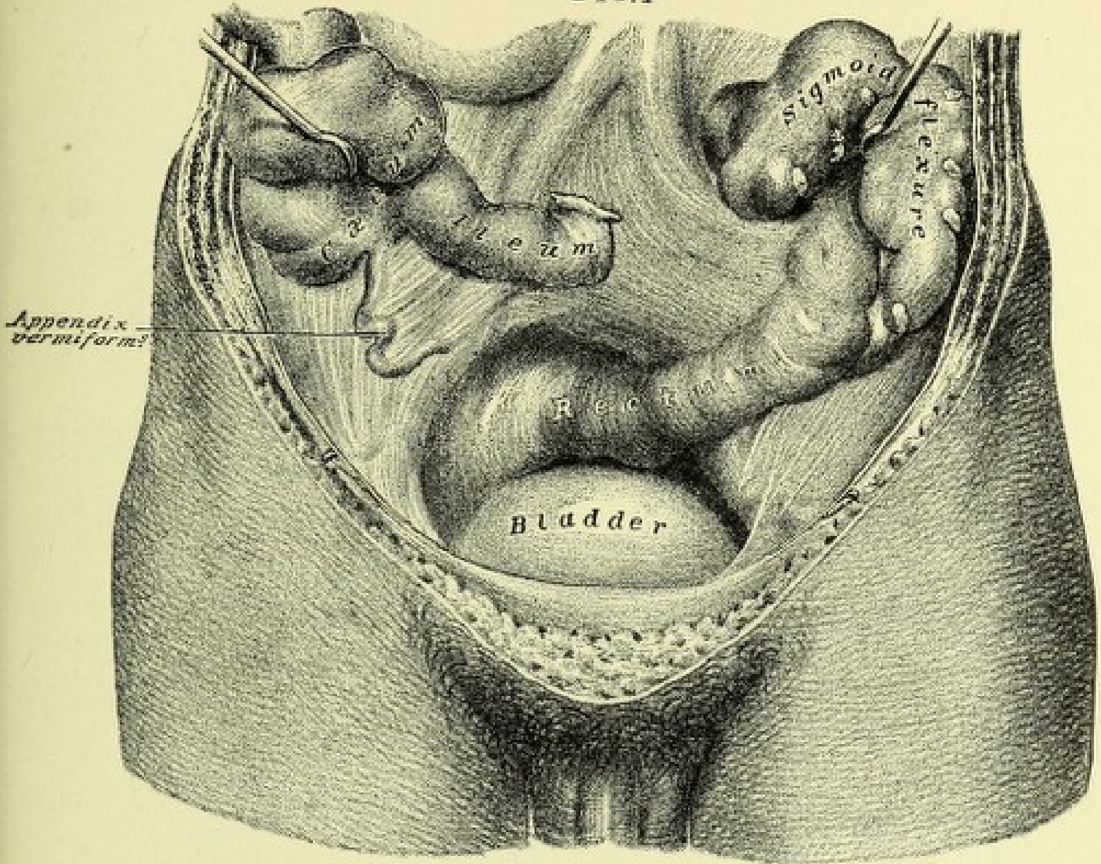
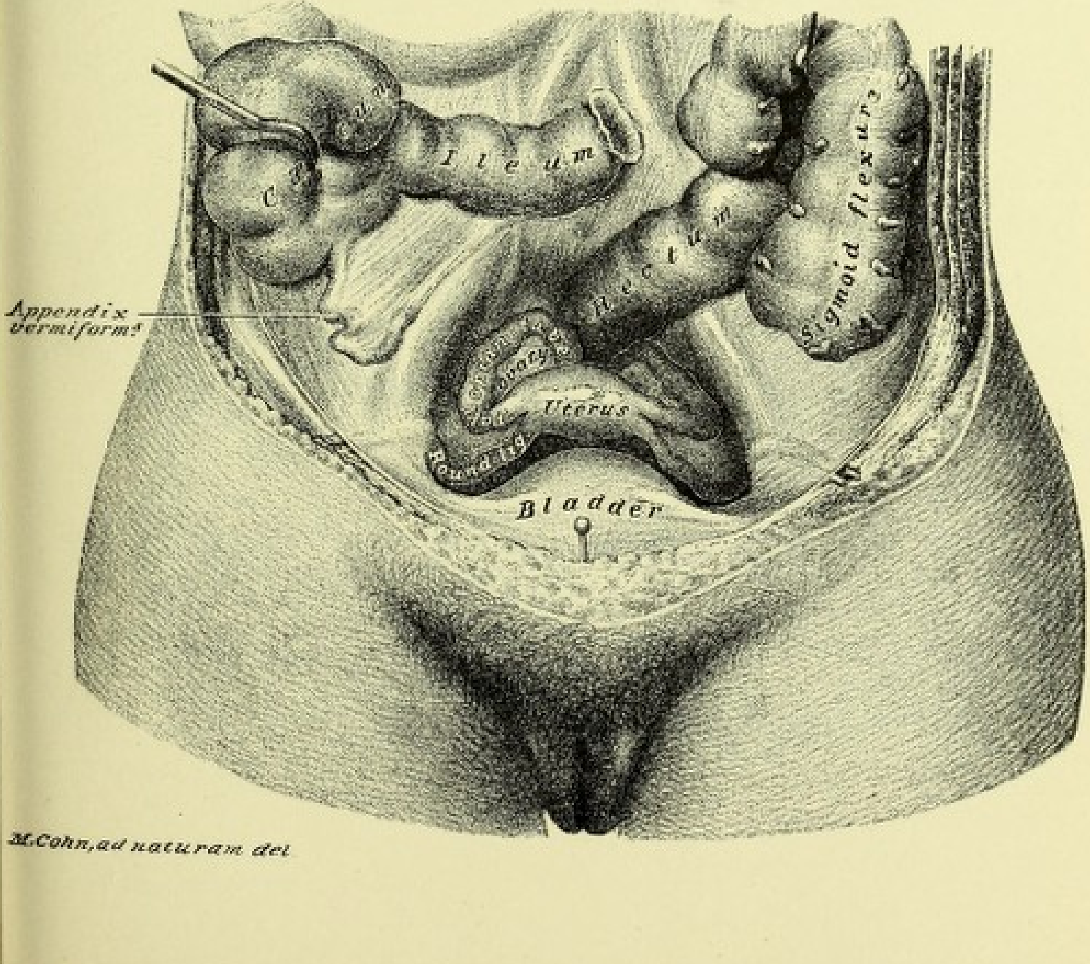


FIG. 2



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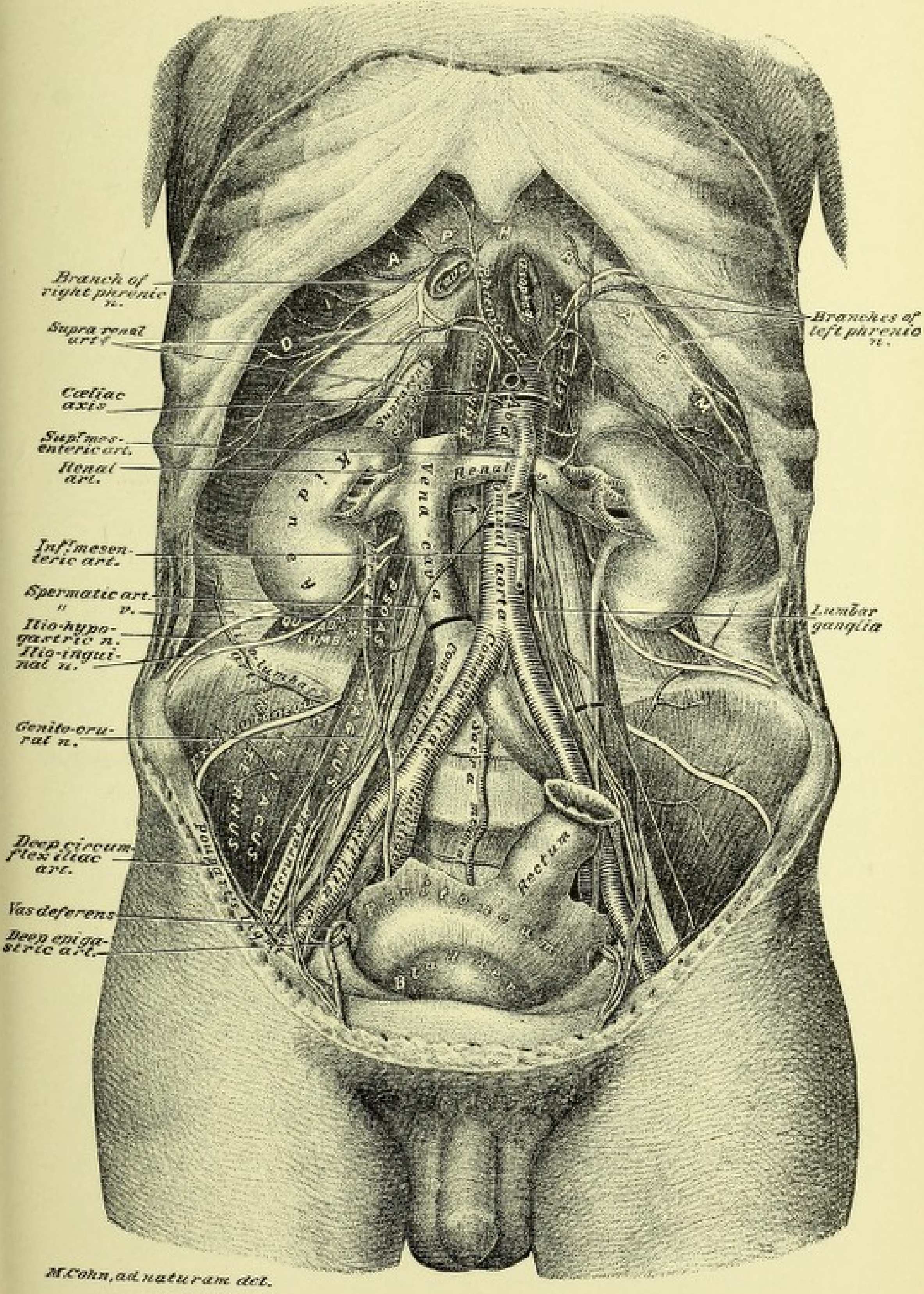

Branch of right phrenic n.
Supra renal art.s
Cœliac axis
Sup.r mesenteric art.
Renal art.
Inf.r mesenteric art.
Spermatic art.
" v.
Ilio-hypogastric n.
Ilio-inguinal n.
Genito-crural n.
Deep circumflex iliac art.
Vas deferens
Deep epigastric art.
Branches of left phrenic n.
Lumbar ganglia
Kidney
Vena cava
Renal
aorta
Psoas
Rectum
Bladder
Iliacus
M.Cohn, ad naturam del.

FIFTH DISSECTION.

ABDOMINAL AND PELVIC INTERIORS.

DISSECTION.—Take up the dissection of the abdominal cavity, as left after the completion of the fourth dissection. Section the vena cava, the ureters and the spermatic vessels (Plate 38); reflect the inferior portions of the two latter into the pelvic cavity. Remove the testes from the scrotum and place them in the pelvis. Spread the thighs and take out the sutures from the perineal flaps. Cut the penis free from the pubic arch, so that it may come away in continuity with the bladder. Trace the ureters and the vasa deferentia or the ureters, the ovarian vessels, and the round ligaments of the uterus as they pass, exterior to the peritoneum, to the interior of the lateral walls of the pelvic cavity; reflect the same, from the respective sides, upon the pelvic viscera, toward the median line. Pass the fingers external to the reflected ducts and vessels, between the peritoneum and the fascia lining the pelvic walls, and free the pelvic organs; use the curved scissors to cut the vesical, middle hemorrhoidal and uterine vessels. Remove the viscera—bladder, rectum (male), or bladder, rectum, uterus, vagina (female), with attached vessels, etc.—through the inferior outlet of the pelvis. Empty and wash out the rectum and bladder, after which the pelvic viscera, *en masse*, may be placed in preservative fluid for subsequent dissection. Bring together the thighs and clean the common, the external and the internal iliac arteries and veins.

1. Common Iliac Arteries, Plates 38 and 39. — These trunks pass from their origin, at the bifurcation of the abdominal aorta upon the body of the fourth lumbar vertebra, to the sacro-iliac articulations. The right lies against the internal surface of the vena cava and the right common iliac vein; the left is between the left psoas magnus muscle, externally, and the left common iliac vein, internally. At the sacro-iliac articulation of a side the artery divides into the external and the internal iliac arteries.

2. External Iliac Artery.—This artery continues, from its origin, along the internal surface of the psoas magnus muscle to pass beneath Poupart's ligament into the thigh, where it becomes the femoral artery. Before passing under the ligament it gives off the deep epigastric artery, previously described (page 54); also, the deep circumflex iliac artery, which passes, externally, superior to and parallel with Poupart's ligament, to perforate the transversalis abdominis muscle and reach the lateral area of the abdominal parietes, where it was before recognized (page 50).

3. Internal Iliac Artery.—This vessel, given off by the bifurcation of the common iliac artery, passes, inferiorly, along the posterior portion of the lateral interior of the pelvic cavity. It divides into an anterior and a posterior trunk: the anterior gives off the obturator, the superior vesical, the uterine and the inferior vesical branches, and then divides into the internal pudic and the sciatic arteries; the posterior gives off the ilio-lumbar and the lateral sacral branches and continues as the gluteal artery.

4. External Iliac Vein.—The femoral vein enters the pelvic cavity, subjacent to Poupart's ligament; the external iliac vein continues it, parallel with and inferior to its artery, to where it meets the internal iliac vein.

5. Internal Iliac Vein.—This vessel runs external to its artery, receiving the comites veins of the branches given off from the anterior and posterior trunks of the internal iliac artery.

6. Common Iliac Veins.—These are formed by the junction of the right and left external and internal iliac veins, opposite the sacro-iliac articulations, inferior to and included in the forks of the bifurcations of the common iliac arteries. They converge to form the vena cava inferior, posterior to the commencement of the right common iliac artery. The left vein runs internal to its artery, while the right lies posterior to its arterial trunk.

Dissection.—Follow the branches of the anterior trunk of the internal iliac artery; cut away their venæ comites.

7. Obturator Artery, Plates 39 and 46.—This artery (vena comes) has a direct course, from its origin, along the interior surface of the obturator internus muscle, to where it leaves the pelvic cavity by its foramen in the obturator membrane, to distribute in the thigh.

8. Superior Vesical Artery, Plate 39.—This artery (vena comes) distributes as its name implies. There is continued from it the obliterated hypogastric artery (page 55).

9. Uterine Artery.—This vessel (venæ comites) enters between the folds of the broad ligament of the uterus, passing to the side of the neck of that organ, whence it is distributed to the uterus and vagina, as will be shown hereafter.

10. Inferior Vesical Artery.—In the male, this artery (venæ comites) distributes to the bladder, rectum, etc.; in the female it becomes the *vaginal artery*, which sends branches to the vagina, bladder and rectum.

11. Pudic Artery.—This artery (venæ comites), which takes its origin from the anterior trunk of the internal iliac artery, leaves the pelvic cavity by the great sacro-sciatic foramen, posterior to the spine of the ischium, to reach the exterior surface of the same. Before leaving the pelvic cavity it gives off the middle hemorrhoidal artery. Its return to the pelvic cavity anterior to the spine of the ischium, and its course in the external wall of the ischio-rectal fossa, etc., was seen in the dissection of the perineum (Male Perineum, page 18).

12. Sciatic Artery.—This artery (venæ comites), arising as before described (page 74), lies upon the interior surface of the pyriformis muscle; it passes between the second and third sacral nerves, to leave the pelvic cavity by the great sacro-sciatic foramen, inferior to the pyriformis muscle.

Dissection.—Section the common, the external and the internal iliac arteries; also, the pudic, sciatic and obturator arteries (Plate 39); remove the portions of the arteries between the section lines. Cut the common and the external iliac veins (Plate 39); remove the common, external and internal iliac veins. In removing the portions of these vessels clear away the subjacent areolar tissue with care; disturb as little as possible the bifurcation of the common iliac artery. Clean the branches of the posterior trunk of the internal iliac artery; also, the sacra media artery.

13. Sacra Media Artery, Plates 38, 39, 40, and 41.—This artery (venæ comites) continues the trunk of the abdominal aorta into the pelvic cavity. It passes to the middle of the anterior surface of the sacrum from beneath the left common iliac vein, continuing, inferiorly, to the coccyx; it gives off lateral branches opposite each segment of the sacrum, which anastomose with branches of the lateral sacral arteries.

14. Lateral Sacral Artery, Plates 39 and 40.—This artery (venæ comites) springs from the posterior trunk of the internal iliac, courses, internally, to the external half of the anterior surface of the second segment of the sacrum, whence it continues, inferiorly, to the coccyx. It affords branches to contiguous muscles; others, which enter the anterior sacral foramina; and still others, which anastomose with the sacra media.

15. Ilio-Lumbar Artery, Plates 38, 39, 40, and 41.—This artery (venæ comites), from the posterior trunk of the internal iliac, passes, superiorly and externally, posterior to the psoas magnus muscle, to distribute upon the interior of the iliacus internus and quadratus lumborum muscles, and in the lateral planes of the abdominal parietes. Its branches anastomose with the inferior lumbar branches of the abdominal aorta, and with the deep circumflex iliac branch of the external iliac.

16. Gluteal Artery, Plates 40 and 46.—This artery (vena comes) is the continuation of the posterior trunk of the internal iliac. It hooks beneath the lumbo-sacral cord of the sacral plexus, to leave the pelvic cavity by the great sacro-sciatic foramen above the pyriformis muscle.

Dissection.—Section the gluteal, lateral sacral and ilio-lumbar arteries (Plate 40). Remove the bifurcation of the common iliac artery. Clean the chain of lumbar sympathetic ganglia and their branches, between the psoas magnus muscle and the bodies of the lumbar vertebræ; also the exposed portions of the lumbar arteries.

17. Lumbar Sympathetic Ganglia, etc., Plates 33, 38 and 41.—These four ganglia are lodged as stated in the preceding dissection clause. They have branches of communication with each other; inferiorly, the chain is continued, to the first sacral ganglion of the pelvis; superiorly, the communicating branch from the first ganglion continues to the twelfth dorsal ganglion of the thorax. They will also be found to have branches of communication with the contiguous anterior branches of the spinal nerves (lumbar). Their distributing branches contribute to the aortic and superior hypogastric plexuses.

18. Lumbar Arteries.—These are four pairs of arteries from the posterior surface of the abdominal aorta; they pass, laterally, over the sides of the bodies of the lumbar vertebræ into the posterior parietes of the abdominal cavity. Their veins commence, on either side, the azygos veins, major right and minor left.

DISSECTION.—Remove fascia and adventitious tissue from the surfaces of the psoas magnus, psoas parvus, quadratus lumborum, posterior portions of the transversalis abdominis, and the iliacus internus muscles, preserving the nerves ramifying upon the interior of the same (Plate 41).

19. Twelfth Dorsal Intercostal Nerve, Plates 33 and 41.—A portion of this nerve runs inferior to the twelfth rib, upon the interior surface of the transversalis abdominis muscle.

DISSECTION.—Section, on one side, the psoas magnus and parvus muscles (Plate 44); reflect the portions of the muscles, superiorly and inferiorly, dissecting out from the muscles the nerves of the lumbar plexus; allow the latter to remain *in situ* (Plate 41).

20. Lumbar Plexus.—This plexus is formed by the anterior branches of the four superior lumbar nerves. It is lodged in the substance of the psoas magnus muscle and upon the interior of the quadratus lumborum and the iliacus internus muscles.

21. Ilio-Hypogastric and Ilio-Inguinal Nerves, Plates 33, 38, and 41.—These nerves originate from the first lumbar nerve; they cross the anterior surface of the quadratus lumborum muscle, continuing upon the interior of the transversalis abdominis muscle, superior to and parallel with the crest of the ilium; they perforate the latter muscle, and pass, as before described, into the planes of the antero-lateral areas of the abdominal parietes (page 49, and Plates 22, 25, 26, and 27).

22. External Cutaneous Nerve, Plates 38, 39, 40, and 41.—This nerve, branch of the second lumbar, passes, inferiorly, to the interior of the posterior extremity of the crest of the ilium;

it then curves, externally and anteriorly, upon the interior of the superior portion of the iliacus internus muscle, running inferiorly to, and parallel with, the crest of the ilium, to pass into the thigh under Poupart's ligament, near the anterior superior spinous process of the ilium.

23. Genito-Crural Nerve, Plates 38 and 41.—This is a branch from the second lumbar, which passes, inferiorly, through the substance of the psoas magnus muscle; it emerges at the internal and rises to the superior surface of the muscle, and continues to Poupart's ligament. The trunk of the nerve bifurcates into a genital and a crural branch; the genital branch joins the spermatic cord at the iliac or internal abdominal ring to distribute to the cremaster muscle; the crural branch leaves the pelvic cavity beneath Poupart's ligament.

24. Anterior Crural Nerve, Plates 38, 39, 40, and 41.—This nerve is contributed to by the second, third and fourth lumbar nerves; the three branches form a single trunk, inferior to the posterior portion of the crest of the ilium, lying between the iliacus internus and the psoas magnus muscles; it appears upon the iliacus internus, superior to Poupart's ligament, along the external border of the psoas magnus; it continues, inferiorly, passing beneath Poupart's ligament into the thigh.

25. Obturator Nerve, Plates 39, 40, 41, and 46.—This branch, given off from the third and fourth lumbar nerves, runs inferiorly and posteriorly to the psoas magnus muscle and the external iliac vein. It appears, inferiorly to the external iliac vein, upon the interior of the obturator internus muscle, where it courses superiorly to, and parallel with, the obturator artery; it leaves the pelvic cavity by the same foramen as the artery (see page 74).

26. Accessory Obturator Nerve.—This is given off (when present) from the fourth lumbar nerve; it accompanies the obturator nerve, but leaves the pelvis under Poupart's ligament, over the horizontal ramus of the os pubis.

Dissection.—Trace the fifth lumbar nerve and the branch it receives from the fourth lumbar; also, the four superior sacral nerves, from the anterior sacral foramina to the great sacro-sciatic foramen. Determine the sacral ganglia of the sympathetic, the fifth sacral nerve, the coccygeal or sixth sacral nerve and the coccygeal ganglion of the sympathetic, or the *ganglion impar*.

27. Sacral Plexus, Plates 33, 39, 40, and 41.—The anterior branch of the fifth lumbar nerve and a branch from the fourth (lumbo-sacral cord) form the superior contribution to the sacral plexus; the plexus is completed by the anterior branches of the first, second, third and part of the fourth sacral nerves. The above trunks converge to two nerves, the great and the small sciatic, which leave the pelvic cavity by the great sarco-sciatic foramen, inferior to the pyriformis muscle. The plexus also affords: interior branches to the pyriformis, the levator ani, and the obturator internus muscles; and exterior branches to the gemellus superior, the gemellus inferior, and the quadratus femoris muscles.

28. Anterior Branches of the Fifth Sacral and the Coccygeal Nerves.—These two nerves distribute to the coccygeus muscle and the skin of the coccygeal region.

29. Sacral Ganglia and Coccygeal Ganglion of the Sympathetic.—These ganglia continue the ganglionic chain of the sympathetic, from the lumbar region into the pelvis; they lie upon the anterior surface of the sacrum, internal to the emergence of the anterior branches of the sacral spinal nerves at the sacral foramina. They are united by branches, and also communicate with the sacral nerves. The fourth sacral ganglion sends a branch to the single coccygeal ganglion (*ganglion impar*), upon the anterior face of the coccyx.

DISSECTION.—Section the aorta, the vena cava, the ureters, the spermatic or the ovarian vessels and the suprarenal branches from the phrenic arteries (Plate 38). Note the arrow placed upon the right crus of the diaphragm, inferior to the renal vein (Plate 38); it points to the receptaculum chyli upon the body of the second lumbar vertebra, posterior to the aorta (Plate 41). Raise, *en masse*, from the interior of the abdominal wall, the suprarenal capsules, the kidneys, the superior portions of the ureters and the spermatic vessels, the renal vessels and the portions of the aorta and the vena cava. In raising the piece of the aorta be careful to hug its posterior surface, so as not to injure subjacent parts. These viscera, attached vessels, etc., should be placed in preservative fluid. In the area exposed by the removal of the portion of the aorta (Plate 41), find a small vein to the right of the median line—the commencement of the vena azygos major—and the receptaculum chyli along the median line; the latter has minute vessels—lymphatics—converging to it. Note a number of lymphatic glands contiguous to the receptaculum chyli; trace some of the lymphatic vessels from the glands to the receptaculum chyli.

30. Receptaculum Chyli, Plate 41.—This, the commencement of the left lymphatic or thoracic duct of the lymphatic system, lies upon the anterior surface of the body of the second lumbar vertebra, posterior to the abdominal aorta; it is about the size of a small quill, and receives lymphatic vessels from the surrounding lymphatic glands; it continues, superiorly, upon the first lumbar vertebra, and passes into the thorax through the aortic opening of the diaphragm.

Dissection.—Remove the peritoneum from the abdominal surface of the diaphragm; trace, in so doing, the ramifications of the phrenic arteries (Plate 41), and note the points of perforation of the phrenic nerves and their distribution. Determine the aortic, the caval and the œsophageal openings in the diaphragm; clean the crura and the ligamenta arcuata externa and interna portions of the diaphragm (Plate 43).

31. Phrenic Arteries, Plates 38 and 41.—These branches from the abdominal aorta (page 70), distribute, right and left, to the inferior surface of the diaphragm. Each artery gives a branch to the suprarenal capsule of its side.

32. Phrenic Nerves.—These nerves perforate the diaphragm from the thorax, to distribute to the inferior surface of the muscle.

33. Cartilage Areas of the Abdominal Interior, Fig. 2, Plate 21.—The cartilage surfaces presenting areas for the attachments of the diaphragm are: the interior surfaces of the ensiform cartilage of the sternum and of the cartilages of the six inferior ribs.

34. Bone Areas of the Abdominal and Pelvic Interiors, Plate 42.—The twelfth dorsal vertebra, the twelfth rib, the lumbar vertebræ and the ilial portion of the os innominatum afford attachments to muscles, that contribute to the superior and postero-lateral walls of the abdominal cavity.

35. Diaphragm, Fig. 2, Plate 21, and Plates 38, 41, 42, 43, and 44.—This muscle forms the septum between the abdominal and thoracic cavities. The portions of the muscle are: a tendinous centre, a circumferential muscle portion and two crura. It is attached as follows: to the interiors of the ensiform cartilage of the sternum and the cartilages of the six inferior ribs, right and left; to the ligamenta arcuata externa—arches of fibrous tissue, that bridge from the cartilages of the twelfth rib to the transverse processes of the first lumbar vertebra; to the ligamenta arcuata interna—internal fibrous arches from the transverse processes of the first lumbar vertebra to the lateral surfaces of the body of the same vertebra; to the anterior surfaces of the bodies of the four superior lumbar vertebræ, by the crura of the muscle. From the abdomen, the fibres are seen to converge from their circumferential attachments to a fibrous portion—the tendinous centre of the diaphragm. Before the removal of the heart from the thorax, the diaphragm maintains the shape of an antero-posterior half-arch over the abdomen (the arch deficient anteriorly); the arch is maintained by the parietal layer of the pericardium, being attached to the superior surface of the tendinous centre inferiorly and to the fixed large vessels, projected from the base of the heart, superiorly; by it the centre of the diaphragm is held up and rendered almost immovable, during inspiration and expiration, respectively. The muscle presents three large openings of communication with the thorax; the aortic, the œsophageal and the caval. The aortic opening is located opposite the twelfth dorsal vertebra, between the crura; it gives transit to the aorta, the left lymphatic or thoracic duct and the right vena azygos. The œsophageal opening is located a little to the left and anterior to the aortic; it allows the œsophagus and the right and left pneumogastric nerves to pass from the thorax into the abdomen. The caval opening is through the tendinous centre of the diaphragm, to the right of, and anterior to the vertebral column; it allows the vena cava inferior to pass from the abdomen into the thorax. The right and left crus are perforated by the sympathetic nerve-trunks and the splanchnic nerves of the sides respectively; the left crus gives transit also to the vena azygos minor vein.

36. Psoas Parvus Muscle, Plate 44, and Plates 39 to 43 inclusive.—This small muscle, when present, is attached to the lateral surface of the body of the twelfth dorsal vertebra (Plate 42); it emerges from beneath the ligamentum arcuatum internum (Plate 43); it continues, inferiorly, upon the interior face of the psoas magnus muscle, and is attached, at the brim of the pelvis, to the ilio-pectineal eminence.

37. Psoas Magnus Muscle, Plates 38 to 44, inclusive.—This muscle is attached, superiorly, to the lateral surfaces of the last dorsal and the lumbar intervertebral discs (Plate 44); it emerges inferiorly to the ligamentum arcuatum internum, runs along the brim of the pelvis, and blends with the iliacus internus; the two leave the abdomen inferiorly to Poupart's ligament.

38. Quadratus Lumborum Muscle, Plates 38, 41, 42, 43 and 44.—This muscle is attached to the inferior border of the twelfth rib, the transverse processes of the lumbar vertebræ, and the posterior third of the interior lip of the crest of the ilium. It emerges from beneath the ligamentum arcuatum externum of the diaphragm (Plate 43). It is located in the plane, posteriorly to the psoas magnus muscle; it continues, posteriorly, the muscle plane of the transversalis abdominis muscle, of the antero-lateral areas of the abdominal parietes.

39. Iliacus Internus Muscle, Plates 38 to 42, inclusive; and Plates 44, 45, and 46.—This muscle is attached to the interior of the ilium, and leaves the pelvic cavity with the psoas magnus muscle, inferiorly to Poupart's ligament.

40. Pelvic Cavity, Plates 42, 45, and 46.—This cavity is enclosed: posteriorly, by the bones, sacrum and coccyx, and by the ligaments, great and small sacro-sciatic; laterally, by the ischial and ilial portions of the os innominatum and the sacro-sciatic ligaments; anteriorly, by the ossa pubis, the symphysis pubis, the ischia, and the obturator membranes; superiorly, it presents an inlet, which makes the cavity continuous with the abdominal; inferiorly, it is closed by the tissue-planes of the perineum (Male or Female Perineum).

41. Bone Areas of the Pelvic Cavity, Plates 42 and 45.—The interior surfaces of all the bones of the pelvic cavity afford attachments to muscles.

42. Pyriformis Muscle, Plates 39, 40, 42, and 46; Fig. 1, Plate 45.—This muscle has its interior pelvic attachment to the anterior surface of the lateral mass of the sacrum, external to the anterior sacral foramina (Plates 42 and 45). It leaves the cavity of the pelvis, at a right angle to its attachment, by the great sacro-sciatic foramen; it goes through the foramen, accompanied by vessels and nerves: superior to it are the gluteal vessels and nerve; inferior to it are the sciatic and pudic vessels and nerves.

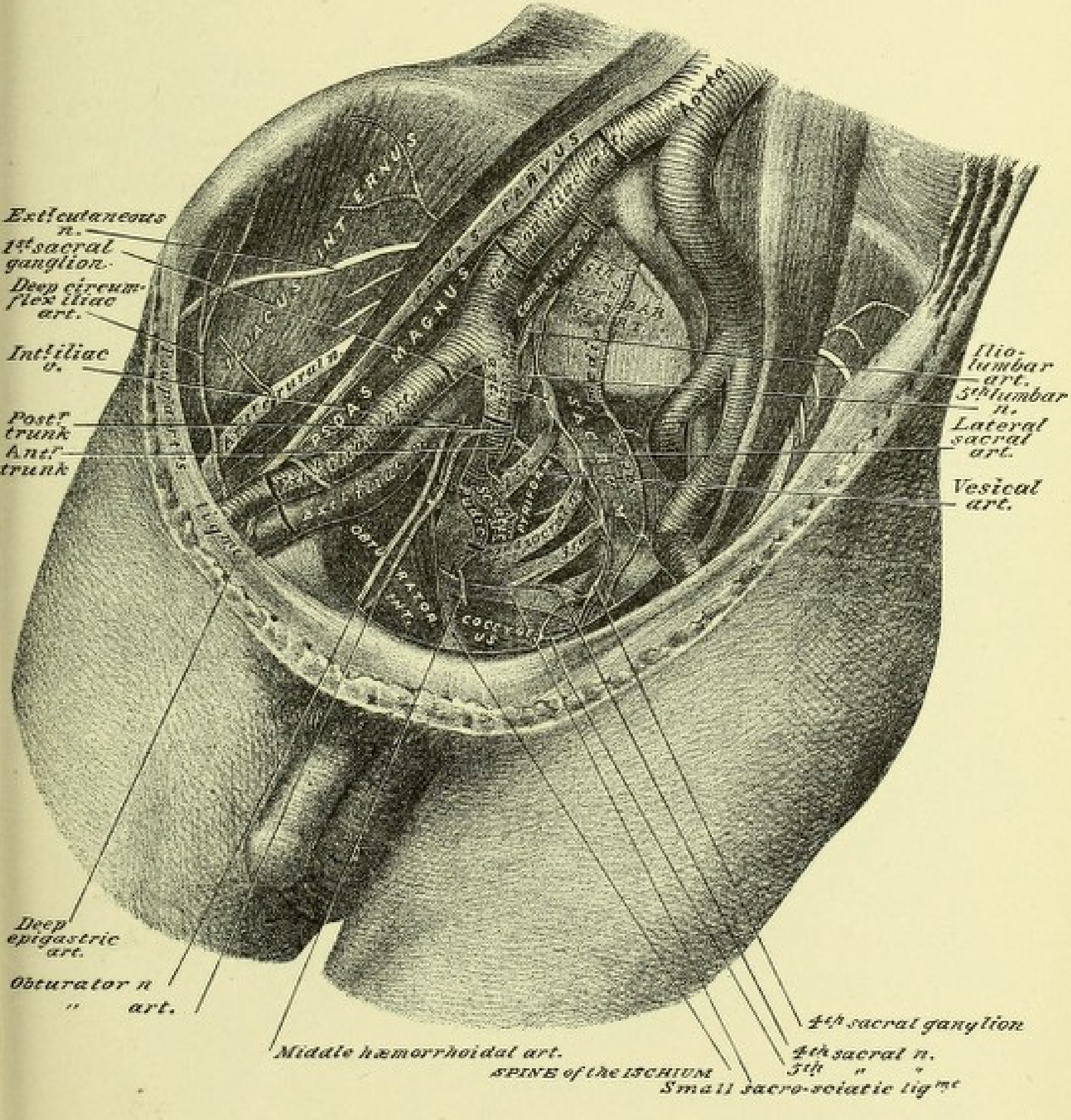
43. Coccygeus Muscle, Plates 39, 40, and 46; Fig. 1, Plate 45.—This muscle is attached to the interior of the spine of the ischium, externally, and the lateral portion of the interior of the coccyx, internally; it crosses upon the interior of the small sacro-sciatic ligament. It is perforated by the fifth sacral and the coccygeal nerves, on their way to the skin of the coccygeal region.

44. Levator Ani et Prostatæ, or Levator Ani et Vaginæ Muscle, Plates 45 and 46.—This muscle was described and partially dissected in the male and female perinei (pages 24 and 39; Plates 9 and 18). The dissected muscles and fasciæ of the pelvic interior, as shown in Plate 46, is intended to make clear the attachments and fascial relations of these muscles (according to sex). (The dissector is not to reproduce this sectioned pelvis.) From the spine of the ischium to the interior of the os pubis, the line of the splitting of the pelvic fascia, into the recto-vesical and obturator fasciæ, bridges the lateral interior of the pelvis—the *pelvic fascia line.* The levator muscle is attached: to the spine of the ischium, posteriorly; the interior of the os pubis, anteriorly; and along the obturator fascia between these points, inferior to the splitting of the pelvic fascia. From these attachments it passes inferiorly—as the levator ani et prostatæ (male) or the levator ani et vaginæ (female)—to sling the pelvic viscera, by the meeting of the right and the left muscle, along the median line of, and at the outlets of, the pelvic viscera at the perineum (Plates 9 and 18). From the obturator fascia, inferior to the line of attachment of the levator muscles, the levator fascia—posterior layer of the triangular ligament and the anal fascia—is projected to the median line of the pelvic outlet, exterior to the compound levator muscle (Male Perineum, page 22 and Fig. 3, Plate 8; Female Perineum, page 39, and Plate 17).

45. Obturator Internus Muscle, Plates 39, 40, 45, and 46. —The inferior portion of this muscle was referred to in the dissection of the male perineum (page 17). It is attached to the interior surface of the obturator membrane and the bony circumference surrounding the same (Fig. 1, Plate 45). From this attachment its tendon leaves the pelvic cavity by the small sacro-sciatic foramen, being projected therefrom into the gluteal region (Plate 100).

46. Ligaments of the Abdominal and Pelvic Interiors, Plates 42 and 45.—These ligaments present as follows: upon the anterior surfaces of the bodies of the lumbar vertebræ, the anterior common ligament of the spinal column; from the transverse process of the fifth lumbar vertebra to the posterior superior spinous process of the ilium, the ilio-lumbar ligament; from the anterior surface of the lateral portion of the sacrum to the interior of the ilium, the anterior sacro-iliac ligament; from the spine of the ischium to the sacrum and coccyx, the small sacro-sciatic ligament; from the sacrum to the body of the ischium, the great sacro-sciatic ligament; from the anterior surface of the inferior segment of the sacrum to the anterior of the coccyx, the anterior sacro-coccygeal ligament; at the symphysis pubis the posterior, superior and inferior pubic ligaments.

Dissection.—If the dissector has the lower extremity assigned to him with the abdomen, he should continue his work by dissecting the anterior surface of the thigh; if he has the trunk region—abdomen, pelvis and thorax—he should take up the dissection of the anterior parietes of the thorax. The demonstration of the abdominal and pelvic viscera will now be given, as they naturally complete the abdomen and pelvis; but the dissector should leave them till after he has finished the dissection of the lower extremity or thorax, according to the assignment of the subject.



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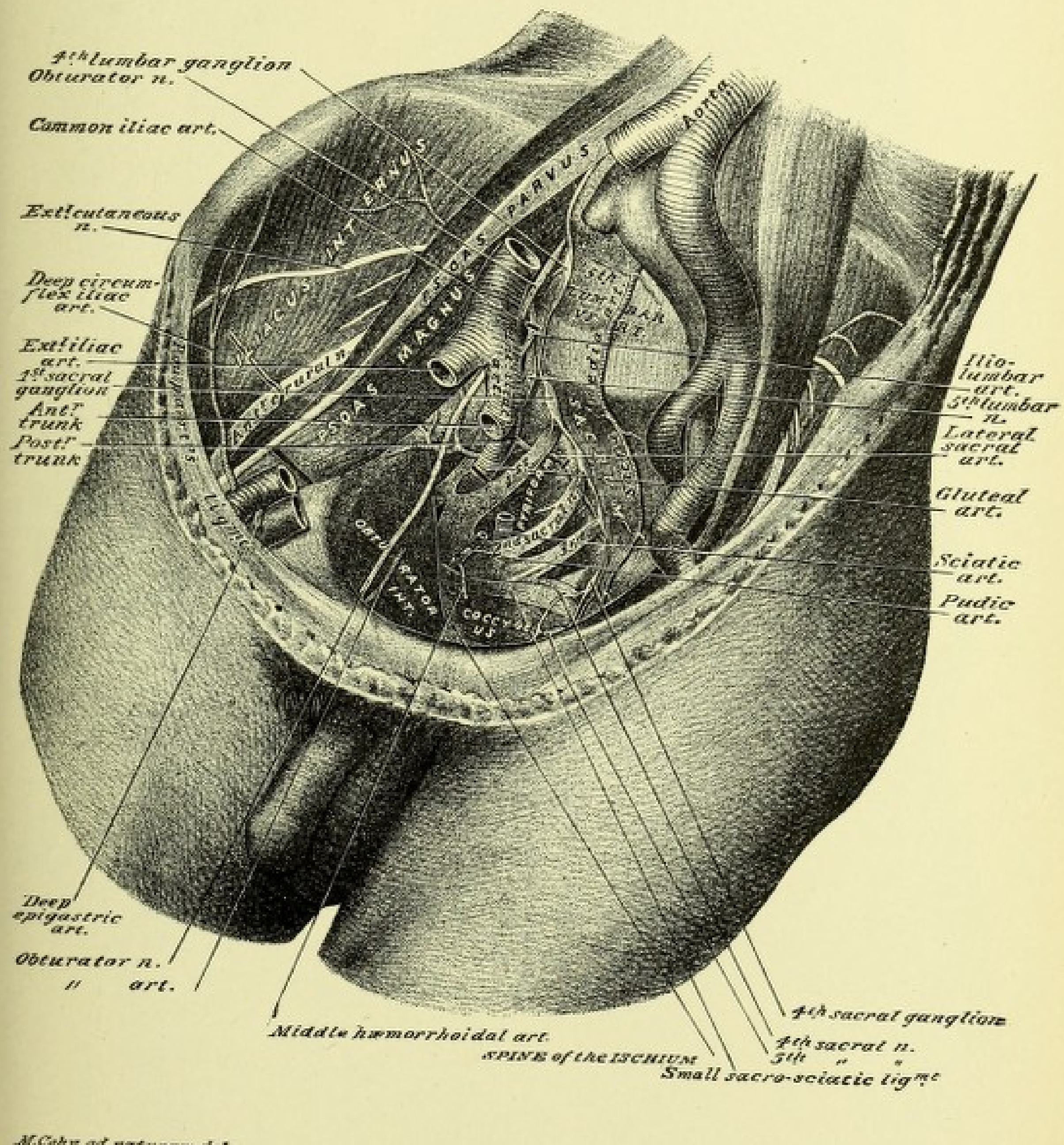
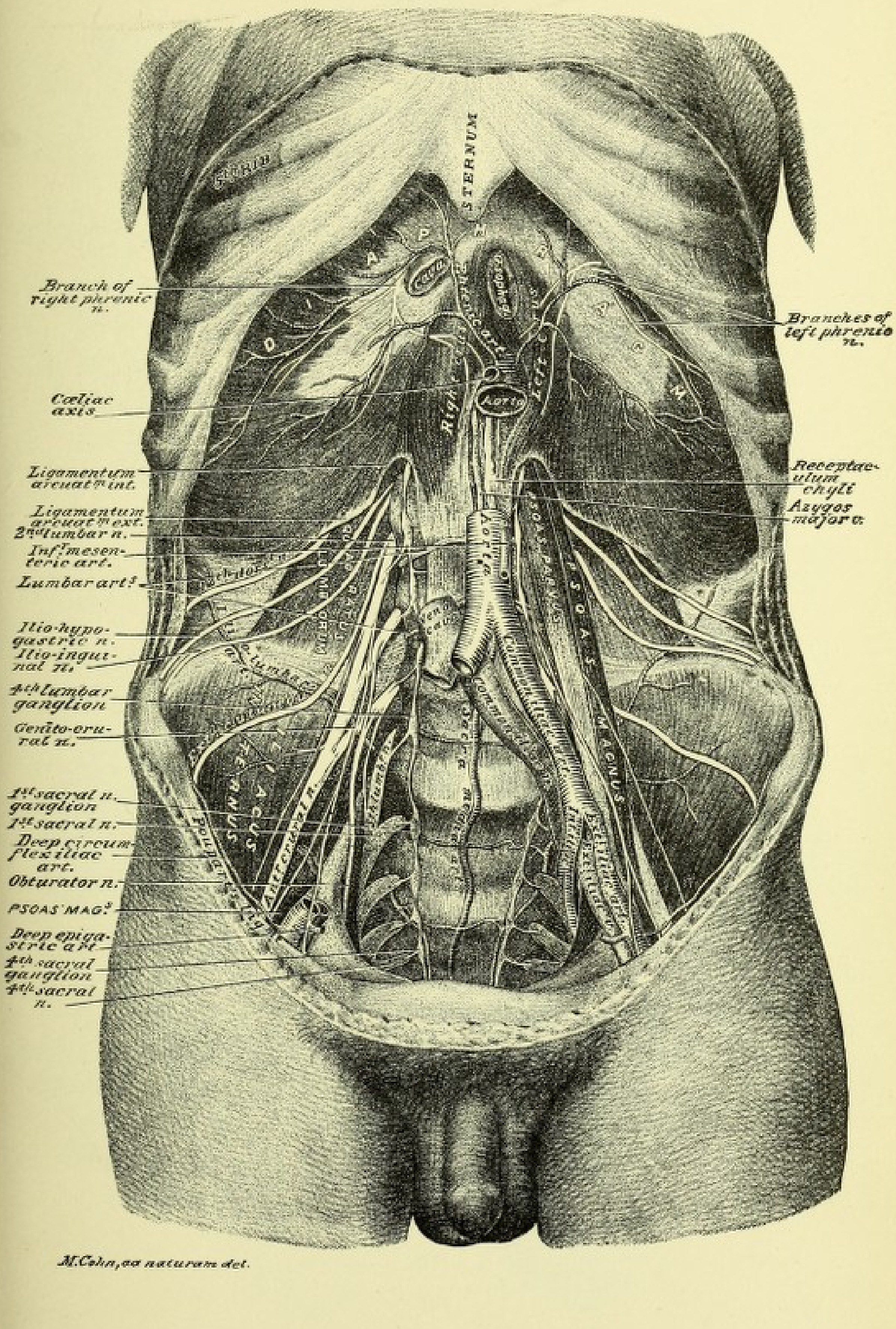
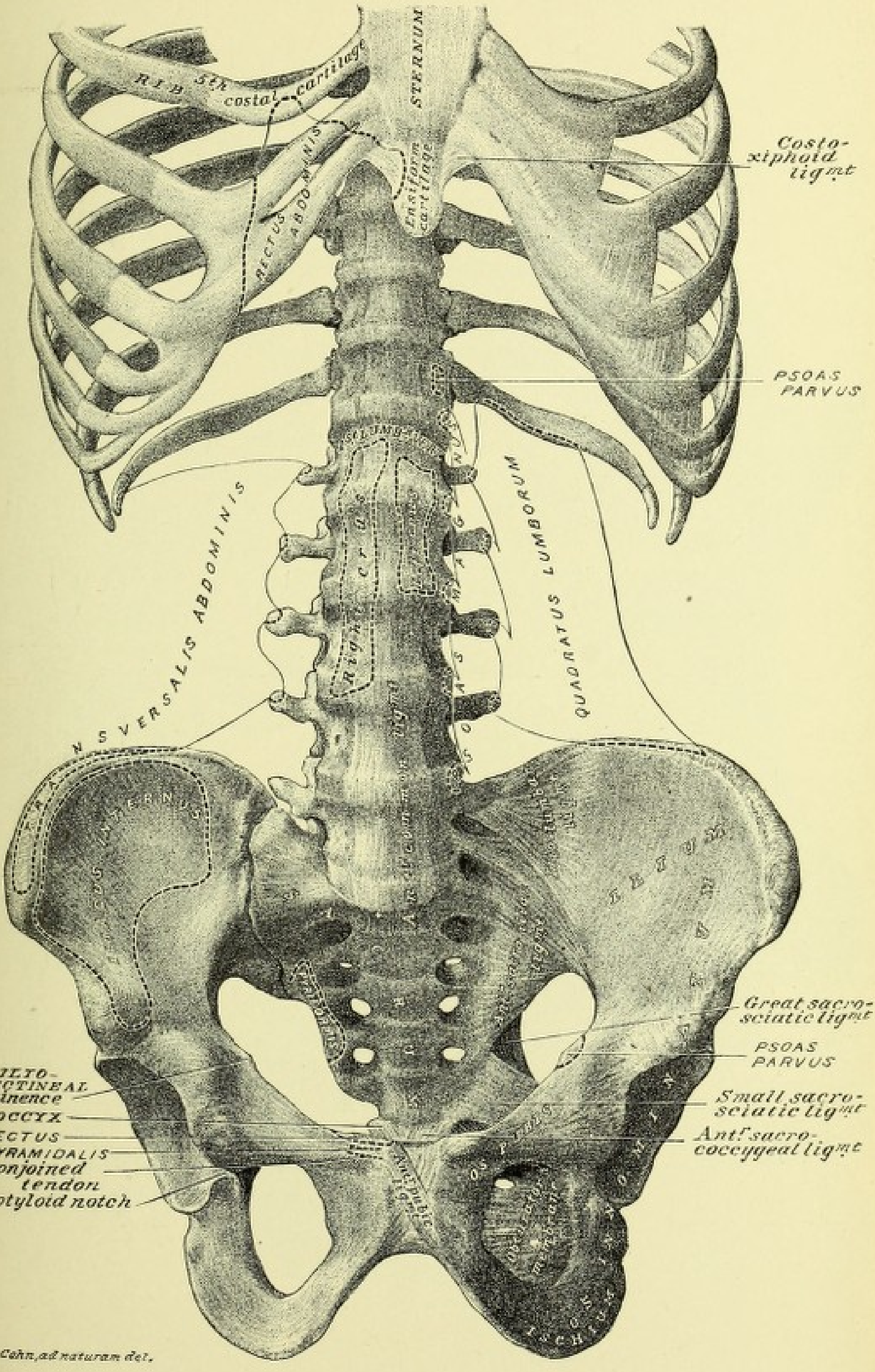
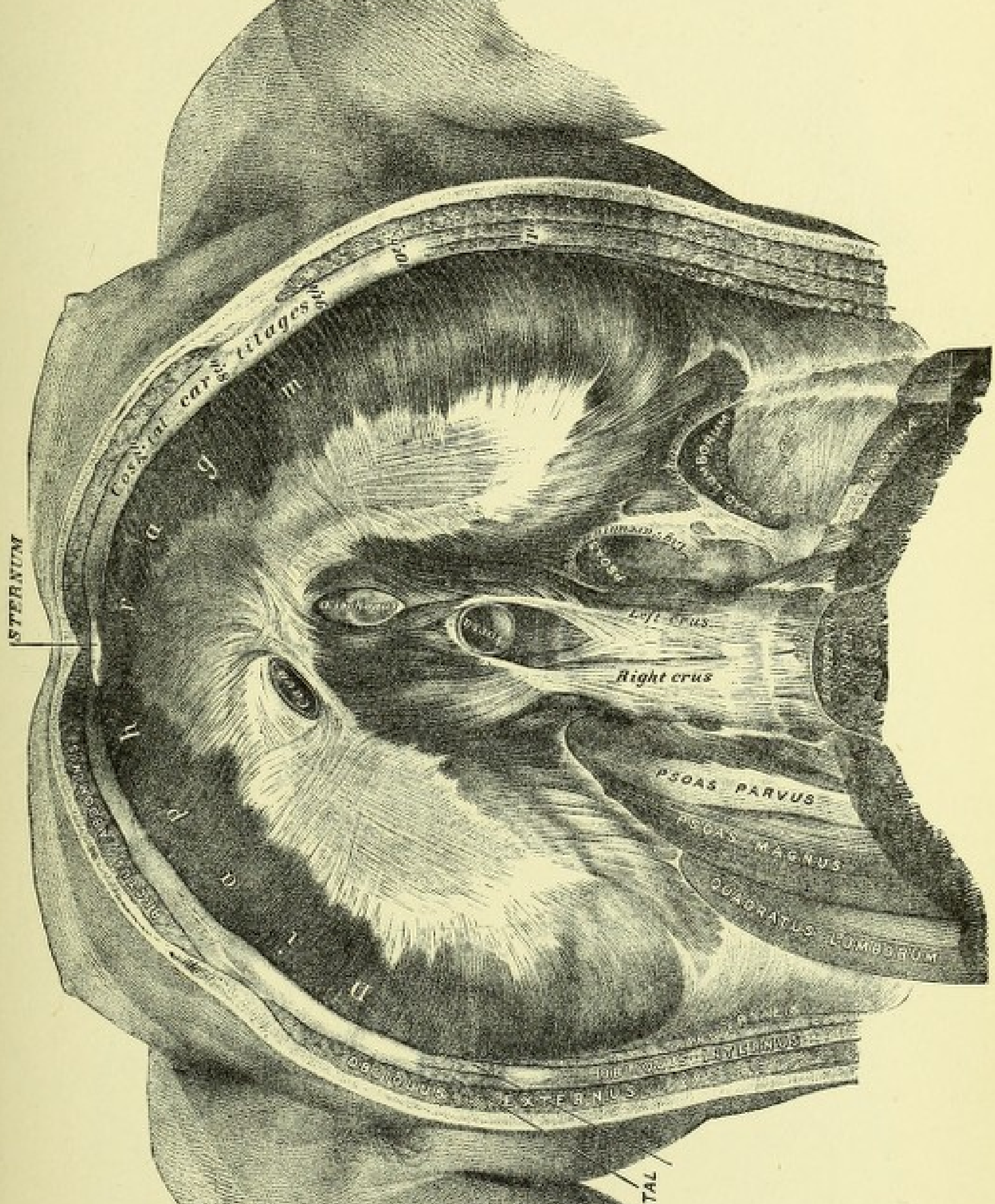


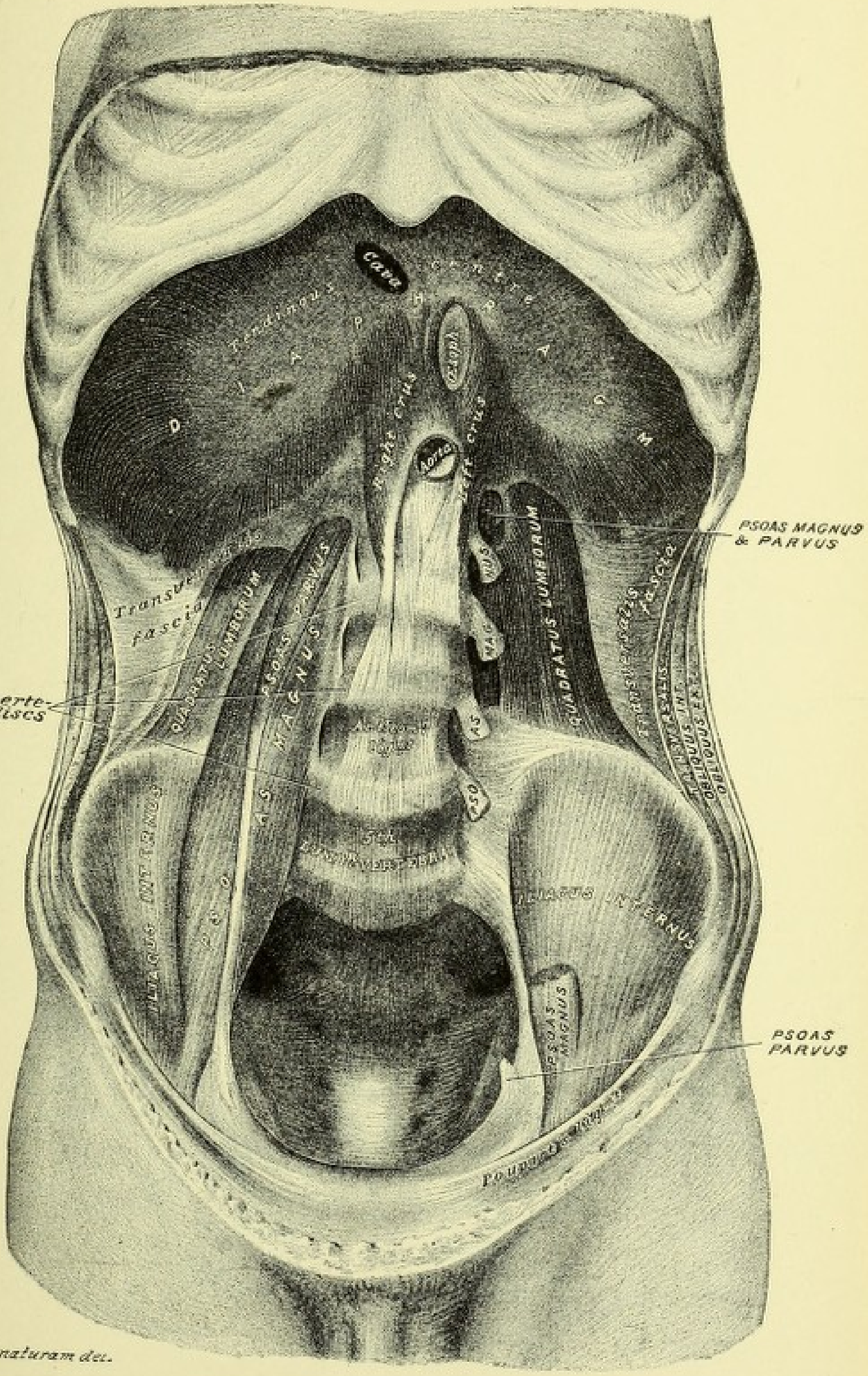
M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

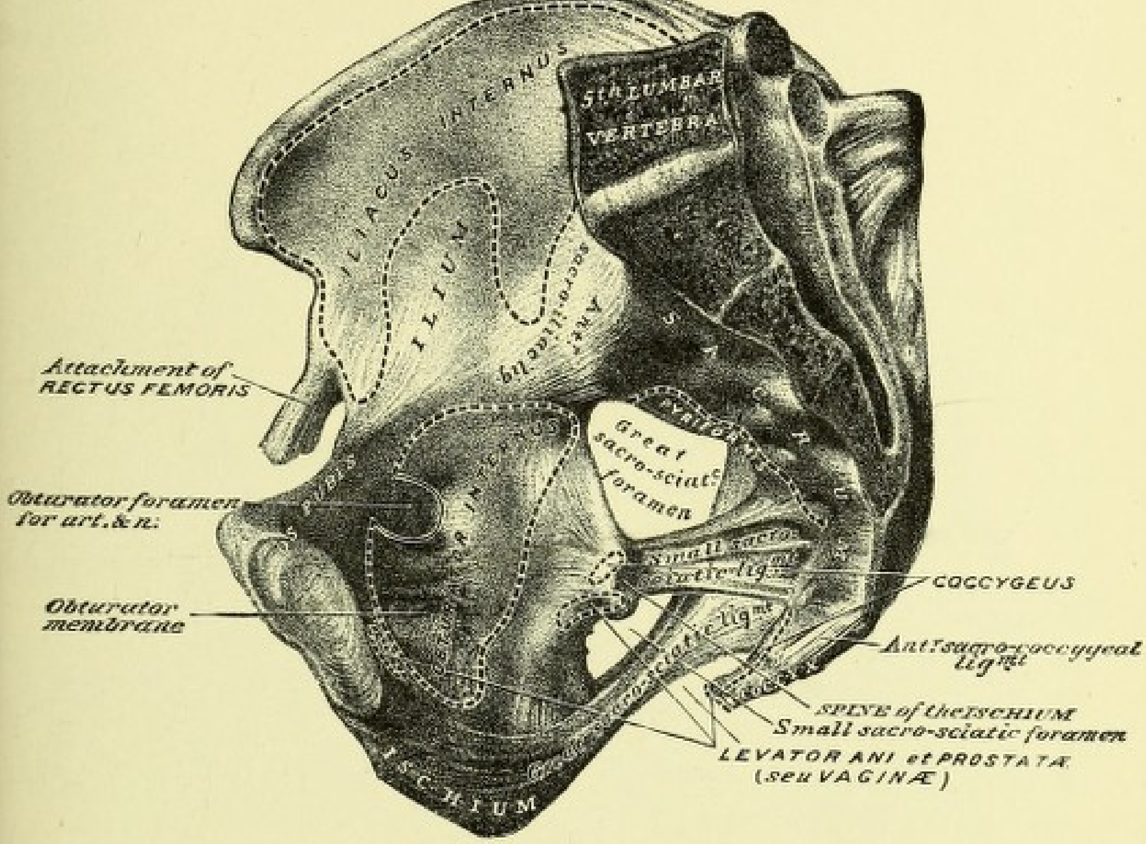

STERNUM
RIB 5th costal cartilage
RECTUS ABDOMINIS
Ensiform cartilage
Costo-xiphoid ligmt
PSOAS PARVUS
TRANSVERSALIS ABDOMINIS
QUADRATUS LUMBORUM
ILIACUS INTERNUS
ILIUM
Great sacro-sciatic ligmt
PSOAS PARVUS
ILYO-PECTINEAL eminence
COCCYX
RECTUS
PYRAMIDALIS
Conjoined tendon
Cotyloid notch
Small sacro-sciatic ligmt
Antr sacro-coccygeal ligmt
OS PUBIS
ISCHIUM
M.Cahn, ad naturam del.


STERNUM
Costal cartilages
Left crus
Right crus
PSOAS PARVUS
PSOAS MAGNUS
QUADRATUS LUMBORUM
OBLIQUUS EXTERNUS
EXT[t]. INTERCOSTAL
INT[t]. "



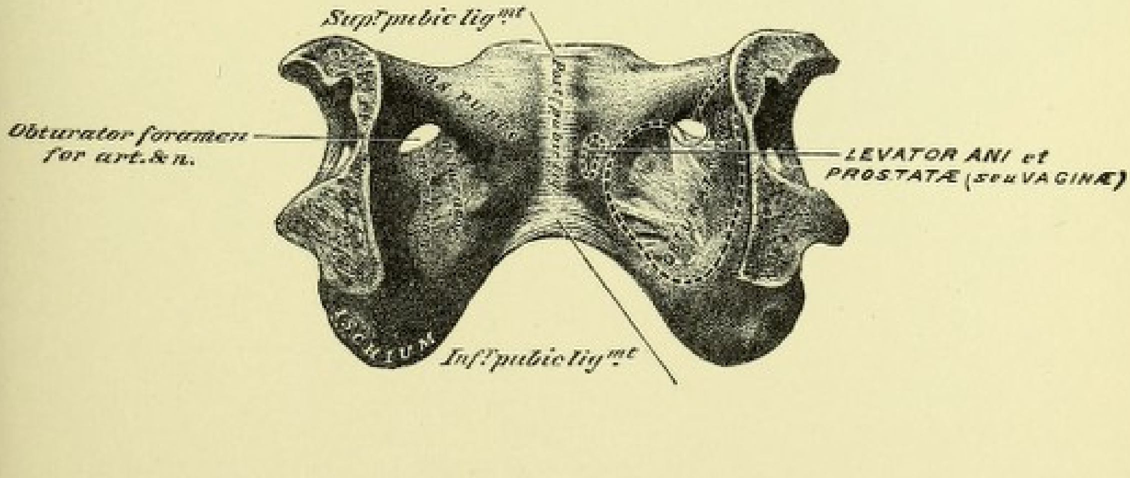
M.Cohn, ad naturam del.

FIG. 1

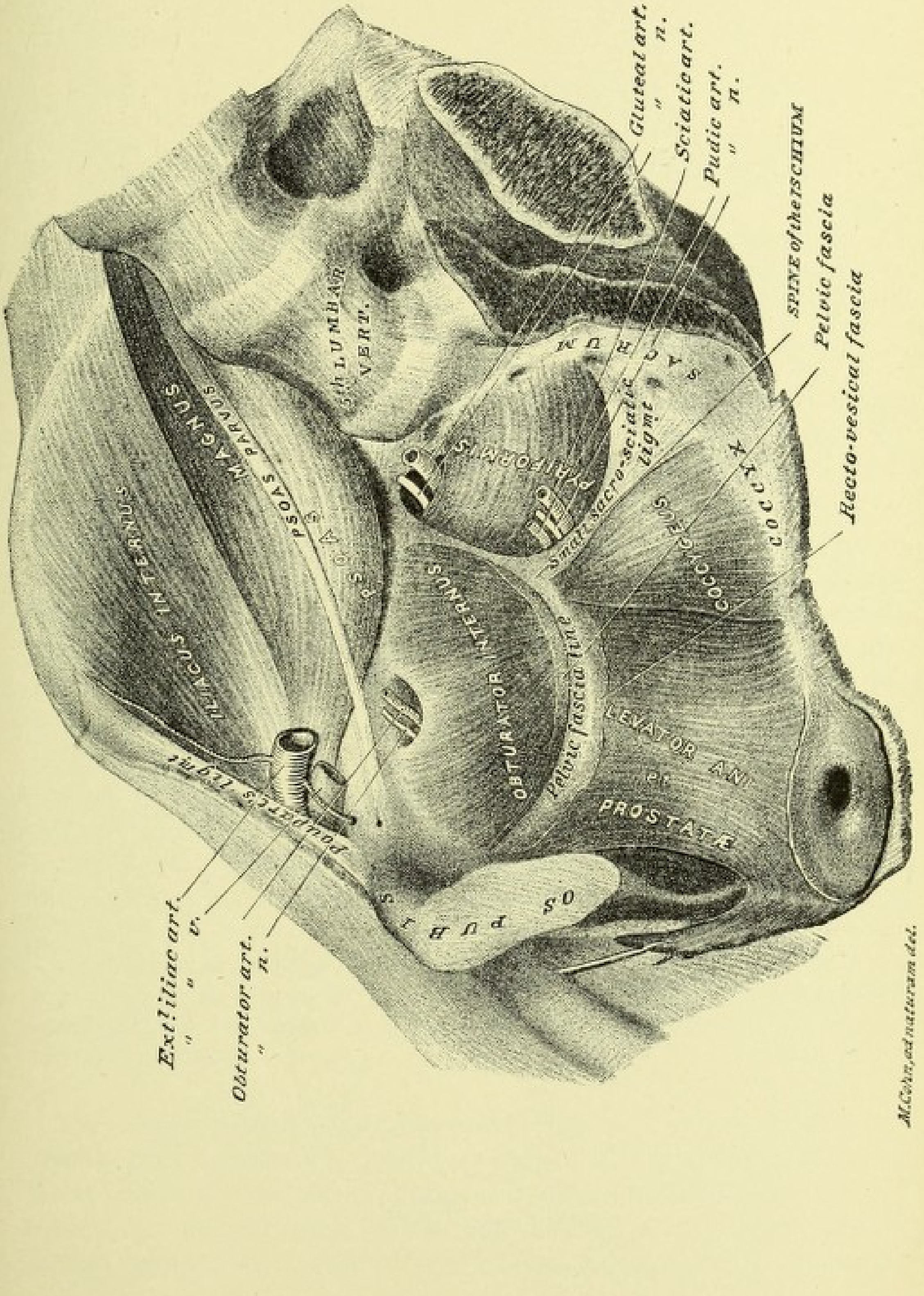


ILIACUS INTERNUS
5th LUMBAR VERTEBRA
ILIUM
Art. sacro-iliac lig.
SACRUM
Attachment of RECTUS FEMORIS
PYRIFORMIS
Great sacro-sciatic foramen
Obturator foramen for art. & n.
PUBIS
Small sacro-sciatic ligmt
COCCYGEUS
Obturator membrane
Great sacro-sciatic ligmt
Antr sacro-coccygeal ligmt
COCCYX
SPINE of the ISCHIUM
Small sacro-sciatic foramen
LEVATOR ANI et PROSTATÆ (seu VAGINÆ)
ISCHIUM

FIG. 2



Supr pubic ligmt
Obturator foramen for art. & n.
LEVATOR ANI et PROSTATÆ (seu VAGINÆ)
ISCHIUM
Infr pubic ligmt


Gluteal art.
" n.
Sciatic art.
Pudic art.
" n.
SPINE of the ISCHIUM
Pelvic fascia
Recto-vesical fascia
5th LUMBAR VERT.
SACRUM
ILIACUS INTERNUS
MAGNUS
PSOAS PARVUS
PSOAS
PYRIFORMIS
Small sacro-sciatic ligmt
COCCYX
COCCYGEUS
OBTURATOR INTERNUS
Pelvic fascia line
LEVATOR ANI et PROSTATÆ
Poupart's ligmt
OS PUBIS
Ext. iliac art.
" " v.
Obturator art.
" n.
M.Cohn, ad naturam del.

SIXTH DISSECTION.

ABDOMINAL VISCERA OUT OF THE BODY.

DISSECTION.—Commence the dissection of the abdominal viscera with the jejunal and ileal portions of the small intestine. Trim the shreds of the mesentery from the intestine; stretch out the latter and slit it open from the jejunal end, along its line of mesentery attachment.

1. Jejunum and Ileum of the Small Intestine, Figs. 1 and 2, Plate 47.—The exterior of the small intestine is invested by peritoneum, except at the line where the two layers of the mesentery meet; at this line of its circumference its arteries and nerves distribute to it, and its veins and lymphatic vessels leave it. The mucous membrane, that lines this intestine, presents the valvulæ conniventes (Fig. 1, Plate 47); these are formed by the membrane's reduplications, which have a velvety appearance, due to the villi; in the ileal portion the valvulæ conniventes diminish in depth and number, and are absent in its inferior third. In the ileum are found, here and there, what are known as Peyer's patches (Fig. 2, Plate 47); these are slightly depressed areas of the mucous membrane with elevated borders, the interiors being somewhat pitted; they are most numerous toward the inferior end of the ileum.

DISSECTION.—Cut off from four to six inches of the small intestine and pin it out taut upon a dissecting board (Fig. 1, Plate 47). Dissect the layers of the intestinal wall; the success of this demonstration will depend upon the freshness of the material.

2. Coats of the Small Intestine, Fig. 1, Plate 47.—This intestine will be found to present a readily demonstrable mucous membrane, a submucous plane not easily determined, a recognizable muscular coat and a well-defined serous coat. Such is the general structure of the subdiaphragmatic portions of the alimentary canal from the œsophageal end of the stomach to the anus; special variations will be noted in the different portions of the canal.

DISSECTION.—Cut the ascending colon about six inches from the junction of the ileum with the large intestine. Note the relation of the ileum to the cæcum and colon, and that of the appendix vermiformis to all three. Demonstrate the action of the ileo-colic valve, by filling first the ileum and then the colon and cæcum with water; note that while the water will flow readily from the former into the latter, it is impossible to effect the reverse current. Cut away the external side of the large intestine opposite the ileo-colic valve (Fig. 6, Plate 47).

3. Cæcum of the Large Intestine, Figs. 4, 5 and 6, Plate 47.—The cæcum is the sac of the large intestine, which is inferior to the entrance of the ileum of the small intestine into the large intestine. At the junction of the cæcum with the colon the ileum of the small intestine opens; the two intestines are separated by a valve—ileo-colic valve. Upon the surface of the cæcum its longitudinal muscular fibres are seen so collected as to form three bands, one anterior, one postero-external, and one postero-internal; it is these bands that determine its sacculated character. The open cæcum and colon (Fig. 6, Plate 47) show the large intestine side of the ileo-colic valve; it is formed by two reduplications of the mucous membrane, which determine a button-hole slit of communication.

DISSECTION.—Search for the orifice of the canal of the appendix vermiformis into the cæcum; pass a probe into the same, and slit open the appendix.

4. Appendix Vermiformis, Plates 35 and 37; Figs. 4, 5, and 6, Plate 47.—This is a blind tube, from two to six inches long, appended to the cæcum; its relation to the cæcum and ileum varies, but, as a rule, it is curled inferiorly and internally to them, having a special meso. Its canal opens into the cæcum, passing through its wall obliquely, thereby forming a valvular opening. Its mucous membrane lining differs from that of the cæcum.

DISSECTION.—Clear the ascending, transverse and descending colon of shreds of meso-colon and omentum.

5. Colon of the Large Intestine, Plate 35.—This portion of the large intestine is distinguished as follows: by the appen-

PLATE 54

FIG. 1

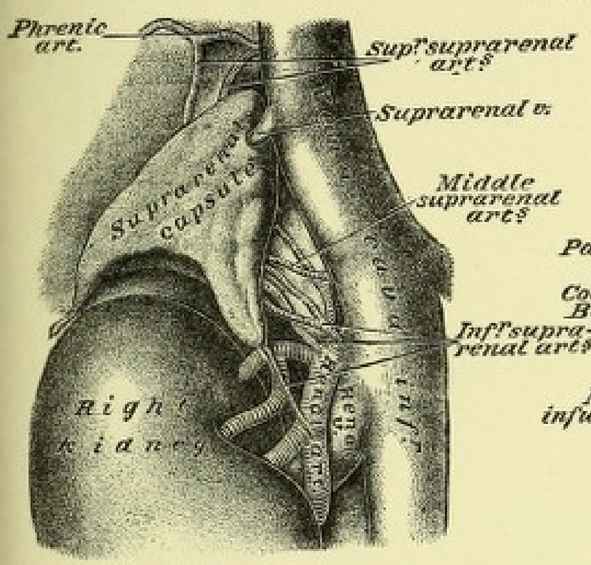


FIG. 3

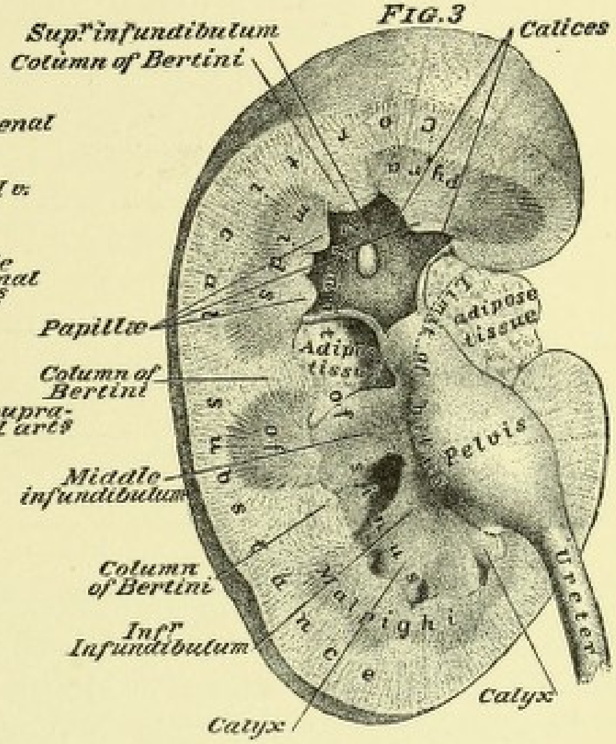


FIG. 2

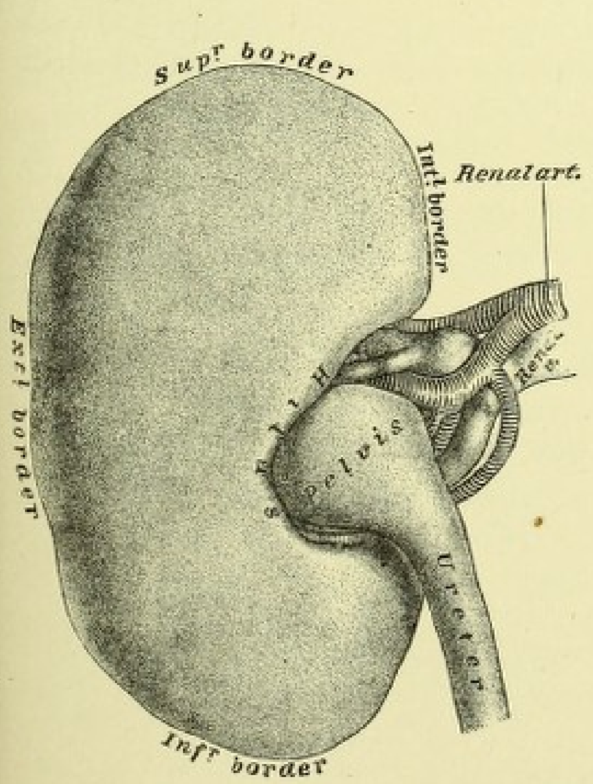
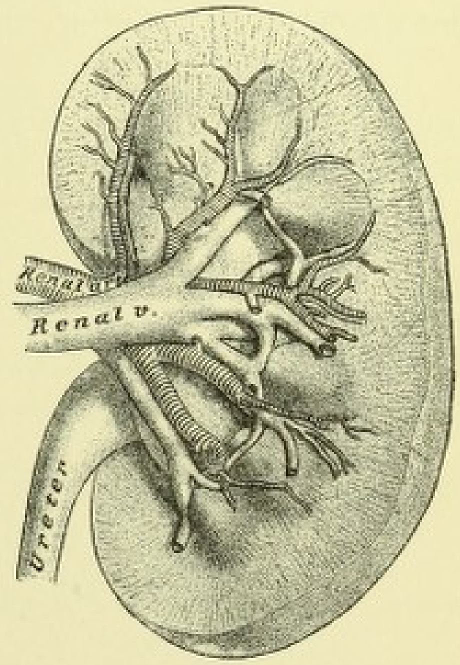


FIG. 4



dices epiploicæ (pellets of fat beneath its redundant peritoneal investiture) at the clefts between its sacculæ; by the continuous sacculæ of which it is formed; and by the three longitudinal bands, that are present upon its circumference. The latter were recognized at their commencement upon the cæcum; they result from the bundling of the longitudinal muscular fibres of the intestine. The bands, taken continuously, are about half the length of this portion of the large intestine, consequently, the peculiar sacculæ of this gut occur in its adaptation to the length of these bands.

Dissection.—Slit open the colon of the large intestine, as was done with the small intestine. Dissect out a portion of one of the longitudinal bands and determine its structure.

6. Mucous Membrane of the Large Intestine, Fig. 3, Plate 47.—This surface of the large intestine presents three longitudinal furrows, corresponding to the exterior muscle bands; between them the mucous membrane is raised into transverse prominences. Here and there more or less well defined, small, prominent points present—the solitary glands.

Dissection.—Commence the dissection of the stomach, spleen, duodenum, pancreas and liver, *en masse*, by cutting through the duodenum just beyond the pylorus of the stomach, and separating the latter and the spleen from the other organs. Place the liver upon its anterior surface, with its inferior border upwards, and allow the duodenum and the pancreas to lie upon their posterior surfaces, inferior to and parallel with the superior border of the liver (Plate 48). Clear the exposed areas of the organs free of adventitious tissue, determining vessels and ducts.

7. Duodenum, Plate 48.—This, the superior portion of the small intestine, was described as it presents *in situ* (page 64). In its present dissection, its relations to the ductus communis choledochus should be especially determined.

Dissection.—Cut away the anterior wall of the descending portion of the duodenum. Incise the ductus communis choledochus, and enter a fine probe through it into the duodenum (Plate 48); note the orifice of the ductus communis choledochus at the mucous membrane surface of the exposed posterior wall of the duodenum.

8. Ductus Communis Choledochus, Plates 48 and 49.—This duct, before described (pages 63 and 67) and illustrated

(Plates 35 and 36) *in situ*, enters the duodenum through the posterior wall of its descending portion ; it receives the duct of the pancreas, before passing into the wall of the gut ; it perforates the wall of the latter canal obliquely, thereby determining a valve-like opening.

DISSECTION.—Trace the superior mesenteric and splenic veins to the vena portæ.

9. Vena Portæ, Plates 48, 52, 35 and 36.—This vein takes its origin at the convergence of the superior mesenteric and the splenic veins—the latter receiving the inferior mesenteric. The trunk of the vena portæ receives the gastro-epiploica dextra, the pyloric, the gastric and the cystic veins. The vessel is from two to three inches long from its origin to where it enters the transverse fissure of the liver.

DISSECTION.—Remove the liver by cutting the ductus communis choledochus and the vena portæ, at the section lines (Plate 48). Clear away the superior mesenteric and splenic veins.

10. Pancreas, Plates 48 and 49.—This organ was described (page 65) and illustrated (Plates 35 and 36) *in situ*. In this its special dissection, it is seen to have somewhat the shape of a hammer. Its anterior surface shows its portions to be : a head, to the right, included in the concavity of the duodenum ; a neck or constricted portion, anterior to the superior mesenteric vessels ; a body, extending to the left ; while its tip or tail-like end terminates at the left. The splenic and inferior mesenteric veins lie posterior to the left half of the pancreas.

DISSECTION.—Turn over the two organs (duodenum and pancreas) ; determine the vessels upon the posterior surface of the head of the pancreas. Dissect longitudinally into the superior half of the posterior surface of the pancreas, from its tip to its head, and search for the pancreatic duct ; start the dissection at about the junction of the head and neck of the organ ; once recognized, follow the duct to the left into the tail of the viscus and to the right toward its head.

11. Inferior Pancreatico-Duodenal Artery, Fig. 1, Plate 49, and Plate 36.—Upon the posterior surface of the pancreas, at its head, the inferior pancreatico-duodenal branch of the superior mesenteric artery presents ; it there follows, from left to right, the curve of the head of the pancreas, as lodged in the concavity of the duodenum ; it supplies branches to the pancreas and duodenum, and anastomoses with the superior pancreatico-duodenal branch of the gastro-duodenal artery.

12. Pancreatic Duct, Plates 49 and 36. — This duct is lodged in the posterior and superior portion of the gland; in its course from the tail of the organ it receives contributing ductlets; in the head of the pancreas it may present two portions, the duct proper and an accessory duct (Fig. 2, Plate 49). The duct proper, as previously stated (pages 67 and 88), joins the ductus communis choledochus, before the latter perforates the coats of the duodenum, the two emptying into the gut by a common opening (Plate 36 and Fig. 1, Plate 49). The accessory duct may open into the duct proper, or, by a distinct opening of its own, into the duodenum; the pancreatic duct proper may, in turn, empty into the duodenum by a special orifice, independent of the ductus communis choledochus.

DISSECTION.—Separate the spleen from the fundus of the stomach, preserving the vessels of the former in continuity with it. Clear away the vessels at the curvatures and fundus of the stomach, slit the organ from its œsophageal orifice along its lesser curvature to within two inches of the pylorus; invert the pylorus and examine its interior appearance.

13. Interior of the Stomach, Fig. 1, Plate 50.—As the interior of the stomach lies exposed, the mucous membrane, at its œsophageal end and at the fundus, is smooth, while that of its body and pylorus is thrown into folds or *rugæ*, which run longitudinally and transversely. The communication of the organ with the duodenum is guarded by a valve—the pyloric; the latter is formed by the thickening of the coats of the organ, more especially the mucous membrane; the opening, as seen inverted, is a circular constriction.

DISSECTION.—Dissect the pancreas from the duodenum; slit the latter open from end to end, and lay it out mucous membrane upwards.

14. Interior of the Duodenum, Fig. 2, Plate 50.—Observe the development of the valvulæ conniventes from their commencement in the descending portion (page 64), to their full definition in the transverse or oblique portion. In the ascending and descending portions, the minute prominences of Brunner's glands may be seen. The orifices of the ductus communis choledochus and of the accessory pancreatic duct appear in the descending portion, as before indicated (page 88; Plate 48).

DISSECTION.—Clear the surfaces of the liver, and determine its ligaments, fissures, lobes, vessels and ducts.

15. Liver, Plates 51 and 52.—The liver was described (page 58) and illustrated (Plates 30, 31, 35, and 36) *in situ*. It is the largest organ of the abdominal cavity, weighing from forty to sixty ounces. It is suspended by ligaments, formed by reflections of the greater and the lesser peritoneum, and by the round ligament or obliterated umbilical vein. From the interior of the right superior and anterior parietes of the abdomen, the *broad* or *suspensory ligament* passes to the antero-superior surface of the organ (page 56). The *round ligament* was before described (page 56). The *coronary ligament* at the postero-superior border of the organ, has a superior and an inferior portion: the superior is formed by the spreading of the broad ligament, right and left, and its reflection to the diaphragm; the inferior is a reflection of the lesser peritoneum from the liver to the diaphragm. The *two lateral ligaments* are the right and left extensions of the portions of the coronary ligament, from the superior lateral angles of the liver to the diaphragm.

The postero-inferior surface of the liver is mapped out by furrows, which are called *fissures*. The *umbilical fissure* and the *fissure for the ductus venosus*—named from the parts they lodge—are the two portions of a longitudinal furrow, which commences at the inferior or free border of the organ—at the notch there presenting—and continues across it to its superior border. The *transverse fissure*—about three inches long—runs at a right angle from the right of the junction of the two last-described fissures. The *fissure for the gall-bladder* extends from near the right extremity of the transverse fissure to the inferior border of the viscus. The *fissure for the vena cava* runs obliquely from near the right extremity of the transverse fissure to the superior border of the gland.

The *five lobes* of the liver are mapped out by the fissures upon its postero-inferior surface, as follows: the *right lobe* to the right of the fissure for the vena cava, the fissure for the gall-bladder and the right end of the transverse fissure; the *lobus quadratus* by the transverse fissure superiorly, the fissure for the gall-bladder to the right and the umbilical fissure to the left; the *lobus Spigelii* by the transverse fissure inferiorly, the fissure for the vena cava to the right and the fissure for the ductus venosus to the left; the *lobus caudatus* extends from the lobus Spigelii into the right lobe, between the right extremity of the transverse fissure and the inferior end of the fissure for the vena cava; the *left lobe* to the left of the fissure for the ductus venosus and the umbilical fissure.

The liver is partially invested by peritoneum. The greater peritoneum projects the two layers of the broad or suspensory ligament to the antero-superior surface of the organ, which spread therefrom right, left, superiorly and inferiorly: superiorly, it extends to the border of the organ, to become the superior portion of the coronary and the lateral ligaments; inferiorly, it reaches the border of the viscus and then passes to its postero-inferior face, and, at the inferior limit of the transverse fissure, it is reflected to the lesser curvature of the stomach, as the anterior layer of the gastro-hepatic omentum. The lesser peritoneum invests the postero-inferior surface of the liver superior to the transverse fissure, and, from the superior limit of the fissure, it is reflected as the posterior layer of the gastro-hepatic omentum. At the fissures and the area included by the portions of the coronary ligament, the peritoneum is wanting; at the latter point the organ is in contact with the diaphragm. The cut surface of the liver presents a dull red color and a dense somewhat granular structure; the dilated orifices of the hepatic veins appear, while the hepatic arteries are closed.

16. Hepatic Artery, Plates 52 and 48.—This vessel was described (page 63) and illustrated (Plates 35 and 36) *in situ*. Reaching the transverse fissure of the liver, it divides into a right and a left branch, which enter the organ.

17. Vena Portæ.—Formed as before described (page 88) and illustrated (Plates 35 and 36) *in situ*, this vessel branches, right and left, into the transverse fissure of the liver; at the fissure it is lodged inferior to the lobus Spigelii; in the fœtus the right branch is continuous with the umbilical vein, and the ductus venosus; in adult life the umbilical vein is, at times, pervious for a variable distance from the vena portæ.

18. Biliary Ducts.—The right and the left leave the liver at the transverse fissure, in a plane inferior to the hepatic arteries; the two unite into a single canal, the *hepatic duct*, which receives the *cystic duct* from the gall-bladder; beyond this the canal is called the *ductus communis choledochus* (pages 63, 67 and 87; Plates 35, 36 and 49).

19. Vena Cava Inferior.—This venous trunk impinges upon the liver in the fissure for the vena cava; it continues superiorly, to the area of the organ not covered by peritoneum, where it bridges from the liver to the caval opening of the diaphragm.

20. Hepatic Veins.—The hepatic veins emerge from the liver to empty into the vena cava inferior, in the bed of the fissure for the vena cava and the area at the superior border of the organ not invested by peritoneum.

Dissection.—Dissect the gall-bladder free from the fissure, in which it is lodged; section the cystic duct close to the hepatic, also the cystic artery at the hepatic artery. Open the gall-bladder at its fundus, and slit it open to its duct.

21. Gall-Bladder.—This is a pyriform sac, the duct of which is more or less tortuous; the latter may be straightened somewhat by dissecting off the areolar tissue, which invests it.

Dissection.—Remove any shreds of peritoneum from the spleen. Determine the vessels of the spleen at its internal surface; after which, it may be placed upon its convex external surface, with its posterior border toward the dissector; then holding the vessels on the stretch toward its posterior border, slice away the spleen tissue of the internal portion of the organ from the hilus to its anterior border, at a sufficient depth to expose the vessels that penetrate the viscus.

22. Spleen, Plate 53.—This organ was located (page 66) and illustrated (Plates 35 and 36) *in situ*. It is somewhat oval in shape, convex and smooth upon its external surface, slightly concave upon its internal surface. It weighs from four to eight ounces. At its internal surface a vertical fissure—the hilus—divides it into two unequal portions, an anterior and a posterior: the anterior and larger area is applied, in order from above downwards, to the stomach, the tail of the pancreas and the splenic flexure of the colon; the posterior and smaller area impinges upon the left suprarenal capsule and kidney. At the hilus the splenic artery and nerves (sympathetic) enter the organ, and the splenic vein and lymphatic vessels leave it. The gastro-epiploica sinistra artery is given off to the stomach from the splenic artery, at the inferior limit of the hilus of the spleen ; the vasa brevia to the stomach are supplied by branches of the splenic artery opposite the hilus. The slicing away of the spleen tissue, from the anterior half of its internal surface, demonstrates the penetration of vessels into the viscus, and determines by their distribution three portions to the organ : a superior, a middle, and an inferior. Its tissue is darker and much less dense than that of the liver.

DISSECTION.—Let the kidneys, the suprarenal capsules and the portions of the aorta and vena cava, as they were removed from the body (page 79), be laid out in their normal relations, upon a dissecting board. Cut the renal and suprarenal arteries at the aorta, their veins at the vena cava. Clear the surfaces of the suprarenal capsules and kidneys, and determine the relations of the two organs to each other ; after which they may be separated.

23. Suprarenal Capsules, Fig. 1, Plate 54.—These viscera were described (page 71) and illustrated (Plate 38) *in situ*. A capsule will average about one drachm and a half in weight; it is triangular in shape, slightly concave at its base, for application to the convexity of the kidney, and presents at its anterior face a hilus for the entrance and exit of its vessels, etc.

DISSECTION.—Determine the relations of the vessels and the ureter, that present at the internal border of the kidney. Grasp the kidney in the left hand, its internal border to the palm, its external convex border projecting between the thumb and fingers : as held, section with a scalpel its fibrous capsule along the convexity of the organ, then peel it off of its anterior and posterior surfaces to its internal border, where it will be found to pass into the hilus; trim the capsule away close to the hilus. Trace the vessels into a kidney as follows : place the kidney upon its posterior surface (Fig. 4, Plate 54), with the renal vein uppermost; hold taut the vessels and ureter, and cut away the kidney tissue from the internal to the external border of the anterior face of the organ, down to the plane of the renal vein ; this will determine the course of both the veins and the arteries. To follow a ureter into a kidney, place the organ upon its anterior surface (Fig. 3, Plate 54), and pin the ureter and kidney taut ; slice off the posterior half of the kidney, from the internal to the external border, down to the plane of the walls of the pelvis and the infundibula. Demonstrate the three infundibula which converge to the pelvis of the organ : the superior, the middle, and the inferior; open the infundibula so as to examine their terminations in the calices, which surround the apices of the pyramids of Malpighi.

24. Kidneys, Figs. 2, 3, and 4, Plate 54.—These organs were described (page 71) and illustrated (Plate 38) *in situ*. A kidney will average about four and one-half ounces in weight.

In shape, the organ is flattened antero-posteriorly, with a convex external border ; it has convex superior and inferior ends, which curve in at the internal border ; its internal border presents a notch—the hilus—which lodges the pelvis of the organ, the supplying artery and nerves, and the outcoming veins and lymphatics ; these are bedded in interstitial adipose tissue. At the hilus (Figs. 2 and 4, Plate 54) the relations of parts are as follows : the renal vein is anterior, the ureter posterior, and the renal artery in the middle. In structure a kidney presents : a capsule ; a peripheral portion—the cortical substance ; an interior portion—the medullary ; and an internal portion—the pelvis. The *capsule* is a fibrous investment, which may be peeled off and traced into the hilus, where it is continuous with the walls of the calices of the pelvis. The *cortical substance* is dense tissue without distinctive parts, to the unaided eye ; it is continued into the medullary portion as the *columns of Bertini.* The *medullary portion* is made up of the *pyramids of Malpighi*—formed by the tubuli uriniferi—separated by the columns of Bertini—through which vessels and nerves run ; the bases of the pyramids are directed toward the cortical portion, their apices—presenting the orifices of the tubuli uriniferi—are the *papillæ* projected into the pelvis. The *pelvis portion* is a fibrous sac, with the following parts : the *calices*—at the bottom of the hilus—or the coves, so to speak, between the promontories of the papillæ of the pyramids ; the *infundibula*—superior, middle, and inferior—or bays into which the calices empty ; and the *pelvis proper* or lake-like expansion of the infundibula, whose outlet is the *ureter* or duct of the organ.

25. Renal Veins, Plate 38, and Figs. 2 and 4, Plate 54.—A renal vein, after being formed by several vessels that leave the hilus, empties into the vena cava inferior ; of the renal veins the left is the longer of the two.

26. Renal Artery.—This artery enters the kidney at the hilus ; it breaks up into branches, which pass to the cortical substance, through the columns of Bertini.

27. Renal Nerves, Plate 33.—These nerves, derived from the renal plexus of the sympathetic nerve, enter the kidney upon the renal artery, and its branches.

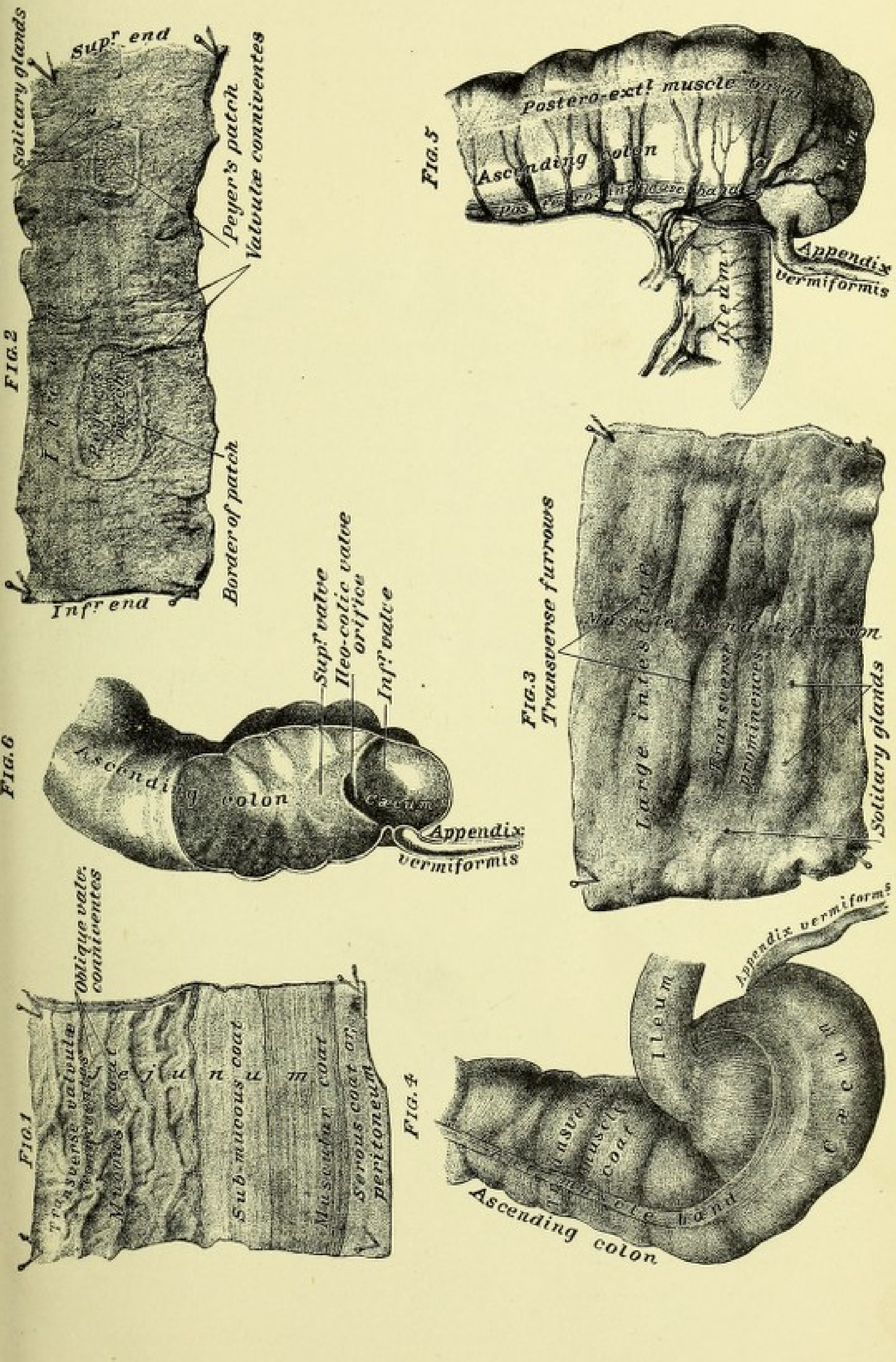


Fig. 2
Supr. end
Solitary glands
Peyer's patch
Valvulæ conniventes
Border of patch
Infr. end
Fig. 5
Postero-extl. muscle band
Ascending colon
Ileum
Appendix vermiformis
Fig. 6
Ascending colon
Supr. valve
Ileo-colic valve orifice
Infr. valve
Appendix vermiformis
Fig. 3
Transverse furrows
Large intestine
Transverse prominences
Solitary glands
Fig. 1
Oblique valv. conniventes
Transverse valvulæ conniventes
Mucous coat
Jejunum
Sub-mucous coat
Muscular coat
Serous coat or peritoneum
Fig. 4
Appendix vermiforms
Ileum
Cæcum
Ascending colon

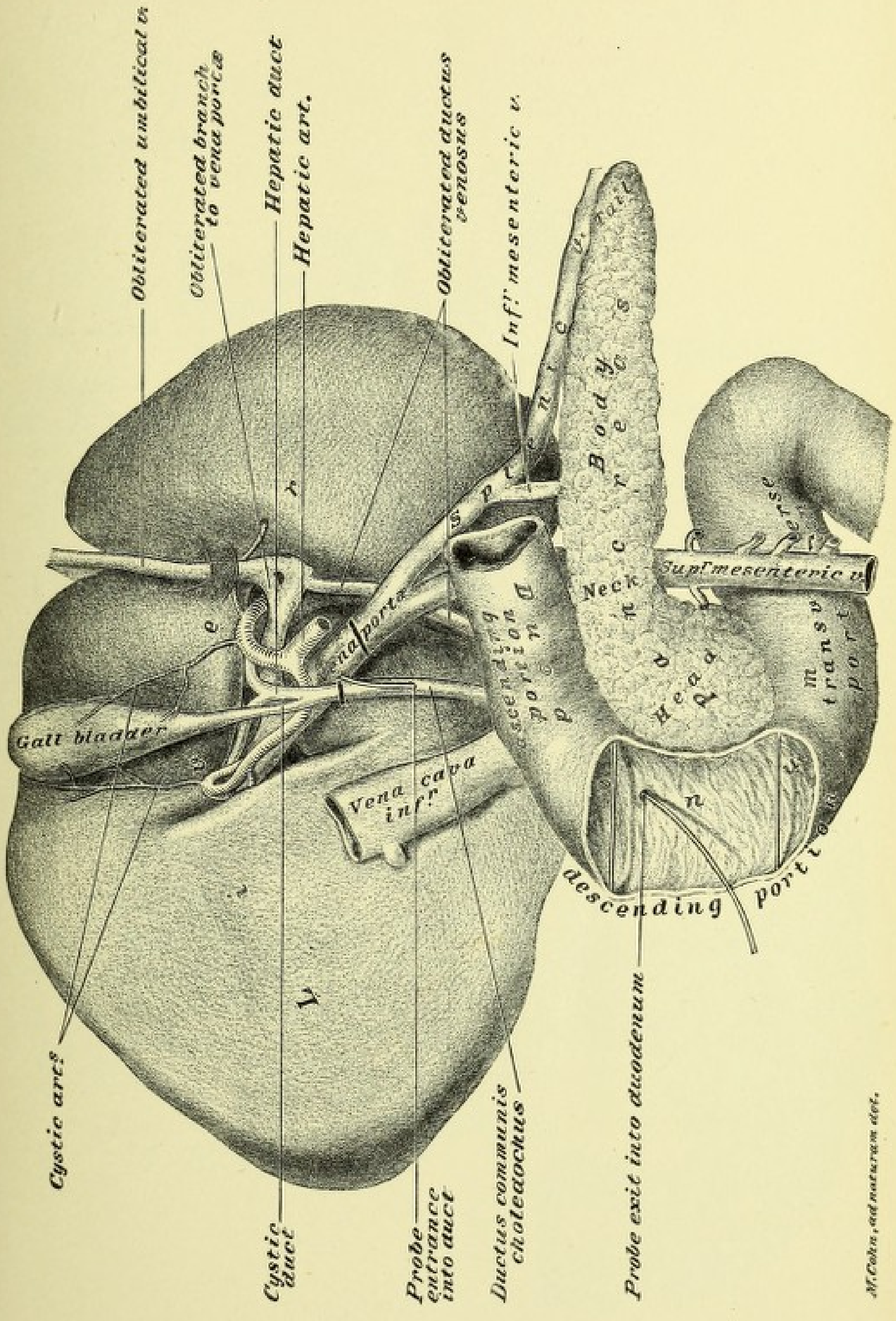

Obliterated umbilical v.
Obliterated branch to vena portæ
Hepatic duct
Hepatic art.
Obliterated ductus venosus
Infr mesenteric v.
Cystic artª
Cystic duct
Probe entrance into duct
Ductus communis choledochus
Probe exit into duodenum
Gall bladder
Vena cava infr
Supr mesenteric v
Neck
Body
Head
descending portion
M. Cohn, ad naturam del.

Fig. 1

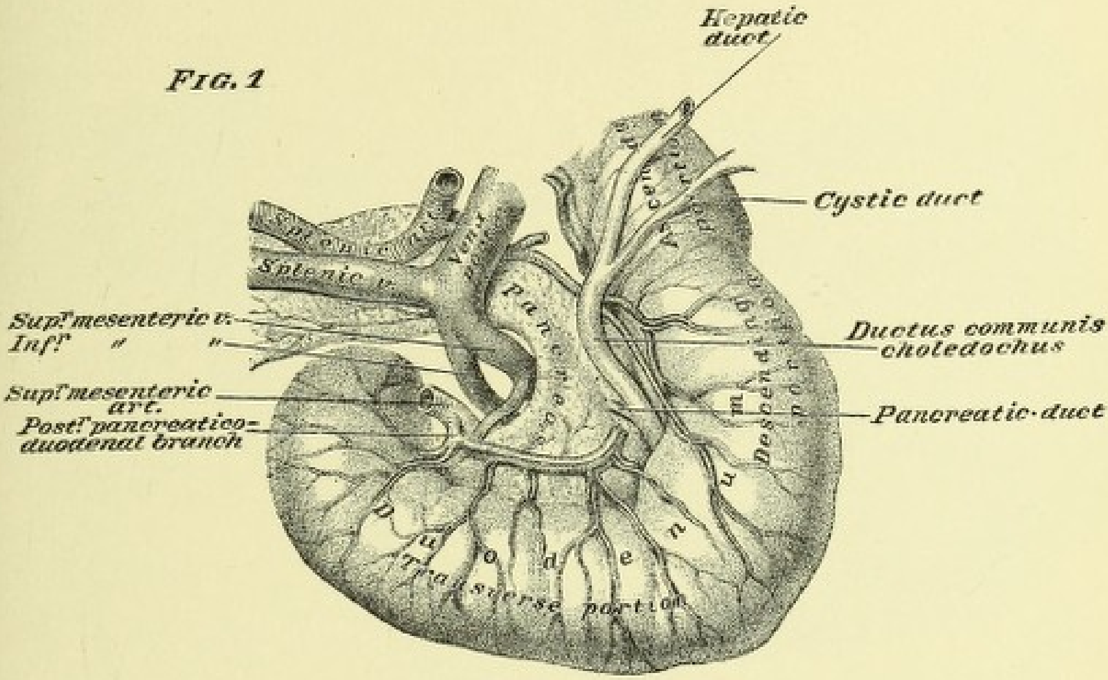

Hepatic duct
Cystic duct
Splenic v.
Sup.r mesenteric v.
Inf.r " "
Ductus communis choledochus
Sup.r mesenteric art.
Post.r pancreatico-duodenal branch
Pancreatic duct
Transverse portion

Fig. 2

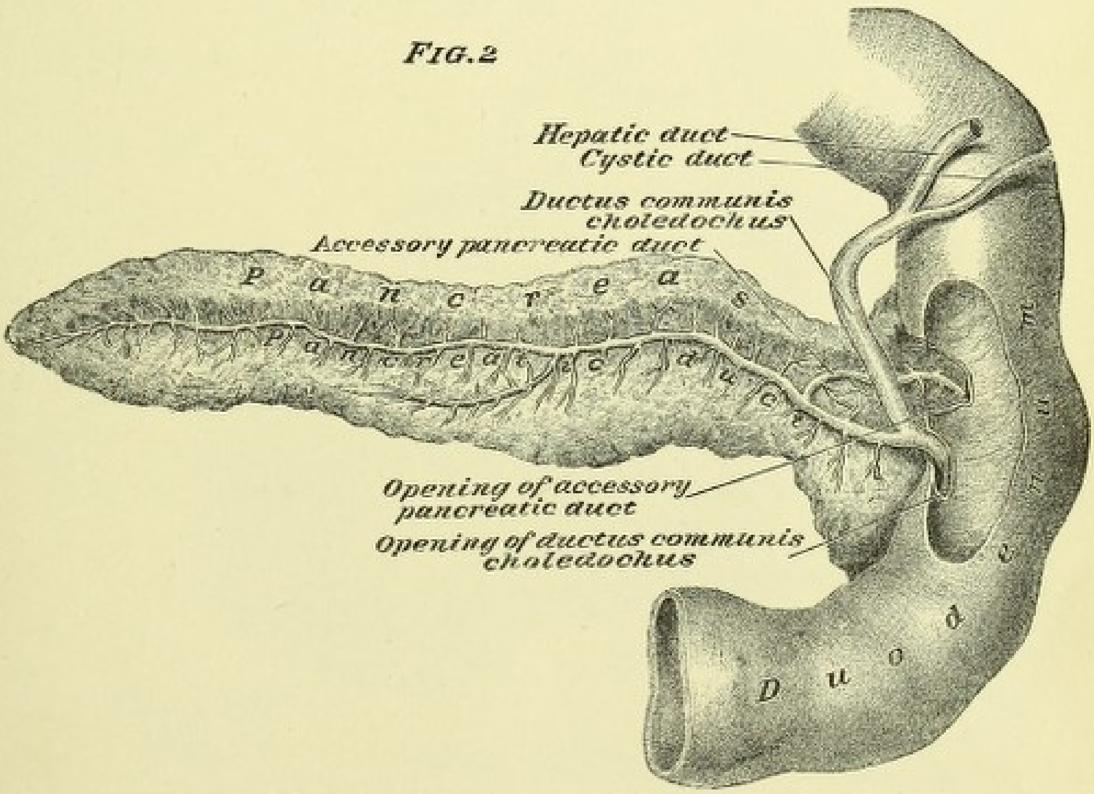

Hepatic duct
Cystic duct
Ductus communis choledochus
Accessory pancreatic duct
P a n c r e a s
Pancreatic duct
Opening of accessory pancreatic duct
Opening of ductus communis choledochus
D u o d e n u m

FIG. 1

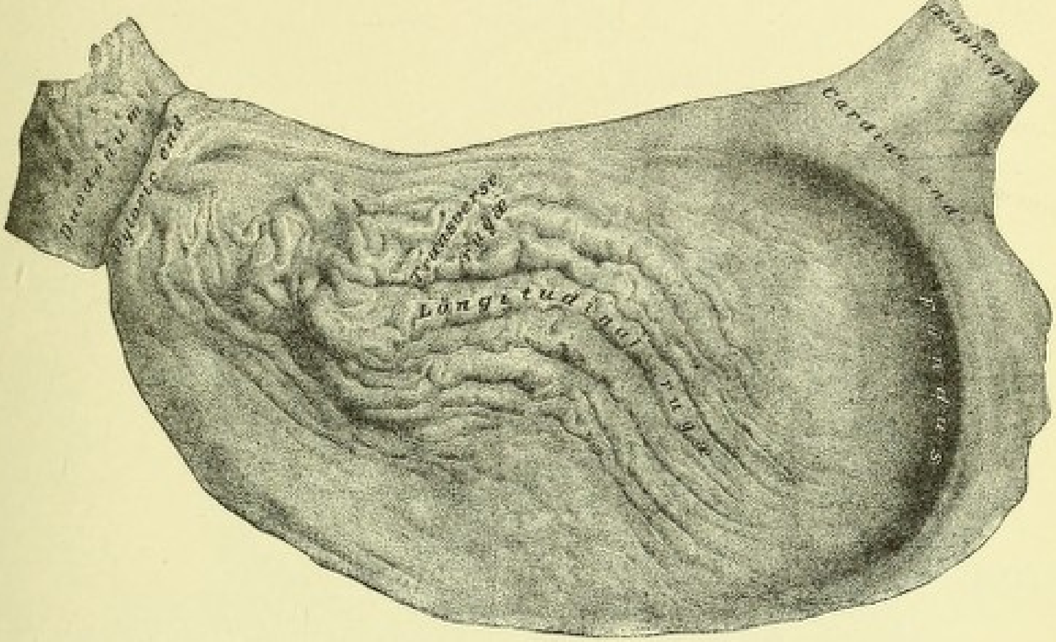

Pyloric end
Cardiac end
Longitudinal rugæ

FIG. 2

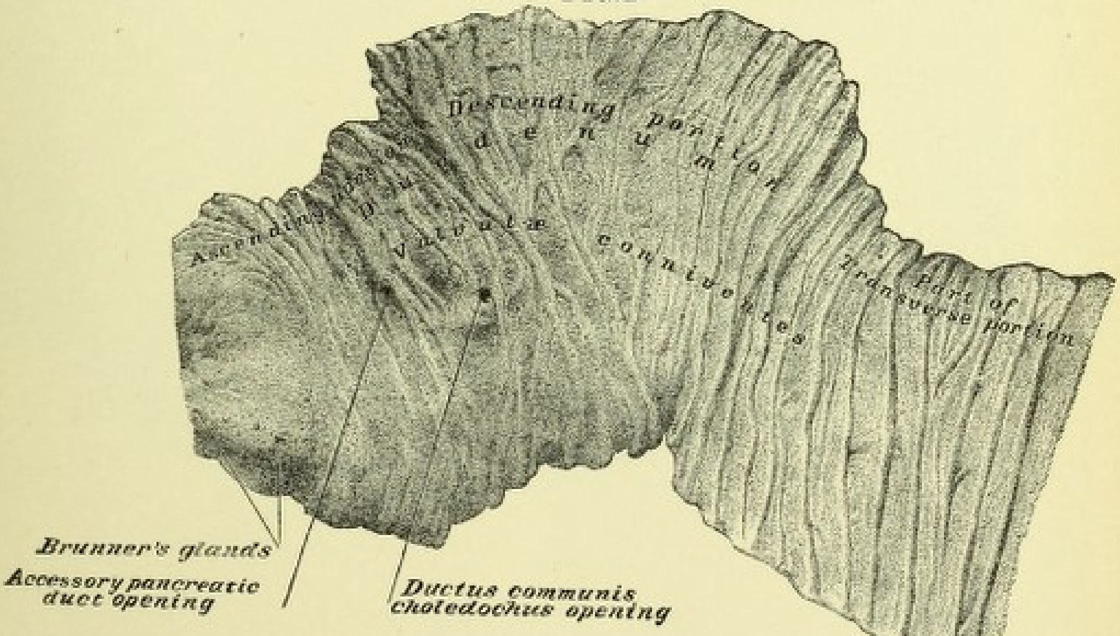
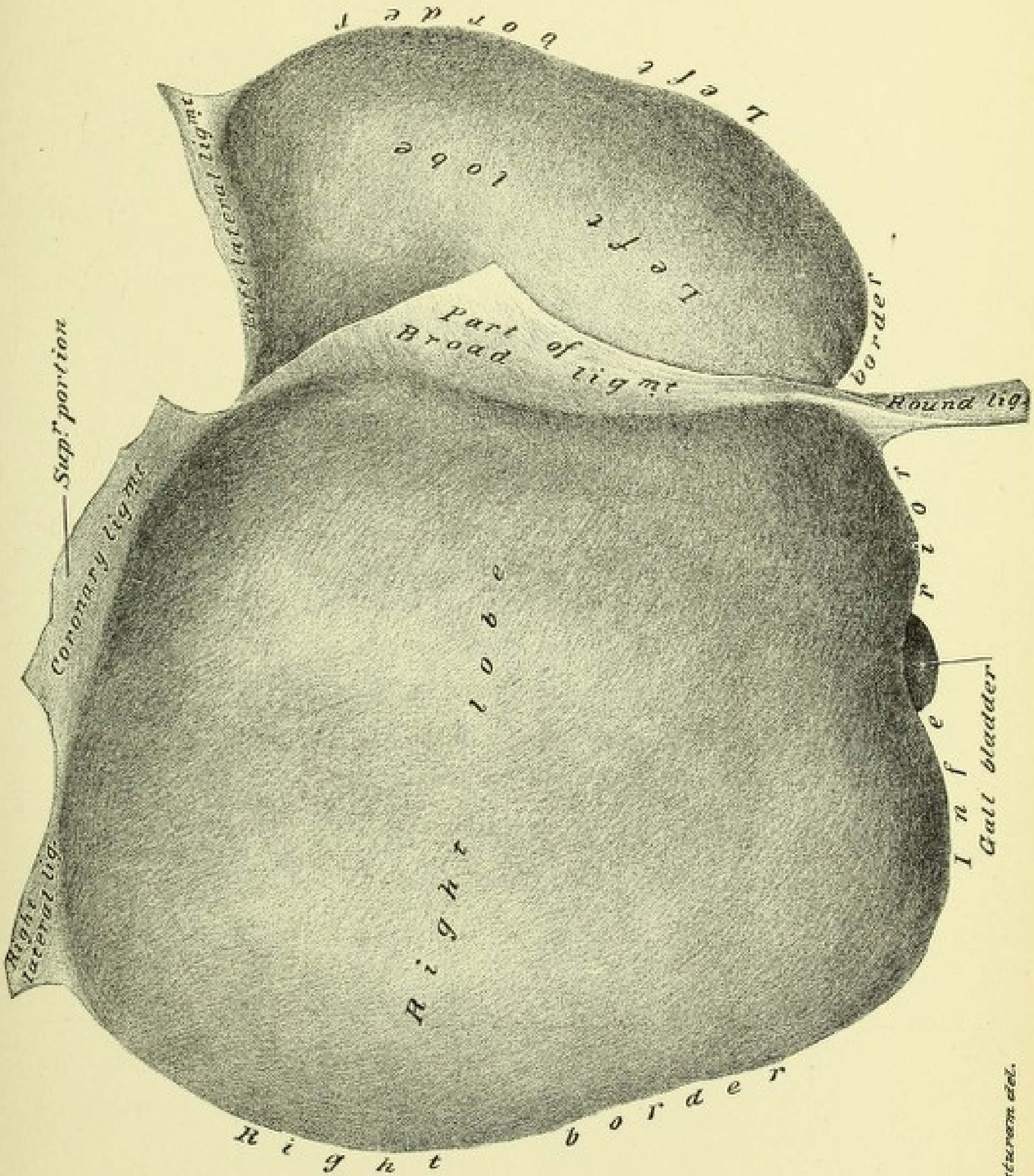

Descending portion
Valvulæ conniventes
Part of
Transverse portion
Brunner's glands
Accessory pancreatic
duct opening
Ductus communis
choledochus opening

PLATE 51



M.Cohn. ad naturam del.

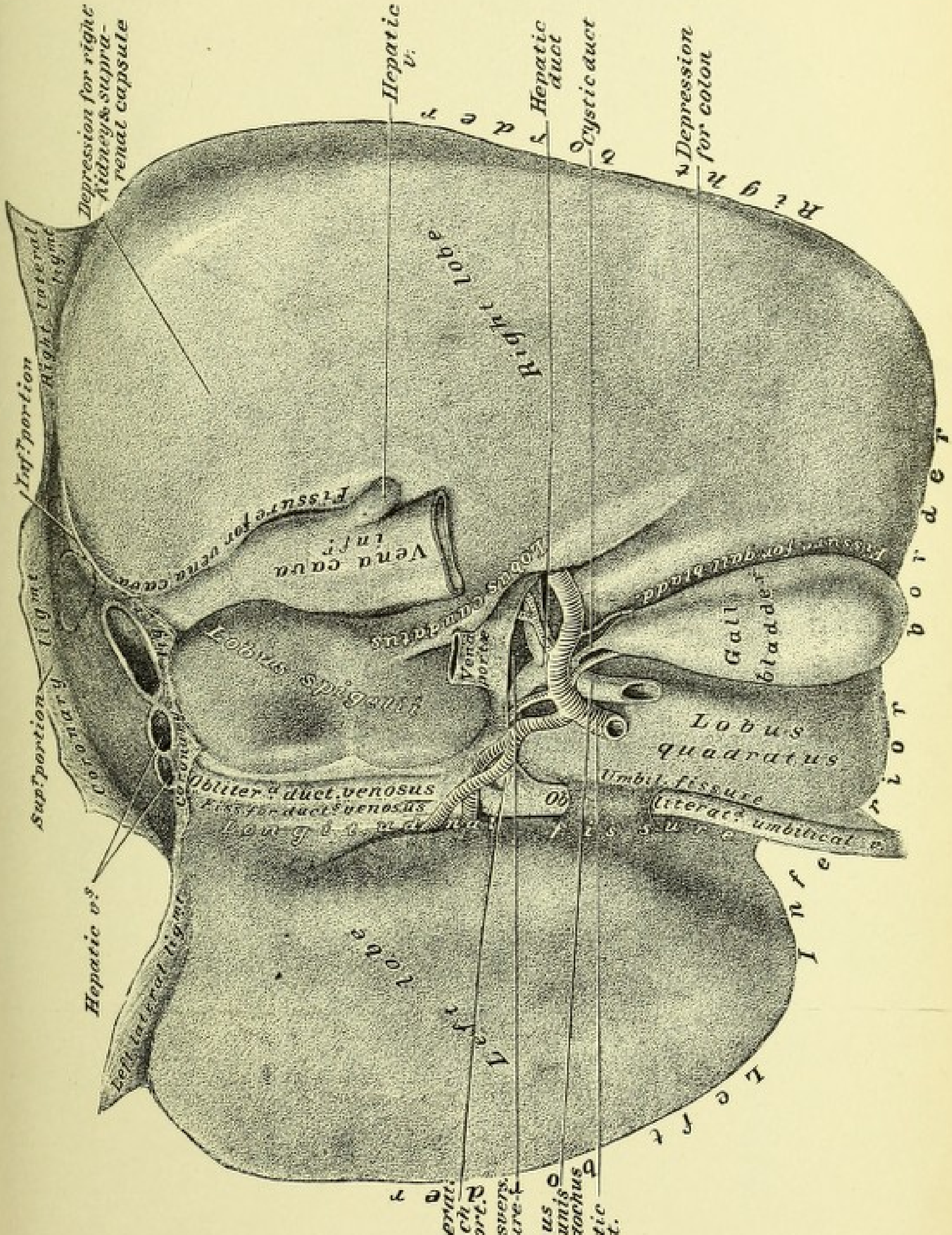
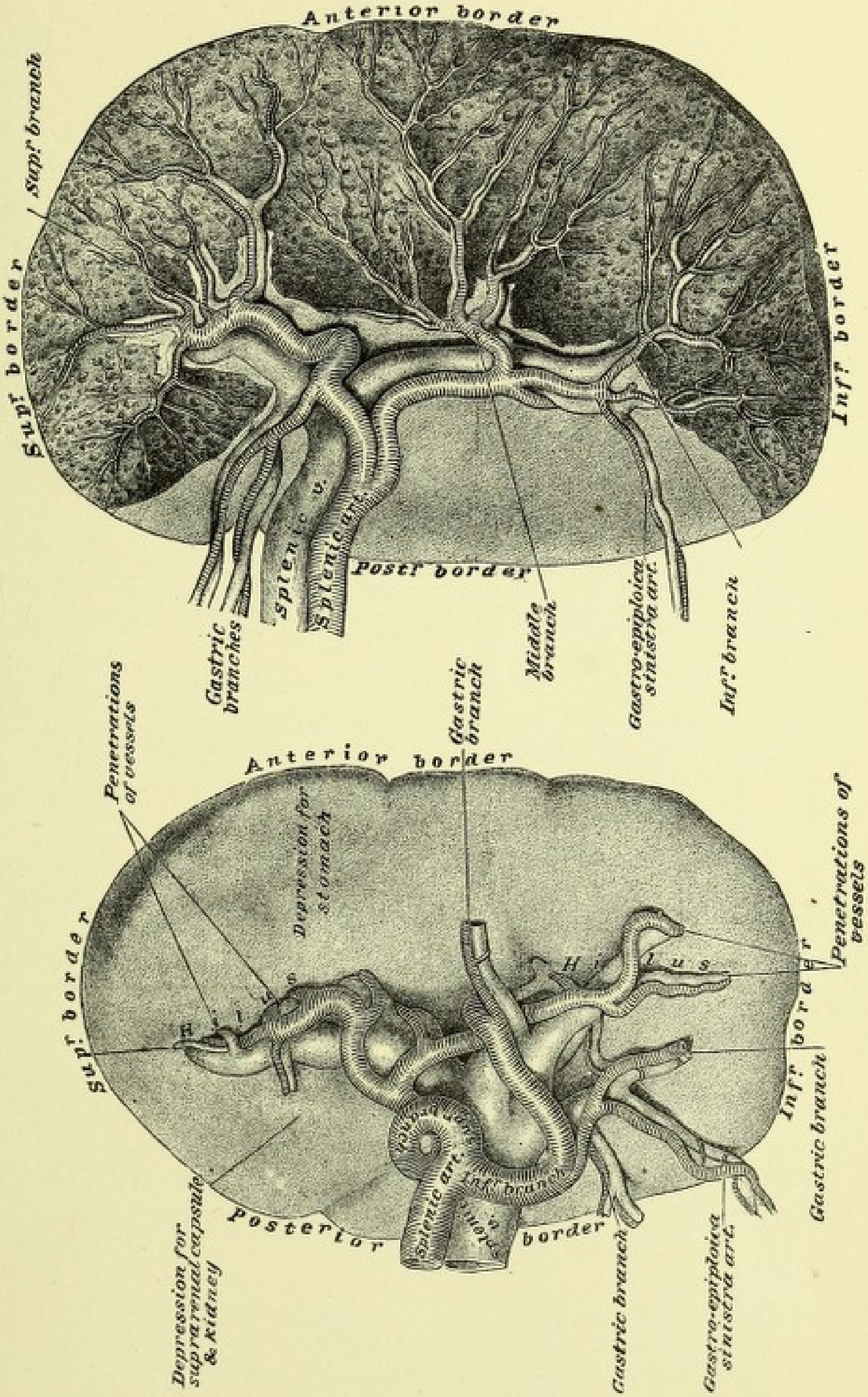

Depression for right kidney & supra-renal capsule
Hepatic v.
Hepatic duct
Cystic duct
Depression for colon
Right border
Right lobe
Right lateral ligt.
Infr. portion
Fissure for vena cava
Vena cava infr.
Lobus caudatus
Fissure for gall bladder
Gall bladder
Lobus Spigelii
Vena portæ
Lobus quadratus
Umbil. fissure
Obliterd. umbilical v.
Obliterd. duct. venosus
Fiss. for ductus venosus
Longitudinal fissure
Supr. portion
Coronary ligt.
Hepatic vs.
Left lateral ligt.
Left lobe
Left border
Inferior border
Obliterat. branch of v. port.
Transvers. fissure
Ductus communis choledochus
Hepatic art.

FIG. 2

FIG. 1


Anterior border
Supr branch
Supr border
Infr border
Postr border
Splenic v.
Splenic art.
Gastric branches
Middle branch
Gastro-epiploica sinistra art.
Infr branch
Anterior border
Penetrations of vessels
Gastric branch
Depression for stomach
Hilus
Supr border
Infr border
Penetrations of vessels
Depression for suprarenal capsule & kidney
Posterior border
Splenic art.
Infr branch
Gastric branch
Gastro-epiploica sinistra art.
Gastric branch

SEVENTH DISSECTION.

MALE PELVIC VISCERA OUT OF THE BODY.

DISSECTION.—In the dissection of the male perineum, the mutual relations of the base of the bladder, the prostate, the vesiculæ seminales, the vasa deferentia, and the rectum were recognized (pages 26 and 27) and illustrated (Plate 12) *in situ*. At present the viscera, as taken from the pelvis *en masse* (page 73), should be dissected, after which the separate organs will claim special attention. The rectum and bladder may be inflated, or better, the rectum may be stuffed with oakum from its superior end; the bladder, opened by a transverse incision at the superior portion of its anterior wall, may also be inflated or filled with oakum. Clean the exterior of the rectum and bladder of shreds of connective tissue; preserve all arteries and nerves hanging from the organs.

1. Rectum, Bladder, etc.—The rectum as distended presents the double curvature, which determines its three portions; in the concavity of its second portion, the bladder, vesiculæ seminales, and prostate are lodged.

2. Peritoneal Investment of Bladder, Plates 12, 31, and Fig. 1, Plate 37.—The fundus, the two lateral, and the posterior surfaces of this organ are invested by peritoneum. Posteriorly, the peritoneum descends to the line of the posterior extremities of the vesiculæ seminales, where it is reflected to the rectum, as the recto-vesical cul-de-sac (pages 27 and 67).

3. Peritoneal Investment of Rectum, Plate 31, and Fig. 1, Plate 37.—The anterior and the right lateral surfaces of the first portion of the rectum, and the anterior and right lateral surfaces of the superior part of the second portion are covered by peritoneum.

DISSECTION.—Cut the peritoneal reflection between the bladder and rectum, and dissect the rectum from the bladder, etc. Cut the vasa deferentia at about four inches from the prostate, thus detaching the testes. The rectum and testes may be returned to the preservative fluid. Cut the ureters about two inches from their vesical ends. Open the bladder and pin it and the penis to a dissecting board, with the exterior of the base of the bladder and the inferior surface of the penis uppermost. Determine the ureters, the vasa deferentia, the vesiculæ seminales, the prostate, the membranous portion of the urethra, Cowper's glands, the bulb of the corpus spongiosum, and the crura of the corpora cavernosa.

4. Ureters, Fig. 1, Plate 55.—The superior portions of these renal ducts were recognized (page 72) and illustrated (Plate 38) *in situ;* their inferior portions were left passing into the pelvic cavity upon the interior of its lateral walls; now they are seen perforating the wall of the bladder.

5. Vasa Deferentia. 6. Vesiculæ Seminales. 7. Exterior of Trigone. 8. Prostate (inferior surface). **9. Membranous Portion of the Urethra** (inferior surface). **10. Cowper's Glands. 11. Bulb of the Corpus Spongiosum. 12. Crura of the Corpora Cavernosa.**—The parts, 5 to 12 inclusive, were described and illustrated in the dissection of the Male Perineum (pages 19, 20, 22, 23, 26; Plates 10 and 12).

Dissection.—Section the prostate on the median line from the notch at its base toward its apex, so as to expose the ejaculatory ducts, traversing its substance.

13. Ejaculatory Ducts, Plate 55.—These ducts, a right and a left, result from the convergence of the right and left vas deferens with the duct of the right and left vesicula seminalis, respectively. The junctions of these ducts take place at or within the prostate; as formed, the ejaculatory ducts continue in a channel through the prostate.

Dissection.—Enter probes or wisps of broom-straw into the ureters and vasa deferentia (Fig. 1, Plate 55); unfasten the bladder and penis; then pin them again to the dissecting board, with the interior of the former and the dorsum of the latter uppermost. Section the penis, a little to one side of the median line of its dorsum, from the glans penis to the bladder, so as to separate the corpora cavernosa and to open into the urethral canal, from the meatus to the bladder (Fig. 1, Plate 56); secure the penis, so as to expose the inferior wall of the urethra.

14. Interior of the Bladder, Fig. 2, Plate 55.—The interior of this organ has a smooth, pale mucous membrane; at its base are seen to protrude the probes at the orifices of the ureters. An interior trigone area appears, which is smaller than the exterior one; the orifices of the ureters are at the angles of its base line, about one inch and a half apart; the opening into the urethra, at the neck of the bladder, forms its apex, about one inch and a half from the openings of the ureters, respectively. The mucous membrane of the trigone area differs from that of the rest of the interior of the organ, in that it is studded with mucous glands.

15. Urethra, Fig. 2, Plate 55, and Fig. 1, Plate 56.—The urethra extends from the bladder to the meatus urinarius; it is a urino-seminal duct—urinary from the bladder, and seminal from the prostatic portion of the urethra. It averages about eight inches in length, and has a prostatic, a membranous, and spongy portion. It is lined by mucous membrane, continued from the bladder and from the ejaculatory ducts; at the meatus (the narrowest part of the canal) the membrane is continuous with the skin upon the glans penis.

The *prostatic portion*, one inch and a quarter long, presents, along the mucous membrane lining of its inferior wall, a median-line longitudinal raphe or urethral crest, which continues, posteriorly, to the neck of the bladder, and, anteriorly, into the membranous portion of the canal. At the highest point of the crest is the caput gallinaginis or veru montanum, which presents the opening of the sinus pocularis, or male utricle (analogue of the uterus of the female); from this sinus the probes or wisps entered into the vasa deferentia (page 95), protrude from the ejaculatory ducts, which open into it. The mucous membrane at the sides of the urethral crest presents the orifices of mucous glands—the prostatic follicles.

The *membranous portion*—three-quarters of an inch long—is the narrowest portion, and is located between the prostate and the corpus spongiosum. The narrowest interior point of the urethral canal is the opening through the triangular ligament (page 20), which is at the junction of the membranous and spongy portions.

The *spongy portion*, six inches long, tunnels the corpus spongiosum cyiinder of the penis, and is divided in turn into three sections: the bulbous, the body, and the glands or fossa navicularis. The *bulbous* is the deepest section; it is about one inch in length, has the largest calibre of the three, and presents the openings of the ducts from Cowper's glands. The *body*, about four inches long, is the narrowest part of the spongy portion of the urethra. The *fossa navicularis*, an inch in length, is an expansion of the urethra, which is situated just within the meatus urinarius, and is lodged in the glans portion of the corpus spongiosum. The mucous membrane of the urethra presents the orifices of sinuses, known as lacunæ; the largest of these is located in the superior wall of the fossa navicularis—the lacuna magna.

DISSECTION.—Detach the bladder and penis from the dissecting board. Cut through the membranous portion of the urethra. Cut the vesiculæ seminales at the points of junction of their ducts with the vasa deferentia and dissect them from the bladder; straighten the convoluted tube of a vesicula seminalis.

16. Prostate, Plates 12, 55, and Fig. 1, Plate 56.—This is a muscular organ, which encloses two canals: one for the transit of the ejaculatory ducts; the other for the urethra. Its muscular structure is continuous with the muscle coat of the neck of the bladder, and with that of the membranous portion of the urethra. In the prostatic portion of the urethra are mucous glands, known as the prostatic follicles, which have led to the organ being called the prostate gland; this appellation is incorrect, as its follicles are of but secondary importance. Anteriorly, it is a single organ, but, posteriorly, it is divided by the cleft at its base (page 26) into a right and a left lobe. The portion inferior to the neck of the bladder forms an isthmus, which unites its two lobes; this isthmus may, in old age, become hypertrophied, which circumstance has led to its being called the middle lobe of the prostate; normally the organ has no middle lobe.

17. Vesiculæ Seminales, Fig. 1, Plate 55.—A vesicula seminalis will be found upon dissection to be a single convoluted tube about six inches long; from the tube blind sacs are projected at intervals.

18. Penis, Figs. 1 and 2, Plate 56, and Fig. 1, Plate 55.—The enveloping sheaths, the vessels and the nerves of this organ are presented in the section Fig. 2, Plate 56; these several parts were described (pages 44, 45 and 46) and illustrated (Plate 22) *in situ*. The penis is formed by three longitudinal bodies or cylinders: the right and left corpus cavernosum, and the corpus spongiosum.

The *corpora cavernosa* are attached by their crura and by the ischio-cavernosi muscles to the rami of the pubic arch (pages 20 and 19); the crura converge over the bulb of the corpus spongiosum and meet at the median line to form the dorsal longitudinal cylinders of the penis; the corpora have an investing fibrous capsule and are separated by a fibrous septum.

The *corpus spongiosum* (page 19; Plates 8 to 12 inclusive) presents three sections: the bulb, the body, and the glans. The *bulb* is lodged between the crura of the corpora cavernosa; the *body* continues forward inferior to the corpora cavernosa as far as the free ends of the latter; the *glans* is its expansion, capping the ends of the corpora cavernosa.

DISSECTION.—A testis, with the scrotal portion of the spermatic cord, should be laid upon a dissecting board and pinned thereto—one pin through the body of the testis, another through the proximal end of the outstretched spermatic cord. Section the sheath (internal spermatic or infundibuliform fascia), investing the cord, and reflect the same. Open the tunica vaginalis of the testis and reflect it; recognize the testis, the epididymis, the vas deferens, the vas aberrans, the artery of the vas deferens, the spermatic artery, the spermatic veins, the spermatic nerves (sympathetic); the latter are continued to the testis upon the artery.

19. Internal Spermatic Fascia, Fig. 3, Plate 56.—This sheath of the spermatic cord and the testis (page 54) is continued as an infundibuliform (funnel spout) prolongation of the transversalis fascia; it blends with the tunica vaginalis of the testis. It occupies a plane interior to the cremasteric muscle fibres of the spermatic cord (page 50).

20. Tunica Vaginalis.—This is the serous investment of the testis. It is a closed sac, which is applied to the antero-lateral surfaces of the testis; it has a visceral and a parietal layer. It, originally, was a portion of the peritoneum, which descended from the abdominal cavity with the testis; at first it has a canal of communication (the canal of Nuck) with the cavity of the peritoneum; later the canal becomes obliterated into a fibrous thread.

21. Testes.—A testis is an ovoid body, weighing from four to eight drachms and suspended from the end of the spermatic cord. It is partially invested by the tunica vaginalis; its posterior surface (in the illustration the accidental position of the testis would make it appear, that it was the superior surface), not invested by the tunica vaginalis, presents the hilus of the organ, where vessels, nerves, and ducts pass. The testis has a fibrous capsule—the *tunica albuginea.* Upon section a testis presents a grayish pulp which extrudes from compartments of the gland.

22. Vas Deferens, Fig. 3, Plate 56, and Plates 29 and 38.—This duct, about two feet in length, commences at the hilus of the testis; it is a recognizable element of the spermatic cord, being like a hard cord of about the size of a thick knitting-needle.

23. Epididymis, Fig. 3, Plate 56.—The epididymis is the convoluted portion of the vas deferens; it is lodged posterior to, and opposite the hilus of the testis. Its portions are the *globus major*, at the superior end (in the figure at the right end); the *body* parallel with the hilus; the *globus minor*, at the inferior end (in the illustration the left end). From the last-named portion the straight part of the vas deferens is continued.

24. Vas Aberrans.—This is a short blind duct, about one and a half to two inches long, which springs from the globus minor of the epididymis; it runs parallel with the vas deferens in the spermatic cord.

25. Artery of the Vas Deferens.—This artery accompanies the vas deferens in the spermatic cord, distributing to it and to the epididymis.

26. Spermatic Artery.—This artery is an element of the spermatic cord, distributing to the testis, the hilus of which it enters.

27. Spermatic Veins.—These leave the testis at its hilus, forming a plexus (the pampiniform) in the scrotal portion of the cord; from the plexus two veins result, which form the venæ comites of the spermatic artery.

FIG. 1

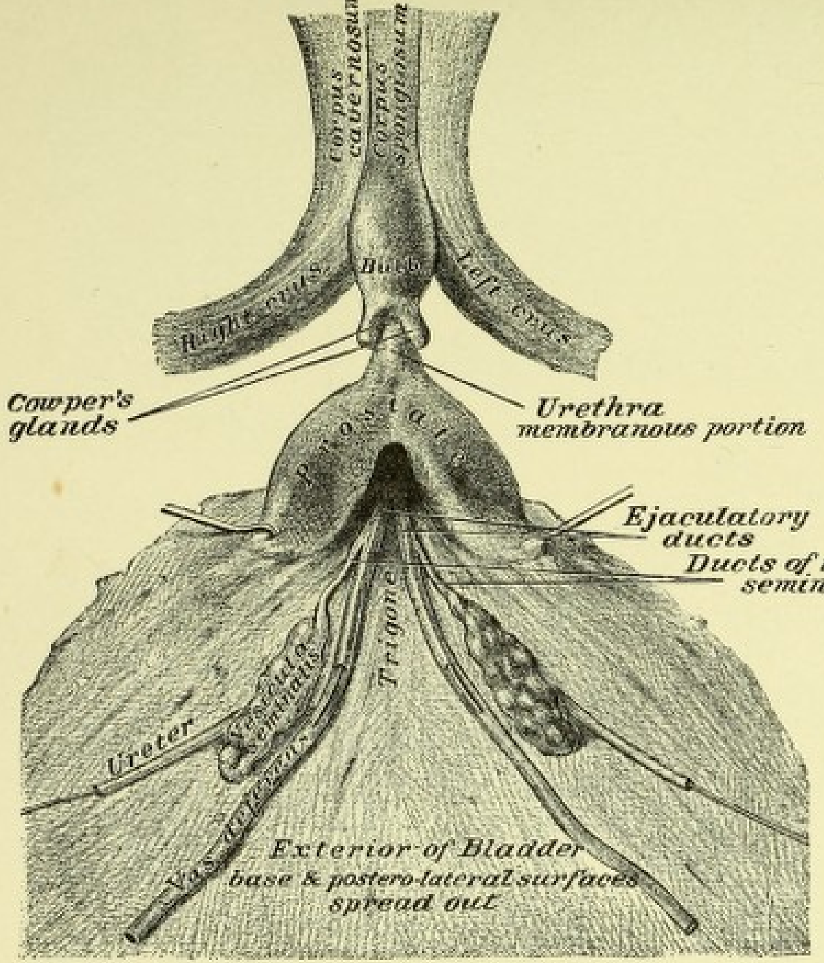
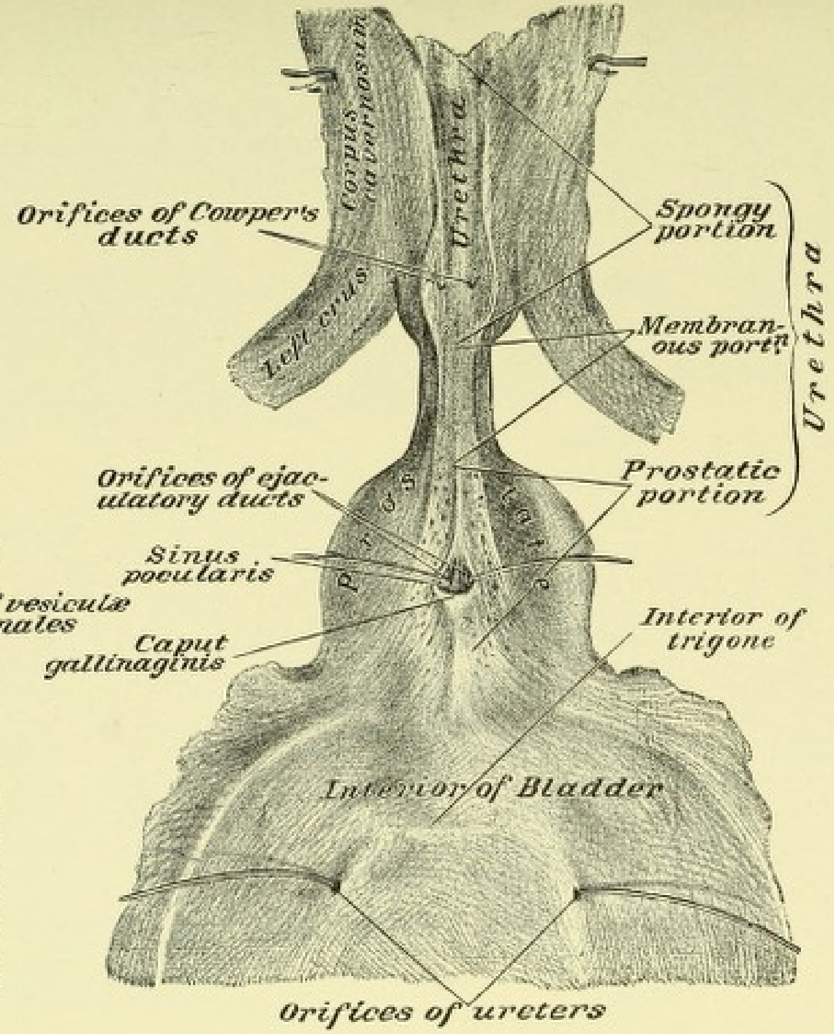


FIG. 2.



M. Cohn, ad naturam del.

FIG. 1

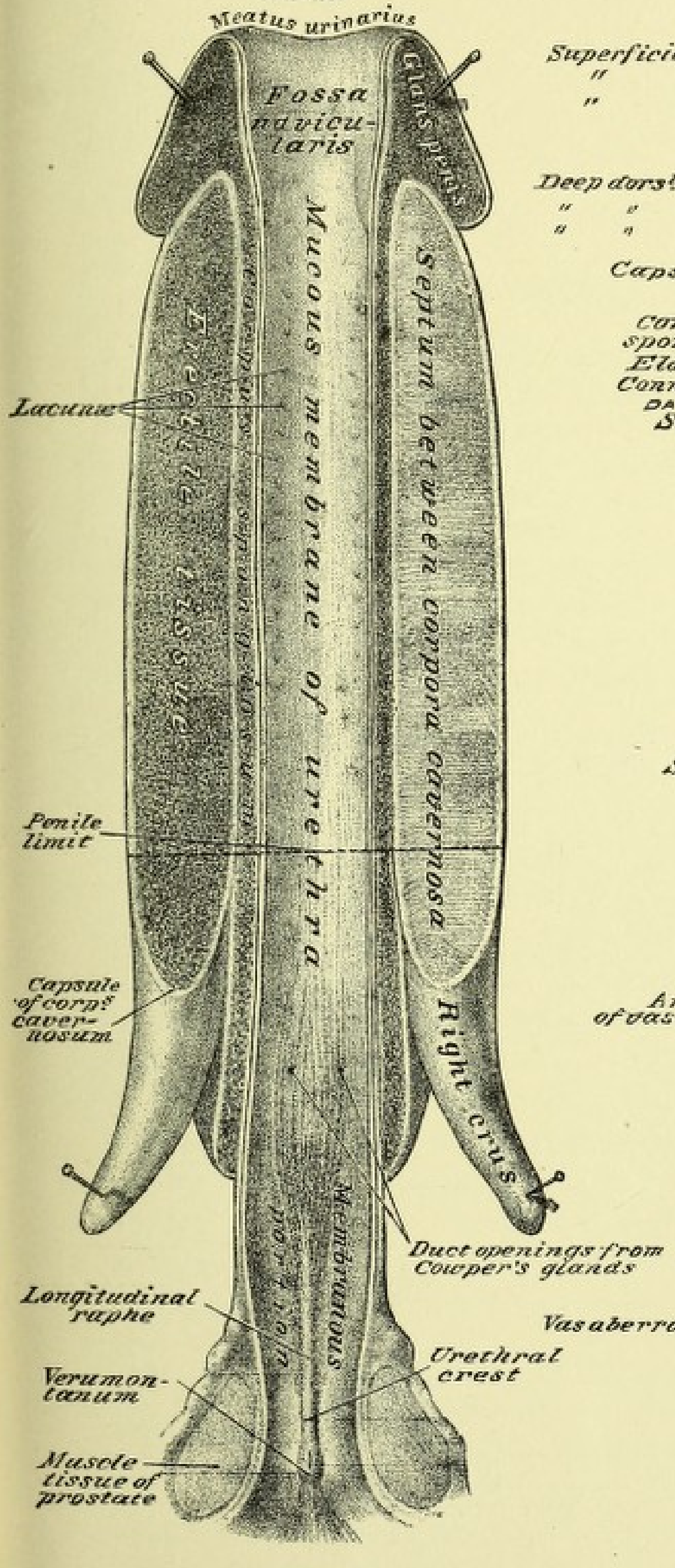


FIG. 2

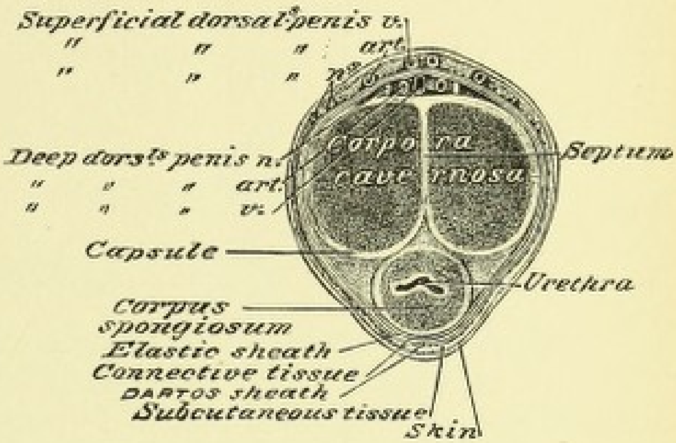
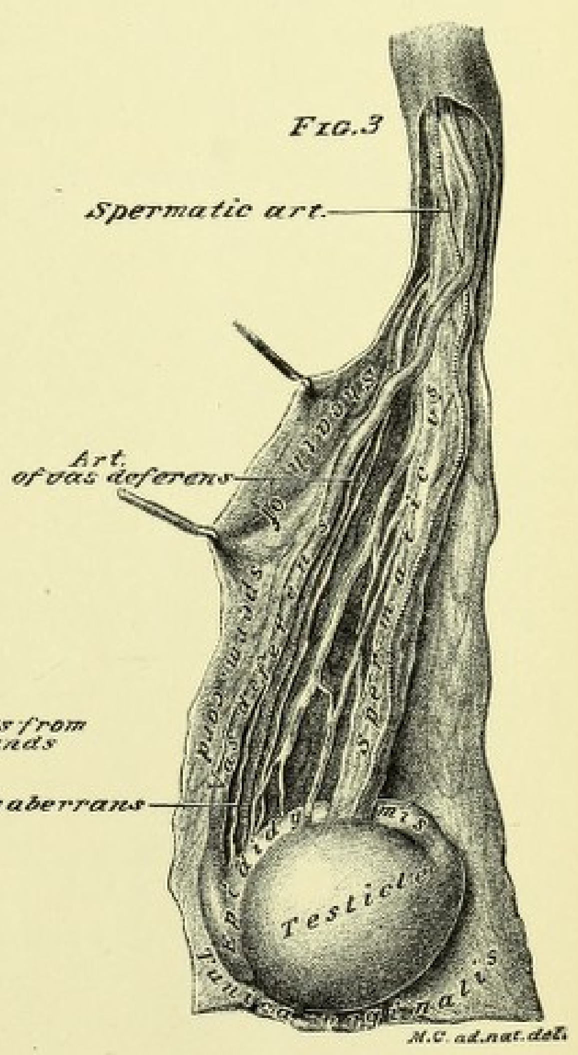


FIG. 3



M.C. ad.nat.del.

EIGHTH DISSECTION.

FEMALE PELVIC VISCERA OUT OF THE BODY.

DISSECTION.—The female pelvic viscera, as taken *en masse* from the body (page 73), may be dissected upon a dissecting board. The rectum and bladder should be prepared as in the dissection of the male pelvic organs (page 95); the vagina should be moderately distended with oakum. In the dissection of these organs as they presented at the pelvic outlet (pages 40, 41; Plates 19 and 20), the relations of the organs were disturbed; they should now be carefully adapted in their normal relations, with one of their lateral surfaces uppermost. All connective tissue should be removed from them, being careful to preserve their peritoneal investiture, the vessels distributing to them, and the broad ligaments of the uterus, with its associated parts.

1. Lateral View of the Female Pelvic Viscera.—In this view of the viscera the rectum presents as a canal with two curvatures; its postero-inferior convexity is for lodgment in the concavity of the sacrum; its antero-superior concavity receives the postero-inferior convexity of the vagina. The uterus protrudes from the superior end of the vagina, with a broad ligament projected from its lateral border. The intimate relations of the contiguous vaginal and rectal walls were before recognized (page 41). The vagina presents an antero-superior concavity, into which is received the postero-inferior convexity of the bladder and the urethra. The bladder will be found adherent to the anterior surface of the supravaginal portion of the neck of the uterus. The relations of the contiguous urethral and vaginal walls were determined in the dissection of the Female Perineum (page 41).

2. Reflections of the Pelvic Peritoneum.—The peritoneum may be traced over the fundus of the bladder—the anterior surface of the organ not being invested by it—whence it spreads over its sides and posterior wall; it is reflected from the latter surface to the anterior of the body of the uterus, thereby forming the vesico-uterine cul-de-sac; it invests the anterior of the body of the uterus, and it folds over its fundus to cover the posterior of the same; it continues upon the posterior surface of the superior end of the vagina, from which it is reflected to the anterior wall of the rectum, thereby forming the recto-vaginal or Douglas' cul-de-sac (page 41; Fig. 2, Plate 20). From the lateral border of the body of the uterus, the peritoneum is projected in two layers (from the anterior and the posterior surface, respectively) as a broad ligament of the organ (page 69; Fig. 2, Plate 37).

Dissection.—Section the peritoneum of the vesico-uterine cul-de-sac, and dissect the bladder and urethra from the uterus and the vagina. Section the recto-vaginal cul-de-sac, and separate the vagina from the rectum. Slit open the bladder and urethra along the mid-line of their antero-superior wall and spread them open upon a dissecting board.

3. Bladder and Urethra.—The interior of the female bladder presents the same appearances as the male (page 97). The short female urethra, one inch and a half in length, is in marked contrast to the male urethra of eight inches; it was seen (page 40; Fig. 1, Plate 20) forming a conical projection from the neck of the bladder; on section, this projection will be found forming a thick wall to the canal.

Dissection.—Lay the uterus with its broad ligaments and the vagina (emptied of oakum) upon the dissecting board, with their antero-superior face uppermost (Fig. 1, Plate 57); pin the organs fast.

4. Broad Ligaments of the Uterus, Fig. 1, Plate 57.—These two ligaments are projected one from either side of the body of the uterus; they are formed as shown above by two layers of peritoneum; the anterior layer presents a smooth unbroken surface.

Dissection.—Incise and dissect off the anterior layer of the right broad ligament of the uterus (Fig. 1, Plate 57); determine the Fallopian tube, the round ligament of the uterus, the ligament of the ovary, and the ramifications of the uterine and ovarian arteries between the layers of the ligament. Recognize the slit in the anterior face of the posterior layer of the ligament, where the vessels to, and from, the ovary pass; the ligament of the ovary also passes to the latter through it.

5. Fallopian Tubes.—These canals spring from the superior and lateral angles of the body of the uterus. A Fallopian tube is about four inches in length, and terminates by a free fimbriated extremity ; one of the fimbriæ being pervious.

6. Round Ligament of the Uterus.—This so-called ligament springs from the side of the body of the uterus ; it passes between the layers of the broad ligament, to emerge from beneath its anterior layer.

7. Ligament of the Ovary.—This so-called ligament is projected from the side of the body of the uterus, at a point between the giving off of the Fallopian tube and the round ligament (nearer the former) ; it continues laterally, between the layers of the broad ligament, to pass out from between them, at the slit in the posterior layer of said ligament (page 102), for attachment to the internal end of the ovary.

8. Uterine Artery, Figs. 1 and 2, Plate 57.—This artery enters between the layers of the broad ligament, external to and opposite the attachment of the vagina to the uterus. It gives off an inferior branch to the exterior of the lateral wall of the vagina, and then continues parallel with and external to the lateral border of the uterus, toward the fundus of the latter ; at about opposite the middle of the body of the uterus, it anastomoses with a branch from the ovarian artery of the side.

9. Ovarian Artery.—This artery enters between the layers of the broad ligament ; it runs parallel with, and inferior to, the Fallopian tube, toward the body of the uterus. It gives off branches to the ovary and the Fallopian tube, of the side, and finally anastomoses with the uterine artery, as before shown. Its branches to the ovary pass to that organ through the slit in the posterior layer of the broad ligament (page 102).

Dissection.—Detach the uterus, etc.; spread the organs out upon the board with their posterior face uppermost and pin them fast (Fig. 2, Plate 57).

10. Peritoneal Investment of the Uterus, Fig. 2, Plate 57.—The greater peritoneum, as before stated (page 102), covers the entire posterior surface of the body of the uterus and is continued, inferiorly, upon the exterior of the superior end of the vagina. From the sides of the uterus it is projected, as the posterior layer of the broad ligament.

11. Ovary.—This almond-shaped body is swung free from the posterior face of the posterior layer of the broad ligament; it is attached thereto by its long axis. An ovary is about one inch and a quarter long, three-quarters of an inch wide, and half an inch thick; it weighs about four scruples. Its arteries and nerves reach it, and its veins and lymphatics leave it by the slit, seen at the anterior face of the posterior layer of the broad ligament (page 102; Fig. 1, Plate 57).

12. Vagina.—This canal, about four inches long, has an exterior fibrous, a middle muscular, and an interior mucous coat. Its free end, which is its narrowest point, forms a vertical fissure or opening at the pudendum (pages 30 and 41; Plates 19 and 20); at its middle, which is its widest part, its transverse diameter is the longest; at its attached or uterine end it is almost circular, receiving into its opening the neck of the uterus; the walls of the vagina (page 41) are in apposition. Slitting open the vagina along its postero-inferior wall (Fig. 2, Plate 57), it presents an antero-superior and a postero-inferior mid-line ridge of its mucous membrane—the columns of the vagina; between these columns the lateral halves of the mucous membrane bridge, forming rugæ; these rugæ are best marked at the pudendal end of the canal, and become less and less so toward its uterine end.

13. Uterus.—The uterus is a cylindrical body, constricted at its middle, and somewhat flattened antero-posteriorly; it weighs about ten drachms, and measures two inches and a half long, one inch and a half wide, and one inch thick; its superior end, the fundus, is globular and larger than its inferior. The inferior end is projected into the superior opening of the vagina, the latter being attached to the circumference of the former. The uterus is a hollow organ, the canals of the Fallopian tubes open into the cavity of its body, the latter into the cavity of its neck, and the cavity of the neck of the uterus opens, at the *external os*, into the vaginal canal. It is about equally divided into a body and neck portion. From the lateral borders of the body, the Fallopian tubes, the ovarian, the round and the broad ligaments are projected, as before shown (pages 102 and 103). The inferior portion of the neck projects into the vagina, where it presents a short anterior and a long posterior lip, which are determined by the *external os* (mouth of the uterus) between the two.

DISSECTION.—Trim away the broad, the ovarian, and the round ligaments from the border of the uterus; cut the Fallopian tubes two inches from the uterus. Slit open the posterior wall of the uterus from the os uteri to the fundus; enter a fine probe into the stump of the Fallopian tube, and cause it to emerge into the cavity of the body of the uterus; make two additional lateral slits to the uterine openings of the Fallopian tubes; pin out the uterus thus opened (Fig. 3, Plate 57).

14. Interior of the Uterus, Fig. 3, Plate 57.—The interior of the uterus shows the organ to be about equally divided into a body and a neck portion. The cavity of the neck and the cavity of the body are readily distinguishable by the difference in the appearance of their mucous membrane. The cavity of the body is somewhat triangular, and has the Fallopian tubes opening into it at the angles of its base; at the apex of the cavity of the body is a slightly constricted portion, the *internal os*, through which it opens into the cavity of the neck portion of the organ. The cavity of the neck is dilated at its mid-portion, and constricted at its ends, the internal os and the external os; its interior presents a median-line longitudinal ridge upon the anterior and the posterior walls, between which its redundant mucous membrane is laid in transverse pleats upon its lateral walls, *arbor vitæ uterinus*. The exterior of the uterus is, as before shown (page 104), partially covered by peritoneum; the interior of its cavities are lined by mucous membrane, continuous with that of the Fallopian tubes and the vagina; the mid-portion of the wall of the organ, between its serous and mucous membrane, is composed of involuntary muscular fibre.

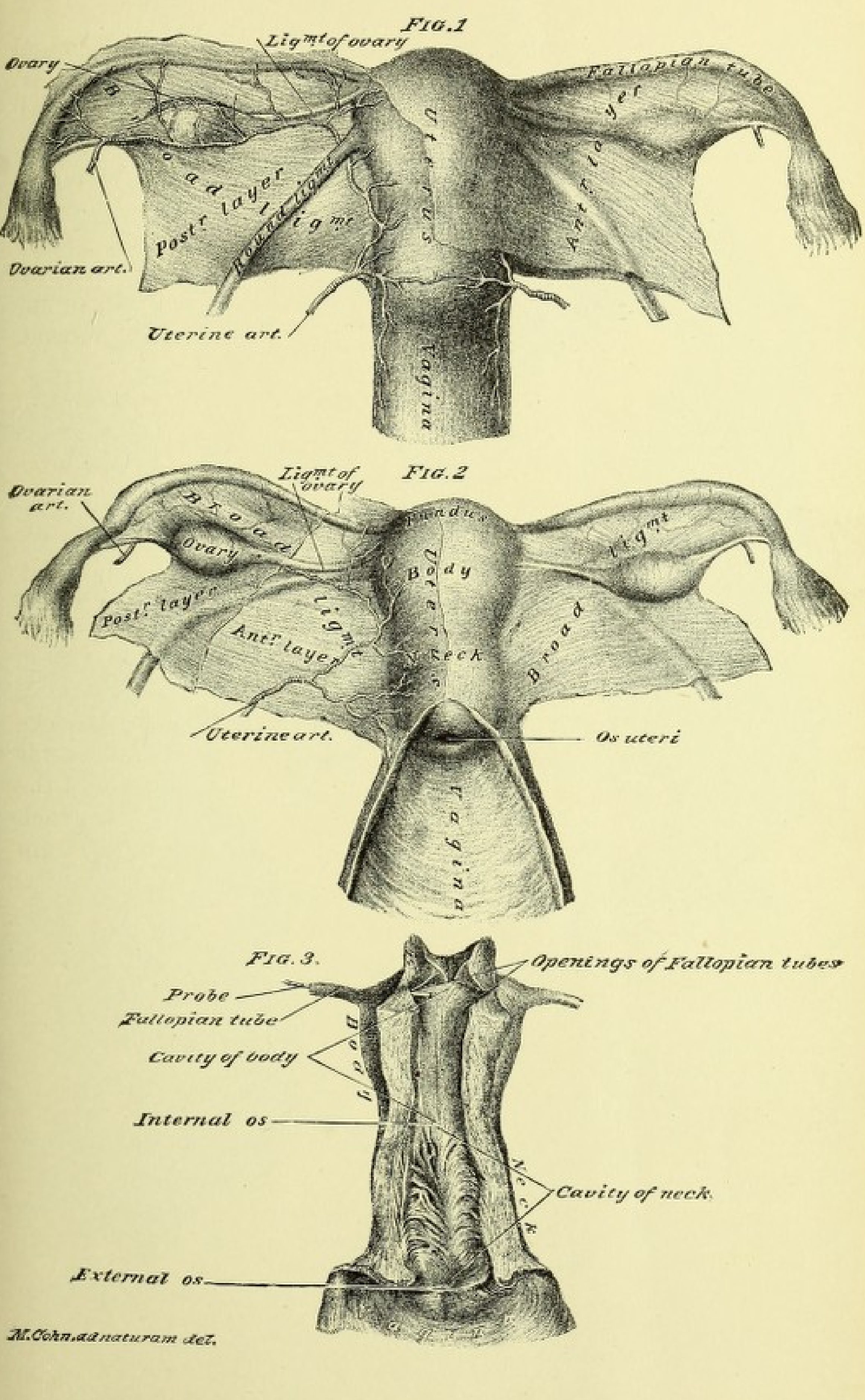
DISSECTION.—Dissect off loose fibrous tissue from the circumference of the rectum, preserving its partial investment of peritoneum, and the arteries that distribute to it. This portion of the alimentary canal is described here, at the end of the dissection of the female pelvic organs, but the description is intended to apply to the rectum in both sexes. Remove the oakum from the rectum, and expose its interior, by slitting it from its inferior end and folding back the two sides of the canal.

15. Rectum, Figs. 1 and 2, Plate 58.—Portions of the rectum presented and were described in the dissections of the organs at the pelvic outlet, male (page 27; Plates 11 and

12) and female (page 41; Fig. 2, Plate 20). This, the terminal eight inches of the large intestine, presents two curvatures, which form its three portions, viz.: first, second, and third. The first portion extends to the first curvature; the second, between the curvatures, has a postero-inferior convexity and an antero-superior concavity; the third portion, beyond the second curvature, tips posteriorly, and terminates at the anus, where it is surrounded by the sphincter ani muscle. The rectum differs from the colon of the large intestine: first, in the absence of the three longitudinal bands of the latter; second, in the absence of appendices epiploicæ.

In unfolding the rectum, as directed, note a contraction at the anus, produced by the external and internal sphincters; a dilatation within the anus; and a bend in the gut at the junction of its second and first portions.

In structure, the walls of the rectum will be found to present an exterior, partial, peritoneal coat (pages 67 and 95), a muscular coat, a submucous coat and an interior mucous coat. In the muscular coat the fibres are both longitudinal and circular: the longitudinal fibres are distributed to the entire circumference of the canal, presenting lateral thickenings of the same, by which an attempt at a right and left muscle-band are determined. The sphincter ani muscle surrounds the anal orifice, and the fibres of the levator ani portion of the levator ani et prostatæ or levator ani et vaginæ muscle reach the wall of the rectum, beneath the plane of the sphincter ani muscle (page 25; Plates 10, 11, and 12).



M. Cohn, ad naturam del.

FIG. 1

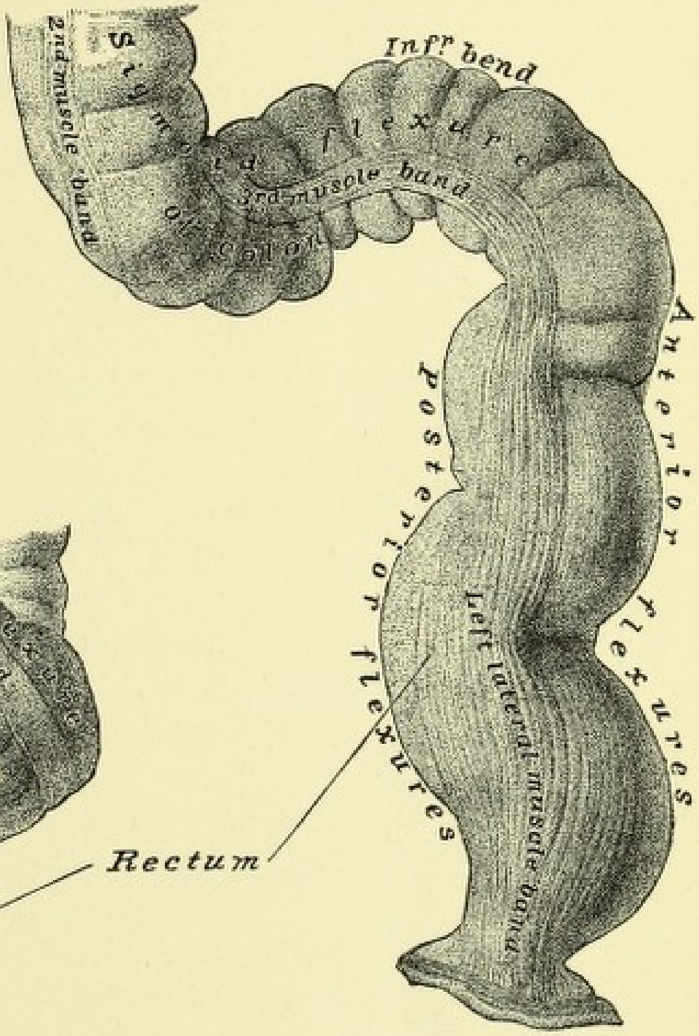
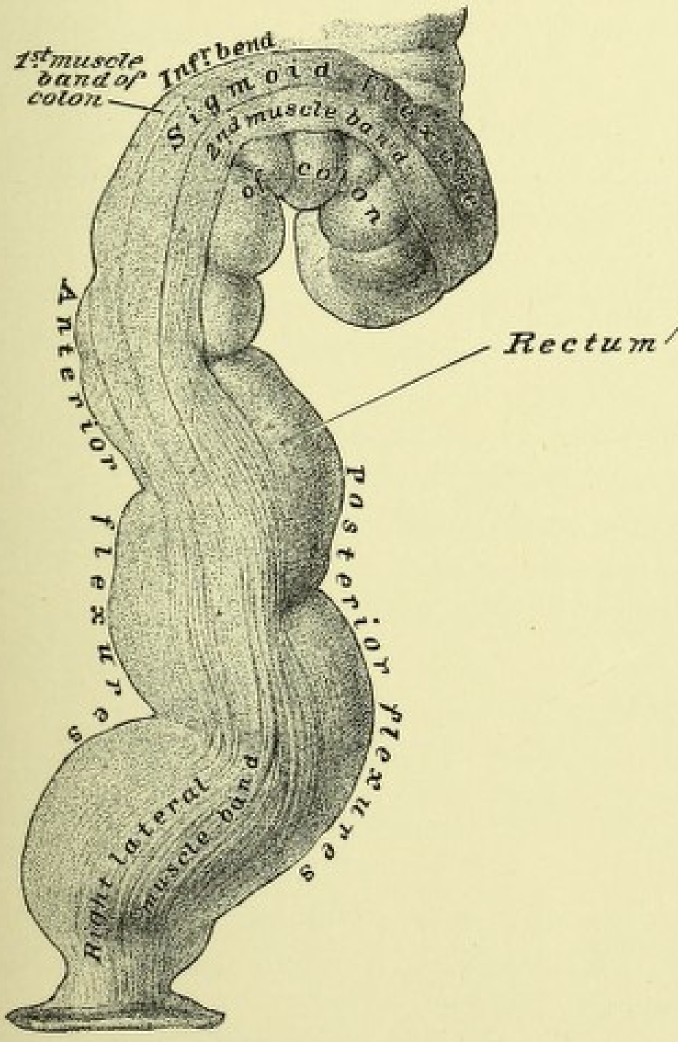

2nd muscle band
Sigmoid flexure
of colon
Infr bend
3rd muscle band
Anterior flexures
Posterior flexures
Left lateral muscle band

FIG. 2


1st muscle band of colon
Infr bend
Sigmoid flexure
2nd muscle band
of colon
Anterior flexures
Posterior flexures
Right lateral
muscle band
Rectum

LOWER EXTREMITY.

NINTH DISSECTION.

ANTERIOR OF THIGH.

Dissection.—Place a block under the pelvis to raise the proximal ends of the lower extremities; extend the limbs at full length with the heels upon the table.

Terms of Relation.—Those applied are: the general terms *anterior* and *posterior* (page 2); the special terms *proximal* and *distal* (toward and from the trunk, respectively); *inner* and *outer* (to the respective lateral surfaces); also, the compound terms *antero-inner* and *outer*, and *postero-inner* and *outer*.

Bones and Bone Areas, Plate 59 and Fig. 1, Plate 91.—The bone surfaces of the dissection are: the anterior border of the ilium and the exterior surfaces of the os pubis and ischium of the os innominatum; the anterior surfaces of the femur, the patella, and of the proximal ends of the tibia and fibula. The areas for muscle attachments are: of the os innominatum, at the anterior border of its ilial and the exterior of its pubic and ischial portions; of the femur, its anterior and postero-inner surfaces; of the patella, its borders; of the tibia, the antero-inner and outer surfaces of its proximal end.

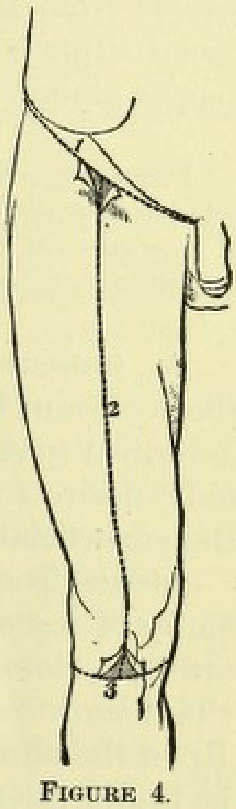


Figure 4.

Dissection.—The skin incisions for this dissection are indicated in Fig. 4, lines 1, 2 and 3. When this dissection is consecutive to that of the abdomen, skin incision 1 will have been made, as the line of the same describes about that of Poupart's ligament.

1. Subcutaneous Tissue.—This plane of tissue varies in thickness; it consists of two layers—superficial and deep—between which the superficial veins and nerves ramify.

DISSECTION.—Over the patella determine a bursa. Along the inner area of the limb find the internal saphenous vein, and follow its tributary branches. Dissect out, when present, the saphenous lymphatic glands in the proximal quarter of the dissection area.

2. Bursa over the Patella, Plate 60.—At the anterior surface of the patella is a well-marked subcutaneous bursa.

3. Internal Saphenous Vein.—This is a large subcutaneous vein, which has a proximal course from the inner side of the knee along the inner side of the thigh, to the saphenous opening (page 109) in the fascia (lata) of the region, where it enters to empty into the femoral vein. In its course it receives tributary subcutaneous veins from the anterior and posterior areas of the thigh; also the recurrent subcutaneous veins from the inferior antero-lateral areas of the abdominal parietes (page 44; Plate 22).

4. Saphenous Lymphatic Glands.—These glands are clustered about the saphenous opening. They receive lymphatic vessels from the areas contributing tributary veins to the internal saphenous vein. Their efferent vessels penetrate to the deeper glands through the saphenous opening.

DISSECTION.—Clear away the saphenous lymphatic glands, being careful not to destroy the boundaries of the saphenous opening. Determine the points of emergence through the fascia lata of the superficial arteries. Cut away the tributary veins of the internal saphenous vein.

5. Subcutaneous Arteries.—The areas of distribution of the recurrent branches of the femoral artery have already been described (page 44) and illustrated (Plate 22). At this time we only desire to recognize, that they—the superficial epigastric, the superficial circumflex iliac and the superior external pudic—emerge from beneath the fascia lata, through or in the vicinity of the saphenous opening. The inferior external pudic artery perforates the pubic portion of the fascia lata, close to the femoro-scrotal groove, for distribution to the scrotum. Upon the anterior surface of the thigh small arterial twigs will be found to emerge through the fascia lata.

DISSECTION.—Trace the cutaneous nerves in their distal course through the subcutaneous tissue.

6. External Cutaneous Nerve.—This nerve becomes subcutaneous at a variable point inferior to the anterior superior spinous process of the ilium. It distributes to the anterior and posterior surfaces of the outer border of the thigh.

7. The Middle Cutaneous Nerve.—This branch of the anterior crural nerve emerges through the fascia at the anterior face of the thigh, from which point it continues subcutaneously to the knee.

8. The Internal Cutaneous Nerve.—This nerve, branch of the anterior crural, emerges, by several branches, through the fascia lata, at the inner and anterior areas of the thigh.

DISSECTION.—Clear the surface of the fascia free of subcutaneous tissue, allowing the cutaneous nerves and vessels to remain upon it.

9. Fascia Lata.—This is the special name given to the fascia of the thigh. It is a thick sheet of fibrous tissue, which swathes the limb; having its proximal attachments to Poupart's ligament, the linea-ilio pectinea, the pubic arch, the tuberosity of the ischium, the posterior surfaces of the coccyx and sacrum, and the exterior lip of the crest of the ilium ; and its distal attachments to the inner and outer tuberosities of the proximal end of the tibia, the proximal end of the fibula and the fascia of the leg.

DISSECTION.—Determine the two anterior proximal planes of the fascia lata. Follow the internal saphenous vein to the saphenous opening; define the borders of the opening, and also the cribriform fascia, which closes the same. Seek the crural branch of the genito-crural nerve, coming through the opening.

10. Saphenous Opening.—This opening or deficiency in the fascia lata results, from the splitting of the fascia, at the inner side of the proximal end of the thigh: an outer, superficial portion—the iliac—is attached to Poupart's ligament; an inner, deep portion—the pubic—is attached to the superior border of the horizontal ramus of the os pubis. The iliac portion lies anterior to the femoral vessels, with its inner border upon the femoral vein, where it is curved to form the superior, the outer, and the inferior limits of the opening—*the falciform edge;* the pubic portion passes posterior to the femoral vessels. The two planes meet, and join at the superior and inferior limits of an ovoid opening, which affords transit to the internal saphenous vein, lymphatic vessels, the crural branch of the genito-crural nerve, and some of the recurrent branches of the femoral artery. From the exterior of the internal saphenous vein to the borders of the opening, the deep layer of the subcutaneous tissue closes the same; this portion of the subcutaneous tissue is perforated by vessels and lymphatics, giving it a sieve-like character, hence its special name of *cribriform fascia of the saphenous opening.*

11. Genito-Crural Nerve.—The crural branch of this nerve (page 78) passes beneath Poupart's ligament, and emerges upon the fascia lata, through the saphenous opening, to distribute to the skin of the proximal third of the anterior face of the thigh.

DISSECTION.—Section the saphenous vein about two inches from the saphenous opening; also cut the nerves in the subcutaneous plane, close to their points of perforation of the fascia lata. Clear the surface of the fascia of all portions of veins and nerves. Incise the fascia in the same line as the skin incisions (Fig. 4, page 107), and reflect lateral flaps of the same.

12. Sartorius Muscle, Plates 59 and 61.—This superficial muscle crosses obliquely from the outer to the inner side of the limb, between its proximal attachment at the anterior border of the os innominatum, inferior to the anterior superior spinous process of the ilium, to its distal attachment at the inner tuberosity of the tibia.

13. Tensor Vaginæ Femoris Muscle, Plate 61.—This is situated at the outer side of the proximal third of the thigh. Its proximal attachment is to the os innominatum, posterior and inferior to the anterior superior spinous process of the ilium; its distal end is attached to the fascia lata in the proximal half of the thigh.

14. Rectus Femoris Muscle, Plate 61.—This muscle occupies a plane deeper than the two previous muscles; it emerges upon the anterior face of the thigh into the distal angle formed between them and continues to the knee.

15. Vastus Externus Muscle.—This is the muscle to the outer side of the rectus femoris and distal to the tensor vaginæ femoris; it swathes around the outer surface of the femur down to the knee.

16. Vastus Internus Muscle.—The distal angle, formed between the sartorius and the rectus femoris, is occupied by this muscle; it winds over the inner surface of the femur down to the knee.

17. Gracilis Muscle, Plates 59 and 61 to 65 inclusive.—This flat, ribbon-like muscle extends along the inner face of the thigh; its proximal attachment is at the exterior border of the pubic arch, its distal at the inner tuberosity of the tibia. About the middle of the thigh it becomes contiguous to the sartorius.

18. Adductor Longus Muscle, Plates 59, 61, 62 and 63.—Occupying the proximal angle, formed by the sartorius and the gracilis, is this triangular muscle; its apex or proximal end is attached to the exterior face of the body of the os pubis; its fibres have a distal and oblique course, passing beneath the inner border of the sartorius to the attachment of its base to the shaft of the femur, at the linea aspera (Fig. 1, Plate 93).

19. Adductor Magnus Muscle, Plate 61.—In the interval between the sartorius, the gracilis and the adductor longus, a portion of this muscle appears.

20. Scarpa's Triangle.—This name has been given to the triangular space, which has its base or proximal limit at Poupart's ligament, its apex or distal limit at the angle of meeting of the sartorius and adductor longus, and its outer and inner sides formed by these muscles, respectively. The floor of the space is formed, at its inner portion, by the anterior surface of the pectineus muscle; at its outer portion, by the anterior surfaces of the thigh portions of the psoas magnus and iliacus internus muscles.

DISSECTION.—Clear the surface of the pectineus muscle, respecting, in so doing, the vessels crossing it. Take up the stump of the internal saphenous vein and follow it to the femoral vein. Open the femoral sheath at the proximal ends of the femoral vein and artery, and expose the two vessels and the femoral canal. Clear the surface of the iliacus internus muscle (Plate 61), that presents to the inner side of the proximal end of the sartorius. Follow the stump of the middle and internal cutaneous nerves to the anterior crural nerve; clear the latter nerve as it lies parallel with the femoral vessels, and determine its deep branches.

21. Vessels and Nerves in Scarpa's Triangle.—Within this triangle are to be found, projected from beneath Poupart's ligament, the femoral vein, the femoral artery, the femoral canal and the anterior crural nerve. The two vessels and the canal are contained in the femoral sheath, with only a thin fibrous septum between them. At its proximal end the *femoral vein* is to the inner side of the artery; toward the apex of the triangle it passes posterior to the artery. To the outer side of the vein is the *femoral artery;* within the triangle it gives off its recurrent branches, which perforate the fascia lata (page 108), to pass into the subcutaneous plane of the abdominal parietes and to the external genitalia—the superficial circumflex iliac, the superficial epigastric, and the superior and inferior external pudics; the profunda femoris artery is also given off from its posterior surface, at a variable distance from Poupart's ligament. To the inner side of the proximal end of the femoral vein a short canal exists—the *femoral canal;* it extends as a pouch of the femoral sheath, and is about one inch in length. At its proximal limit the femoral canal opens into the abdominal cavity by the *femoral ring*, which is bounded, as follows: by the femoral vein, externally; the superior border of the horizontal ramus of the os pubis, inferiorly; Gimbernat's ligament, internally; and Poupart's ligament, superiorly. The *anterior crural nerve* lies to the outer side of the femoral artery, being separated from it by a slight interval; to it can be traced the middle and internal cutaneous nerves; the internal saphenous nerve may be followed down from it to the femoral artery; its deep or muscular branches take a distal course, disappearing beneath the sartorius muscle; a branch to the pectineus muscle passes internally, in a plane posterior to the femoral vessels.

DISSECTION.—Section the sartorius muscle (Plate 61) and reflect its portions, superiorly and inferiorly. (The reflected portions of the sartorius muscle should not be cut close to their attachments, as is represented in Plate 62). Abduct the thigh and semiflex the knee, resting the foot upon its outer border.

22. Hunter's Canal, Plate 62.—Beneath the portion of the sartorius muscle distal from Scarpa's triangle, a layer of fibrous tissue (a portion of the sheath of the sartorius) stretches from the anterior surfaces of the adductor longus and magnus muscles to the inner surface of the vastus internus muscle. A triangular canal—*Hunter's Canal*—is formed as follows: by the fascia of the sartorius anteriorly and to the inner side; the adductor longus and magnus muscles posteriorly; the vastus internus muscle to the outer side.

23. Internal or Long Saphenous Nerve.—This nerve is given off from the inner side of the anterior crural; it accompanies the femoral artery into Hunter's canal.

Dissection.—Extend the limb; section the tensor vaginæ femoris muscle at its distal attachment to the fascia lata and reflect it superiorly; in raising it from its bed note the branch from the inferior gluteal nerve, that enters its deep surface. Clear the muscle surfaces beneath the tensor vaginæ femoris, preserving the ramifications of arteries.

24. Gluteus Medius and Minimus Muscles, Plates 62, 63, 64 and 65.—The anterior borders of these two muscles present proximal to the trochanter major and to the outer side of the proximal end of the rectus femoris muscle.

25. Rectus Femoris Muscle, Plates 59, 61 and 62.—This is the superficial, anterior, straight muscle of the thigh; its proximal attachments are to the inferior spinous process of the os innominatum and by a reflected tendon, from a point upon the superior surface of the cotyloid cavity or acetabulum of the same bone; its distal attachment is at the base or proximal border of the patella.

Dissection.—Raise the rectus femoris muscle from its bed; be careful not to destroy subjacent nerves. Section it (Plate 62) and reflect its halves, superiorly and inferiorly. In reflecting its proximal portion, note its supplying nerve, from the anterior crural; also its arterial supply, from the external circumflex artery. Slit open the fascial wall of Hunter's canal and distinguish the contained vessels and nerves; in doing so the femoral artery and the internal saphenous nerve may be hooked to the inner side, and the nerves to the vastus internus muscle to the outer side, in order to bring into view the femoral vein and the profunda femoris artery.

26. Contents of Hunter's Canal, Plate 63.—The *femoral artery* continues from Scarpa's triangle to the inner side of the shaft of the femur, entering Hunter's canal, where it lies upon the anterior surfaces of the adductor longus and magnus muscles; as lodged in the canal, it gives off two or three branches to the vastus internus muscle. At the distal end of the canal the artery passes through the femoral opening in the adductor magnus muscle. The *femoral vein* takes the same course as the artery ; at first it lies posterior to and then passes to the outer side of the artery, where it lies against the vastus internus muscle. The *internal saphenous nerve* accompanies the femoral vessels through the canal, upon the anterior and outer surface of the femoral artery ; it leaves the artery at its distal end, anterior to the adductor magnus muscle, to join the internal saphenous vein, at the distal side of the knee.

DISSECTION.—Expose the profunda femoris artery and its vein, at the proximal side of the adductor longus muscle, in a plane posterior to the femoral vessels. Note how this artery and vein pass posterior to the adductor longus muscle. Cut away the venæ comites of the profunda femoris artery and its branches.

27. Profunda Femoris Artery.—This artery (vena comes) is a branch from the posterior surface of the femoral artery, at a variable point in the course of the latter through Scarpa's triangle. It takes a distal course in a plane posterior to its parent trunk, having its vein to its inner side ; it passes to the plane posterior to the adductor longus muscle. Its branches are the external circumflex, the internal circumflex, and the three perforating.

DISSECTION.—Clear the surfaces of the vastus externus, the cruréus, and the vastus internus muscles, respecting, in so doing, the nerves and arteries, which enter their proximal portions. Trace the muscle branches of the anterior crural nerve and the distribution of the external circumflex artery ; trim away the venæ comites of the arteries.

28. Vastus Externus Muscle, Plate 59, Fig. 1, Plate 93, and Plates 61 to 65 inclusive.—The anterior surface of this muscle was before referred to (page 111) ; it is now fully exposed (Plate 63). It is attached to the femur, from a point posterior to and distal from the trochanter major, to the entire length of the outer lip of the linea aspera down to the external condyle ; it winds around the outer surface of the shaft of the femur, having an anterior free border ; it blends, at its distal end, with the tendon of the rectus femoris.

29. Crureus Muscle, Plates 59 and 63.—This is the anterior, deep, straight muscle of the thigh ; it is attached to the proximal two-thirds of the anterior surface of the shaft of the femur ; at its distal end, it blends with the tendon of the rectus femoris.

30. Vastus Internus Muscle, Fig. 1, Plate 93, and Plates 59, 61, 62 and 63.—This muscle occupies the inner face of the shaft and inner condyle of the femur; it is attached to the inner lip of the linea aspera, from which it winds around the inner surface of the femur, to fuse with the crureus, and blend, at its distal end, with the tendon of the rectus femoris. Compared with the vastus externus: it is the smaller of the two—that is, it does not rise as high upon the shaft of the femur; it covers the inner condyle of the femur, forming a cushion of muscle upon it, while the vastus externus does not cover the condyle of its side.

31. Quadriceps Extensor Femoris Muscle and its Compound Aponeurosis, Plates 59 and 61 to 65, inclusive.—The rectus femoris, the vastus internus, the crureus, and the vastus externus blend at their distal extremities, thus forming a quadriceps (four-headed) muscle, which is attached to the base and borders of the patella. Distal to the patella the quadriceps tendon is continued as a compound aponeurosis, which caps the anterior and the two lateral areas of the knee-joint, attaching itself to the tubercle of the patella (the so-called ligamentum patellæ) and to the inner and outer tuberosities of the proximal end of the tibia. The proximal portion of the aponeurosis is lined by the anterior ligament of the knee-joint; it is separated from it, opposite the joint, by a layer of fat.

32. External Circumflex Artery, Plate 63.—This artery, branch of the profunda femoris, distributes distal branches to the muscles of the quadriceps group; a proximal branch winds around the outer surface of the hip to the muscles of the gluteal region.

33. Muscle Branches of the Anterior Crural Nerve, Plates 61, 62 and 63.—From the deeper portion of the trunk of the anterior crural nerve, where the same is lodged in Scarpa's triangle, branches are given off, which may be traced to the following muscles: the sartorius, the pectineus (page 112), the rectus femoris, the vastus internus, the crureus and the vastus externus.

DISSECTION.—Section the aponeurosis of the quadriceps muscle by a curved incision to the distal side of the patella (Plate 63); be careful not to cut into the joint, but expose a layer of fat, present between the aponeurosis and the anterior ligament of the joint. Make a longitudinal incision through the substance of the vastus externus muscle, down to the shaft of femur, as shown in Plate 64. Semiflex the knee-joint and abduct the thigh. Reflect the aponeurosis from the inner side of the knee-joint proximally, and to the outer side, cutting the anterior ligament of the joint at the circumference of the articular surface of the patella. Continue the proximal reflection of the vastus internus, the crureus, and the vastus externus (inner portion of) muscles, being careful to leave, *in situ*, the proximal portion of the redundant anterior ligament of the joint, with the attachment to it of the subcrureus muscle; trace the latter muscle to its proximal attachment. Cut the reflected muscles, and portion of muscle (vastus externus), from the shaft of the femur; cut the branches of the anterior crural nerve and those of the external circumflex artery, at their trunks, respectively. Carefully cut away the vastus internus muscle from its linea aspera attachment (Fig. 1, Plate 91).

34. Subcrureus Muscle, Plates 59, 64, and 65.—This is a small muscle attached, at its proximal end, to the anterior surface of the distal third of the shaft of the femur; at its distal end, to the anterior ligament of the knee-joint.

35. Proximal Portion of the Anterior Ligament of the Knee-Joint, Plates 64 and 65.—This ligament lines the tendon and aponeurosis of the quadriceps extensor femoris muscle; it is adapted to the two conditions of the joint, flexion and extension: in the position of flexion it is drawn taut over the anterior surface of the condyles of the femur; in extension it appears redundant, at the proximal side of the base of the patella, where it is drawn up by the subcrureus muscle.

Dissection.—Section the femoral artery and vein distal to their profunda femoris branches (Plate 63); cut them also at the proximal side of the femoral opening in the adductor magnus muscle (Plate 64). Section the adductor longus muscle (Plate 63), and reflect its proximal portion to its pubic attachment, where it may be cut or, better, turned off upon the symphysis pubis; in raising it do not disturb the branches of the anterior portion of the obturator nerve beneath it; recognize the branch of this portion of the obturator nerve, that supplies the adductor longus muscle—entering its posterior surface. Reflect the distal portion of the adductor longus to its femoral attachment (Fig. 1, Plate 93) and cut it close to the bone. Trace the profunda femoris artery and its internal circumflex branch; its perforating and its muscle branches; cut away their venæ comites.

36. Profunda Femoris Artery, Plates 64 and 65.—This artery was before recognized as a branch of the femoral in Scarpa's triangle, as passing posterior to the adductor longus muscle (page 114), and as giving off the external circumflex artery (page 115). At present it is exposed in its course upon the anterior surfaces of the adductor brevis and magnus muscles ; it lies close to, and parallel with the femur, and gives off three branches : the first, the second, and the third perforating. They are called perforating, because they pass through openings in the adductor brevis and magnus muscles, to distribute in the posterior plane of the thigh ; the terminal end of the artery also perforates the adductor magnus muscle. In its course the artery affords muscle branches to the adductor magnus muscle, some of which also pass to the posterior plane of the limb.

Dissection.—Turn off the femoral vein over Poupart's ligament; determine the interspace between the pectineus and the psoas magnus muscles ; make a longitudinal cut through the pectineus, and reflect its proximal portion to its attachment to the horizontal ramus of the os pubis, where it may be cut or turned off. Restore the femoral vein to the surface of the psoas magnus muscle. In reflecting the portion of the pectineus muscle, respect the anterior portion of the obturator nerve and the obturator artery. Trace the branches of the anterior portion of the obturator nerve ; clear the obturator artery; look for the accessory obturator nerve, which, when present, passes beneath the pectineus muscle.

37. Internal Circumflex Artery, Plates 63 and 64.—This artery is a branch from the inner side of the profunda femoris ; it passes to the inner side of the limb, posterior to the adductor longus muscle, to distribute to the adductor muscles.

38. Pectineus Muscle, Plates 59, 61 to 64 inclusive, and Fig. 1, Plate 93.—This muscle has its proximal attachment to the exterior and superior surfaces of the horizontal ramus of the os pubis of the os innominatum ; thence it has a distal and oblique course, forming the inner portion of the floor of Scarpa's triangle (page 111), to its distal attachment to the femur, at the inner side of the proximal open angle of the linea aspera.

39. Obturator Nerve, Plates 64 and 65.—This nerve, from the lumbar plexus (described page 78, and illustrated Plates 39, 40, 41 and 46), emerges from the pelvis, under cover of the pectineus muscle, at the anterior and inner angle of the thyroid foramen, and anterior to the border of the obturator externus muscle. It divides into two portions, an anterior and a posterior, which are in contact, respectively, with the anterior and posterior surfaces of the adductor brevis muscle. The anterior portion affords branches as follows: to the adductor longus, the gracilis, and the adductor brevis muscles; a communicating branch to the internal cutaneous nerve (of the anterior crural), which at times (as in Plate 64) has a special cutaneous distribution to the inner face of the leg; an articular branch, which perforates the adductor magnus muscle on its way to the knee-joint.

40. Obturator Artery.—This artery enters the thigh from the pelvis with the nerve. It distributes to the obturator externus and the adductor muscles, and the hip-joint.

Dissection.—Clear the surfaces of the adductor brevis and magnus muscles. Define the femoral opening in the distal portion of the adductor magnus. Trace the femoral vein and artery through the opening. Recognize and follow the anastomatica magna branch of the femoral artery.

41. Adductor Brevis Muscle, Plates 59 and 64, and Fig. 1, Plate 93.—This muscle is the third of the adductor group; it is attached to the exterior surface of the pubic arch and to the linea aspera of the femur. It presents openings, close to the shaft of the femur, for the first and second perforating arteries from the profunda femoris.

42. Femoral Opening in the Adductor Magnus Muscle, Plates 64 and 65.—This opening is in the tendinous portion of the distal half of the adductor magnus; through it the femoral artery passes into the popliteal space, becoming the popliteal artery, and the popliteal vein, having a reverse course, becomes the femoral.

43. Anastomotica Magna Artery.—This artery (venæ comites) is given off from the femoral, before the latter enters the opening in the adductor magnus muscle. It has a distal course along the inner surface of the knee; it distributes to muscles and anastomoses with the internal articular branches of the popliteal artery.

Dissection.—Section the perforating branches of and the terminal portion of the profunda femoris artery; cut the proximal ends of the femoral artery, the femoral vein, and the anterior crural nerve close to Poupart's ligament (Plate 64). Remove the profunda artery with the stumps of the femoral vessels and the anterior crural nerve. Cut the internal circumflex artery at its origin from the profunda and leave its posterior branch *in situ*. Section the anterior portion of the obturator nerve (Plate 64), the distal ends of its gracilis and articular (knee) branches, and remove the nerves. Section the adductor brevis muscle and reflect its parts; in reflecting its proximal part respect the posterior portion of the obturator nerve posterior to it, and recognize its branch to the muscle, which enters the posterior surface of the same; the distal portion of the muscle should be cut at its attachment at the linea aspera of the femur, trimming out the perforating arteries from their points of muscle perforation. Reflect the distal portion of the pectineus muscle and cut it at its femoral attachment. Cut the obturator artery. Trace branches from the posterior portion of the obturator nerve and from the internal circumflex artery to the adductor magnus muscle. Clean the anterior surface of the adductor magnus and the exposed portions of the obturator externus, the quadratus femoris, the iliacus internus, the psoas magnus, and the semimembranosus muscles; also the exposed area of the capsular ligament of the hip-joint.

44. Posterior Portion of the Obturator Nerve, Plate 65 and Fig. 2, Plate 66.—This portion of the obturator nerve supplies the adductor brevis, the adductor magnus and the obturator externus muscles; sometimes the articular branch to the knee-joint is derived from this portion of the nerve, instead of the anterior portion (page 118; Plate 64).

45. Internal Circumflex Artery.—Branches from this artery distribute upon the anterior surface of the proximal portion of the adductor magnus muscle. Two branches of it pass posteriorly; one to the hip-joint, the other between the contiguous borders of the adductor magnus and the quadratus femoris muscles, to emerge into the posterior plane of the thigh.

46. Adductor Magnus Muscle, Plates 59, 64 and 65; Fig. 2, Plate 66, and Fig. 1, Plate 91.—From its proximal attachment, to the exterior of the ischium of the os innominatum, this muscle spreads to its distal attachment to the entire length of the linea aspera of the femur, along the outer side of the inner lip of the same, and to the inner condyle of the femur. It extends as a septum of muscle from the inner surface of the femur, dividing the inner mass of the thigh into an anterior and a posterior plane, the respective surfaces of the muscle forming the floor of each. It presents openings close to its femoral attachment: three or four proximal ones for the perforating arteries from the profunda femoris (page 117); and a large distal opening—*the femoral*—for the femoral artery and vein (page 118).

47. Iliacus Internus Muscle, Plates 59, 61 to 65 inclusive, and Fig. 1, Plate 91.—The abdominal portion of this muscle was described (page 82), and illustrated (Plates 38 to 41 inclusive, and Plate 44), *in situ;* its abdominal attachment was before shown (Plate 42, and Fig. 1, Plate 45). The muscle is projected from the abdominal cavity, beneath Poupart's ligament, into the anterior plane of the thigh. It bridges over the hip-joint, exterior to the anterior portion of its capsular ligament, and it is attached to the antero-inner surfaces of the proximal end of the shaft of the femur, near the trochanter minor.

48. Psoas Magnus Muscle: Plates 59, 65; Fig. 1, Plate 66; Fig. 1, Plate 91.—The abdominal portion of this muscle was described (page 82), and illustrated (Plates 38 to 41 inclusive) *in situ;* its abdominal attachment was before shown (Plates 42, 43, and 44). The muscle enters the thigh to the inner side, and parallel with, the iliacus internus, and is attached to the femur at the posterior surface of the trochanter minor.

49. Quadratus Femoris Muscle: Plates 59, 65; Fig. 2, Plate 66; and Fig. 1, Plate 91.—A portion of the anterior face of this muscle appears proximal to, and in a plane posterior to, the border of the adductor magnus muscle. Between it and the adductor magnus a branch from the internal circumflex artery passes to the posterior plane of the thigh.

50. Semimembranosus Muscle, Plates 64 and 65.—At the inner side of the distal third of the thigh, a portion of the anterior surface of this muscle appears in the distal angle between the gracilis and the adductor magnus muscles.

Dissection.—Section the iliacus internus and the psoas magnus muscles close to their attachments to the femur; reflect them, superiorly, to the brim of the pelvis, where they may be cut; note a large bursa beneath them which should be preserved. Clear the surface of the obturator externus muscle, and determine the proximal portions of the obturator vessels and nerve.

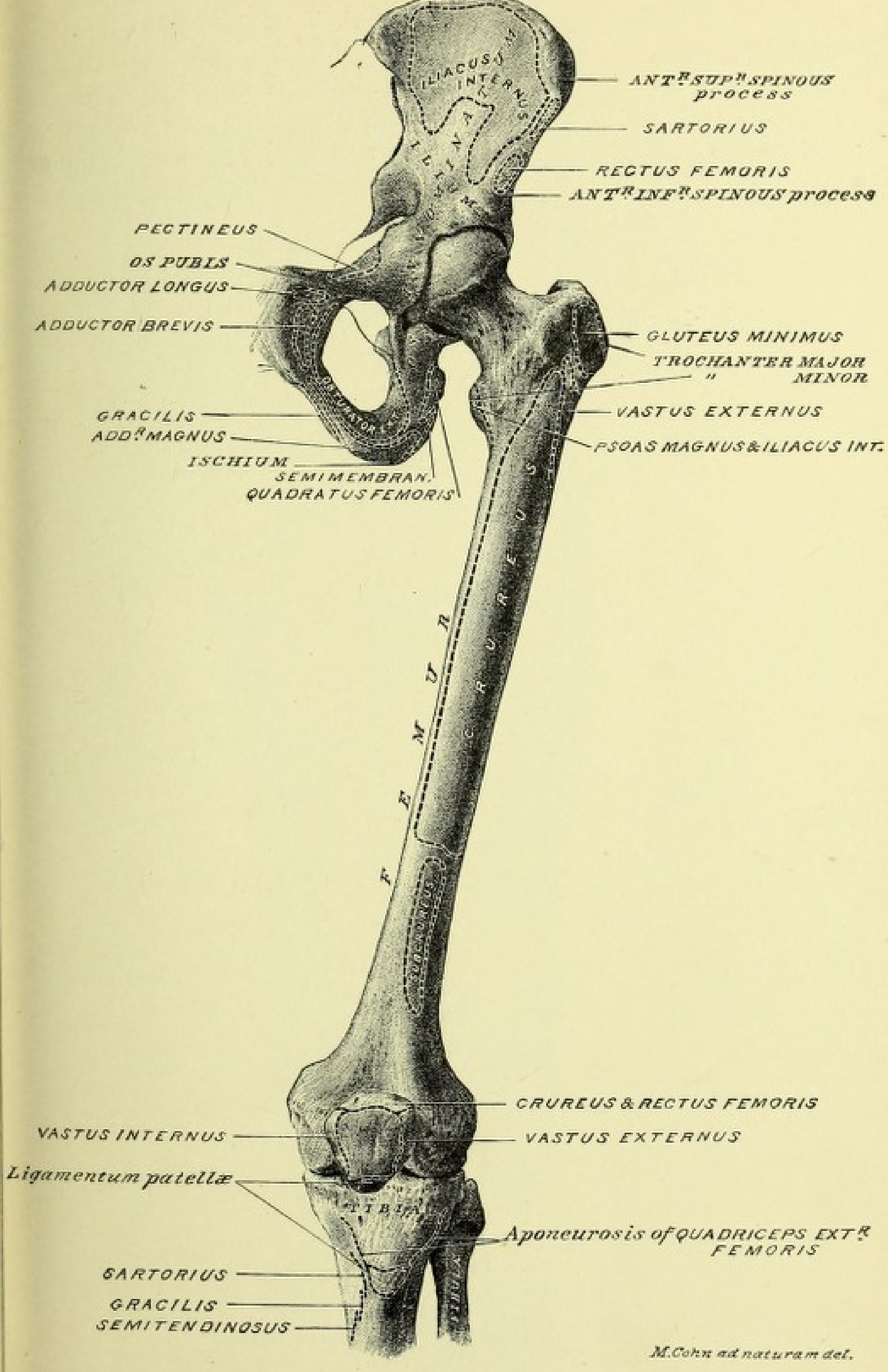
51. Bursa of the Psoas and Iliacus Muscles, Fig. 1, Plate 66.—A large bursa presents between the psoas magnus and iliacus internus muscles and the capsular ligament of the hip-joint; it sometimes communicates with the interior of the joint.

52. Obturator Externus Muscle, Plates 59, 64, 65 and 66.—This muscle is attached, internally, to the exterior face of the internal and inferior borders of the obturator foramen, and from the internal half of the obturator membrane (Plate 59); its course is externally, its tendon passing posterior to the hip-joint (Fig. 1, Plate 66).

53. Obturator Nerve, Plate 66.—The posterior portion of this nerve sometimes perforates the obturator externus muscle; more commonly, the anterior and posterior portions of the nerve form a single trunk, which passes out of the pelvis superior to the muscle.

DISSECTION.—Clean the exterior of the anterior portion of the capsular ligament of the hip-joint. Cut the ilial attachment of the rectus femoris muscle close to the bone.

54. Capsular Ligament of the Hip-joint, Fig. 2, Plate 66, and Plates 64 and 65.—The anterior portion of the capsular ligament of the hip-joint has its proximal attachment at the anterior and inner surfaces of the rim of the cotyloid cavity of the os innominatum and its distal attachment to the trochanters and the anterior intertrochanteric line of the femur. This area of the capsular ligament presents three thick longitudinal portions, which may be designated as follows: the ilio-femoral ligament, the ilio-femoral band, and the pubio-femoral band. The *ilio-femoral ligament* has its proximal attachment at the antero-inner border of the rim of the cotyloid cavity of the os innominatum, and the superior surface of the wall of the cotyloid cavity, up to the anterior inferior spinous process of the ilium; its distal attachment is to the inner portion of the anterior intertrochanteric line. The *ilio-femoral band* has its proximal attachment to the superior surface of the wall of the cotyloid cavity, extending up to the anterior inferior spinous process of the ilium; its distal attachment is to the outer portion of the anterior intertrochanteric line of the femur upon the face of the great trochanter. These two fibrous bands, thus diverging inferiorly, form an inverted Y-shaped ligamentous structure, which has been designated by Bigelow as the Y ligament of the hip-joint ("The Mechanism of Dislocation and Fracture of the Hip, etc." By Professor Henry J. Bigelow, M.D., pages 17 and 18). In the interval between the fibrous bands, an articular branch of the external circumflex artery perforates the capsular ligament of the joint. Manipulating the joint by external and internal rotation, and by forced extension, these two bands of the Y ligament are made more evident. The *pubio-femoral band* is a sweep of fibrous tissue, that bridges from the exterior face of the horizontal ramus of the os pubis to the trochanter minor.



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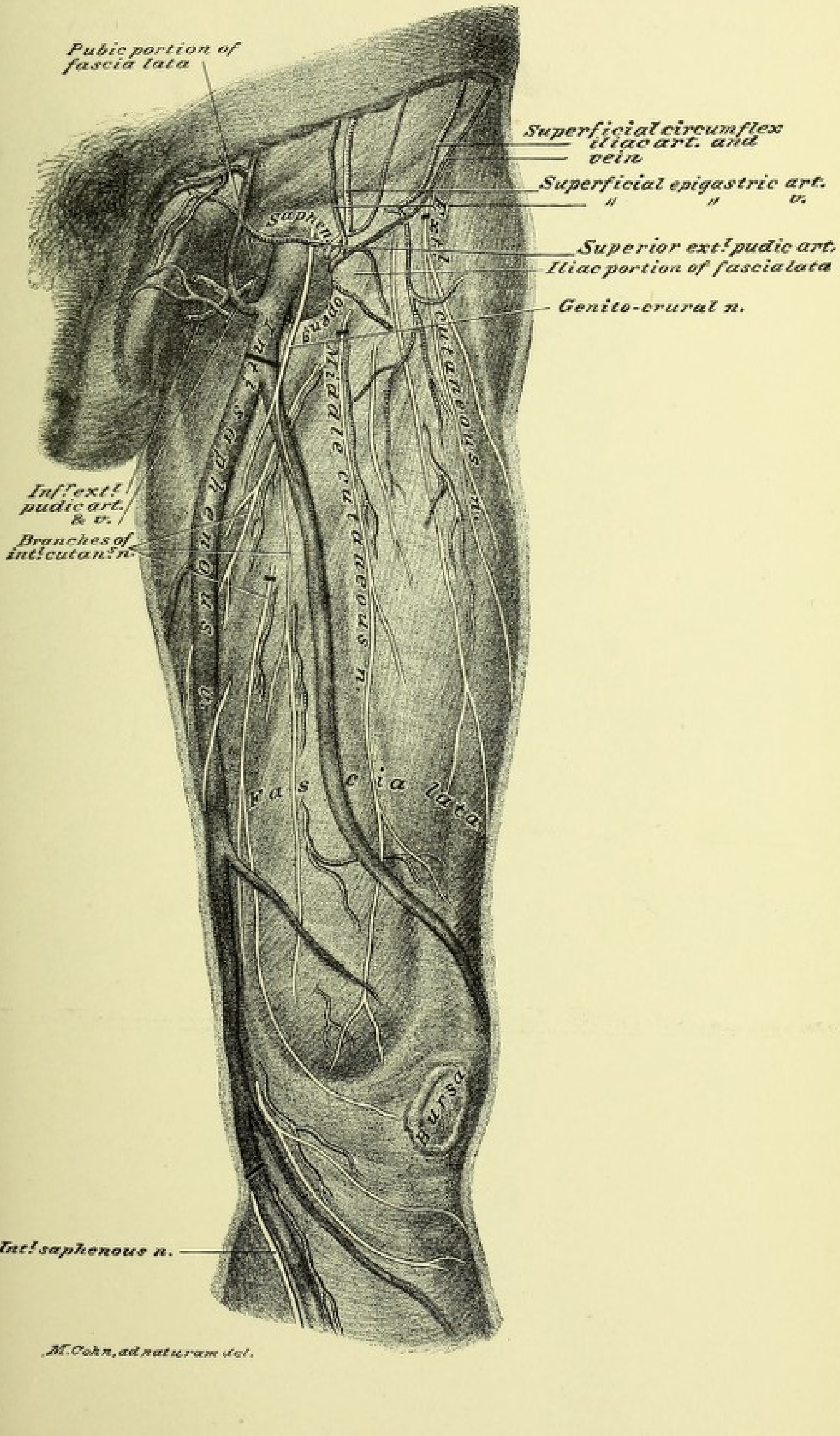

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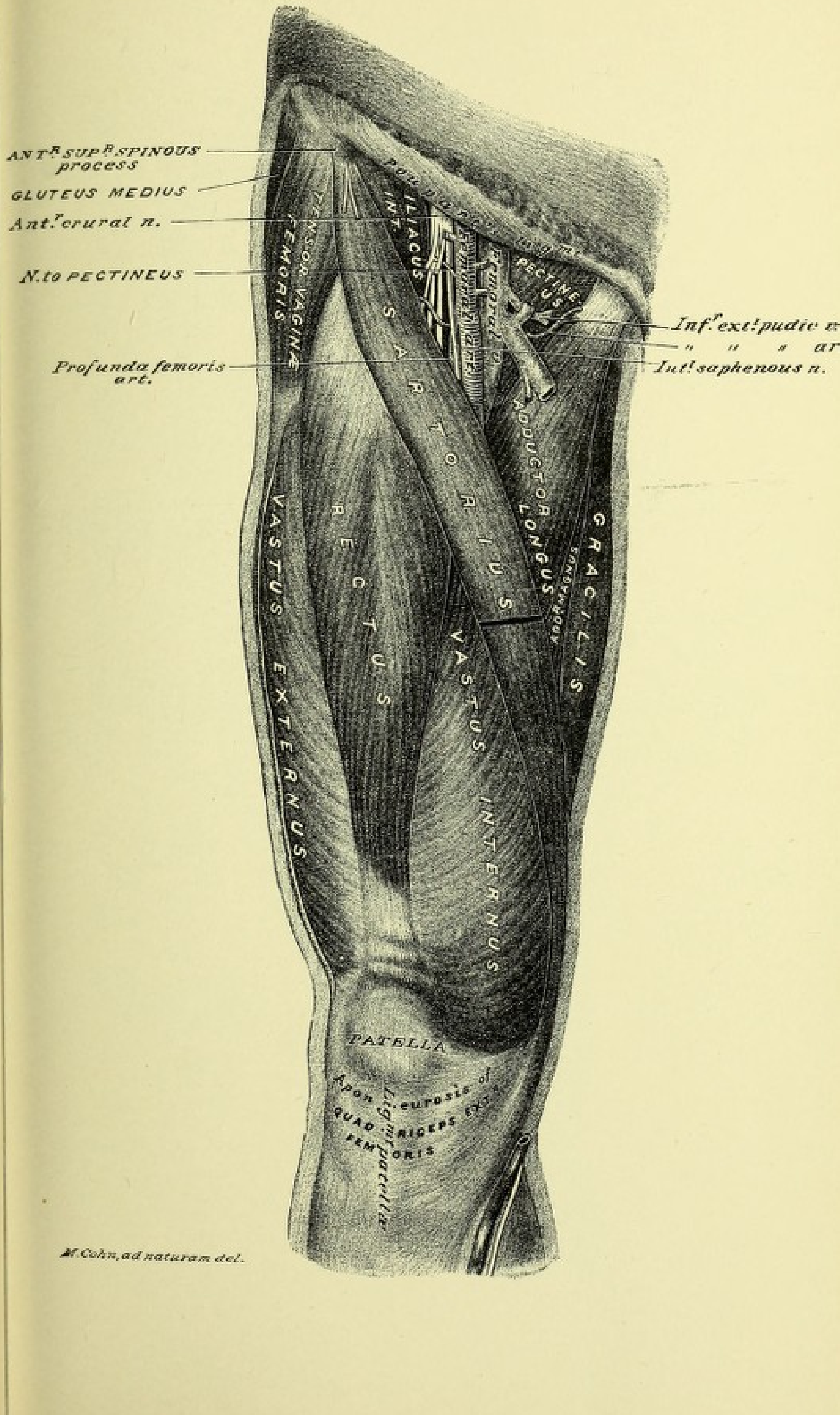

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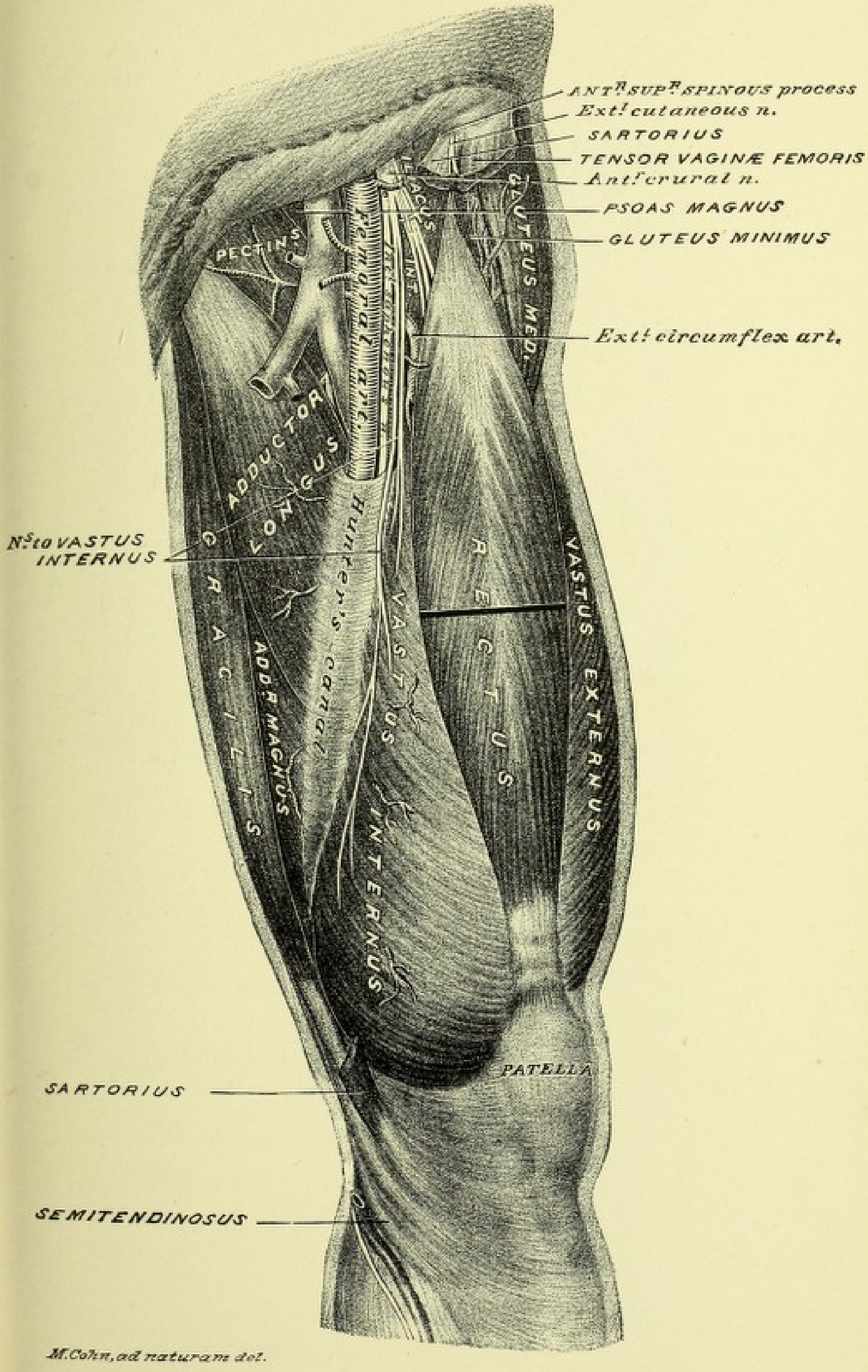

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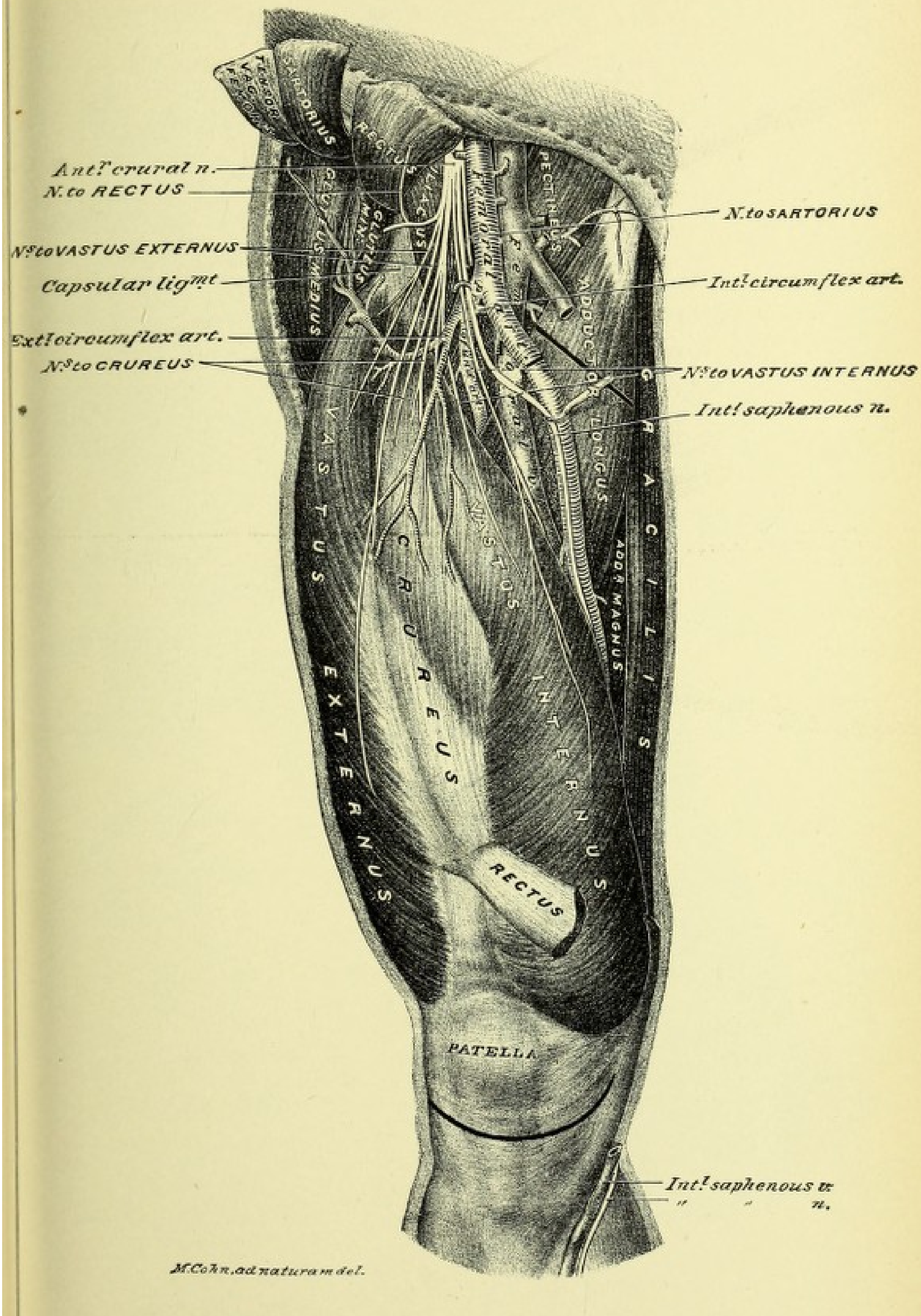

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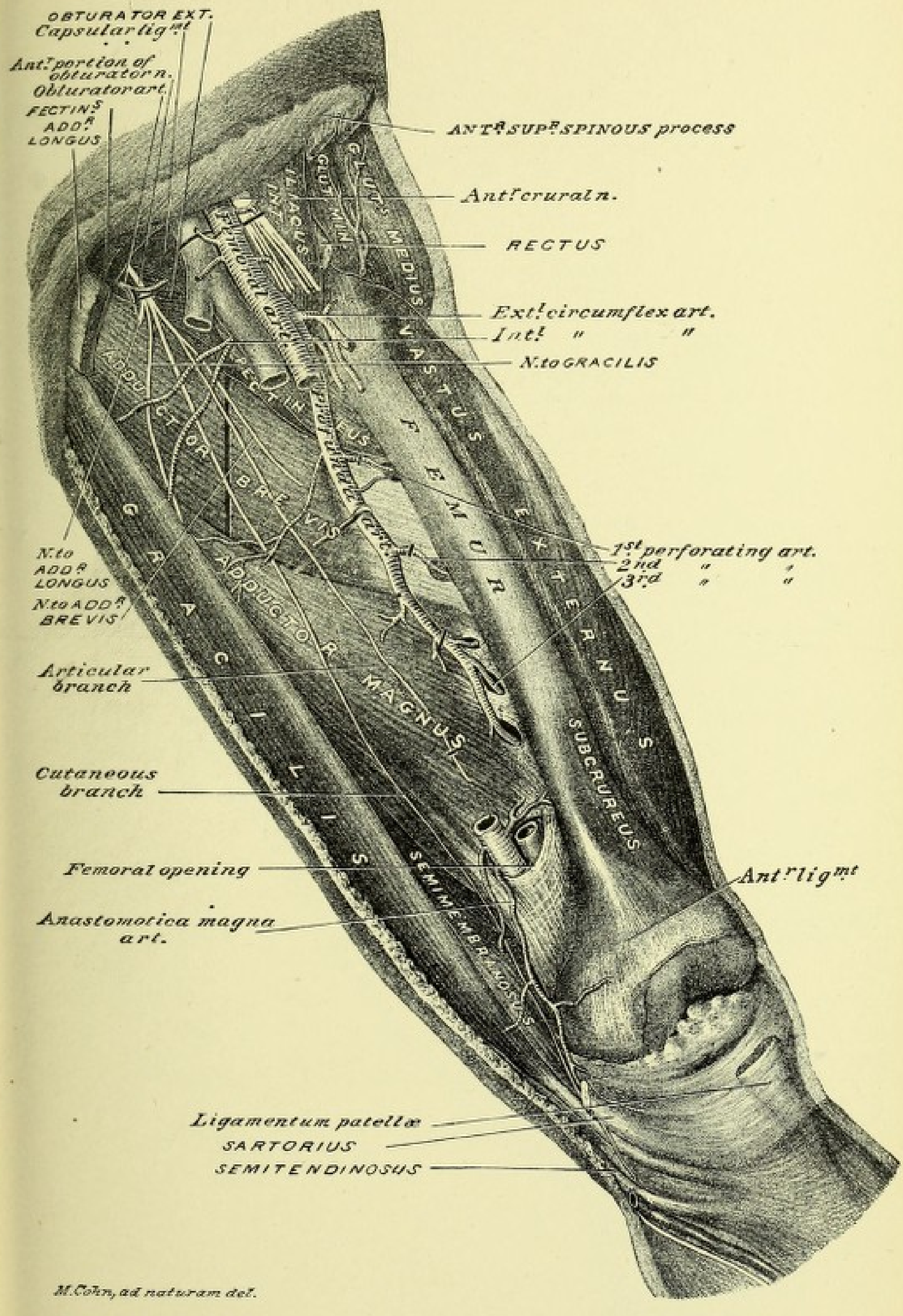

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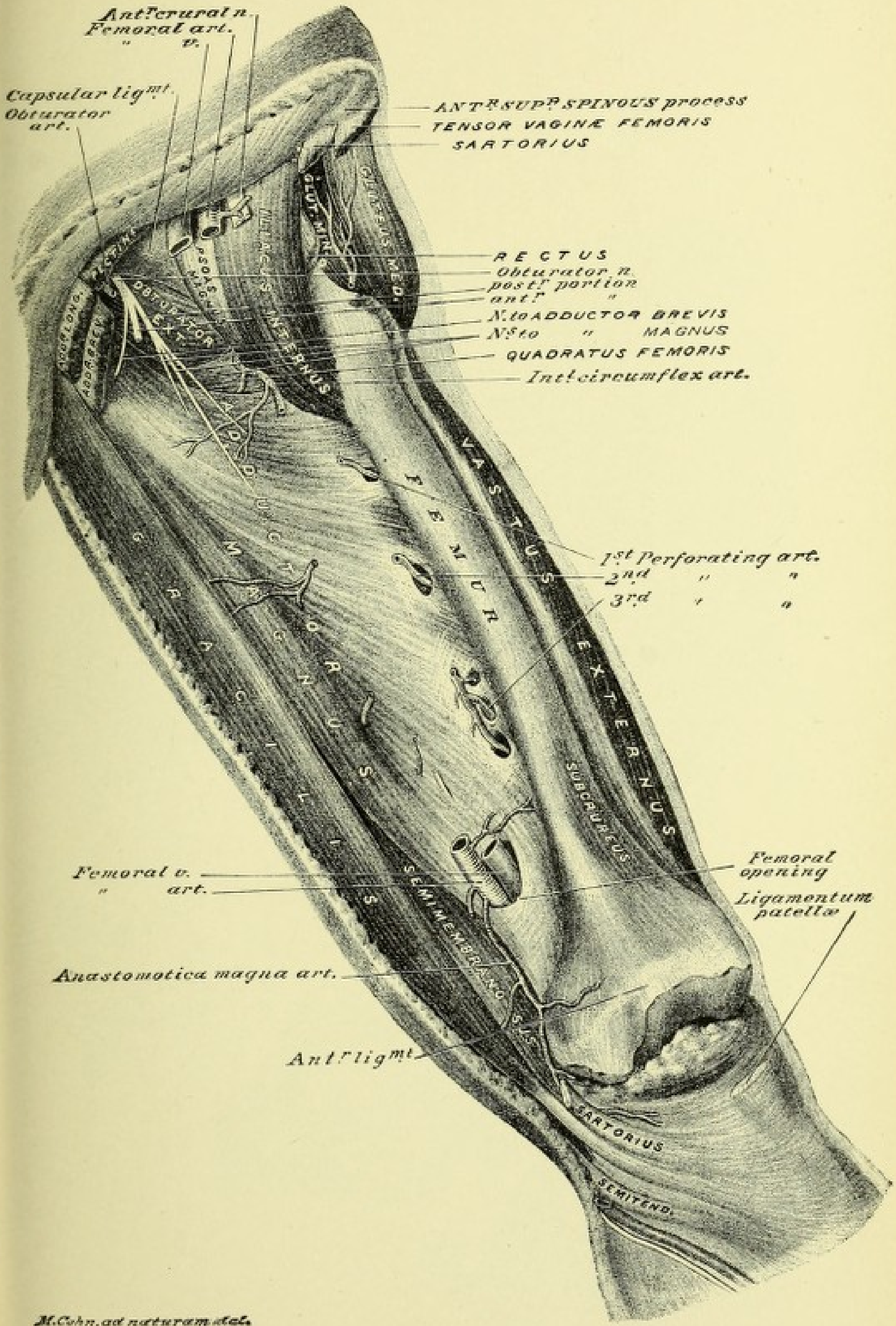

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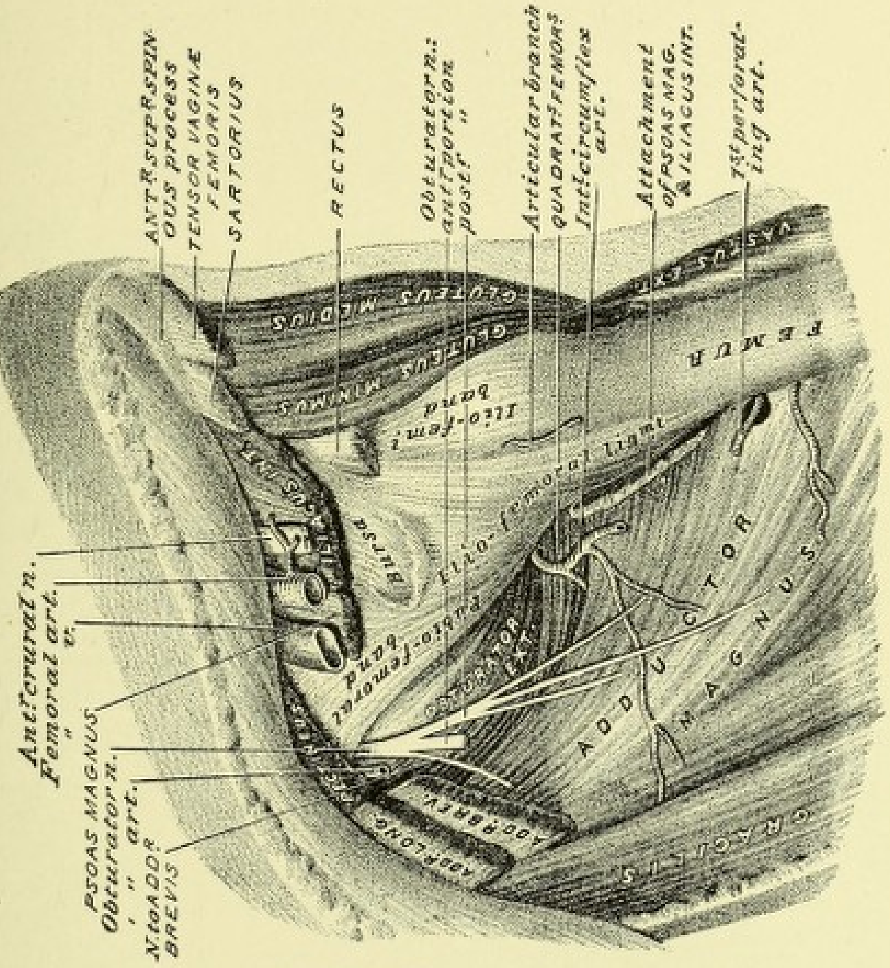

FIG. 1

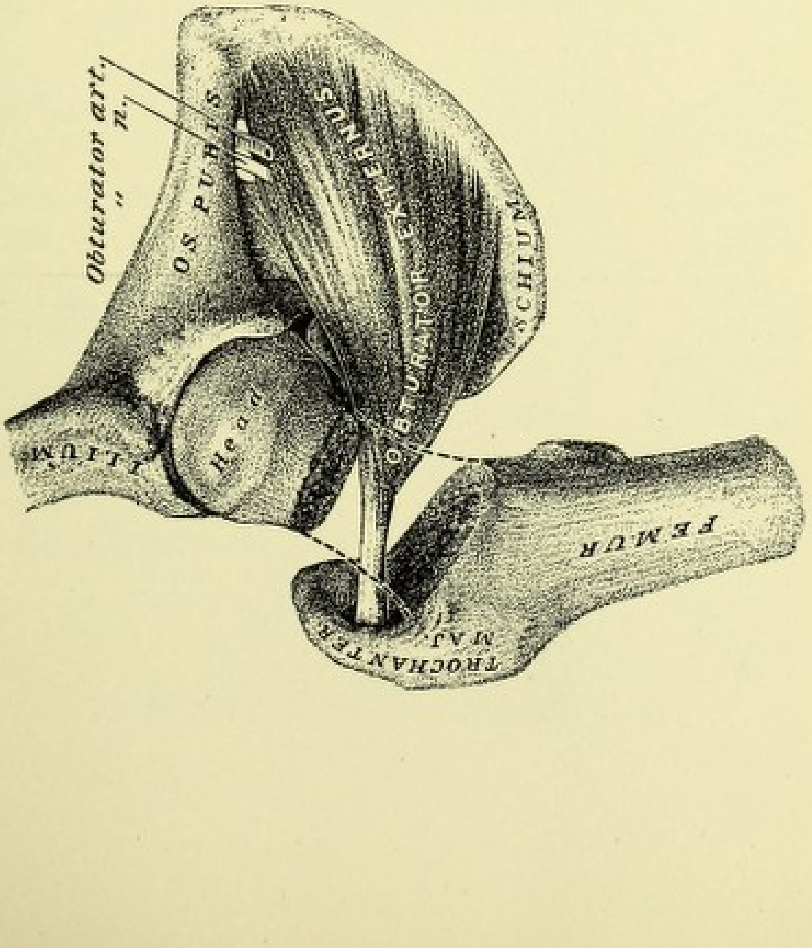

FIG. 2

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TENTH DISSECTION.

ANTERIOR OF LEG AND DORSUM OF FOOT.

DISSECTION.—For this dissection the two limbs should be supported at the ankles on blocks; tie the great toes together, so as to expose the outer antero-lateral area of the leg and foot.

Terms of Relation.—The terms applicable to both regions are: the general, *inferior;* the special, *proximal* and *distal* (toward and from the trunk). Those for the leg are: *anterior*, *posterior*, *outer*, and *inner surfaces; outer antero-lateral* and *inner antero-lateral areas* (including both anterior and outer or inner surfaces, respectively). Those to the foot are: *dorsum* or *dorsal surface; plantar surface; inner* or *pollex border* or *side; outer* or *minim border* or *side.* Those to the toes are: *dorsal*, *plantar*, and *lateral digital surfaces.* The regions of the foot will be spoken of as *tarsal*, *metatarsal*, and *digital.*

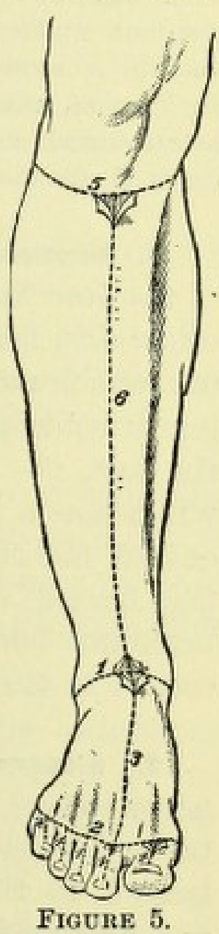


FIGURE 5.

Bones and Bone Areas, Plates 67 and 68.—The outer and inner surfaces of the tibia and fibula of the leg; the dorsal surfaces of the bones of the tarsal region of the foot—calcaneum, astragalus, scaphoid, cuneiform (internal, middle, and external), and cuboid; the dorsal surfaces of the bones of the metatarsal region—the five metatarsals; and the dorsal surfaces of the fourteen bones of the digits* form the osseous framework of the dissection. All of these bones, except the astragalus, the scaphoid, the cuboid, and the three

* The bones of the digits will be called by the special French names given to them by Chaussier, anglicized as follows: *phalanx* (s.), *phalanges* (pl.), to the five bones of the proximal row; *phalangine* (s.), *phalangines* (pl.), to the four of the middle row; *phalangette* (s.), *phalangettes* (pl.), to the five of the distal row.

cuneiform, afford attachments to muscles. Each metatarsal and each digital bone has a *base* (proximal end), a *shaft*, and a *head* (distal end).

DISSECTION.—Make the skin incisions 1, 2, 3, and 4, 4, 4, 4, 4, of Figure 5; reflect flaps well off of the inner and outer borders of the tarsal and metatarsal regions of the foot, and the dorsal halves of the lateral digital surfaces (Plate 71). Facilitate the turning off of the flaps from the foot by additional skin incisions from the tips of the malleoli, respectively, to the heel.

1. Subcutaneous Tissue of the Dorsum of the Foot and Digits, Plates 69, 70, and 71.—In this tissue subcutaneous veins will be found in a superficial plane, while subcutaneous nerves lie in a deeper one.

DISSECTION.—Dissect out the saphenous arch of veins, their tributary and resultant trunks; expose the subcutaneous distribution of the external saphenous, the musculo-cutaneous, the anterior tibial, the internal saphenous, and the internal calcaneal nerves, upon the dorsum and borders of the foot and the lateral digital surfaces. Clear the fascia of the dorsal surfaces of the foot and digits of subcutaneous tissue, preserving the above veins and nerves, *in situ*.

2. Saphenous Arch.—This venous arch crosses the dorsum of the foot in the distal third of the metatarsal region. At the outer side it is continued by the external saphenous vein (Plate 69), which ascends to the posterior surface of the leg, by winding inferiorly to the external malleolus; at the inner side of the foot, the arch is continued by the internal saphenous vein, which has a proximal course to the inner surface of the distal end of the tibia (Plate 70). The convexity of the arch receives the dorsal collateral digital veins. A variable number of branches leave the concavity of the arch, having a proximal course to the leg.

3. External Saphenous Nerve, Plate 69.—This cutaneous nerve enters the outer border of the foot, inferiorly to the distal end of the fibula. It distributes a dorsal collateral digital branch to the outer lateral digital surface of the fifth digit, and similar branches to the fifth and fourth digits.

4. Musculo-Cutaneous Nerve, Plates 69, 70, and 71.—The cutaneous branch (sometimes two) of this nerve enters upon the dorsum of the foot, at the middle of the ankle. It breaks up into branches: the dorsal collateral digital nerves of the fourth and third, the third and second digits, and that of the inner lateral digital surface of the pollex digit (Plate 70). It anastomoses with the external saphenous and the anterior tibial nerves.

5. Anterior Tibial Nerve, Plates 69 and 71.—The terminal portion of this nerve perforates the fascia at the middle of the first intermetatarsal space; it divides into the dorsal collateral digital nerves of the second and first digits.

6. Internal Saphenous Nerve, Plate 70.—This cutaneous nerve accompanies the vein of the same name, distributing to the skin of the inner border of the tarsal region.

7. Internal Calcaneal Nerve.—This nerve, branch of the posterior tibial, perforates the fascia to distribute to the skin of the inner side of the heel.

DISSECTION.—Untie the great toes. Make the skin incisions 5 and 6, of Figure 5 (page 123), and reflect flaps well off the antero-inner and outer lateral areas of the leg. Expose the subcutaneous veins and nerves.

8. Internal Saphenous Vein.—This subcutaneous vein may be followed, in its proximal course along the inner surface of the leg to the inner side of the knee, where it was before described (page 114; Plate 63). It receives tributary branches from the anterior and posterior surfaces of the leg.

9. Internal Saphenous Nerve.—This nerve accompanies the last-described vein; it has a distal course from where it enters the proximal limit of this dissection. It distributes patellar and other branches to the anterior and posterior (Plate 84) surfaces of the leg.

10. Musculo-Cutaneous Nerve, Plate 69.—The cutaneous branch (sometimes two) of this nerve, pierces the fascia of the leg, at a variable point, in the distal half of its outer antero-lateral area, continuing therefrom to the foot (page 124).

11. Cutaneous Branches of the External Popliteal Nerve.—Branches of this nerve distribute in the proximal half of the outer antero-lateral area of the leg.

12. Fascia of the Leg and Foot, Plates 69 and 70; Figs. 2 and 3, Plate 3.—The fascia of the dissection area is attached to the anterior border of the tibia and the anterior surface of the fibula (Plate 72); it isolates the muscles, which are lodged in the anterior tibio-fibular interosseous space (Plate 3). A special fascia, at the outer surface, isolates the peroneus longus and brevis muscles (Plate 3). At the ankle it forms the anterior annular ligament, from the distal border of which it is continued upon the dorsum of the foot; it is continuous at the borders of the foot with the plantar fascia (Plate 76).

DISSECTION.—Cut away the subcutaneous veins and nerves from the dorsum of the foot. Incise the fascia, longitudinally, upon the several tendons, and discover their synovial sheaths, by introducing probes into them (as with the palmar tendons in Fig. 2, Plate 4). Remove the fascia from the dorsum of the foot, clearing the tendons and defining the distal border of the anterior annular ligament.

13. Tendons upon the Dorsum of the Foot, Plates 71 and 72.—Between the malleoli four tendons enter from the leg upon the dorsum of the foot. They are from the inner to the outer side: that of the tibialis anticus, the extensor proprius pollicis, the extensor longus digitorum (initial tendon), and the peroneus tertius muscles. The initial tendon of the extensor longus digitorum gives off four terminal tendons, which have a longitudinal course to the digits, second to fifth, inclusive.

DISSECTION.—Clear away the subcutaneous veins and nerves from the fascia of the outer antero-lateral area of the leg; incise the fascia along the outer side of the anterior border of the tibia, and reflect the same to the outer side of the leg, as far as its fibular attachment (Plate 72). Allow the fascia to remain upon the proximal portion of the tibialis anticus muscle (Plate 72). Preserve that portion of the fascia, which forms the anterior annular ligament, by defining its proximal border.

14. Anterior Annular Ligament.—This is a dense portion of the fascia, opposite the anterior surface of the distal ends of the tibia and fibula; it is attached to the internal malleolus to the external malleolus and the dorsum of the distal portion of the calcaneum. It binds in place the outer antero-lateral muscles of the leg, as they pass to the dorsum of the foot. A loop of the ligament isolates the tendons of the extensor longus digitorum (initial) and the peroneus tertius muscles.

15. Tibialis Anticus Muscle, Plates 67, 71, and 72.—This is attached to the proximal two-thirds of the outer surface of the shaft of the tibia; its tendon commences at the distal third of the leg, passing upon the outer surface of the distal end of the tibia. It is included in a special compartment of the anterior annular ligament, posteriorly to which it enters upon the inner side of the dorsum of the foot, where it is continued into the plantar plane of the foot, at the distal third of the tarsal region.

16. Extensor Longus Digitorum Muscle, Fig. 1, Plate 67; Plates 68, 71, and 72.—This muscle is attached to the proximal three-fourths of the inner surface of the fibula; its initial tendon passes posteriorly to the anterior annular ligament; upon the dorsum of the tarsal region it divides into four terminal tendons, which pass to be attached to the dorsal surfaces of the bases of the phalangines and phalangettes of the digits, second to fourth, inclusive. The latter attachments will be dissected later (page 150; Figs. 2 and 3, Plate 82).

17. Peroneus Tertius Muscle.—This muscle has its proximal attachment to the distal portion of the inner surface of the fibula (it seems like a continuation of the last-described muscle): its tendon passes posteriorly to the anterior annular ligament, to the outer side of the outer terminal tendon of the extensor longus digitorum. It has a distal course, along the outer side of the tarsal region, to its distal attachment to the dorsal surface of the fifth metatarsal bone.

18. Extensor Proprius Pollicis Muscle.—This muscle has its proximal attachment to the middle of the inner side of the fibula; at the distal third of the leg it emerges from between the tibialis anticus and the extensor longus digitorum muscles. Its tendon passes, posteriorly to the anterior annular ligament, to the dorsum of the foot; it then has a distal course—upon the astragalus, the scaphoid, the internal cuneiform, the first metatarsal, and the phalanx of the first digit—to its distal attachment at the dorsal surface of the base of the phalangette of the first or pollex digit.

Dissection.—Expose the pollex tendon of the extensor brevis digitorum muscle, the dorsalis pedis artery and veins, and the anterior tibial nerve, as lodged in the inner intertendinous space—between the tendon of the extensor proprius pollicis muscle and the inner terminal tendon of the extensor longus digitorum muscle—upon the dorsum of the tarsal and metatarsal regions.

19. Pollex Tendon of the Extensor Brevis Digitorum Muscle, Plates 71 and 72.—This, the inner tendon of the muscle, has a distal, and oblique, course from the second digit (terminal) tendon of the extensor longus digitorum muscle, to its attachment to the dorsal surface of the base of the phalanx of the first digit.

20. Dorsalis Pedis Artery, Plates 71 to 74, inclusive.—This artery (venæ comites) enters upon the dorsum of the foot, from the posterior of the anterior annular ligament; it continues along the outer side of the tendon of the extensor proprius pollicis muscle, to where it bifurcates into the metatarsal and the second dorsal digital arteries. The *second dorsal digital artery* has a distal course, between the first and second metatarsal bones, giving off the first dorsal digital artery, to the inner lateral digital surface of the first digit; it is crossed upon its dorsal surface by the pollex tendon of the extensor brevis digitorum muscle.

21. Anterior Tibial Nerve.—This nerve is continued from the leg, to the dorsum of the foot, accompanying the dorsalis pedis artery, along its outer side. It gives off a branch from its outer side, which passes beneath the extensor brevis digitorum muscle. The nerve-trunk continues into the first intermetatarsal space, receives an anastomotic branch from the musculo-cutaneous nerve (Plate 69), and distributes as before described (page 125).

Dissection.—Incise and remove the fascia from the peroneus longus and peroneus brevis muscles, upon the outer or fibular surface of the leg. Trace their tendons posteriorly, and inferiorly, to the external malleolus and along the outer border of the foot.

22. Peroneus Longus Muscle, Fig. 2, Plate 67; Plates 71 to 74, inclusive.—This, the superficial muscle at the outer surface of the leg, is attached to the proximal half of the fibula. About the middle of the leg its tendon commences and continues upon the peroneus brevis muscle to the posterior of the external malleolus; it then winds inferiorly to the malleolus, where it is lodged in the inferior groove upon the outer surface of the calcaneum. It runs along the outer border of the tarsal region, to where it passes into the plantar region, into a groove in the cuboid bone.

23. Peroneus Brevis Muscle, Plates 67, 68, and 71 to 74, inclusive.—This muscle is attached to the distal half of the outer surface of the fibula, where it is lodged beneath the last-described muscle. Its tendon commences posteriorly to the external malleolus, inferiorly to which it winds to the outer side of the tarsal region, where it is lodged in the superior groove upon the outer surface of the calcaneum, and is continued to its distal attachment to the base of the fifth metatarsal bone. The two grooves upon the outer surface of the calcaneum, for the tendons of the peroneus longus and brevis muscles, are separated by the peroneal tubercle (Plate 101).

DISSECTION.—Section the tendons of the extensor longus digitorum and the peroneus tertius muscles (Plate 72), and reflect their distal portions. Do not dissect the extensor tendons from the dorsal surfaces of the digits, but leave them to be worked and studied at page 149. Clear the surface of the extensor brevis digitorum muscle.

24. Extensor Brevis Digitorum Muscle, Plates 68, 71, 72, and 73.—This muscle is located upon the dorsum of the foot. Its proximal attachment is to the dorsal surface of the distal end of the calcaneum, where the muscle forms a point; it then expands into a flat muscle, whose distal limit projects four tendons to the dorsal surfaces of the digits, first to fourth, inclusive (described page 150; illustrated Figs. 2 and 3, Plate 82). The pollex tendon was before described (page 128).

DISSECTION.—Cut the tendon of the extensor proprius pollicis muscle (Plate 72). Reflect the proximal portions of the extensor longus digitorum, the peroneus tertius, and the extensor proprius pollicis muscles to the outer side; also, the tibialis anticus muscle to the inner side (Plate 73). Expose the anterior tibial vessels and nerve between the reflected muscles; trace the artery and nerve, and note their muscle branches.

25. Anterior Tibial Artery, Plate 73.—This artery (venæ comites) lies between the tibialis anticus muscle, to its inner side, and the peroneus tertius, extensor proprius pollicis, and extensor longus digitorum muscles, to its outer side. It affords muscle branches to the contiguous muscles, gives off at the ankle-joint the external and internal malleolar branches, and is continued to the foot as the dorsalis pedis artery (page 128). It is lodged upon the anterior surface of the tibio-fibular interosseous ligament.

26. Anterior Tibial Nerve.—This nerve joins the last-described artery in the proximal third of the interosseous space; at first it lies to its outer side, then crosses to its inner side. It affords branches to the tibialis anticus, the extensor proprius pollicis, the extensor longus digitorum, and the peroneus tertius muscles (the latter descending in the substance of the extensor longus digitorum muscle).

Dissection.—Section the extensor brevis digitorum muscle (Plate 73); reflect its proximal portion to its attachment, at which it may be cut; turn off its tendons to the toes and cut them (do not dissect them at the dorsal surfaces of the digits, second to fourth, inclusive). Find the nerve and artery supplying the muscle—they enter its deep surface. Trace the branches of the dorsalis pedis artery; the dorsal digital, the dorsal collateral digital, and the perforating arteries.

27. Branches of the Dorsalis Pedis Artery, Plate 74.—These are the tarsal, and the branches of bifurcation—the metatarsal and the second dorsal digital. The *tarsal* crosses to the outer side of the tarsal region, supplying the extensor brevis digitorum muscle and the tarsal joints, and anastomosing with the external malleolar, of the anterior tibial, and the metatarsal. The *metatarsal* crosses, to the outer side of the tarsal region, upon the dorsal surface of the bases of the metatarsal bones—second, third, and fourth; it anastomoses as just stated.

28. Dorsal Digital Arteries, Plates 71 and 74.—These are six arteries (venæ comites), as follows: the *first* is a branch of the second, which runs upon the dorsal surface, and along the inner side of the distal portion, of the first metatarsal bone; the *second* is one of the branches of bifurcation of the dorsalis pedis, and is lodged in the first intermetatarsal space (page 128); the *third*, *fourth*, and *fifth* are distal branches from the metatarsal, having a distal course in the second, third, and fourth intermetatarsal spaces; the *sixth* is a branch of the fifth, and runs along the outer side of the fifth metatarsal bone.

29. Dorsal Collateral Digital Arteries, Plates 71 and 74.—These ten arteries are branches of bifurcation or the continuation of the dorsal digital arteries: the first and tenth are the continuations of the first and sixth digital arteries, respectively; the second to ninth, inclusive, arise from the terminal bifurcations of the digital arteries, second to fifth, inclusive. They ramify in the dorsal halves of the lateral digital surfaces of the digits, as shown upon the second digit in Plate 71.

30. Perforating Arteries, Plates 68 and 74; Fig. 1, Plate 82.—These four arteries (venæ comites) perforate from the plantar region, between the proximal ends of the dorsal interossei muscles, to anastomose with the dorsal digital arteries, second to fifth, inclusive. The first (the *communicating* branch of the anterior tibial, of authors) anastomoses with the second dorsal digital; the second, third, and fourth are branches from the plantar digital arteries (page 148).

31. Dorsal Interossei Muscles, Plates 68 and 74.—The dorsal surfaces of these four muscles appear in the intermetatarsal spaces, first to fourth, inclusive.

Dissection.—Cut away the extensor longus digitorum, the peroneus tertius, and the extensor proprius pollicis muscles from their fibular attachments; preserve the attachment of the fascia and intermuscular septum to the fibula, at the outer side of these muscles. Trace the musculo-cutaneous nerve between the peroneus longus and brevis muscles (Plate 74). Cut the peroneus longus muscle, at the head of the fibula, as required in tracking the musculo-cutaneous nerve to its origin from the external popliteal nerve (Plate 74); follow the branches of the musculo-cutaneous nerve to the peroneus longus and brevis muscles. Trace the anterior tibial nerve through the proximal portions of the extensor longus digitorum and the peroneus longus muscles, to its origin from the external popliteal nerve.

32. External Popliteal Nerve, Plates 72 and 74.—This nerve winds around the head or proximal end of the fibula, from the popliteal space. It enters the proximal portion of the peroneus longus muscle, where it gives off the recurrent articular branch, and bifurcates into the musculo-cutaneous and the anterior tibial nerves.

33. Musculo-Cutaneous Nerve, Plate 74.—This nerve, given off from the external popliteal, has a muscle distribution to the peroneus longus and brevis muscles ; and a cutaneous distribution as before described (pages 124 and 125) and illustrated (Plates 69 and 70).

34. Anterior Tibial Nerve.—This nerve passes from the external popliteal, through the proximal portions of the peroneus longus muscle, the intermuscular septum, and the extensor longus digitorum muscle, to reach the anterior surface of the tibio-fibular interosseous ligament, where it was before described (page 130).

Dissection.—Trace the anterior tibial artery to its proximal limit ; follow its anterior tibial recurrent branch. Find, at the opening in the distal portion of the tibio-fibular interosseous ligament, the anterior peroneal artery ; follow it to its anastomosis.

35. Anterior Tibial Artery.—The proximal end of this artery (venæ comites) emerges, from the posterior to the anterior region of the leg, by a deficiency in the proximal portion of the tibio-fibular interosseous ligament.

36. Anterior Tibial Recurrent Artery.—This artery (venæ comites) is given off from the proximal end of the anterior tibial ; it has a recurrent course through the proximal portion of the extensor longus digitorum muscle, to contribute to the peri-articular network of anastomosing arteries upon the outer antero-lateral area of the knee.

37. Anterior Peroneal Artery.—This artery (venæ comites), branch of the peroneal artery of the posterior region of the leg, emerges, to the anterior of the leg, by an opening in the distal portion of the tibio-fibular interosseous ligament. It takes a distal course along the outer side of the ankle-joint, to the tarsal region of the foot, where it anastomoses with the external malleolar branch of the anterior tibial artery.

Dissection.—After this dissection, be careful to keep the leg and foot wet ; more especially the toes, dorsum of the foot, ankle, and knee.

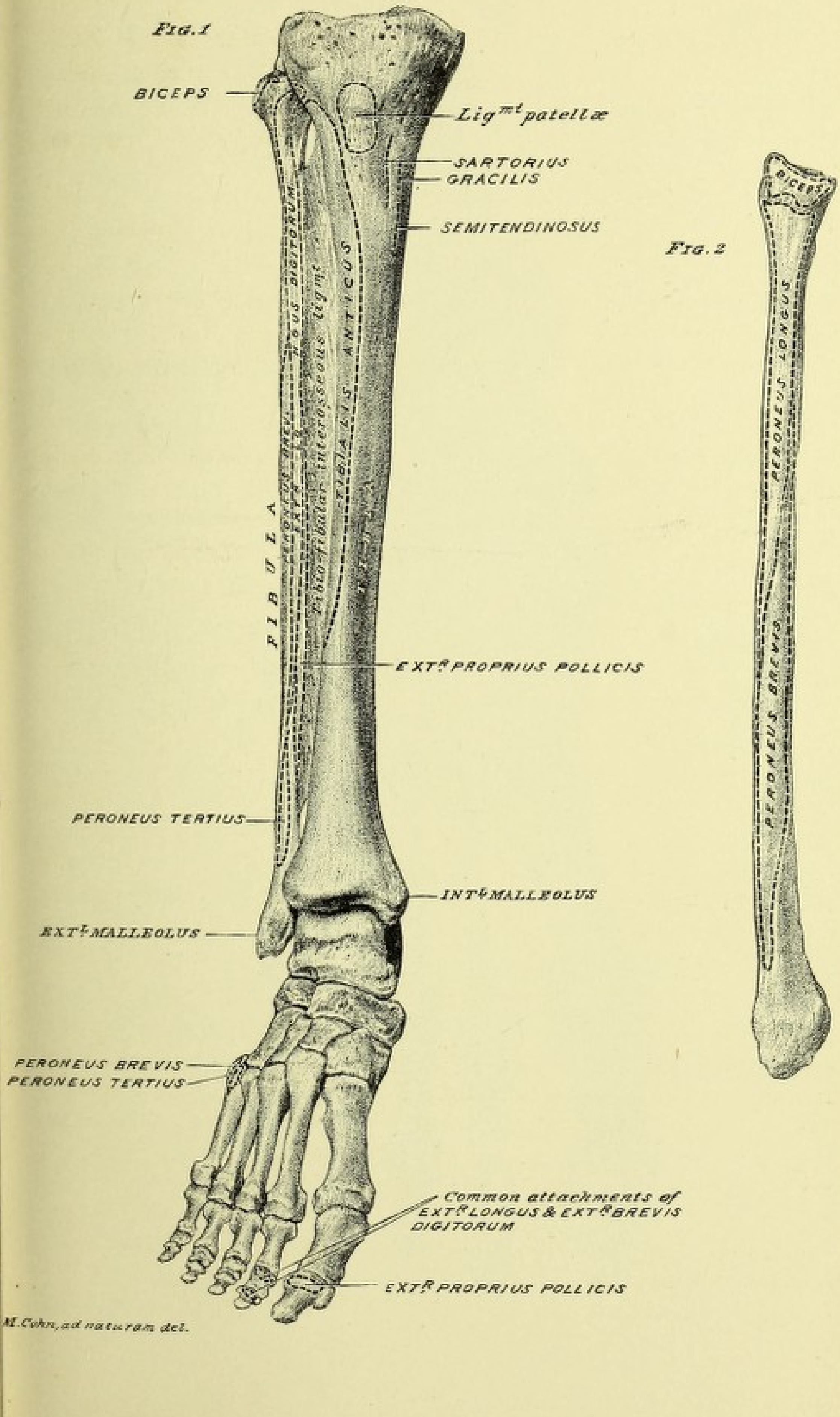
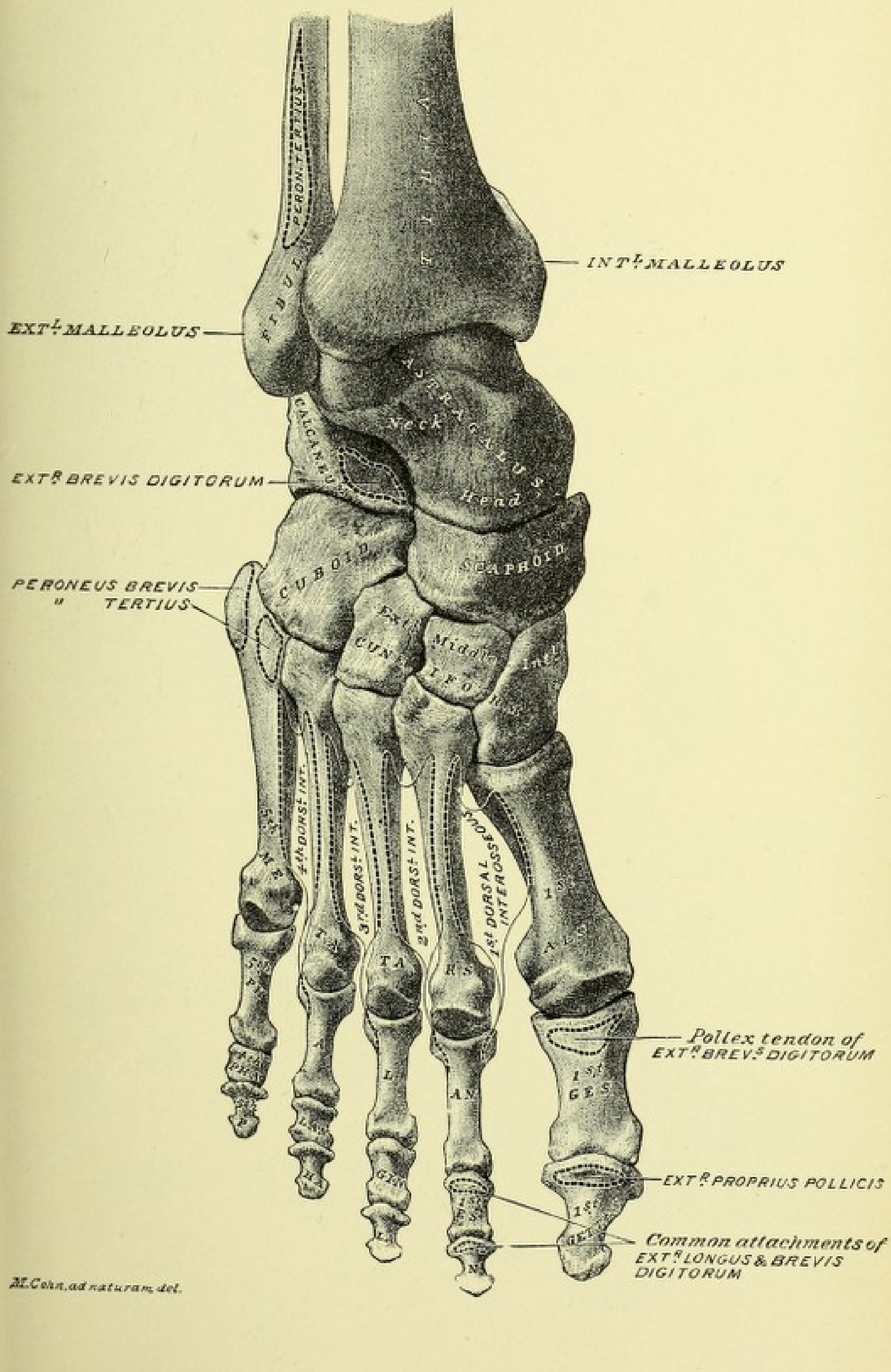
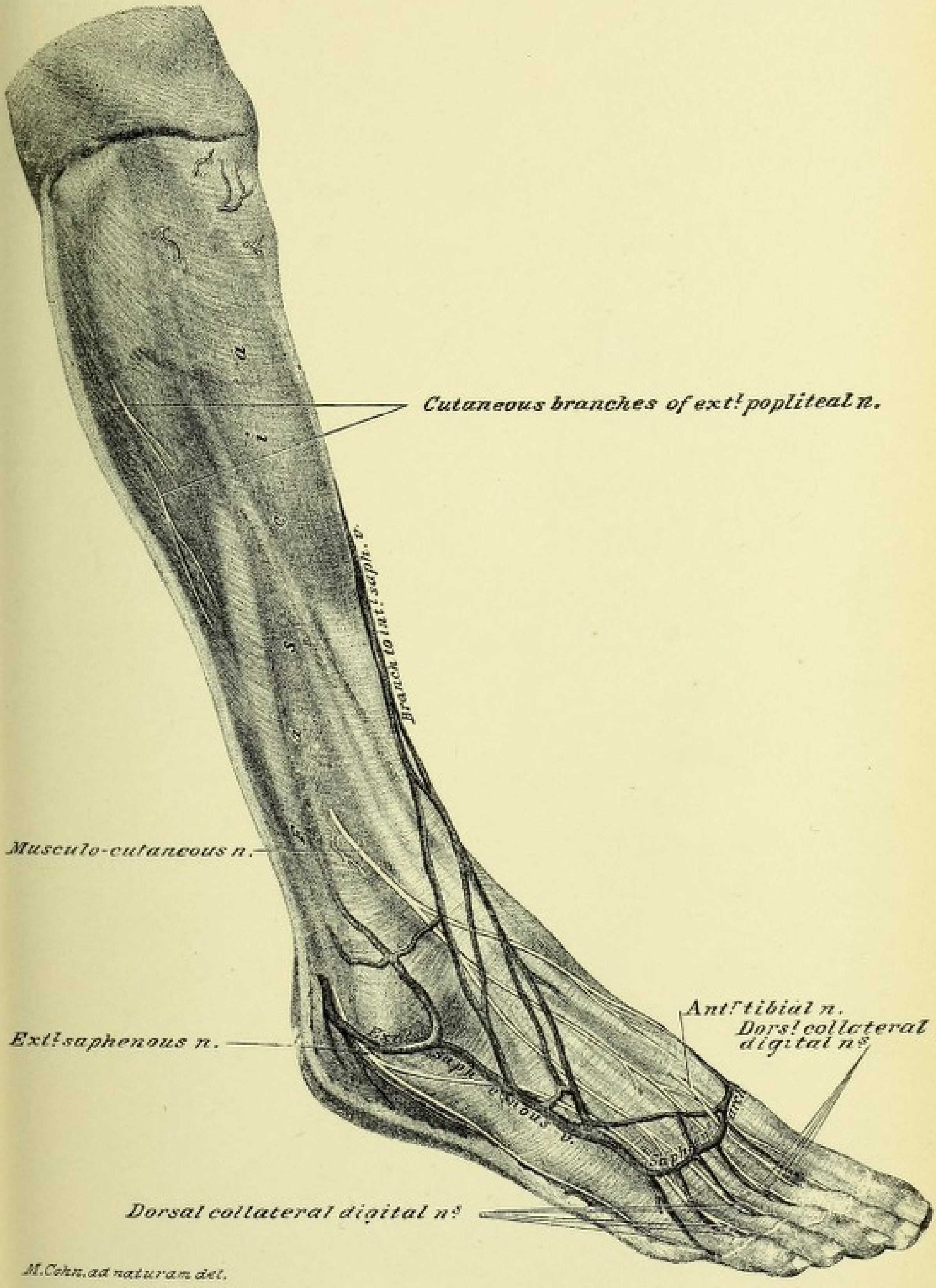


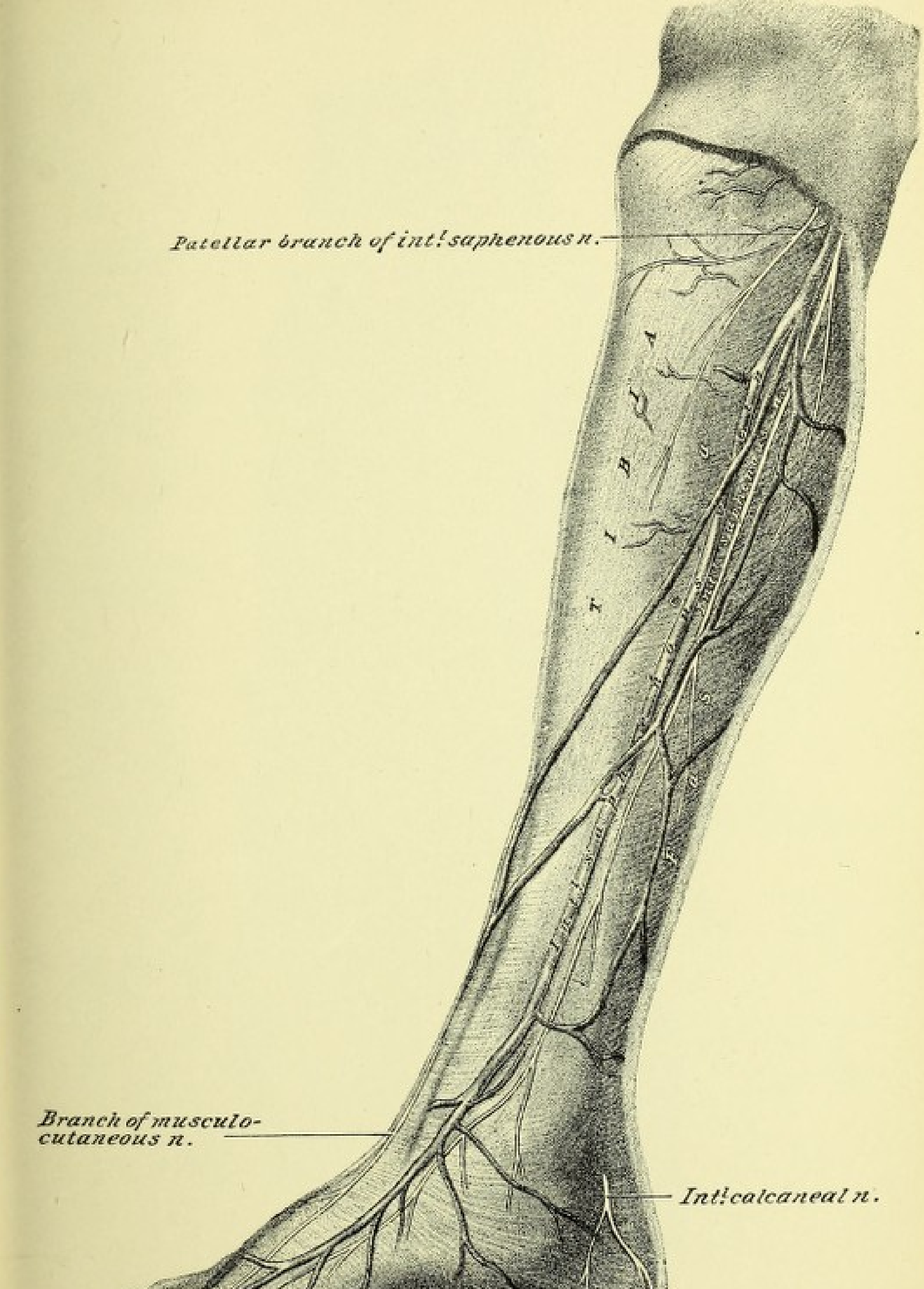
FIG. 1
BICEPS
Ligmt patellæ
SARTORIUS
GRACILIS
SEMITENDINOSUS
FIBULA
TIBIALIS ANTICUS
Tibio-fibular interosseous ligmt
EXTR PROPRIUS POLLICIS
PERONEUS TERTIUS
INTL MALLEOLUS
EXTL MALLEOLUS
PERONEUS BREVIS
PERONEUS TERTIUS
Common attachments of
EXTR LONGUS & EXTR BREVIS
DIGITORUM
EXTR PROPRIUS POLLICIS
FIG. 2
BICEPS
PERONEUS LONGUS
PERONEUS BREVIS
M. Cohn, ad naturam del.


INT^L MALLEOLUS
EXT^L MALLEOLUS
EXT^R BREVIS DIGITORUM
PERONEUS BREVIS
" TERTIUS
Pollex tendon of
EXT^R BREV^S DIGITORUM
EXT^R PROPRIUS POLLICIS
Common attachments of
EXT^R LONGUS & BREVIS
DIGITORUM
TIBIA
FIBULA
PERON. TERTIUS
ASTRAGALUS
Neck
Head
CALCANEUM
CUBOID
SCAPHOID
Ext.
CUN
Middle
IFO
4th DORS^L INT.
3rd DORS^L INT.
2nd DORS^L INT.
1st DORSAL INTEROSSEOUS
TA
RS
1st
GES
M.Cohn, ad naturam, del.



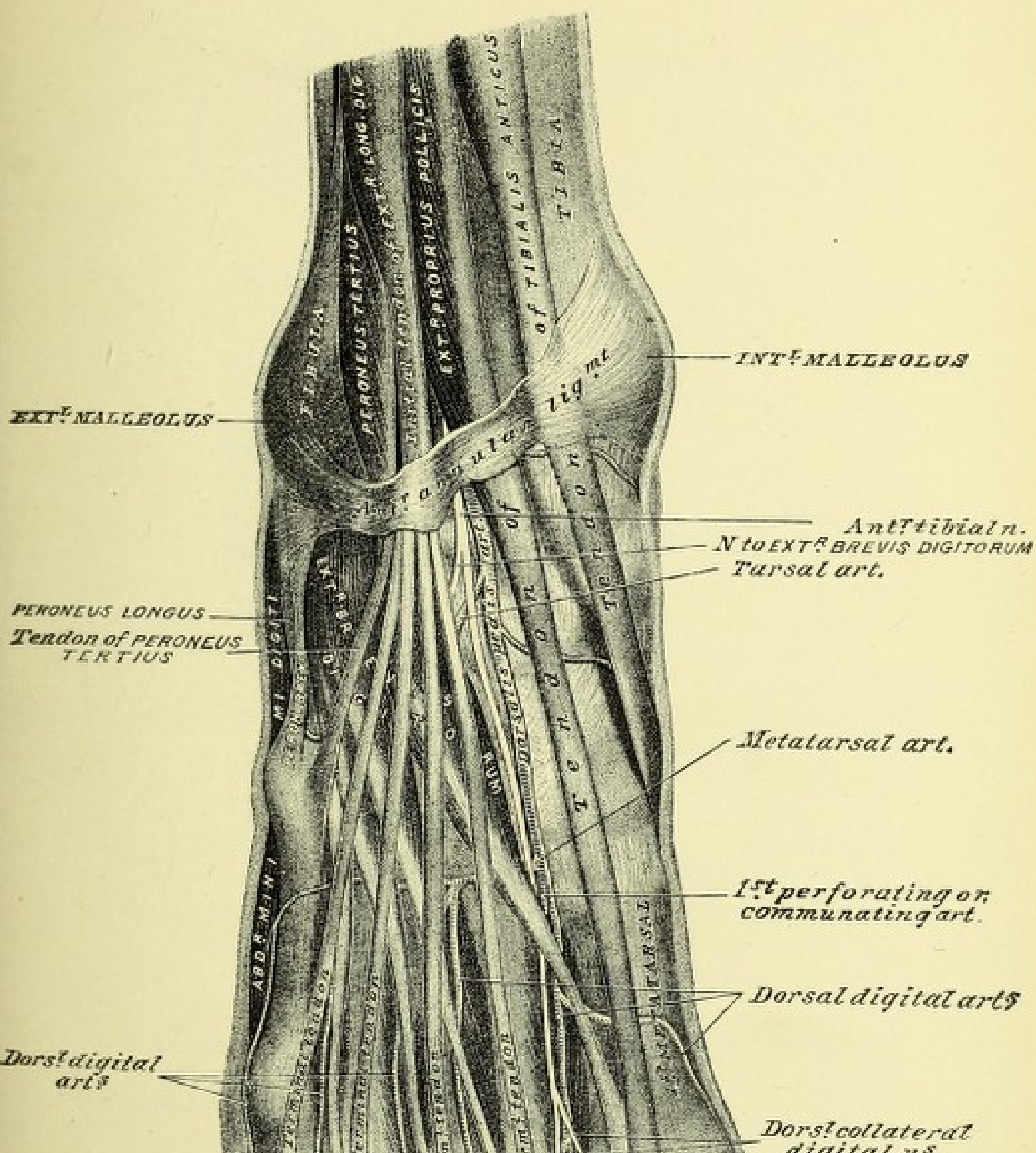
M. Cohn. ad naturam del.

PLATE 70



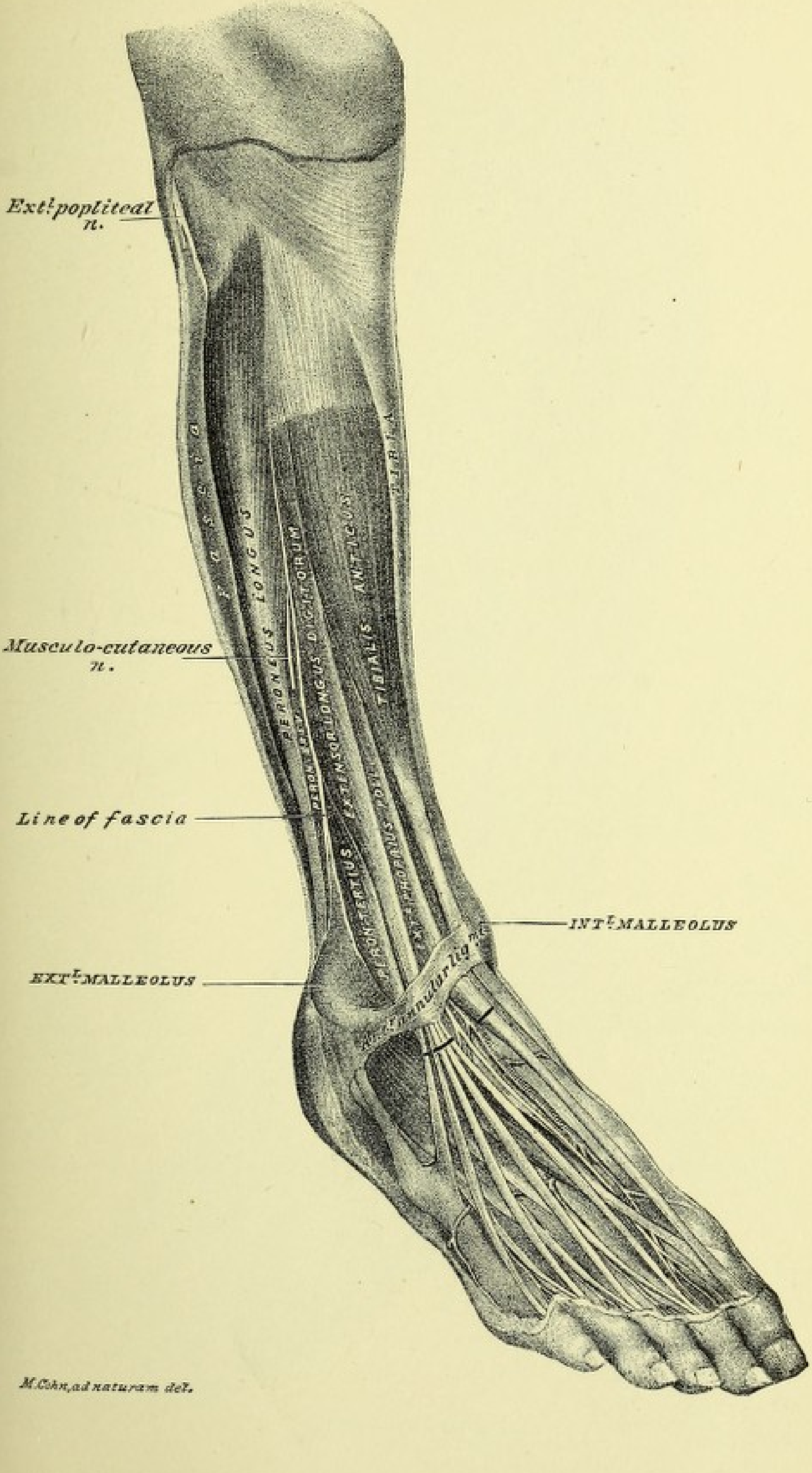
M. Cohn, ad naturam del.

PLATE 71



M. Cohn, ad naturam del.

PLATE 72



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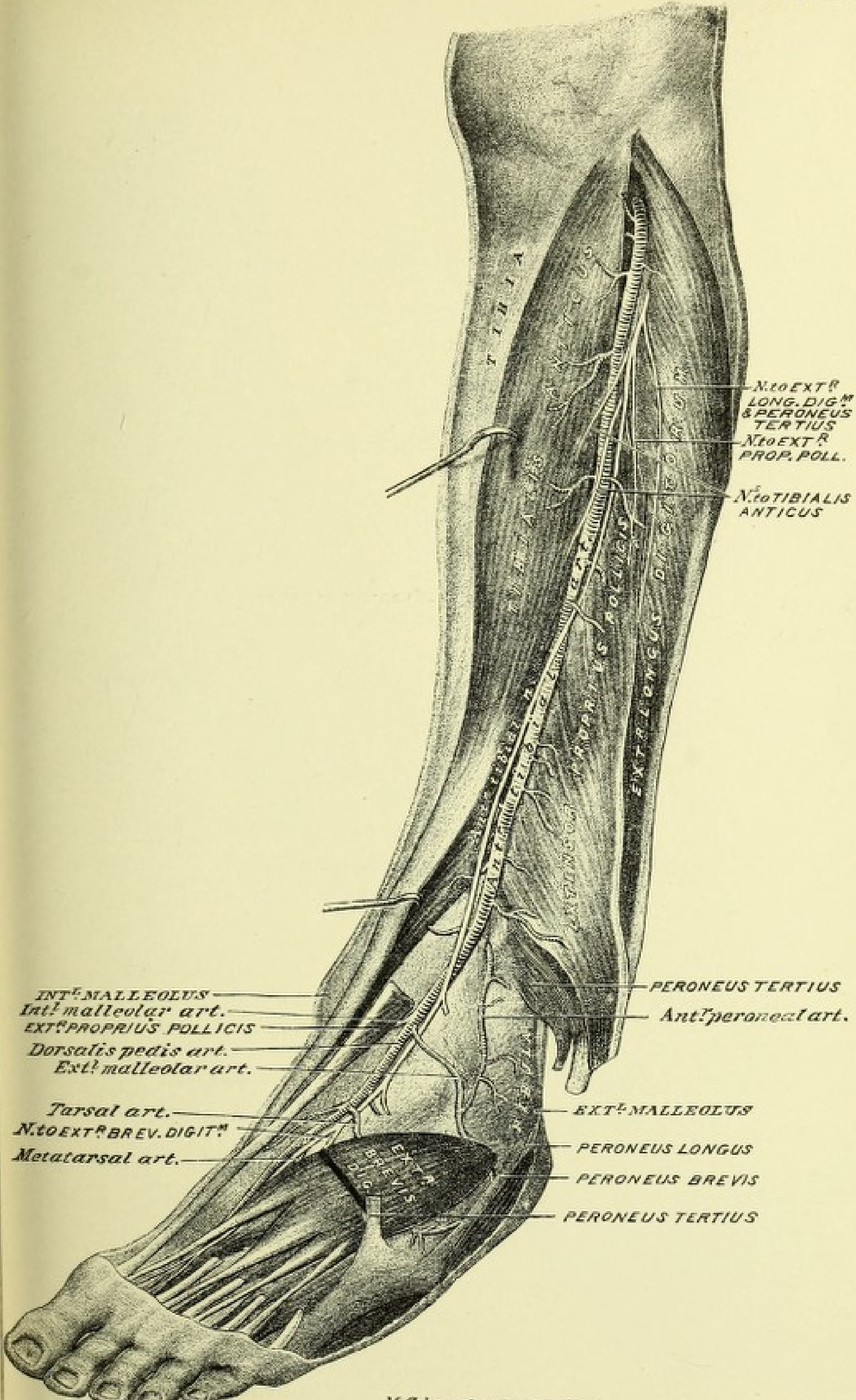
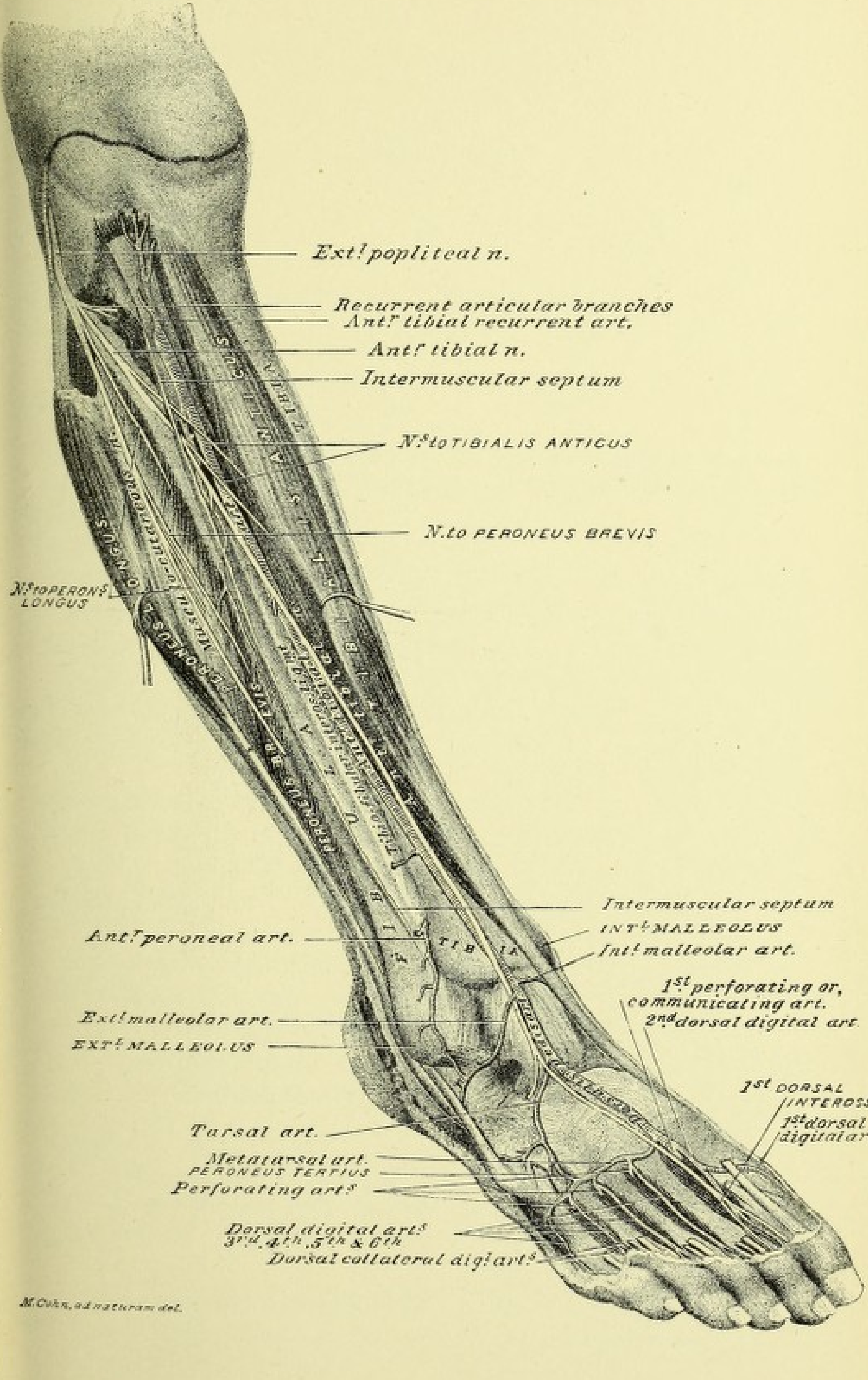


M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

ELEVENTH DISSECTION.

PLANTAR REGION OF THE FOOT.

Dissection.—Raise the foot and lodge the heel on a block, so as to bring the sole on a convenient level for the dissector standing in front of it. Steady the foot by chain-hooks or strings.

Terms of Relation.—The special terms *proximal* (toward the heel), *distal* (from the heel), *outer side*, *inner side*, *plantar surface*, and *dorsal surface* will apply to the entire area of the dissection; *pollex border* and *minim border* to the tarsal and metatarsal regions; *plantar* and *lateral digital surfaces* to the digits.

Bone Areas, Plate 75.—The plantar surface of the following bones forms the osseous plane of the sole of the foot: the calcaneum; the astragalus; the cuboid; the scaphoid; the three cuneiform—internal, middle, and external; the five metatarsal; the fourteen bones of the digits —five phalanges, four phalangines, and five phalangettes (see page 123). With the exception of the astragalus and the middle cuneiform, they all afford attachments to muscles.

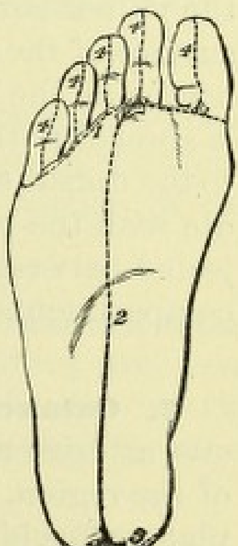


Figure 6.

Dissection.—Make the skin incisions 1, 2, and 3 of Figure 6, and reflect flaps as indicated. Where the dorsum of the foot has been previously dissected the flaps will have to be cut away; otherwise they can be tied over the dorsum of the foot by strings.

1. Subcutaneous Tissue.—This plane of tissue is thick and dense over the heel and outer half of the dissection area, with large areolæ for the lodgement of fat ; over the inner half it is thinner, especially at the hollow of the sole of the foot.

DISSECTION.—Remove the subcutaneous tissue from the plantar fascia, being careful to preserve the vessels and nerves superficial to it. Determine the portions of the plantar fascia and the distal slips of its middle portion. Make the skin incisions 4, 4, 4, 4, 4, of Figure 6, and reflect flaps from the respective plantar and lateral digital surfaces of the digits ; expose the plantar collateral digital nerves and vessels, and the sheaths of the flexor tendons.

2. Plantar Fascia, Plate 76.—This fascia is a thick plane of fibrous tissue, which stretches from the heel to the toes. It consists of three portions : the middle, the inner, and the outer. The *middle portion*, the thickest of the three, has a proximal attachment to the calcaneum ; in the metatarsal region it spreads laterally and divides into five slips, which pass to the sheaths of the flexor tendons—on the digits—and to the sides of the heads of the metatarsal bones ; at the distal ends of the slips, transverse fibres bridge across the foot from one to the other—*the superficial transverse ligament*. The *inner portion* has a proximal attachment to the calcaneum and along the inner border of the middle portion of the fascia ; it spreads to the pollex border of the foot, where it is continued to the dorsal surface of the same. The *outer portion* is attached to the calcaneum and the outer border of the middle portion of the fascia ; it spreads to the minim border of the foot, where it is continued to the dorsal surface of the same. At the junctions of the middle with the respective inner and outer portions septa are projected between the muscles, which determine three longitudinal compartments, for muscles, etc.

3. Cutaneous Arteries and Nerves.—Small plantar cutaneous arteries and nerves perforate to the subcutaneous plane of the region, along the borders of the middle portion of the plantar fascia.

4. First Digital Nerve, Plates 76 and 77.—This nerve, branch of the internal plantar, perforates the fascia near the pollex border of the foot, opposite the first metatarsal bone ; it continues as the inner plantar collateral digital nerve of the pollex digit.

5. Sixth Digital Artery.—This artery (venæ comites), branch of the fifth digital, crosses opposite the inner half of the head of the first metatarsal bone, to become the inner plantar collateral digital artery of the pollex digit.

6. Internal Plantar Artery.—The terminal portion of this artery (venæ comites) perforates the inner portion of the plantar fascia to the outer side of, and a little distal to, the point of perforation of the first digital nerve ; it accompanies the nerve, along its outer side, and anastomoses with the sixth digital artery.

7. First Digital Artery and Its Anastomotic Branch.—This artery (venæ comites), branch of the external plantar, perforates the outer portion of the plantar fascia, near the outer border of the middle portion of the plantar fascia. It gives off an anastomotic branch to the second digital artery. The first digital artery is continued to the fifth digit, as its outer plantar collateral digital artery.

8. Sixth Digital Nerve.—This nerve perforates the fascia near the point where the first digital artery emerges. It accompanies the artery, along its inner side, becoming the outer plantar collateral digital nerve of the fifth digit.

9. Second, Third, Fourth, and Fifth Digital Nerves.—These four nerves present, for a portion of their course, in the metatarsal region, between the slips of the middle portion of the plantar fascia.

10. Branches of the Anastomotic Artery from the Internal Plantar Artery.—These arteries (venæ comites) are seen, for a part of their course, at the inner sides of the slips of the middle portion of the plantar fascia, accompanying the portions of the digital nerves there lodged.

11. Plantar Collateral Digital Nerves.—These nerves emerge, from the dorsal surface of the superficial transverse ligament, into the subcutaneous tissue of the lateral digital surfaces.

12. Plantar Collateral Digital Arteries, Plates 76 and 77. —These arteries (venæ comites) appear in the subcutaneous tissue of the webbing between the digits; they have a distal course in the subcutaneous tissue of the lateral digital surfaces, upon the dorsal surface of the last-described nerves.

13. Digital Sheath of the Flexor Tendons, Plate 76.—A fibrous sheath invests the flexor tendons, upon the plantar surface of each digit; it is attached to the lateral borders of the phalanx and the phalangine, and to the plantar surface of the phalangette of the digit. Its longitudinal fibres are continued from the plantar fascia. Opposite the flexures of the joints its texture is so modified as to allow flexion and extension of the digit. The plantar collateral digital vessels and nerves lie superficial to it.

DISSECTION.—Make a transverse incision through the middle portion of the plantar fascia (Plate 76), and reflect its distal portion with the superficial transverse ligament; preserve the digital nerves and the branches of the anastomotic artery, from the internal plantar artery, between the slips of the fascia. Reflect its proximal portion, and note the existence of an intermuscular septum at its outer and another at its inner limit; also, that it is attached to the subjacent flexor brevis digitorum muscle, from which it should not be removed (Plate 77). Trace the digital branches of the internal plantar nerve; also their muscle branches. Follow the distribution of the anastomotic branch of the internal plantar artery. Slit up the sheaths of the flexor tendons and clear the plantar plane of the flexor brevis digitorum muscle.

14. Digital Branches of the Internal Plantar Nerve, Plate 77.—The internal plantar nerve emerges at the distal angle of divergence of the flexor brevis digitorum and the abductor pollicis muscles. The first digital nerve is given off from its inner side; it was before described in the distal part of its course (page 134). The second and third come off as one trunk, which bifurcates into the two nerves. The fourth is the terminal portion of the internal plantar nerve. The second, third, and fourth digital nerves have a distal course to where they bifurcate, respectively, into the plantar collateral digital nerves of the first and second, second and third, and third and fourth digits.

15. Nerves to the Flexor Brevis Pollicis Muscle.—The first digital nerve, near its proximal end, supplies a branch to the inner head of this muscle; the outer head receives a branch from the internal plantar nerve, before the giving off of the second and third digital nerves.

16. Nerves to the First and Second Lumbricales Muscles.—The first lumbricalis muscle is supplied by the third digital nerve; the second lumbricalis receives its nerve from the fourth digital nerve.

17. Anastomotic Branch of the Internal Plantar Artery.—This artery (venæ comites), branch of the internal plantar, emerges from the inner intermuscular septum, to the plantar surface of the flexor brevis digitorum muscle; it takes a distal course, breaking up into three branches, which accompany—lying in a deeper plane—the second, third, and fourth digital nerves, before referred to (page 135). The branches anastomose, respectively, with the fifth, fourth, and third digital arteries.

18. Flexor Brevis Digitorum Muscle, Plates 75, 77, and 78.—This muscle occupies the middle of the plantar area: its proximal attachment is to the calcaneum and the dorsal surface of the proximal third of the middle portion of the plantar fascia; in the metatarsal region it projects four tendons to the digits, second to fifth, inclusive; opposite the phalanx of a digit the tendon splits and reunites again, thereby forming a button-hole opening for the transit of a terminal tendon of the flexor longus digitorum muscle; after having provided this point of transit of a longus tendon, the brevis tendon splits again for attachment to the borders of the plantar surface of the phalangine of a digit.

Dissection.—Dissect off the inner portion of the plantar fascia. Preserve the first digital nerve and the sixth digital artery (pages 134 and 135). Follow the internal plantar artery in a proximal direction to where it emerges from a deeper plane. Clear the surface of the abductor pollicis muscle.

19. Internal Plantar Artery, Plate 77.—The terminal portion of this artery (venæ comites) emerges, from a deep plane, in the angle of divergence of the flexor brevis digitorum and the abductor pollicis muscles. It accompanies, along its outer side, the first digital nerve; at its distal end it anastomoses with the sixth digital artery. It runs along the plantar surface of the outer head of the flexor brevis pollicis muscle.

20. Abductor Pollicis Muscle, Plates 77 and 78.—This muscle occupies the inner border of the tarsal and metatarsal regions of the plantar area of the foot. Its proximal attachment is to the inner tuberosity of the calcaneum and to the plantar ligaments; in the metatarsal region it forms a tendon, which joins the inner head of the flexor brevis pollicis muscle; the two muscles have a common point of attachment to the inner side of the base of the phalanx of the pollex digit. In its course it covers the tendons of the tibialis posticus and anticus muscles.

DISSECTION.—Remove the outer portion of the plantar fascia; track, in a proximal direction beneath the fascia, the fifth and sixth digital nerves, and the first digital artery (Plate 77), to where they emerge from a deeper plane. Clear the plantar surface of the abductor minimi digiti muscle.

21. Fifth and Sixth Digital Nerves, Plate 77.—These nerves, branches of the superficial branch of the external plantar nerve, appear in the distal angle of divergence of the flexor brevis digitorum and the abductor minimi digiti muscles: the fifth digital nerve bifurcates into the plantar collateral digital nerves to the fourth and fifth digits; the sixth digital nerve has been before described (page 135).

22. First Digital Artery. — This artery (venæ comites), branch of the external plantar, accompanies the sixth digital nerve, lying to its outer side; its distal portion has already been described (page 135). Its anastomotic branch to the second digital artery passes to the dorsal surface of the minim flexor tendons.

23. Abductor Minimi Digiti Muscle, Plates 75, 77, and 78. —This muscle extends along the minim border of the foot; its proximal attachment is to the calcaneum, and to the plantar ligaments; its distal attachment is to the outer side of the proximal end of the shaft of the phalanx of the fifth digit.

DISSECTION.—Cut away the sheaths of the flexor tendons and expose the tendon of the flexor longus pollicis muscle, and the digital ends of the terminal tendons of the flexor longus digitorum muscle. Clear the surfaces of the exposed areas of the flexor brevis pollicis, the lumbricales, and the flexor brevis minimi digiti muscles. Determine the distal portions of the second, third, fourth, and fifth digital arteries.

24. Tendon of the Flexor Longus Pollicis Muscle, Plates 77 and 78.—The tendon of this muscle emerges from the dorsal surface of the inner border of the flexor brevis digitorum muscle, and runs through the pollex metatarsal (upon the plantar surface of the flexor brevis pollicis muscle) and digital areas.

25. Terminal Tendons of the Flexor Longus Digitorum Muscle.—The distal ends of these tendons appear on the plantar surfaces of the digits, second to fifth, inclusive, distal to the button-hole openings in the tendons of the flexor brevis digitorum muscle (page 137).

26. Flexor Brevis Pollicis Muscle.—The plantar surface of the first metatarsal bone lodges this muscle ; the tendon of the longus pollicis muscle runs, on its plantar surface, in a furrow between its heads (Plate 81). Its inner head and a portion of its outer head appear at this stage of the dissection.

27. Digital Arteries, Plates 77 and 79.—The distal portions of the second, third, fourth, and fifth digital arteries appear to the outer sides of, and parallel with, the flexor tendons. They pass into the webbing between the toes, and there bifurcate into the plantar collateral digital arteries (page 135.)

DISSECTION.—Section (Plate 77) the proximal ends of the exposed portions of the first digital, the internal plantar, and the fifth and sixth digital nerves. Cut the nerves to the flexor brevis pollicis and those to the first and second lumbricales muscles. Reflect the digital nerves, first to sixth, inclusive, off from the toes. Section the proximal ends of the anastomotic artery from the internal plantar, the terminal portion of the internal plantar artery, and the first digital artery. Reflect the first digital artery (cutting its anastomotic branch) and the internal plantar artery over the toes ; turn off the branches of the anastomotic artery from the internal plantar artery to the anastomoses of its branches with the digital arteries—third, fourth, and fifth—and cut them away. Section (Plate 78) the flexor brevis digitorum, the abductor pollicis and the abductor minimi digiti muscles ; reflect their distal portions and cut them away (Plate 79) ; turn off their proximal portions, noting their artery and nerve supply ; cut the nerves close to the muscles and then cut away the muscles near their calcaneal attachments (Plate 79). Follow to their proximal ends, at the inner side of the calcaneum, the internal plantar nerve and artery. Trace the external plantar artery in its distal course from the inner surface of the ankle. Follow the external plantar nerve in its distal course from the inner surface of the ankle, and determine its muscle branches ; note that the distal ones cross upon the plantar surface of the external plantar artery.

28. Internal Plantar Artery, Plate 79.—This artery (venæ comites) arises, at its proximal end, from the bifurcation of the posterior tibial artery, at the inner side of the calcaneum.

The artery has a distal course, in the longitudinal axis of the pollex digit, through the inner intermuscular septum; it emerges for superficial distribution as already stated (page 137). Its proximal and deep portion supplies the flexor brevis digitorum and the abductor pollicis muscles, and gives off its anastomotic artery (page 137).

29. Internal Plantar Nerve.—This nerve accompanies the internal plantar artery, lying to its dorsal surface; its proximal portion supplies the flexor brevis digitorum and the abductor pollicis muscles. Its metatarsal and digital portions were before described (page 136).

30. Nerve to the Flexor Brevis Digitorum Muscle.—In reflecting the proximal portion of this muscle this nerve, branch from the outer side of the internal plantar nerve, appears entering its inner side.

31. Nerve to the Abductor Pollicis Muscle.—From the inner side of the internal plantar nerve a branch is given to this muscle, which enters its outer surface.

32. Nerve to the Abductor Minimi Digiti Muscle.—The external plantar nerve gives off, opposite the inner surface of the calcaneum, a branch to this muscle; it crosses the foot, on the plantar surface of the proximal end of the flexor accessorius muscle, to reach the deep surface of the proximal half of the muscle it supplies.

33. External Plantar Artery, Plates 79 and 81.—This artery (venæ comites) originates from the bifurcation of the posterior tibial artery, at the inner side of the calcaneum; it passes obliquely across the proximal third of the sole of the foot, upon the plantar surface of the flexor accessorius muscle, and enters the outer intermuscular septum; through which it runs, in the longitudinal line of the fourth digit. The plantar surface of the distal third of the artery is crossed by branches of the external plantar nerve. Opposite the base of the fourth metatarsal bone the artery curves to the inner side and passes to the dorsal surface of the outer border of the terminal tendon, to the fifth digit, of the flexor longus digitorum muscle. In the exposed portion of its course it gives off muscle branches and the first digital artery; the latter has been described (page 135) and illustrated (Plates 76 and 77).

34. External Plantar Nerve.—This nerve appears in the sole of the foot parallel with, and to the inner side of, the external plantar artery; it crosses, as does the artery, to the minim half of the region. It bifurcates into a superficial and a deep branch: the *superficial branch* bifurcates, in turn, into the fifth and sixth digital nerves, before described (page 138); the *deep branch* follows the course of the external plantar artery, lying to its inner side, and passes with it into the metatarsal region. The trunk of the nerve and the exposed portion of its deep branch give off nerves to muscles of the tarsal and metatarsal regions.

35. Nerve to the Flexor Accessorius Muscle, Plates 79 and 81.—The external plantar nerve gives off a distal branch to this muscle as it crosses its plantar surface.

36. Muscle Branches from the Deep Branch of the External Plantar Nerve, Plate 79.—The deep branch of the external plantar nerve gives off the following distal branches from its outer side: the first, to the flexor brevis minimi digiti and the third plantar interosseous muscles; the second, to the fourth dorsal interosseous muscle; the third and fourth disappear in their distal course, beneath the minim terminal tendon of the flexor longus digitorum muscle. These nerves pass upon the plantar surface of the external plantar artery.

DISSECTION.—Clear the tendons at the pollex border of the tarsal region; the initial and terminal tendons of the flexor longus digitorum muscle; and the tendon of the flexor longus pollicis muscle. Expose the accessorius, the lumbricales, and the flexor brevis minimi digiti muscles; also portions of the transversus pedis, the adductor pollicis, the third plantar interosseous, the fourth dorsal interosseous, and the second plantar interosseous muscles. Determine the tendons at the minim border of the tarsal region.

37. Tendon of the Tibialis Posticus Muscle, Plates 75, 79, 80, and 81.—This tendon enters the pollex border of the tarsal region, distal to the internal malleolus, and continues to its attachment to the tubercle of the scaphoid bone.

38. Tendon of the Tibialis Anticus Muscle.—The proximal portion of this muscle occupies the anterior surface of the leg, and was before described (page 127) and illustrated (Plates 67, and 71 to 74, inclusive); its distal tendon enters the pollex border of the plantar surface, from the dorsum of foot, to reach its distal attachment, at the plantar surfaces of the internal cuneiform bone and of the base of the first metatarsal bone.

39. Initial and Terminal Tendons of the Flexor Longus Digitorum Muscle.—The *initial tendon* of this muscle enters the plantar region, from the posterior surface of the leg, at a point distal to the internal malleolus of the ankle; it takes an oblique course therefrom to about the middle of the proximal limit of the metatarsal region, where it gives off *four terminal tendons* to the digits, second to fifth, inclusive; in the digital regions the terminal tendons pass through the button-hole openings in the tendons of the flexor brevis digitorum muscle (page 137; Plates 77 to 80, inclusive) to their distal attachments, to the plantar surfaces of the bases of the phalangettes of the digits, second to fifth, inclusive.

40. Tendon of the Flexor Longus Pollicis Muscle, Plates 75, and 77 to 81, inclusive.—This tendon enters the sole of the foot by a groove at the posterior border of the astragalus; it runs in a groove upon the sustentaculum tali of the calcaneum, to the outer side of the initial tendon of the flexor longus digitorum muscle. It takes a distal and straight course to the pollex digit, passing to the dorsal surface of the initial tendon of the flexor longus digitorum muscle; in the metatarsal region it lies between the heads of the flexor brevis pollicis muscle; it has its distal attachment to the plantar surface of the base of the phalangette of the pollex digit.

41. Flexor Accessorius Muscle, Plates 75, 79, and 80.—This muscle has two points of proximal attachment—an inner and an outer—upon the plantar surface of the calcaneum; they are united by fibrous tissue. The two portions unite into a flat muscle, which has its distal attachment to the outer border of the initial tendon of the flexor longus digitorum muscle, proximal to its division into its four terminal tendons.

42. Lumbricales Muscles, Plates 77 to 80, inclusive.—These muscles are lodged to the inner sides of the terminal tendons of the flexor longus digitorum muscle. Their proximal ends are attached to the contiguous terminal tendons; their distal ends form tendons, which pass over the inner sides of the metatarso-phalangeal articulations, second to fifth, inclusive.

43. Flexor Brevis Minimi Digiti Muscle, Plates 75 and 77 to 81, inclusive.—This muscle occupies the plantar surface of the fifth metatarsal bone. Its proximal attachment is to the plantar surface of the base of the fifth metatarsal bone and the contiguous portion of the sheath of the peroneus longus muscle; it has a distal and slightly oblique course to its attachment, at the outer side of the base of the phalanx of the fifth digit.

44. Transversus Pedis Muscle, Plates 79 and 80.—Portions of the plantar surface of this muscle appear between the distal ends of the lumbricales muscles and the terminal tendons of the flexor longus digitorum muscle.

45. Adductor Pollicis Muscle, Plates 77 to 80, inclusive.—Between the first lumbricalis and the outer head of the flexor brevis pollicis muscles a small area of this muscle presents.

46. Interosseous Muscles, Plates 79 and 80.—Between the inner border of the flexor brevis minimi digiti muscle and the outer border of the minim terminal tendon of the flexor longus digitorum muscle portions of the third plantar, the fourth dorsal, and the second plantar interosseous muscles appear.

47. Tendons of the Peroneus Longus and Peroneus Brevis Muscles, Plates 79 and 80.—Along the minim border of the tarsal region these two tendons present: the longus tendon running in its sheath along the outer border of the flexor accessorius muscle; the brevis tendon along the outer border of the longus tendon.

Dissection.—Cut the proximal ends of the internal plantar artery and nerve (Plate 79), and dissect away their distal portions. Section the initial tendon of the flexor longus digitorum muscle, the tendon of the flexor longus pollicis muscle, and the flexor accessorius muscle (Plate 80); reflect the distal portions of the tendons over the toes, carrying the lumbricales muscles with the terminal digitorum tendons. Determine the slip of communication between the tendon of the flexor longus pollicis muscle and the distal portion of the initial tendon of the flexor longus digitorum muscle; after which the slip may be cut. In raising the fourth and third lumbricales muscles note the nerves that enter their dorsal surfaces; trace the nerves to the second plantar interosseous and the transversus pedis nerves; the two latter nerves are in turn given off from the deep branch of the external plantar nerve. Find the nerves to the first plantar and the third dorsal interosseous muscles. Follow the deep branch of the external plantar nerve, and the external plantar artery, into the metatarsal region.

48. Tendinous Slip between the Tendon of the Flexor Longus Pollicis and the Initial Tendon of the Flexor Longus Digitorum Muscles.—At the crossing of these tendons (Plates 79 and 80) a tendinous slip passes from the pollicis to the digitorum tendon.

49. Nerve to the Fourth Lumbricalis Muscle, Plate 81, and Fig. 1, Plate 82.—In reflecting this muscle its nerve will be seen to enter its dorsal surface; the same may be traced to where it is given off from the nerve to the second plantar interosseous muscle.

50. Nerve to the Second Plantar Interosseous Muscle, Plates 79, 81, and Fig. 1, Plate 82.—This is the third nerve given off from the deep branch of the external plantar nerve.

51. Nerve to the Third Lumbricalis Muscle, Plate 81, and Fig. 1, Plate 82.—As the muscle is reflected this nerve is seen to enter its dorsal surface; it can be followed to its origin from the nerve to the transversus pedis muscle.

52. Nerve to the Transversus Pedis Muscle, and its Branches to the First Plantar and the Third Dorsal Interosseous Muscles.—The nerve to the transversus pedis muscle—from the deep branch of the external plantar—enters its proximal side. It gives a branch to either side: the inner to the first plantar interosseous muscle; the outer to the third dorsal interosseous muscle.

53. Deep Branch of the External Plantar Nerve, Plate 81.—After having given off the nerve to the transversus pedis muscle, this branch is continued, at the outer border of the adductor pollicis muscle, to the dorsal surface of the latter muscle.

54. External Plantar Artery.—This artery curves toward the inner side of the metatarsal region of the foot, accompanying the last-described nerve branch.

Dissection.—Expose the tarsal grooves for the tendon of the flexor longus pollicis muscle and the initial tendon of the flexor longus digitorum muscle. Note the expansions of the tendon of the tibialis posticus muscle from the tubercle of the scaphoid bone.

55. Tarsal Grooves for the Long Flexor Tendons, Plates 75 and 81.—Between the tendon of the tibialis posticus and the inner border of the flexor accessorius muscle two longitudinal grooves present: the outer one upon the plantar surface of the sustentaculum tali of the calcaneum (Plate 75) for the tendon of the flexor longus pollicis muscle; the inner one for the initial tendon of the flexor longus digitorum muscle.

56. Expansions of the Tendon of the Tibialis Posticus Muscle, Fig. 1, Plate 82.—This tendon is not only attached to the tubercle of the scaphoid bone but it sends expansions across the area included by the tibialis anticus and the peroneus longus tendons, and the inner border of the flexor accessorius muscle.

Dissection.—Clean (Plate 81) the plantar surface of the transversus pedis muscle; determine the relations of the digital arteries to the slips of the muscle; and expose the adductor pollicis and the flexor brevis pollicis muscles.

57. Transversus Pedis Muscle, Plates 75, 79, 80, and 81.—This muscle crosses the plantar surfaces of the heads of the metatarsal bones, having a slip from the inner side of the head of each of those bones, from the fifth to the second, inclusive. These slips unite into a transverse muscle, which, at its inner end, has an attachment, in common with the adductor pollicis muscle and the outer head of the flexor brevis pollicis muscle, to the outer side of the plantar surface of the base of the phalanx of the pollex digit. Openings present between its slips and the plantar surfaces of the heads of the fourth, third, and second metatarsal bones.

58. Digital Arteries, Plates 77, 79, and 81.—The second, third, and fourth digital arteries lie upon the dorsal surface of the transversus pedis muscle; they emerge from the openings between the slips of that muscle and the heads of the metatarsal bones, into the webbing between the toes. The fifth digital artery emerges between the distal tendons of the flexor brevis pollicis muscle, gives off the sixth digital artery, and then continues to the webbing between the first and second toes, over the plantar surface of the outer portion of the compound flexor brevis pollicis tendon (page 147).

59. Adductor Pollicis Muscle, Plates 75, 81, and Fig. 1, Plate 82.—This muscle has its proximal attachment at the plantar surface of the bases of the third and fourth metatarsal bones and the contiguous portion of the sheath of the tendon of the peroneus longus muscle. It takes an oblique course to the outer surface of the base of the phalanx of the pollex digit, its fibres running parallel with those of the outer head of the flexor brevis pollicis muscle; it contributes to the compound flexor brevis pollicis tendon (page 147).

60. Flexor Brevis Pollicis Muscle, Plates 77 to 81, inclusive.—This muscle has an inner and an outer portion, or head, determined by the plantar surface of the muscle being furrowed (Plate 81), for the transit of the tendon of the flexor longus pollicis muscle (Plates 77 to 80, inclusive). The *inner portion* of the muscle has its proximal attachment to the expansion of the tendon of the tibialis posticus muscle (page 145); as it advances to its distal end it fuses with the tendon of the abductor pollicis muscle (page 137). The *outer portion* has its proximal attachment to the cuboid bone and the sheath of the tendon of the peroneus longus muscle. The two portions form a muscle upon the plantar surface of the first metatarsal bone; opposite the head of the bone, it divides into two distal tendons, which are united by fibrous tissue. The distal attachment of this muscle is by a compound tendon, which is described at page 147.

Dissection.—Section the nerve to the flexor brevis minimi digiti muscle (Plate 81); detach the proximal attachments of the muscle and reflect it to its distal end, where it may be cut (Fig. 1, Plate 82). Cut the slips of the transversus pedis muscle from their metatarsal attachments; note its nerve and cut it close to the muscle; turn off the muscle over the pollex digit. Cut the digital arteries (Plate 81) and clear the plantar collateral digital arteries from the lateral digital surfaces. Detach the proximal end of the adductor pollicis muscle; turn over its outer border so as to determine the entrance of its nerve at its dorsal surface; follow the nerve to its origin from the external plantar nerve, then cut it close to the muscle; continue the reflection of the muscle upon the pollex digit.

61. Nerve to the Adductor Pollicis Muscle, Fig. 1, Plate 82.—This nerve is given off from that portion of the deep branch of the external plantar nerve which is situated on the dorsal surface of the adductor pollicis muscle.

DISSECTION.—Cut the proximal attachments of the flexor brevis pollicis muscle and reflect it, in a distal direction, from the plantar surface of the first metatarsal bone and the fifth digital artery. Section the muscle into its two heads, through the furrow for the flexor longus pollicis muscle. Raise the fifth and sixth digital arteries and turn them upon the tarsus. Determine *the compound flexor brevis pollicis tendon* as formed by the heads of the flexor brevis pollicis muscle, the abductor pollicis, the adductor pollicis, and the transversus pedis muscles. Note the sesamoid bones included in the compound tendon; and, the ligament that attaches the proximal border of these bones to the plantar surface of the head of the first metatarsal bone.

62. Compound Flexor Brevis Pollicis Tendon, Plates 75, 81; Fig. 1, Plate 82.—The heads of the flexor brevis pollicis muscle have two distal tendons, which are united by fibrous tissue: the inner is joined by the tendon of the abductor pollicis muscle; the outer receives the adductor pollicis and the transversus pedis muscles. Each compound tendon contains a sesamoid bone; the two bones being lodged, respectively, upon the inner and outer tuberosities of the plantar surface of the head of the first metatarsal bone. To the distal side of the sesamoid bones the compound tendon is attached to the plantar and lateral digital surfaces of the base of the phalanx of the pollex digit. To the borders of the sesamoid bones is attached the plantar metatarso-phalangeal ligament (page 180).

DISSECTION.—Section the muscles near the sesamoid bones; cut the ligament from the latter to the first metatarsal bone, and turn the bones on end upon the base of the phalanx of the pollex digit (Fig. 1, Plate 82). Trace the terminal portion of the deep branch of the external plantar nerve.

63. Nerves to the Second and First Dorsal Interosseous Muscles, Fig. 1, Plate 82.—The terminal portion of the deep branch of the external plantar nerve lies upon the plantar surface of the interosseous muscles, where it bifurcates to supply the second and first dorsal interosseous muscles.

DISSECTION.—Trace the plantar arch through the metatarsal region and note its branches. Replace the fifth and sixth digital arteries.

64. Plantar Arch of the External Plantar Artery, Plate 82.—The plantar arch is formed by the deep branch of the external plantar artery; the artery curves as it enters the metatarsal region, opposite the base of the fourth metatarsal bone, and continues to the proximal end of the first intermetatarsal space, where it anastomoses with the communicating artery from the bifurcation of the dorsalis pedis artery (page 128 ; Plate 74).

65. Digital Arteries, Fig. 1, Plate 82.—The first digital artery has been described (pages 135 and 138) ; the second, third, fourth, and fifth digital arteries are given off from the convexity of the plantar arch, having a distal course therefrom : the second, between the fourth dorsal and the second plantar interosseous muscles; the third, between the third dorsal and the first plantar interosseous muscles ; the fourth, between the second and the first dorsal interosseous muscles ; the fifth, upon the outer side of the first metatarsal bone. The fifth digital artery gives off the sixth (page 145) ; the latter crosses, the plantar surface of the distal end of the inner head of the flexor brevis pollicis muscle, to the inner side of the pollex digit.

66. Perforating Branches of the Digital Arteries, Plate 74 and Fig. 1, Plate 82.—From the second, third, and fourth digital arteries perforating branches are given off, respectively, which pass to the dorsum of the foot, between the proximal ends of the attachments of the dorsal interosseous muscles (Plate 68). (These branches are at times given off from the plantar arch.)

DISSECTION.—Clear and determine the plantar surface of the plantar and dorsal interosseous muscles.

67. Plantar Interosseous Muscles, Plate 75 and Fig. 1, Plate 82.—These muscles, three in number, present at the plantar surface of the foot and are lodged to the outer sides of the second, third, and fourth intermetatarsal spaces. Their proximal attachments are to the inner sides of the third, fourth, and fifth metatarsal bones (Plate 75), respectively ; their distal ends form tendons, which wind, severally, over the inner sides of the third, fourth, and fifth metatarso-phalangeal joints.

68. Dorsal Interosseous Muscles, Plates 68, 74, and Fig. 1, Plate 82.—These four muscles occupy the four intermetatarsal spaces, appearing at both the dorsal and plantar surfaces of the foot. The first and second are to either side of the second metatarsal bone ; the third and fourth are to the outer sides of the third and fourth metatarsal bones, respectively. Their proximal attachments are to the opposite dorsal-plane surfaces of the five metatarsal bones (Plate 68). Their distal ends form tendons, which cross the inner sides of the metatarso-phalangeal joints: the first over the inner side of that of the second digit; the second, third, and fourth over the outer sides of those of the second, third, and fourth digits.

DISSECTION.—Cut away the sesamoid bones and clean their surfaces. Replace the flexor longus pollicis and flexor longus digitorum tendons; suture their cut ends together. Extend the foot so as to see the dorsal and lateral digital surfaces of the toes. Recognize the distal attachments of the lumbricales muscles. Determine the double distal attachments of the dorsal and plantar interosseous muscles; also the construction of the compound digital extensor aponeuroses. The distal ends of the tendons of the extensor longus and brevis digitorum muscles were left, *in situ*, on the dorsal surface of the digits, second to fifth, inclusive (pages 129 and 130); they may now be dissected.

69. Sesamoid Bones, Fig. 1, Plate 82.—These are two oblong bones included in the compound flexor brevis pollicis tendon (page 147), with their dorsal surfaces articulating with the plantar surface of the head of the first metatarsal bone.

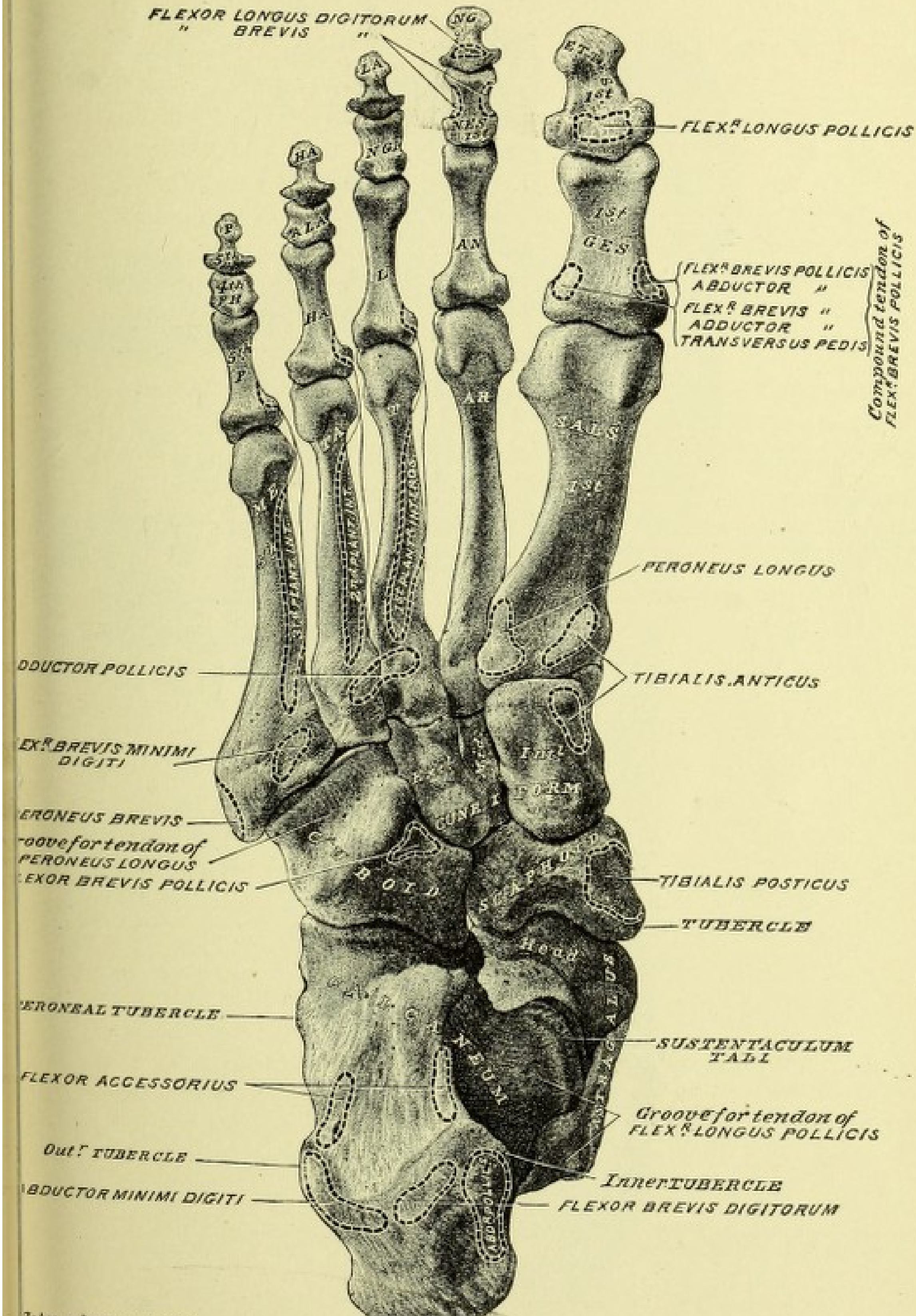
70. Lumbricales Muscles, Fig. 3, Plate 82.—The lumbricales muscles have their distal attachments to the inner sides of the bases of the phalanges of the digits, second to fifth, inclusive.

71. Distal Attachments of the Dorsal Interosseous Muscles, Fig. 2, Plate 82.—The distal tendon of each dorsal interosseous muscle may be determined to have two attachments: one to the lateral digital surface of the base of the phalanx of the digit to which it belongs (the first muscle to the inner side of the phalanx of the second digit; the second, third, and fourth muscles to the outer sides of the phalanges of the respective second, third, and fourth digits); another by a fibrous expansion, which contributes to the compound digital extensor aponeurosis of the digit.

72. Distal Attachments of the Plantar Interosseous Muscles, Figs. 2 and 3, Plate 82.—The distal attachment of each of these muscles is also double: one to the inner surface of the base of the phalanx of the digit—third, fourth, and fifth; the other, by a fibrous expansion, to the inner borders of the terminal tendons of the extensor longus digitorum muscle of the third, fourth, and fifth digits.

73. Compound Digital Extensor Aponeuroses, Fig. 1, Plate 67; Plate 68; Figs. 2 and 3, Plate 82.—Upon the dorsum of each digit, second to fifth inclusive, a compound digital extensor aponeurosis is formed, by the fusion of a terminal tendon of the extensor longus digitorum muscle, a tendon of the extensor brevis digitorum muscle, and fibrous expansions from dorsal and plantar interosseous muscles. The terminal tendon of the extensor longus digitorum of the second digit receives at its inner border the expansion from the first dorsal interosseous; at its outer border the second tendon of the extensor brevis digitorum and the expansion from the tendon of the second dorsal interosseous. The expansion from the first plantar interosseous blends with the inner border of the longus terminal tendon of the third digit; the third tendon of the extensor brevis digitorum and the expansion from the third dorsal interosseous joins its outer border. For the fourth digit, the inner border of the third extensor longus terminal tendon receives the expansion from the second plantar interosseous; to the outer border of the same comes the fourth tendon of the extensor brevis muscle and the expansion from the fourth dorsal interosseous muscle. For the fifth digit, the expansion from the third plantar interosseous muscle fuses with the inner border of the fourth longus terminal tendon. The compound extensor digital aponeurosis of a digit has three attachments: a middle one to the dorsal surface of the base of the phalangine; two lateral, which unite for attachment, to the dorsal surface of the base of the phalangette. These aponeuroses lie upon the dorsal ligaments of the digital joints.

Dissection.—After the dissection of the dorsal and plantar regions of the foot be careful to keep the foot wrapped in wet cloths, so that the ligaments of the foot and ankle do not become too dry for subsequent dissection.



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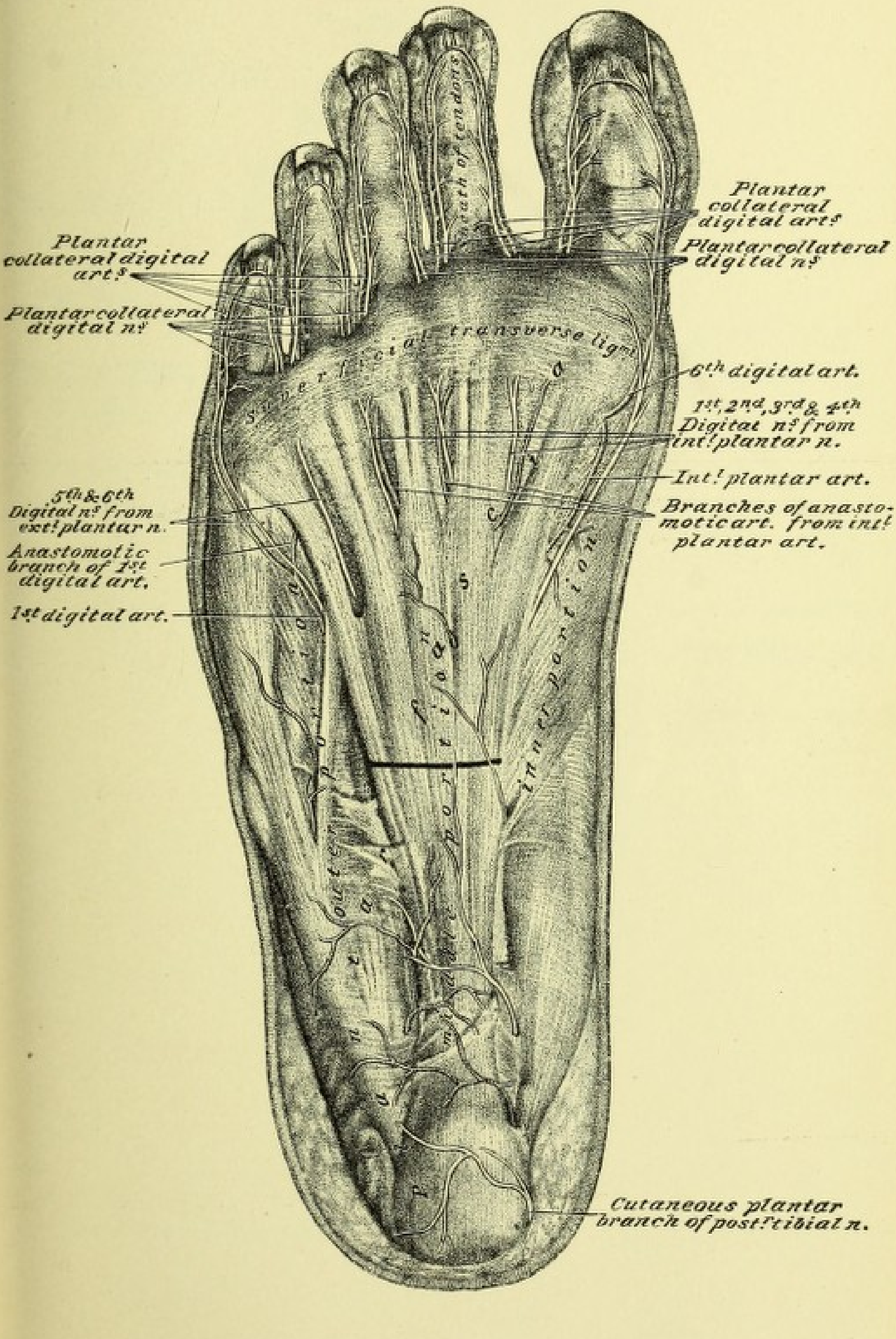
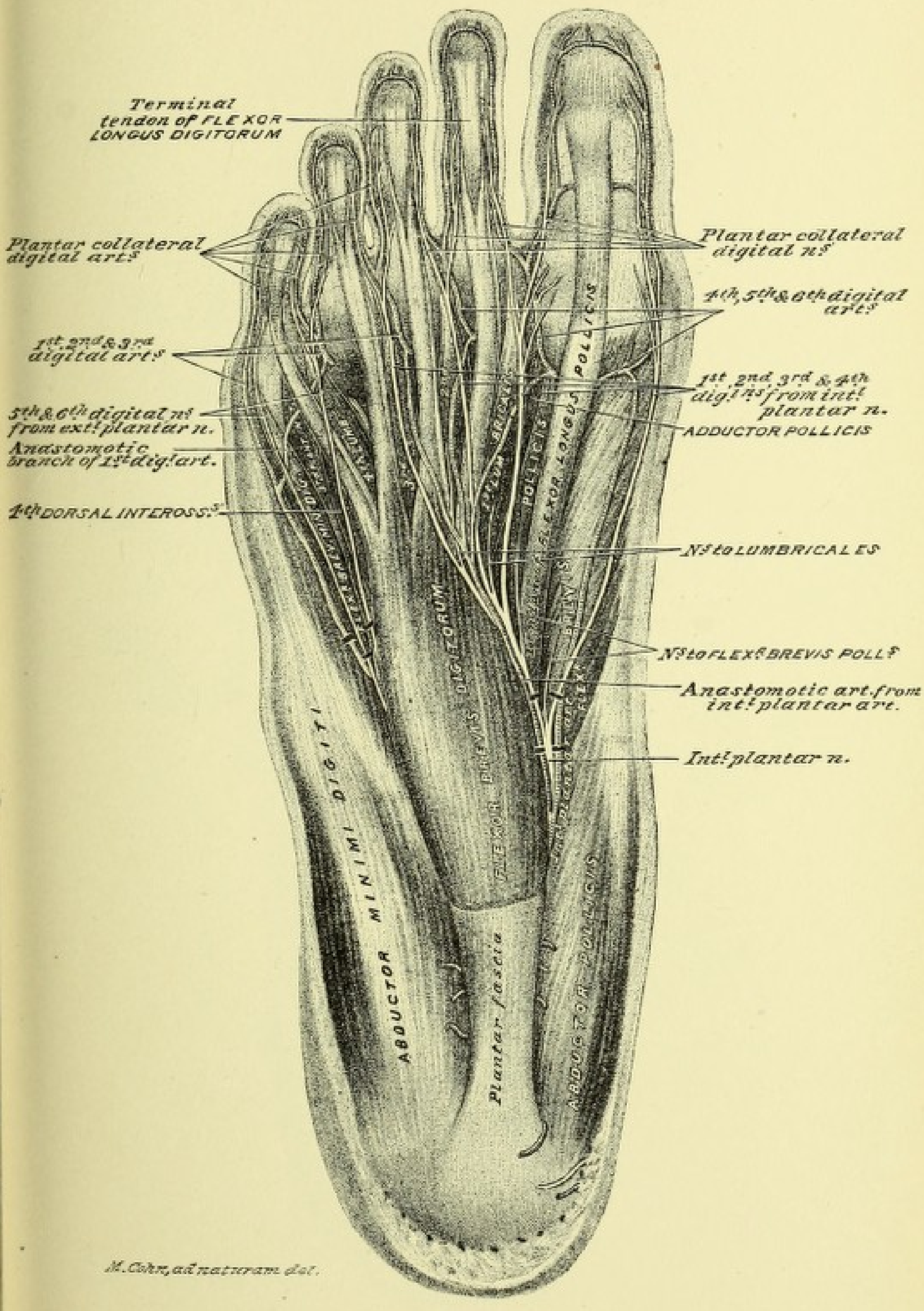

Plantar collateral digital art.s
Plantar collateral digital n.s
Plantar collateral digital art.s
Plantar collateral digital n.s
Superficial transverse ligt.
sheath of tendons
6th digital art.
1st, 2nd, 3rd & 4th Digital n.s from int.l plantar n.
Int.l plantar art.
Branches of anastomotic art. from int.l plantar art.
5th & 6th Digital n.s from ext.l plantar n.
Anastomotic branch of 1st digital art.
1st digital art.
outer portion
inner portion
Cutaneous plantar branch of post.r tibial n.



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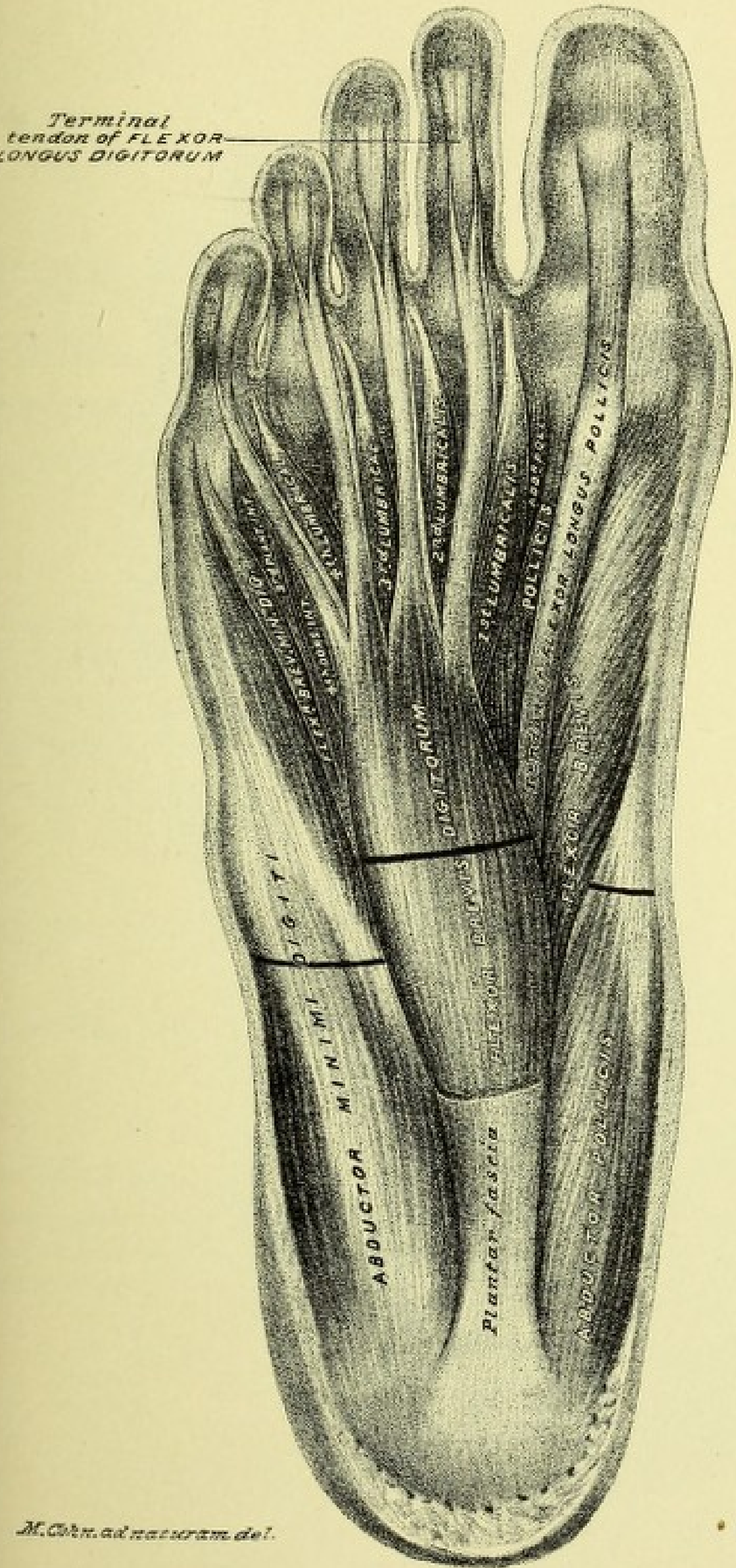

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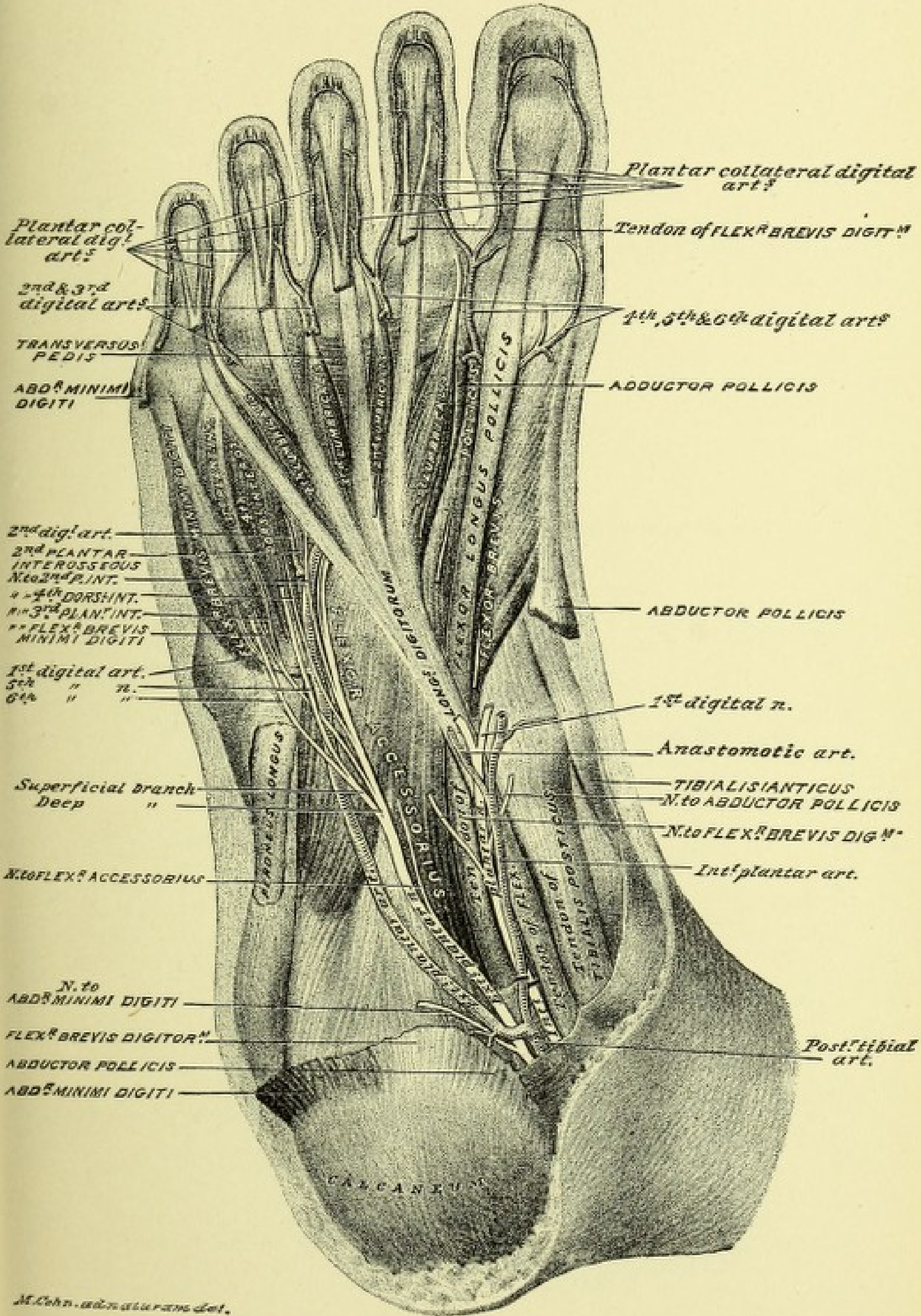
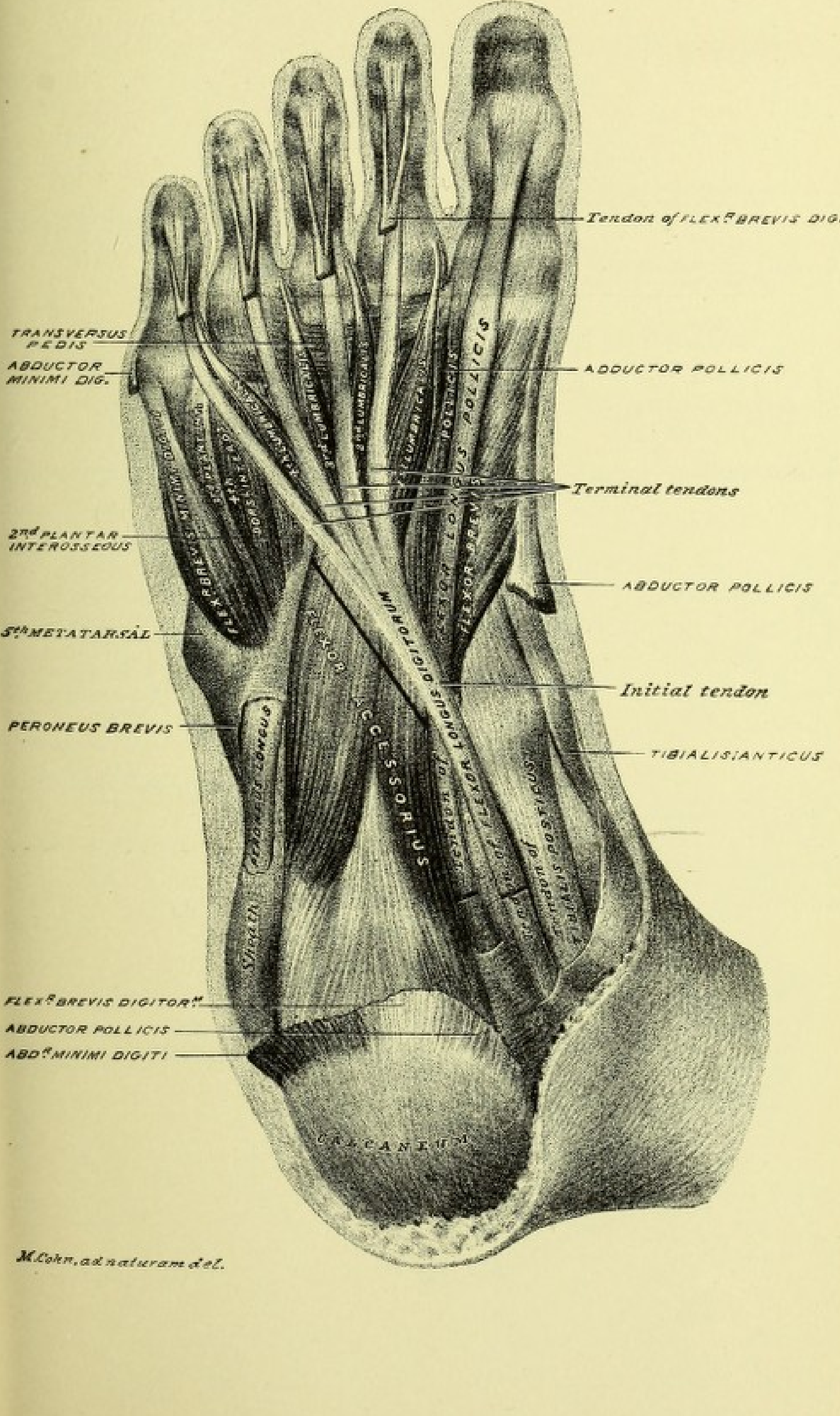

Plantar collateral digital art.s
Plantar collateral dig.l art.s
Tendon of FLEX.R BREVIS DIGIT.M
2nd & 3rd digital art.s
4th, 5th & 6th digital art.s
TRANSVERSUS PEDIS
ABD.R MINIMI DIGITI
ADDUCTOR POLLICIS
FLEXOR LONGUS POLLICIS
FLEXOR BREVIS
LONGUS DIGITORUM
FLEXOR ACCESSORIUS
PERONEUS LONGUS
2nd dig.l art.
2nd PLANTAR INTEROSSEOUS
N.to 2nd P.INT.
" " 4th DORS.INT.
" " 3rd PLAN.T INT.
" " FLEX.R BREVIS MINIMI DIGITI
ABDUCTOR POLLICIS
1st digital art.
5th " n.
6th " "
1st digital n.
Anastomotic art.
TIBIALIS ANTICUS
N.to ABDUCTOR POLLICIS
N.to FLEX.R BREVIS DIG.M
Superficial branch
Deep "
N.to FLEX.R ACCESSORIUS
Int.l plantar art.
Tendon of TIBIALIS POSTICUS
N.to ABD.R MINIMI DIGITI
FLEX.R BREVIS DIGITOR.M
ABDUCTOR POLLICIS
ABD.R MINIMI DIGITI
Post.r tibial art.
CALCANEUS
M.Cohn. ad naturam del.



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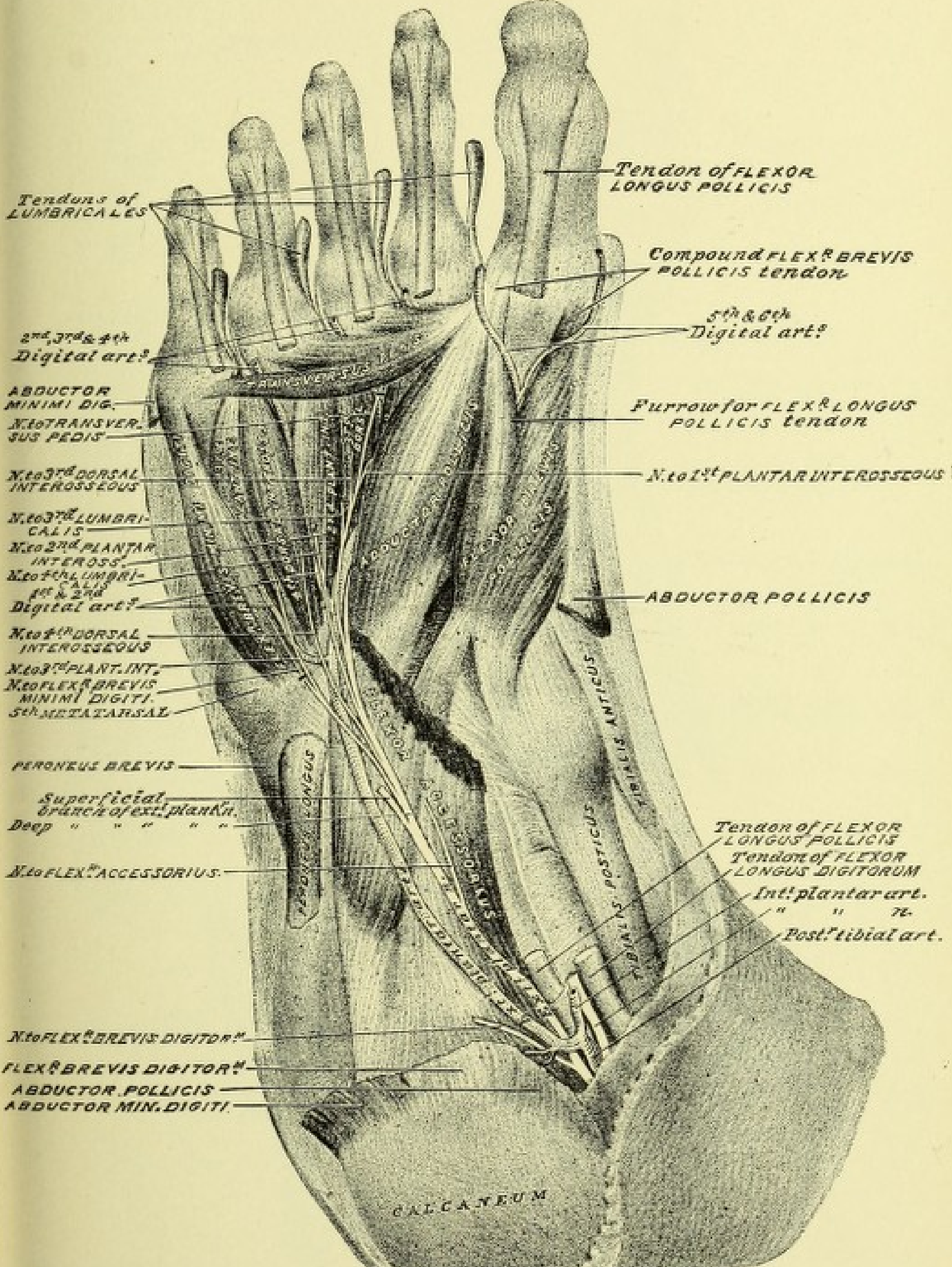

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FIG. 1

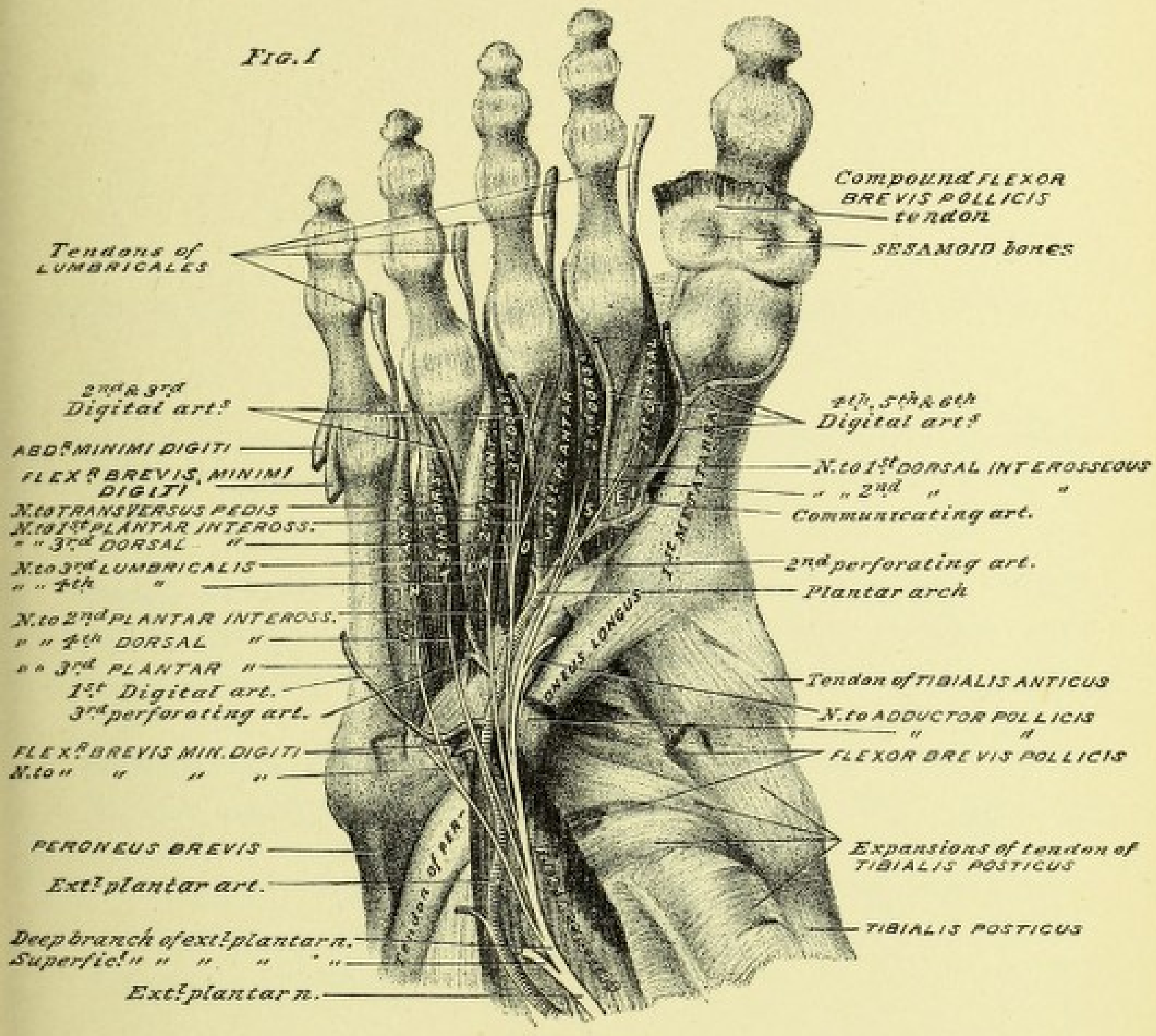


FIG. 2

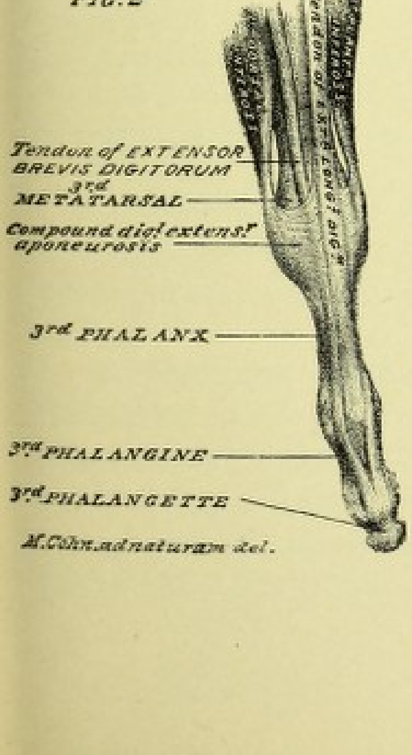
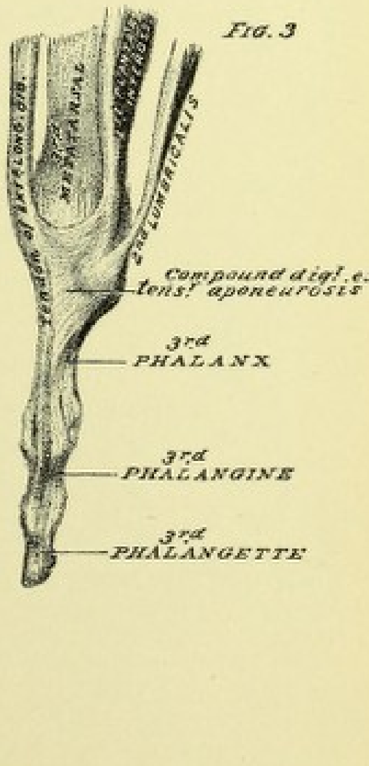


FIG. 3



M. Cohn ad naturam del.

TWELFTH DISSECTION.

POSTERIOR REGION OF THE LEG AND THE POPLITEAL SPACE.

DISSECTION.—Extend the limb with its posterior surface uppermost; place blocks under the pelvis, thigh, and ankle, respectively; secure the foot at a right angle to the leg.

Terms of Relation.—*Proximal* (toward the trunk), *distal* (from the trunk), *inner side*, *outer side*, *anterior surface*, and *posterior surface* will be used to indicate the relations of parts.

Bone Areas, Plate 83.—The posterior surface of the calcaneum, the astragalus, the tibia, the fibula, and the distal end of the femur form the osseous plane of this dissection; with the exception of the astragalus, all these bones afford attachments to muscles presenting in this dissection.

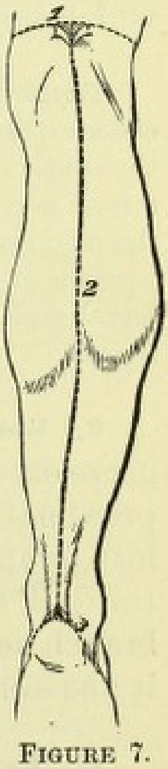


FIGURE 7.

DISSECTION.—Make the skin incisions 1, 2, and 3 of Figure 7, and reflect lateral flaps as indicated. When the dissection of the posterior surface of the leg is consecutive to that of the anterior, the skin flaps will have to be removed. Determine the saphenous veins and nerves.

1. Subcutaneous Tissue, Plate 84.—This plane of tissue presents the ramifications of superficial veins and nerves.

2. External Saphenous Vein.—At about the middle of the leg this vein perforates the fascia; it runs, through the distal half of the dissection area, to the external malleolus, where it passes, distal to the same, into the minim half of the dorsal surface of the foot (page 124; Plate 69).

3. Internal Saphenous Vein.—This vessel appears, for a short distance, along the inner side of the proximal third of the leg.

4. External Saphenous Nerve.—The inner and outer roots of this nerve perforate the fascia, distal to the point of emergence of the external saphenous vein, and unite to form the nerve proper ; it accompanies the latter vein.

5. Internal Saphenous Nerve.—This nerve sends branches to the inner half of the posterior area of the leg.

6. Small Sciatic Nerve.—Branches of this nerve perforate the fascia in the popliteal space and the proximal portion of the leg.

DISSECTION.—Section the external saphenous vein and the roots of the external saphenous nerve, where they perforate the fascia (Plate 84). Clear the surface of the fascia free of subcutaneous tissue, veins, and nerves.

7. Superficial Fascia.—This fascia invests the leg, and closes in the popliteal space, by bridging between the muscles which border the same.

DISSECTION.—Incise the superficial fascia, in the same lines as the skin incisions (page 151), and reflect flaps, corresponding to those of the skin, from the subjacent muscles, nerves, etc. Trace the popliteal branches of the small sciatic nerve, that perforate the fascia, to the trunk of the nerve, and follow the ramifications of the terminal branches of the latter; expose the proximal portions of the external saphenous vein, the inner and outer roots of the external saphenous nerve, and the cutaneous branch of the external popliteal nerve.

8. Small Sciatic Nerve, Plate 85.—The distal end of this nerve enters the proximal portion of the leg from the thigh. Its proximal end appears upon the biceps muscle and breaks up into branches, which distribute to the skin of the proximal third of the posterior region of the leg, as shown above ; one branch accompanies the external saphenous nerve, with which it anastomoses.

9. External Saphenous Vein, Plates 85 and 86.—This vein may be traced, proximally, between the heads of the gastrocnemius muscle, into the popliteal space.

10. Inner Root of the External Saphenous Nerve.—This nerve has a proximal course along the inner side of the last-described vein; it can be traced to the popliteal space, to where it is given off from the internal popliteal nerve.

11. Outer Root of the External Saphenous Nerve.—This root can be traced upon the outer head of the gastrocnemius muscle, to its proximal origin from the cutaneous branch of the external popliteal nerve.

12. Cutaneous Branch of the External Popliteal Nerve.—This nerve lies upon the outer head of the gastrocnemius muscle, emerging from the outer side of the popliteal space, where it is given off from the inner side of the external popliteal nerve. Its branches perforate the fascia to distribute to the outer side of the leg; some of its branches are projected into the outer antero-lateral area of the leg (page 125; Plate 69).

DISSECTION.—Clear the surface of the gastrocnemius muscle, preserving the ramifications of the four last-described nerves, and the proximal end of the external saphenous vein.

13. Gastrocnemius Muscle, Plates 83, 85, and 86.—This muscle occupies the proximal half of the posterior region of the leg. At its proximal end it presents two diverging portions—the outer and the inner heads—which pass to be attached to the posterior surface of the femur, at the proximal side of the condyles of that bone. Its posterior surface presents a longitudinal-median furrow, which lodges the external saphenous vein, the inner root of the external saphenous nerve, and the terminal branch of the small sciatic nerve. At its distal end the muscle forms a flat tendon, which fuses with the tendon of the soleus muscle to form the tendo Achillis.

DISSECTION.—Section the small sciatic nerve (Plate 85) and remove its distal portion. Clear the muscles forming the proximal boundaries of the popliteal space. Trace the external popliteal nerve, also the internal saphenous nerve and vein.

14. Biceps Muscle, Fig. 2, Plate 67; Plates 85 to 88, inclusive, and Plate 90.—The distal portion of this muscle forms the outer boundary of the proximal half of the popliteal space; it may be traced to its attachment to the proximal end of the fibula.

15. Vastus Externus Muscle, Plates 85 to 88, inclusive, and Plate 90.—A portion of the distal end of this muscle presents to the outer side of the exposed part of the biceps muscle

16. Semimembranosus Muscle, Plates 83, 85 to 88, inclusive, and Plate 90.—Proximal to the inner head of the gastrocnemius muscle the distal portion of this muscle appears, forming the inner boundary of the proximal half of the popliteal space.

17. Semitendinosus Muscle, Fig. 1, Plate 67; Plates 85 to 88, inclusive, and Plate 90.—The distal portion of this muscle lies upon the posterior surface of the last-described muscle, winding, anteriorly, between the inner head of the gastrocnemius and the semimembranosus muscles.

18. Gracilis Muscle.—The distal end of this muscle runs along the inner side of the semimembranosus muscle.

19. Sartorius Muscle.—The distal portion of this muscle presents, anterior to the last-described muscle.

20. Internal Saphenous Nerve, Plate 86.—This nerve, before described (page 125; Plate 70), lies along the inner side of the proximal portion of the dissection area, appearing at the posterior border of the distal end of the sartorius muscle.

21. Internal Saphenous Vein.—This vein, before described (page 125) and illustrated (Plate 70), joins the internal saphenous nerve at the inner side of the leg, lying anterior to it. It enters the leg opposite the anterior border of the distal end of the sartorius muscle.

Dissection.—Section (Plate 86) the proximal ends of the cutaneous branch of the external popliteal nerve, the external saphenous vein, the inner root of the external saphenous nerve, and the internal saphenous vein and nerve. Cut away the distal portions of these nerves and veins. Semiflex the knee-joint and draw the muscles bounding the popliteal space to either side; determine the nerves and vessels contained in the popliteal space. In cleaning the exposed portion of the plantaris muscle preserve its nerve.

22. Popliteal Space.—This space approaches the shape of the diamond-figure on a playing card. Its distal boundaries are: to the inner side, the inner head of the gastrocnemius muscle; to the outer side, the plantaris muscle and the outer head of the gastrocnemius muscle. Its proximal boundaries are: the semimembranosus muscle to the inner side; the biceps muscle to the outer side. The floor of the space is formed by the posterior surface of the distal end of the shaft of the femur, and the exterior surface of the posterior ligament of the knee-joint.

23. External Popliteal Nerve, Plates 85 to 88, inclusive, and Plate 90.—This nerve emerges from the popliteal space, in the groove between the outer head of the gastrocnemius muscle and the distal end of the biceps muscle, giving off a cutaneous branch (page 153; Plates 85 and 86). It winds round the proximal end of the shaft of the fibula, through the substance of the peroneus longus muscle, where it divides into the anterior tibial and the musculo-cutaneous nerves (page 131; Plates 72 and 74); followed to its proximal end, it is seen to arise from the bifurcation of the great sciatic nerve.

24. Internal Popliteal Nerve, Plates 85 and 86.—This, the largest of the two popliteal nerves, arises from the bifurcation of the great sciatic nerve; it has a longitudinal course through the posterior plane of the popliteal space. It gives off, from its posterior surface, the inner root of the external saphenous nerve (page 153).

25. Nerve to the Plantaris Muscle.—This nerve is given off from the outer side of the internal popliteal nerve; it passes directly to the inner face of the muscle.

26. Nerves to the Gastrocnemius Muscle, Plate 87.—A branch from the posterior surface of the internal popliteal nerve is projected between the heads of the gastrocnemius muscle: from its sides the heads of the muscle are supplied; the branch itself is continued to the anterior surface of the gastrocnemius muscle, to supply the soleus muscle.

DISSECTION.—Hook the internal popliteal nerve aside, and dissect out the popliteal vein and its tributary branches.

27. Popliteal Vein, Plate 86.—This vein takes a longitudinal course, through the popliteal space, in a plane anterior to the internal popliteal nerve; it enters at the middle of the distal limit of the space, and passes toward the inner side of its proximal limit. It receives the external saphenous vein (Plates 85 and 86) and the venæ comites of the branches of the popliteal artery. It leaves the popliteal space, at its proximal limit, by the femoral opening in the tendon of the adductor magnus muscle (page 118; Plates 64 and 65); at the latter opening it lies to the outer side of the popliteal artery.

DISSECTION.—Section the veins tributary to the popliteal vein, and cut them away. Raise and hook aside the vein from the popliteal artery.

28. Popliteal Artery, Plates 86, 87, 88, and 90.—This artery (vena comes) has a longitudinal and oblique course, through the popliteal space, in a plane anterior to the popliteal vein; it enters the space at the femoral opening in the adductor magnus muscle (page 118; Plates 64 and 65); it lies upon the posterior surface of the distal end of the shaft of the femur, the exterior surface of the posterior ligament of the knee-joint, and the posterior surface of the popliteus muscle.

29. Muscle Branches of the Popliteal Artery.—Superior and inferior muscle branches are supplied by the popliteal artery: the superior to the muscles bordering the proximal half of the popliteal space; the inferior to the gastrocnemius, the plantaris, and the soleus muscles.

30. Superior Internal and External Articular Arteries.—These arteries (venæ comites) are lateral branches from the proximal portion of the popliteal; they wind around the sides of the femur to contribute to the peri-articular plexuses of arteries, at the antero-lateral areas of the knee.

DISSECTION.—Clear the superficies of the portions of the muscles and tendons in the distal part of the dissection area.

31. Soleus Muscle, Plate 85.—This muscle presents at the sides of the gastrocnemius muscle; at its distal end its tendon forms the greater part of the tendo Achillis.

32. Tendon of the Plantaris Muscle.—This tendon runs along the inner border of the tendo Achillis.

33. Peroneus Longus and Peroneus Brevis Muscles, Plates 85 and 87.—The posterior surface of these muscles present along the fibular border of the soleus and flexor longus pollicis muscles.

34. Flexor Longus Pollicis Muscle.—This muscle appears between the peroneus brevis muscle and the tendo Achillis.

Dissection.—Expose the tendons and the posterior tibial vessels and nerve, which are located upon the posterior surface of the distal end of the tibia.

35. Tendon of the Tibialis Posticus Muscle.—Upon the inner portion of the posterior surface of the internal malleolus is lodged this tendon.

36. Tendon of the Flexor Longus Digitorum Muscle.—This tendon runs to the outer side of the last-described tendon, and is superposed upon it.

37. Posterior Tibial Artery.—A portion of this artery (venæ comites) appears along the outer side of, and parallel with, the last-described tendon.

38. Posterior Tibial Nerve.—A portion of this nerve runs along the outer side of the last-described artery, and to the inner side, though in a deeper plane, of the tendo Achillis.

Dissection.—Section the gastrocnemius muscle (Plate 85), and reflect its proximal portion; cut away the middle portion of the muscle, by cutting its respective heads distal to the points of entrance of their nerves (Plate 87); follow the nerves from their origins to the heads of the muscle. Clear the plantaris muscle, preserving its nerve and artery. Determine the nerves and vessels to the soleus muscle, and clear the surface of the muscle.

39. Plantaris Muscle, Plates 83, 85, 86, and 87.—This presents a short muscle portion at its proximal end, which is attached to the posterior surface of the distal end of the femur, at the proximal side of the attachment of the outer head of the gastrocnemius muscle. Its long slender tendon has a distal course: for its first portion upon the posterior surface of the inner half of the soleus muscle; for its second portion to the inner side of, and anterior to, the tendo Achillis—to its attachment to the calcaneum.

40. Soleus Muscle, Plates 83, 85, and 87.—This, the largest muscle of the posterior region of the leg, has, at its proximal end, two attachments: an outer, to the posterior surface of the proximal end of the shaft of the fibula; an inner, to the oblique line on the posterior surface of the proximal third of the shaft of the tibia. Between these proximal attachments the internal popliteal nerve and the popliteal vein and artery pass into the leg, anteriorly to the soleus muscle. The gastrocnemius and soleus muscles (page 153) form the *tendo Achillis*, which is attached to the posterior surface of the calcaneum

41. Nerves to the Soleus Muscle, Plate 87.—These nerves are supplied from the internal popliteal: the inner, the branch from which the gastrocnemius muscle is supplied (page 155), passes, posteriorly to the plantaris muscle, to enter the proximal end of the tibial portion of the muscle, at the outer side of the tendon of the plantaris muscle; the outer, directly from the internal popliteal nerve, passes, anteriorly to the plantaris muscle, to enter the proximal end of the fibular portion of the muscle.

Dissection.—Section, as in Plate 88, the inner nerve to the soleus muscle; cut the plantaris muscle distal to the entrance of its vessel and nerve, as in Plates 88 and 90; reflect the tendon of the muscle to its attachment to the calcaneum, where it may be cut away. Section the tendo Achillis (Plate 87) and reflect the soleus muscle to its proximal attachments, where they may be cut away, the tibial near the bone, the fibular distal to the point of entrance of its nerve and vessels, as in Plates 88 and 90. Clear the surface of the popliteus muscle. Trace the distal portions of the internal popliteal nerve, the popliteal vein, and the popliteal artery; note the muscle branches of the nerve.

42. Popliteus Muscle, Plates 83, 87, 88 and 90.—This muscle winds from its proximal attachment, at the side of the outer condyle of the femur, to the posterior face of the knee-joint; it widens as it passes to its distal attachment to the tibia, proximal to the oblique line of that bone.

43. Nerves from the Distal Portion of the Internal Popliteal Nerve, Plate 88.—The distal portion of this nerve gives off the following muscle branches: to the popliteus and flexor longus digitorum muscles, from its inner side; to the tibialis posticus muscle, from its outer side.

44. Nerve to the Popliteus Muscle, Plates 88 and 90.—This nerve is given off from the inner side of the internal popliteal nerve and passes directly to the muscle.

45. Intermuscular Fascia.—A layer of fascia separates the deep muscles, vessels, and nerves of the posterior region of the leg from the soleus muscle. It is attached as follows: to the fibula, between the flexor longus pollicis and the peroneus longus and brevis muscles; to the tibia, along the inner side of the flexor longus digitorum muscle.

DISSECTION.—Remove the intermuscular layer of fascia from the subjacent vessels, nerves, and muscles.

46. Posterior Tibial Nerve, Plate 88.—This nerve is the distal continuation of the internal popliteal nerve; it extends from the distal border of the popliteus muscle to the inner side of the calcaneum, where it bifurcates into the internal and the external plantar nerves. In the proximal quarter of its course it gives off, from its outer side, a branch to the flexor longus pollicis muscle; and in its distal quarter, a plantar cutaneous branch.

DISSECTION.—Extend the foot upon the leg (Plate 89). Clear (Plate 88) the surfaces of the flexor longus pollicis and the flexor longus digitorum muscles; trace them into the plantar region of the foot (Plate 89). Follow the nerves to these muscles from the distal portion of the internal popliteal nerve, and the posterior tibial nerve.

47. Flexor Longus Pollicis Muscle, Plates 83, 75, 88 and 89.—This muscle is attached to the distal two-thirds of the posterior surface of the shaft of the fibula. Its distal, tendinous, portion passes over the ankle (Plate 89), to enter the plantar region of the foot, by a groove in the posterior border of the astragalus (Plate 75.) Its course, relations, and distal attachments, in the plantar region, were before described (pages 138, 142, and 144) and illustrated (Plates 79 and 80).

48. Nerves to the Flexor Longus Pollicis Muscle, Plate 88.—The origin of the trunk of these nerves was described above; the nerves can now be traced to the muscle.

49. Flexor Longus Digitorum Muscle, Plates 83, 75, 88 and 89.—The proximal end of this muscle is attached to the posterior surface of the distal two-thirds of the shaft of the tibia. Its distal end presents its initial tendon upon the posterior surface of the internal malleolus, where it enters the plantar region of the foot, distal to the malleolus (Plate 89); its plantar course, relations, division into four terminal tendons, and the digital attachments of the latter, were before described (pages 139 and 142) and illustrated (Plates 79 and 80).

50. Nerves to the Flexor Longus Digitorum Muscle, Plate 88.—These nerves may now be traced to the muscle: one from the internal popliteal nerve (page 158); the other from the posterior tibial branch to the flexor longus pollicis muscle.

DISSECTION.—Hook the posterior tibial nerve to the inner side; dissect away the (venæ comites) of the posterior tibial and peroneal arteries; note the branches of the distal portion of the popliteal artery and its bifurcation at the lower border of the popliteus muscle. Follow the anterior tibial, the posterior tibial, and the peroneal arteries.

51. Popliteal Artery, Plates 88 and 90.—The distal termination of this artery is at the distal border of the popliteus muscle, where it bifurcates into the anterior and the posterior tibial arteries.

52. Inferior Internal and External Articular Arteries.—These arteries (venæ comites) are given off from the sides of the distal portion of the popliteal artery. They wind around the sides of the proximal ends of the tibia and fibula, respectively, to contribute to the peri-articular plexuses at the antero-lateral areas of the knee.

53. Anterior Tibial Artery, Plates 88, 90, 73, and 74.—This artery passes to the anterior surface of the tibio-fibular interosseous ligament, through the deficiency at the proximal end of the ligament (pages 130 and 132).

54. Posterior Tibial Artery, Plate 88.—This artery (venæ comites) has a distal course to the inner side of the calcaneum, where it bifurcates into the internal and the external plantar arteries (pages 139 and 140; Plates 79 and 81). It is lodged between the flexor longus pollicis and the flexor longus digitorum muscles.

55. Peroneal Artery.—This artery (venæ comites) is given off from the last-described artery, between the origin of the latter and the proximal end of the flexor longus pollicis muscle; it runs parallel with, and to the outer side of, its parent trunk; it passes to the anterior surface of the pollicis muscle.

DISSECTION.—Clear the posterior surface of the peroneus longus and brevis muscles; determine the continuity of the two muscles from the outer side of the leg into the plantar region of the foot (Plate 89).

56. Peroneus Longus Muscle, Fig. 2, Plate 67; Plates 75, 80, 88, 89, and 90.—The anterior surface of this muscle has been described (page 129) and illustrated (Plates 72, 73, and 74). The posterior surface of the muscle occupies the proximal half of the outer side of the leg. It is attached to the proximal half of the outer side of the shaft of the fibula; its tendon commences at about the middle of the leg and is continued to the posterior surface of the external malleolus, distal to which it winds to the minim border of the tarsal region of the foot, where it enters a groove at the outer side of the cuboid bone; by this groove it is directed obliquely across the bases of the metatarsal bones, to its distal attachment to the outer side of the base of the first metatarsal bone (Plates 75, and 79 to 82, inclusive). Where lodged in the groove of the cuboid bone the tendon contains a sesamoid bone. In the plantar region, the tendon of the muscle is held in its osseous groove by a fibrous sheath, which is formed by the distal end of the long calcaneo-cuboid ligament.

57. Peroneus Brevis Muscle.—The anterior surface of this muscle has been described (page 129) and illustrated (Plates 72, 73, and 74). It is attached to the distal half of the outer side of the shaft of the fibula. Its tendon lies upon the posterior surface of the external malleolus, distal to which it winds (Plate 89) to the minim border of the tarsal region, where it passes to its distal attachment, at the base of the fifth metatarsal bone.

DISSECTION.—Cut the sutures uniting the cut tendons of the flexor longus pollicis and the flexor longus digitorum muscles (page 149). Reflect the proximal portions of these muscles and cut them away from their areas of bone attachment (Plate 83). Cut the posterior tibial nerve opposite the tibial attachment of the soleus muscle (Plate 90). Section the posterior tibial artery, distal to its giving off of the peroneal artery (Plate 90). Trace the peroneal artery and its branches.

58. Peroneal Artery, Plates 88 and 90.—This artery (venæ comites) has a distal course parallel with, and to the inner side of, the fibula, between the flexor longus pollicis muscle, posteriorly, and the tibialis posticus muscle, anteriorly. It affords branches to contiguous muscles, and terminates, at the distal limit of the tibio-fibular interosseous space, by bifurcating into the anterior and the posterior peroneal arteries.

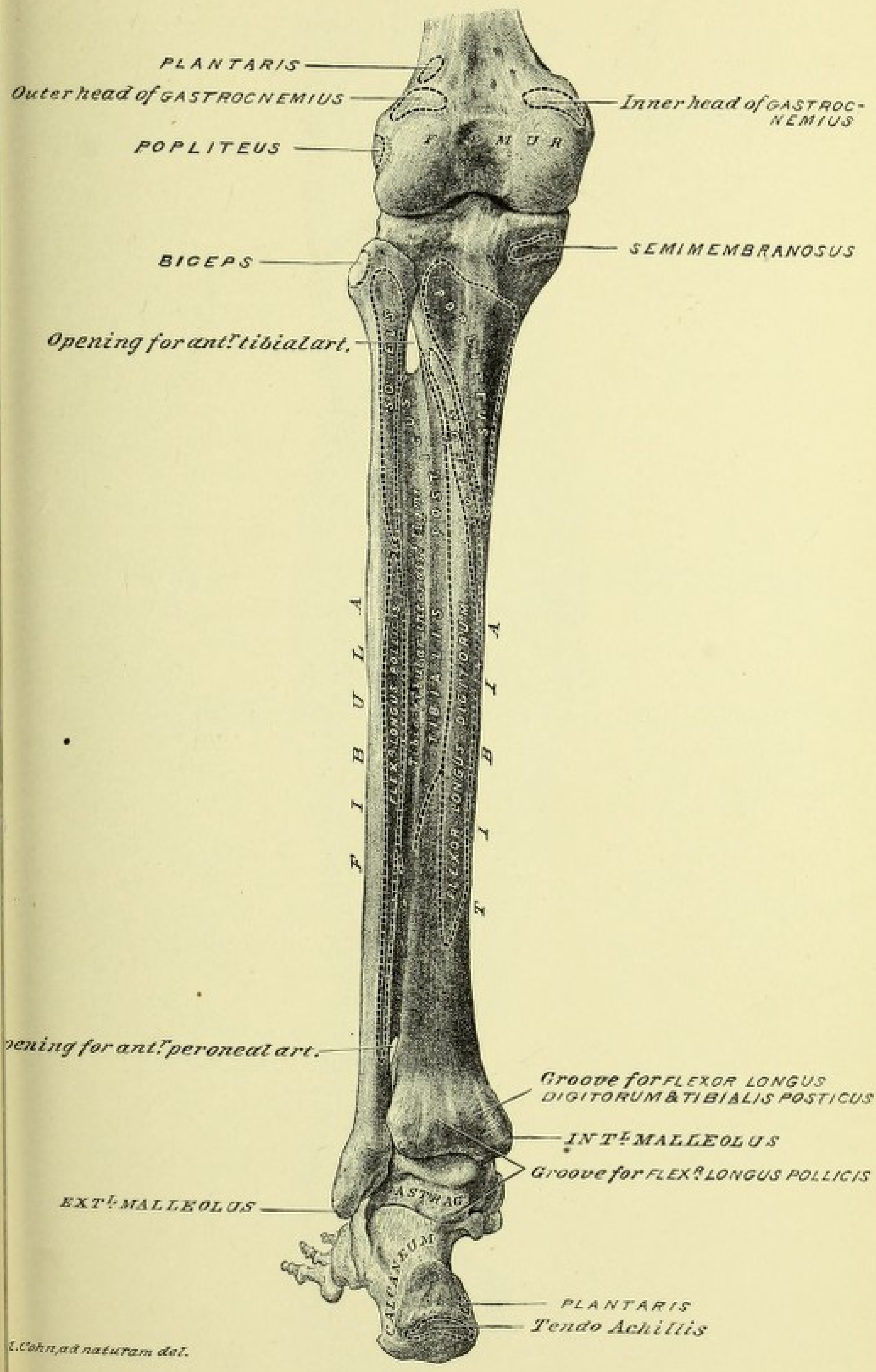
59. Anterior Peroneal Artery, Plate 90. — This artery (venæ comites) was seen at the anterior surface of the leg (page 132), and illustrated (Fig. 1, Plate 73 and Plate 74). It passes to the anterior surface of the leg, through a deficiency at the distal end of the tibio-fibular interosseous ligament.

60. Posterior Peroneal Artery. — This artery (venæ comites) is a small vessel upon the posterior surface of the ankle-joint, between the tendo Achillis and the tendons of the peronei muscles.

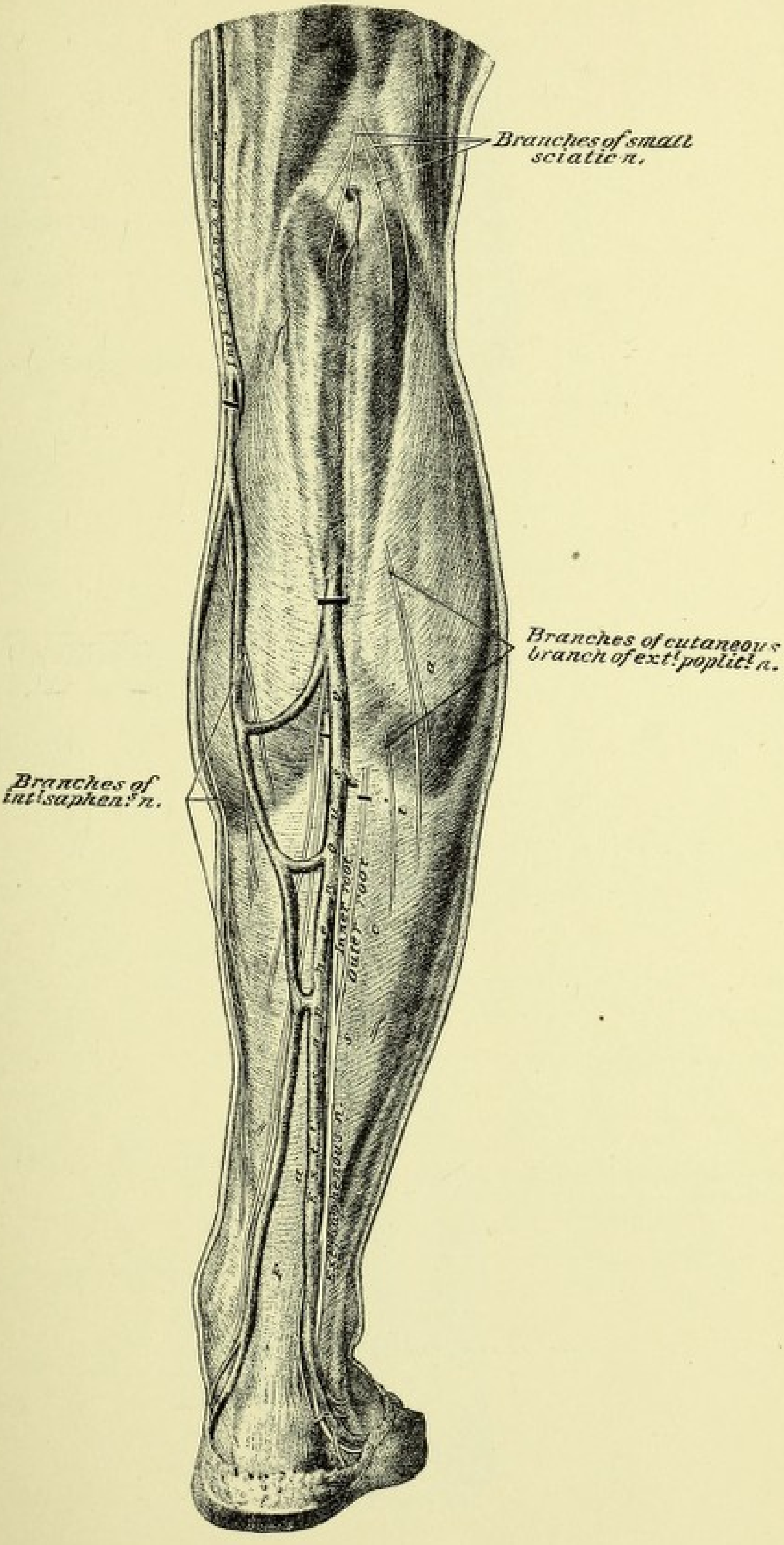
Dissection.—Clear the posterior surface of the tibialis posticus muscle and follow its tendon into the plantar region of the foot.

61. Tibialis Posticus Muscle, Plates 75, 79 to 82 inclusive, 83, and 87 to 90, inclusive.—This muscle occupies the posterior surface of the tibio-fibular interosseous ligament (Plate 90); it is attached to the proximal half of the ligament and the adjoining surfaces of the tibia and fibula (Plate 83). Its tendon lies upon the posterior surface of the internal malleolus (Plates 85, 87, 88 and 89), distal to which it winds to reach the pollex border of the tarsal region of the foot (Plate 89). It is attached, primarily, to the tubercle of the scaphoid bone (Plates 75, 79 to 82, inclusive, and 89); secondarily, by outer and distal expansions, which are described at pages 182 and 183, and illustrated Plate 105, and Fig. 1, Plate 106.

PLATE 83



I. Cohn, ad naturam del.


Branches of small sciatic n.
Branches of cutaneous branch of ext.l poplit.l n.
Branches of int.l saphen.s n.
Inner root
Outer root

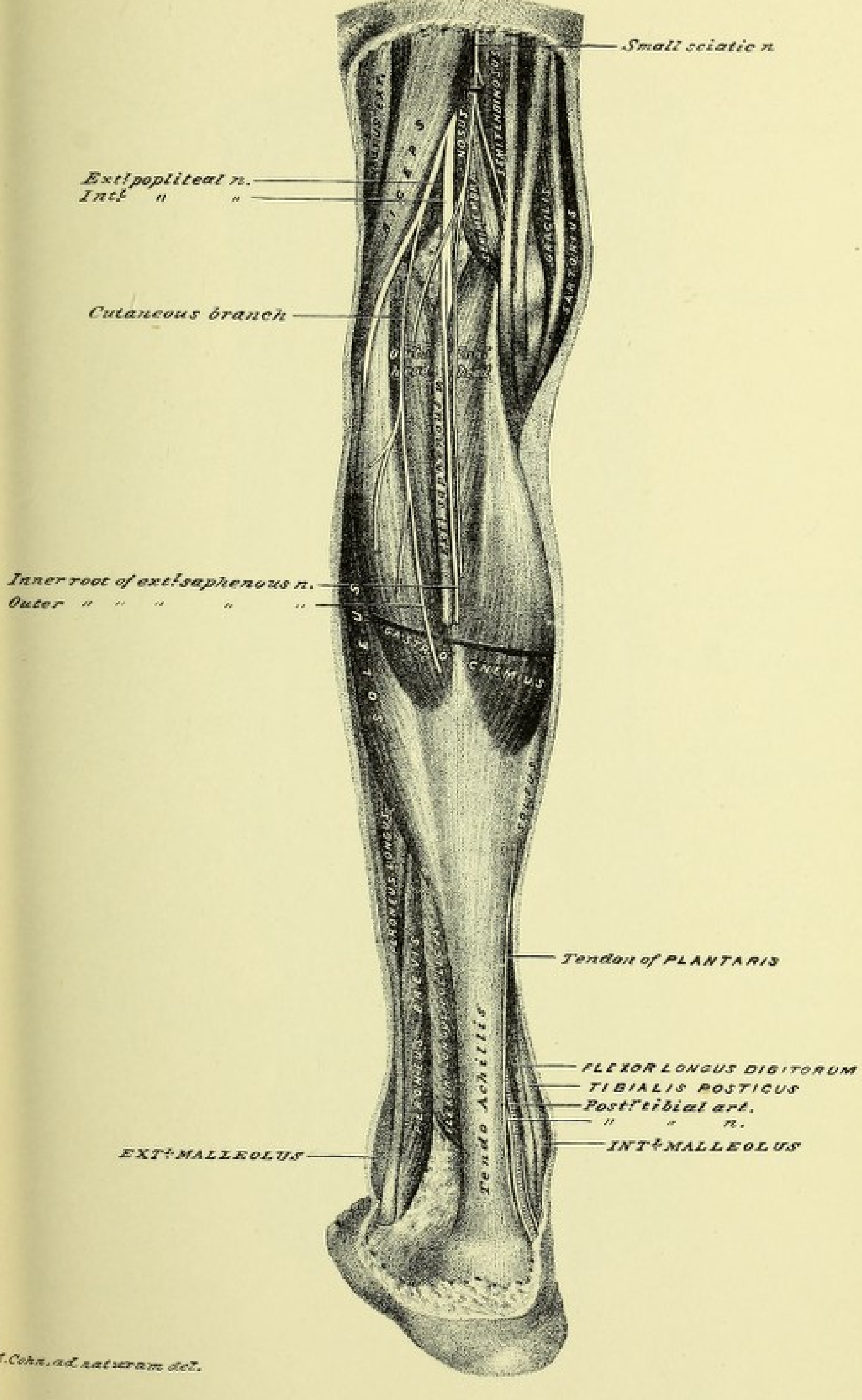


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PLATE 86

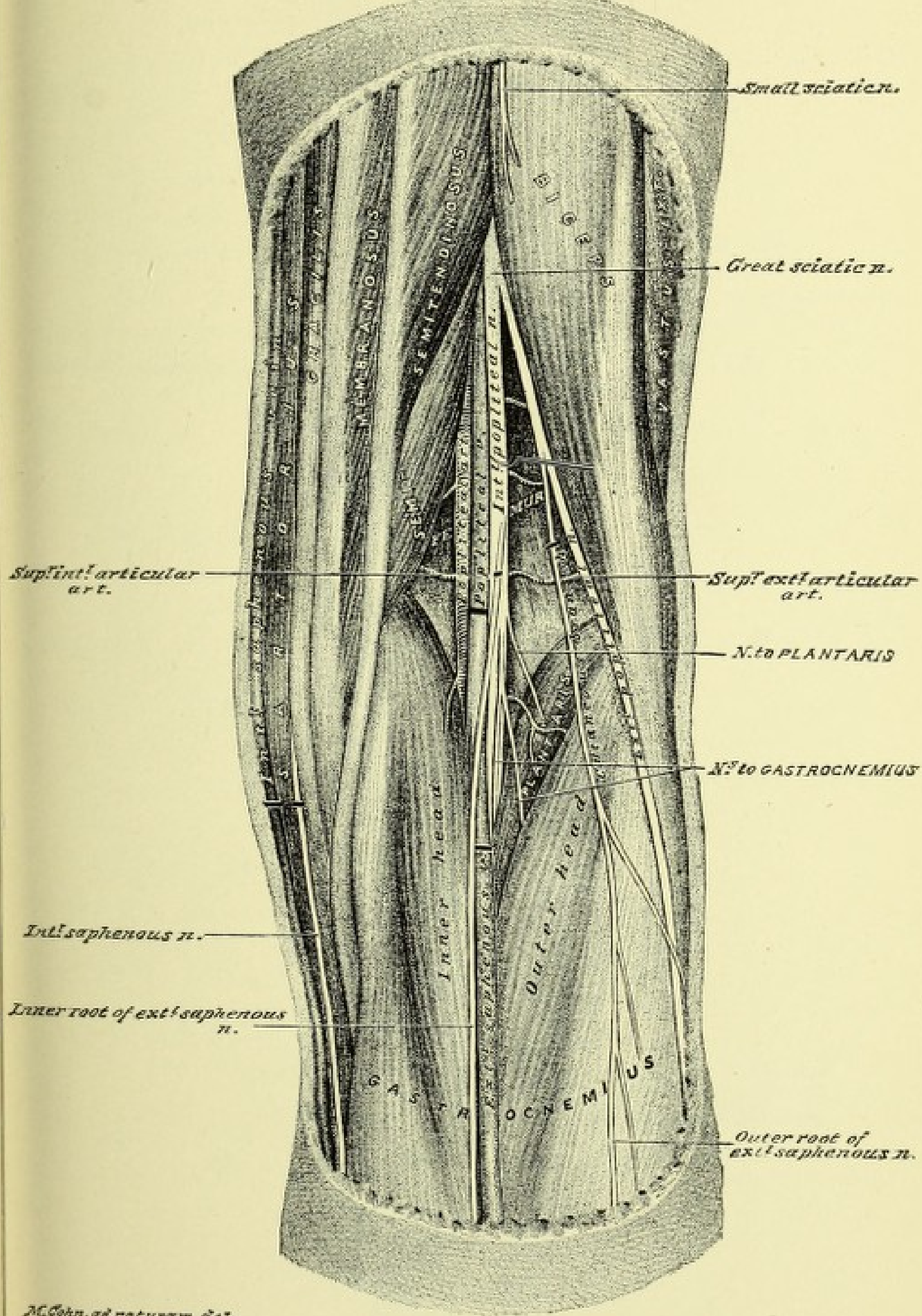

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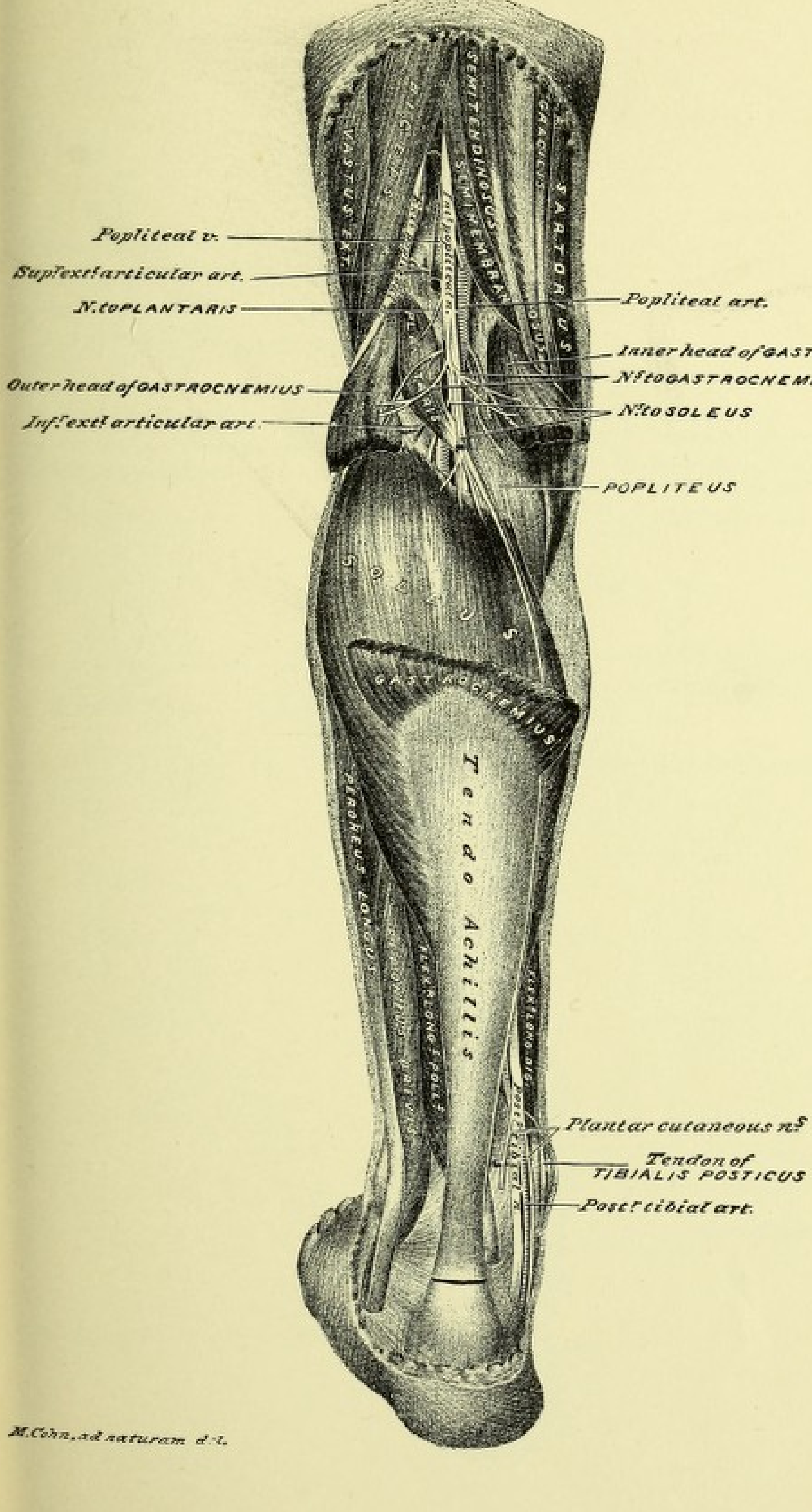
PLATE 87



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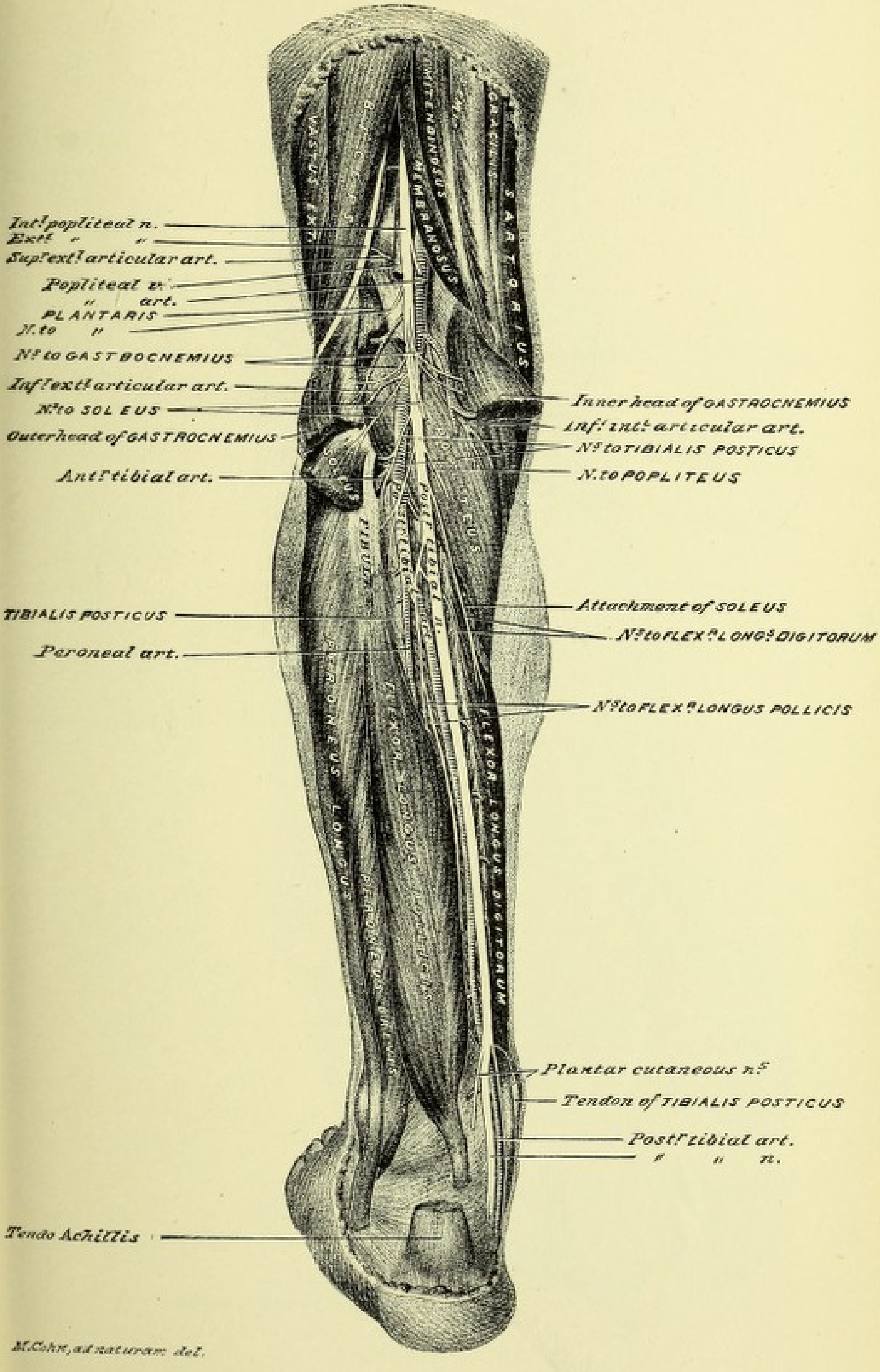

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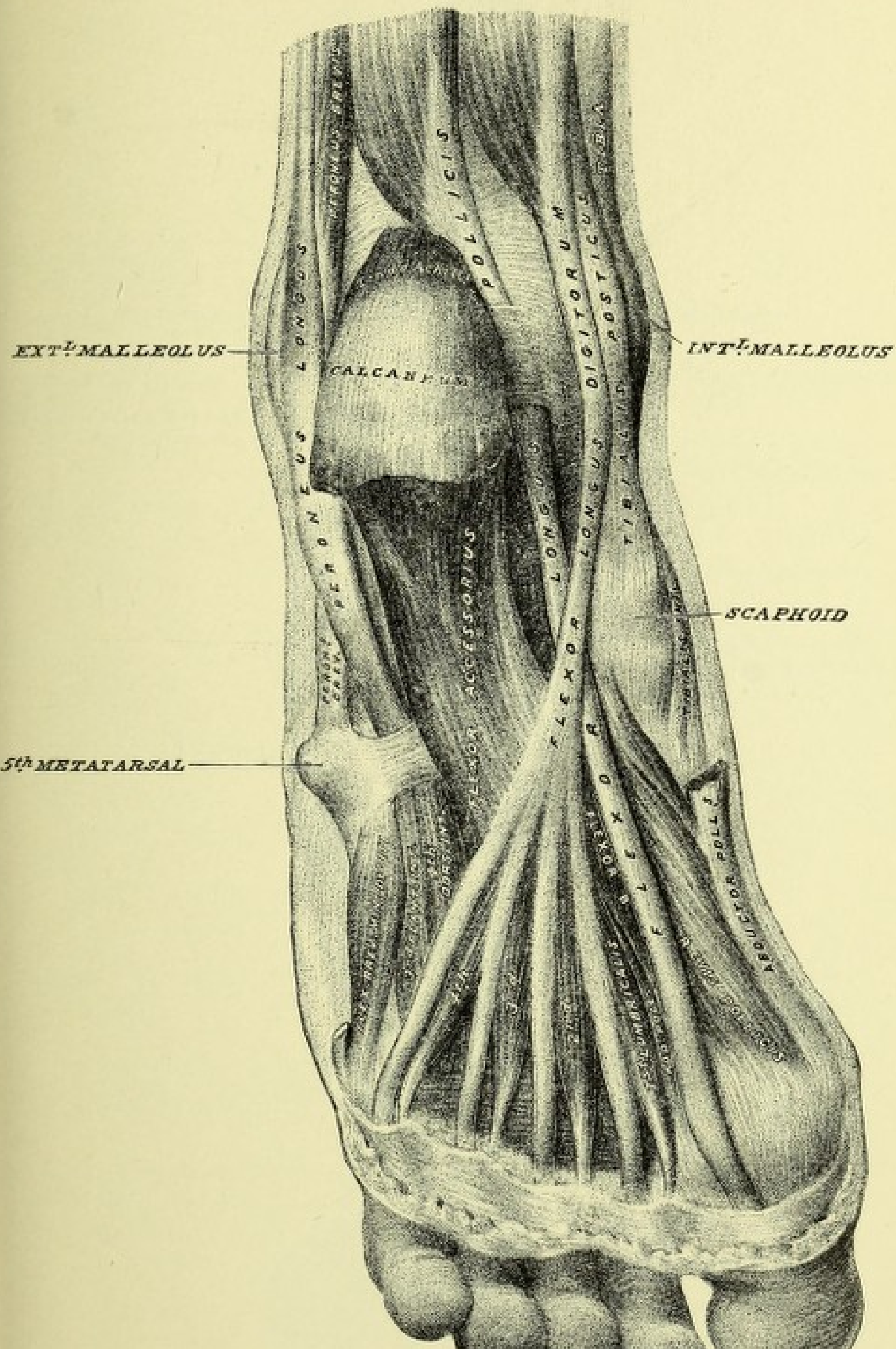

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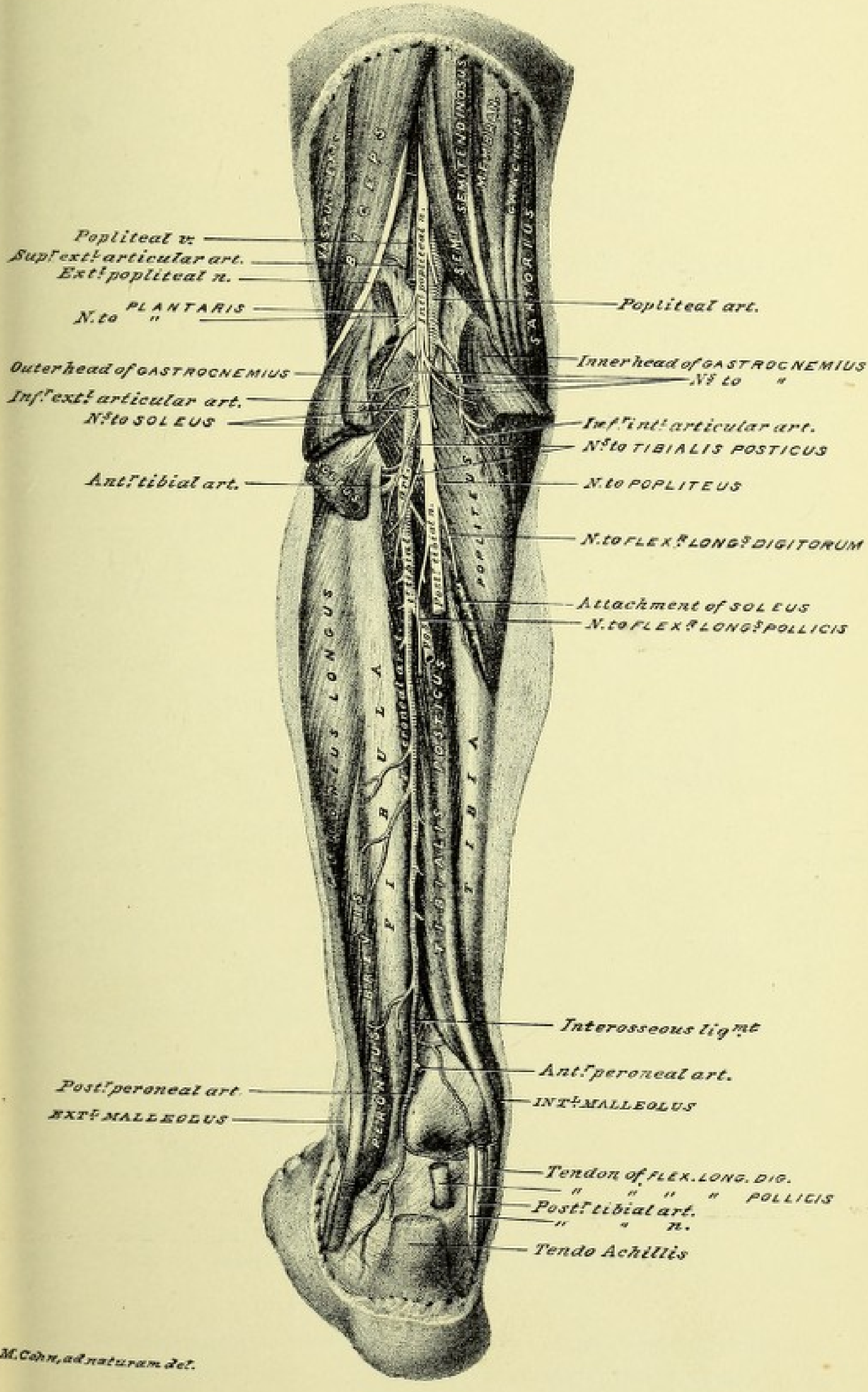

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THIRTEENTH DISSECTION.

GLUTEAL REGION AND POSTERIOR REGION OF THE THIGH.

Dissection.—Place a block under the anterior of the pelvis; extend the limb, rotate the thigh inwards, and let the knee, leg, and foot rest upon the table.

Terms of Relation.—To the gluteal region the general terms of relation are applicable (page 2); to the thigh region the terms *proximal*, *distal*, *inner side*, *outer side*, *anterior surface* and *posterior surface* will be applied.

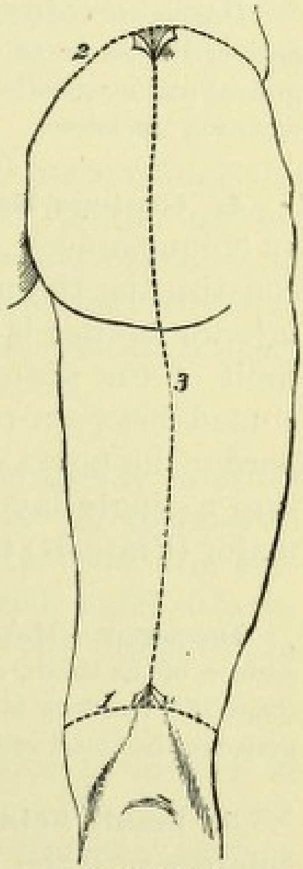


Figure 8.

Bone Areas, Plate 91.—The exteriors of the os innominatum, the sacrum, and the coccyx, and the posterior surfaces of the femur and the proximal ends of the tibia and fibula form the osseous plane of the dissection. All these bones afford areas for muscle attachments.

Dissection.—Make the skin incisions 1, 2, and 3 of Figure 8, and reflect lateral flaps as indicated. Where the dissection of the anterior of the thigh has been made, the skin may be dissected off.

1. Subcutaneous Tissue.—This tissue is thicker and denser than that of the anterior of the thigh; the veins and nerves are much smaller and less numerous.

Dissection.—Clear away the subcutaneous tissue from the fascia, preserving, as far as possible, the subcutaneous nerves and veins.

2. Subcutaneous Nerves, Plate 92.—Branches of the external cutaneous nerve, from the lumbar plexus (page 109;

Plate 60), wind over the outer border of the thigh. Branches of the small sciatic nerve perforate the fascia, in the outer and inner halves of the posterior region of the thigh ; branches of the latter nerve also wind over the inferior border of the gluteus maximus muscle, to ramify superiorly. Terminal branches of the twelfth dorsal, the ilio-hypogastric and the lumbar spinal nerves enter the gluteal region at its superior limit ; posterior branches of the sacral spinal nerves appear near the median line.

3. Fascia Lata.—The posterior portion of the fascia lata forms the fascial plane of the gluteal region and the posterior region of the thigh ; its anterior portion, with which the posterior is continuous, was before described (page 109) and illustrated (Plate 60).

Dissection.—Abduct the limb, so as to bring the inner side of the leg against the border of the table. Incise and dissect off the fascia lata of the gluteal region, parallel with the fibres of the gluteus maximus muscle, thereby exposing the latter.

4. Gluteus Maximus Muscle, Plates 91, 93, and 94.—This is an oblong muscle, which lies obliquely across the gluteal region, constituting the principal mass of the buttock. Inferior to its inferior border is the gluteal fold, which forms the proximal limit of the posterior region of the thigh. The muscle is included between two layers of the fascia lata: at its superior border the fascia splits to include the muscle, and unites again into a single layer at its inferior limit; upon the trochanter major (Plate 94) the muscle is attached to the fascia.

Dissection.—Make an incision through the fascia lata of the posterior surface of the thigh, corresponding to the line of skin incision 3, of Figure 8 (page 163); reflect lateral flaps from the subjacent muscles. Be careful to preserve the small sciatic nerve.

5. Small Sciatic Nerve, Plates 92 and 94.—This nerve emerges into the posterior region of the thigh, at the inferior border, and from the anterior surface, of the gluteus maximus muscle; it takes a distal course between the fascia lata and the surface of the biceps muscle (long head), giving off lateral branches, described above, which perforate the fascia, to reach the subcutaneous tissue. Its branches continue into the subcutaneous plane of the proximal portion of the posterior region of the leg (page 152; Plate 84).

DISSECTION.—Replace the limb upon the table. Section the small sciatic nerve at its proximal end (Plate 94); cut its distal portion away.

6. Vastus Externus Muscle, Plates 91 and 94.—The posterior surface of this muscle occupies the outer border of the posterior of the thigh—from the trochanter major to within a short distance of the outer condyle of the femur; it is attached to the outer lip of the linea aspera of the femur.

7. Biceps Muscle, Plate 94.—The long head of this muscle is projected into the posterior region of the thigh, from the anterior surface and inferior border of the gluteus maximus muscle; it takes an oblique course to the outer side of the knee. A part of the attachment of its short head—to the linea aspera of the femur—is seen between its long head and the vastus externus muscle.

8. Semitendinosus Muscle.—This muscle appears from the anterior surface of the gluteus maximus muscle, at the inferior border of the latter; it runs along the inner side of the long head of the biceps, to which it is apposed, to about the distal third of the thigh, where the two diverge—the semitendinosus passing to the inner side of the knee.

9. Gracilis Muscle.—This muscle presents at the internal surface of the thigh (page 111; Plates 61 to 65, inclusive). Its posterior edge forms the inner border of the posterior surface of the thigh; its distal end may be traced to its attachment to the inner tuberosity of the tibia and the fascia of the leg.

10. Semimembranosus Muscle.—This muscle is lodged in a plane anterior to the biceps (long head) and the semimembranosus muscles. It is projected from the anterior surface of the gluteus maximus muscle: the proximal half of its inner portion occupies the interval between the semitendinosus and the gracilis muscles; its distal portion appears in the divergence of the semitendinosus and biceps muscles. A portion of its anterior surface appeared in the dissection of the anterior region of the thigh, between the adductor magnus and the gracilis muscles (page 120; Plates 64 and 65).

11. Adductor Magnus Muscle.—This muscle, though in a plane anterior to the three last-described muscles, presents at two points distal to the inferior border of the gluteus maximus muscle: in the proximal angle formed by the gracilis and the semimembranosus muscles; and in the proximal angle between the long and the short heads of the biceps.

12. Popliteal Space.—The popliteal space, with its contents, *in situ*, is described (page 154) and illustrated (Plates 85 and 86); it is reproduced in this dissection to enable the appreciation of the continuity of parts from the thigh to the leg.

DISSECTION.—Section the gluteus maximus muscle (Plate 93) and reflect its portions, externally and internally. In raising the portions of the muscle, note the bursæ beneath the muscle; also the vessels and nerves that enter its deep surface. Cut away the inferior part of its external portion, close to its femoral attachment, and the superior part thereof with the fascia lata, to which it is attached; cut the vessels and nerves entering its anterior surface.

13. Gluteus Maximus Muscle, Plates 91, 93, 94, and 95.—The reflection of the external portion of this muscle will determine its attachment to the fascia lata of the thigh, superiorly, and to the femur, inferiorly—at the inner side of the proximal portion of the outer lip of the linea aspera. Its internal attachments are: to the exterior surfaces of the postero-internal border of the os innominatum, and the external borders of the sacrum and coccyx; to the posterior surfaces of the sacro-iliac and great sacro-sciatic ligaments.

DISSECTION.—Abduct the limb, so as to bring the inner side of the leg against the border of the table. Clear the area anterior to the gluteus maximus muscle, so as to expose the bursæ under the muscle, the great sacro-sciatic ligament, the pyriformis muscle, the proximal portion of the small sciatic nerve, the inferior gluteal nerve, the great sciatic nerve, the sciatic artery and its branches, the superficial branch of the gluteal artery, and the posterior surface of the gluteus medius muscle. Cut away the internal portion of the gluteus maximus muscle, as in Plate 95.

14. Bursæ Beneath the Gluteus Maximus Muscle, Plate 96; and Fig. 1, Plate 4.—Two large bursæ present beneath the gluteus maximus muscle: one on the tuberosity of the ischium; the other upon the trochanter major of the femur.

15. Great Sacro-Sciatic Ligament, Plates 95, 99, and 100. —This ligament extends from the exterior of the tuberosity of the ischium to the posterior surfaces of the sacrum, near its external border, and of the posterior inferior spinous process of the ilium portion of the os innominatum.

16. Pyriformis Muscle, Plates 91 and 95 to 100, inclusive.— The internal attachment of this muscle, at the interior of the pelvis, was before described (page 82) and illustrated (Plate 42; Fig. 1, Plate 45; and Fig. 1, Plate 46). The muscle is projected from the pelvis into the gluteal region, through the great sacro-sciatic foramen; it has an attachment to the superior border of the foramen. It takes a somewhat oblique course, externally, to its attachment to the antero-superior part of the internal surface of the trochanter major of the femur.

17. Small Sciatic Nerve, Plates 95 to 100, inclusive.—The proximal portion of this nerve, anterior to the gluteus maximus muscle, may be traced to its point of emergence into the gluteal region, from the anterior of, and at the inferior border of, the internal half of the pyriformis muscle. It gives off the inferior pudendal nerve, which winds inferiorly to the tuberosity of the ischium to reach the external genitalia (pages 16 and 32; Plates 6 and 13).

18. Inferior Gluteal Nerve.—This nerve emerges into the gluteal region with the last-described nerve. It breaks up into a number of branches, which enter the anterior surface of the superior part of the gluteus maximus muscle; so close is the relation of the proximal end of this nerve and the small sciatic nerve, that it requires care to separate them.

19. Sciatic Artery.—In the reflection of the portions of the gluteus maximus muscle arterial branches were cut, which entered the inferior part of its anterior surface; the stumps may be followed to the sciatic artery (venæ comites), which enters the gluteal region at the inferior border of the pyriformis muscle; at the latter point it is internal to, and in close relation with, the small sciatic nerve. Besides affording branches to the gluteus maximus muscle, the trunk of this artery gives off an articular branch (to the hip-joint), which runs, externally, along the inferior border of the pyriformis muscle.

The trunk of the artery continues, inferiorly, into the proximal part of the posterior region of the thigh; its course is, externally to the tuberosity of the ischium, parallel with, and superficial to, the great sciatic nerve; to the latter nerve it gives a branch, the *comes nervi ischiadici* (Plates 96 and 97), which enters the nerve. Muscle branches are afforded to contiguous muscles; and terminal branches anastomose with the internal circumflex and the first perforating branch of the profunda femoris artery.

20. Superficial Branch of the Gluteal Artery, Plates 95 and 99.—Stumps of arteries present, which were cut as they entered the anterior surface of the superior part of the gluteus maximus muscle; they may now be traced to this branch of the gluteal artery (venæ comites), at the superior border of the internal portion of the pyriformis muscle, between the latter and the gluteus medius muscle.

21. Gluteus Medius Muscle, Plates 91 and 95 to 100, inclusive.—This muscle occupies the interval between the trochanter major of the femur and the anterior two-thirds of the crest of the ilium. The internal third of its posterior surface is overlapped by the gluteus maximus muscle (Plate 93); its external border is covered by the tensor vaginæ femoris muscle (Plate 61). Upon the removal of the latter muscle, its external border presents at the outer side of the proximal portion of the anterior surface of the thigh (Plates 62 to 65, inclusive; and Fig. 2, Plate 66). It is attached, superiorly, to the exterior of the ilium of the os innominatum, between its superior and middle curved lines, being continued to the anterior border of the bone; inferiorly, it narrows to be attached to the superior and external surfaces of the trochanter major of the femur.

Dissection.—Section the inferior gluteal nerve, the small sciatic nerve, and the sciatic artery at their superior ends (Plate 97), and dissect away their inferior portions; cut the articular branch of the artery at its origin and leave it *in situ*. Separate the long head of the biceps muscle from the semitendinosus muscle, being careful not to cut away the nerves and arteries that supply them.

22. Long Head of the Biceps Muscle, Fig. 1, Plate 91; Plates 93 to 98, inclusive.—The biceps is the outer, superficial and longitudinal muscle of the posterior surface of the thigh; its proximal portion having two heads: the *long head* is attached to the tuberosity of the ischium, in common with the semitendinosus muscle, taking an oblique course therefrom toward the outer side of the knee; the *short head* lies anteriorly to the long head.

23. Semitendinosus Muscle.—The proximal end of this muscle is fused, for about three or four inches, with the last-described muscle; the two muscles having a common attachment to the postero-inferior border of the tuberosity of the ischium. The muscle takes its course parallel with, and to the inner side of, the long head of the biceps. At about the distal third of the thigh its tendon commences, which diverges from the biceps muscle and passes to the inner side of the knee; it may be traced to its attachment to the inner tuberosity of the tibia (Fig. 1, Plate 67).

DISSECTION.—Flex the leg slightly, and steady it in that position; hook the long head of the biceps muscle to the outer side, and the semitendinosus and semimembranosus muscles to the inner side. Trace the great sciatic nerve through the gluteal region and the posterior region of the thigh; dissect out the muscle branches of the nerve and its terminal bifurcation.

24. Great Sciatic Nerve, Plates 95 to 97, inclusive.—This nerve, the largest in the body, is derived from the sacral plexus; it is projected into the gluteal region, through the great sacro-sciatic foramen, appearing from the anterior of the inferior border of the pyriformis muscle, a little external to the emergence of the inferior gluteal and the small sciatic nerves. In the gluteal region it is lodged upon the posterior surface of the gemellus superior, the obturator internus, the gemellus inferior, and the quadratus femoris muscles; on the latter muscle it lies between the ischium of the os innominatum and the trochanter major of the femur—nearest the former. In the posterior region of the thigh it has a distal course, anterior to the superficial muscles (biceps, semitendinosus, and semimembranosus) and the muscle floor of the posterior region of the thigh—the adductor magnus. At a point to the proximal side of the popliteal space, the nerve bifurcates into the external and the internal popliteal nerves, which have been described (page 155) and illustrated (Plates 85 and 86).

25. Nerves to the Biceps Muscle, Plates 96 and 97.—Two branches are given off from the great sciatic nerve to the heads of this muscle: to the long head a branch from the inner side of the nerve; to the short head a branch from its outer side, which bifurcates before entering the muscle.

26. Nerve to the Adductor Magnus, the Semimembranosus, and the Semitendinosus Muscles.—Distal to the biceps branches, a nerve is given off from the inner side of the great sciatic, which bifurcates: the short branch supplying the adductor magnus muscle; the long one taking a longitudinal course, and dividing, to supply the semimembranosus and the semitendinosus muscles.

27. Nerve to the Semitendinosus Muscle.—This, the most distal and shortest branch from the great sciatic nerve, passes directly from the inner side of the nerve to the muscle.

Dissection.—Cut the proximal ends of the long head of the biceps and the semitendinosus muscle (Plate 96); reflect the muscles, in a distal direction, and cut the nerves and vessels supplying them. Section the long head of the biceps near its junction with the short head; and the semitendinosus near its distal attachment (Plate 96). Clear the surfaces of the short head of the biceps muscle and the semimembranosus muscle.

28. Short Head of the Biceps Muscle, Plates 94, 96, 97, and 98; Fig. 1, Plate 91; Fig. 2, Plate 67.—This head of the biceps muscle is located in a plane anterior to the long head (Plate 94); and in part to the outer side of the latter. It has a longitudinal course, being attached to the linea aspera, along the inner side of the distal two-thirds of its outer lip (Fig. 1, Plate 91). In the distal quarter of the thigh, the two heads of the biceps unite; they then pass as a single muscle over the outer side of the knee, to be attached to the proximal end of the fibula.

29. Semimembranosus Muscle, Plates 94, 96, and 97; Fig. 1, Plate 91.—This muscle, the largest in the posterior region of the thigh, lies to the inner side of the thigh, anterior to the long head of the biceps and the semitendinosus muscles. Its proximal attachment is to the inferior and external surfaces of the tuberosity of the ischium; the muscle takes a longitudinal course to the inner side of the posterior surface of the knee, where it may be traced to a short thick tendon, which is in part attached to the proximal end of the tibia, at the posterior plane of its inner tuberosity; it also contributes to the posterior ligament of the knee-joint.

DISSECTION.—Cut the proximal ends of the great sciatic nerve and the semimembranosus muscle (Plate 97); make a distal reflection of the nerve and muscle; cut the nerve to the adductor magnus muscle; cut the semimembranosus muscle near its distal attachment (Plate 97). Cut the perforating arteries and the popliteal artery and its branches, as in Plate 98. Dissect away all arteries of the posterior region of the thigh and popliteal space. Clear the surface of the adductor magnus muscle. Determine the femoral opening, and the openings for the perforating branches and terminal portion of the profunda femoris artery, through the adductor magnus muscle. Find the anastomotica magna artery and the long saphenous nerve at the inner side of the distal portion of the thigh.

30. Adductor Magnus Muscle, Plate 59; Fig. 1, Plate 91; Plates 93 to 100, inclusive.—The anterior surface of this muscle, described (pages 111 and 119) and illustrated (Plates 61 to 65 inclusive; and Fig. 2, Plate 66), forms the floor of the anterior region of the thigh; its posterior surface constitutes the floor of the posterior region of the thigh. Its proximal attachment is to the exterior of the body and of the anterior ramus of the ischium; its distal attachment is to the inner side of the external lip of the linea aspera of the femur for its whole length from the trochanter major; it is also attached to the inner condyle of the femur. It is perforated by the femoral artery and vein, and by the perforating branches of the profunda femoris artery.

31. Femoral Opening in the Adductor Magnus Muscle, Plates 96, 97, and 98.—The anterior of this was described (page 118) and illustrated (Plates 64 and 65); its posterior view presents in the distal third of the muscle. It transmits, in a distal direction, the femoral artery to become the popliteal; and in a proximal direction, the popliteal vein to become the femoral. The vein is to the outer side of the artery.

32. Openings in the Adductor Magnus Muscle for the Branches and Terminal Portion of the Profunda Femoris Artery, Plates 63, 64, and 98.—Close along the femoral attachment of the adductor magnus muscle four openings present, at about equal distances, for the transit of the three perforating branches and the terminal portion of the profunda femoris artery; muscle branches also perforate the muscle.

33. Anastomotica Magna Artery, Plate 98.—This artery (venæ comites) has been described (page 118) and illustrated (Plates 64 and 65) in the anterior region of the thigh. If the dissection of the anterior region of the thigh has not preceded that of the posterior region, this artery will present at the inner side of the tendinous portion of the adductor magnus muscle, to the proximal side of the inner condyle of the femur.

34. Internal Saphenous Nerve.—This nerve was before described (pages 113 and 114), as seen in the anterior region of the thigh. It is now seen, from its posterior aspect, in that portion of its course where it accompanies the last-described artery.

Dissection.—Determine the articular branches of the popliteal artery and follow them to the antero-lateral areas of the knee.

35. Articular Branches of the Popliteal Artery.—The articular branches of this artery are five in number: the superior and inferior external articular, the superior and inferior internal articular, and the azygos articular. The four first wind, respectively, to the antero-lateral areas of the knee-joint, to form with the anastomotica magna, from the femoral, and the anterior tibial recurrent (page 132; Plate 74), from the anterior tibial, the deep and superficial peri-articular plexuses of the antero-lateral areas of the knee. The azygos articular branch perforates the posterior ligament of the knee-joint.

Dissection.—Clear the surface of the quadratus femoris muscle and find the emergence of the internal circumflex artery at the internal portion of its inferior border.

36. Quadratus Femoris Muscle, Plate 59; Fig. 1, Plate 91; Plates 95 to 100, inclusive.—A small area of the anterior surface of this muscle appeared in the anterior region of the thigh (page 120; Plate 65, and Fig. 2, Plate 66). Its posterior surface presents as an oblong muscle, running transversely, from the anterior surface of the posterior ramus of the ischium (Plate 59), internally, to the posterior surface of the trochanter major of the femur, externally. It has the gemellus inferior muscle superiorly, and the adductor magnus muscle inferiorly.

Dissection.—Section the gluteus medius muscle (Plate 95) and reflect its portions, superiorly and inferiorly, to their attachments, where they may be cut away, as in Plate 99; note the vessels entering the anterior surface of the muscle. Follow the ramifications of the deep branches of the gluteal artery and the superior gluteal nerve, from their emergence into the gluteal region to their distribution. Clear the surface of the gluteus minimus muscle.

37. Internal Circumflex Artery, Plate 98.—The terminal portion of this artery (venæ comites) enters the inner side of the proximal portion of the posterior region of the thigh, between the quadratus femoris and adductor magnus muscles.

38. Deep Branches of the Gluteal Artery, Plate 99.—This artery (venæ comites) appears in the gluteal region superior to the internal portion of the pyriformis muscle, between it and the gluteus minimus muscle; it presents a superior and an inferior portion, which ramify between and supply the gluteus medius, and gluteus minimus muscles; the inferior portion also supplies the tensor vaginæ femoris muscle.

39. Superior Gluteal Nerve.—This nerve appears at the superior border of the pyriformis muscle; between it and the gluteus minimus muscle. Its emergence is external to that of the last-described artery. It divides into a superior and an inferior portion; they ramify between the gluteus medius and minimus muscles, and supply the same. The inferior portion also supplies the tensor vaginæ femoris muscle.

40. Gluteus Minimus Muscle, Plates 59, 91, 99, and 100.—This muscle is located upon the exterior surface of the ilial portion of the os innominatum, to which it is attached between the middle and the inferior curved lines of that bone (Fig. 1, Plate 91); inferiorly, it is attached to the anterior border of the trochanter major of the femur (Plate 59). Its internal border overlaps the superior border of the pyriformis muscle; its antero-external border is covered by the tensor vaginæ femoris muscle (Plate 61); on the removal of the latter it appears at the outer side of the proximal portion of the anterior surface of the thigh (Plates 62 to 65, inclusive; and Fig. 2, Plate 66).

Dissection.—Expose the internal pudic vessels and nerve, also the nerve to the obturator internus and the gemellus superior muscles, in the interval between the internal ends of the pyriformis muscle and the great sacro-sciatic ligament. Clear the surfaces of the gemellus superior, the obturator internus, and the gemellus inferior muscles; expose the proximal portion of the great sciatic nerve.

41. Pudic Artery, Plates 95 to 100, inclusive.—In the dissection of the interior of the pelvis this artery is described (page 75) and illustrated (Plates 39 and 40; Fig. 1, Plate 46). Emerging from the anterior surface of the internal portion of the pyriformis muscle it runs over the exterior of the spine of the ischium, and then enters the pelvic cavity by the small sacro-sciatic foramen; after it enters the pelvis, it ramifies upon the obturator internus muscle, along the interior of the external wall of the ischio-rectal fossa; this portion of its course has been described (pages 18 and 33) and illustrated (Plates 7, 13, and 14.

42. Pudic Nerve.—This nerve, branch from the sacral plexus, appears with the last-described artery and accompanies it upon the exterior face of the spine of the ischium; it enters the pelvic cavity, with the artery, by the small sacro-sciatic foramen. Its subsequent course with the artery, along the interior of the external wall of the ischio-rectal fossa, is described (page 18) and illustrated (Plates 7, 13, and 14).

43. Nerve to the Obturator Internus and the Gemellus Superior Muscles.—This nerve arises from the sacral plexus, and accompanies the pudic artery and nerve across the exterior surface of the spine of the ischium; running external to them. It re-enters the pelvis by the small sacro-sciatic foramen to supply the obturator internus muscle; before entering the foramen it sends a branch to the gemellus superior muscle.

44. Obturator Internus Muscle, Fig. 2, Plate 91, and Plates 95 to 100, inclusive.—The internal attachment of the obturator internus muscle and its portion within the pelvic cavity has been described (pages 17 and 84) and illustrated (Plates 39 and 40; and Fig. 1, Plate 46). It is projected into the deep plane of the gluteal region through the small sacro-sciatic foramen; it continues, externally, to its attachment to the trochanter major of the femur (Fig. 2, Plate 91).

45. Gemellus Superior Muscle.—This muscle is attached, internally, to the exterior surface of the spine of the ischium; it continues therefrom, externally, between the obturator internus and the pyriformis muscles, to where it fuses with the tendon of the obturator internus muscle.

46. Gemellus Inferior Muscle.—This muscle is attached, internally, to the exterior surface of the body of the ischium; it continues, externally, between the obturator internus and the quadratus femoris muscles, to where it blends with the tendon of the obturator internus muscle.

47. Compound Tendon of the Obturator Internus, Gemellus Superior, and Gemellus Inferior Muscles.—These three muscles join, at their external ends, forming a compound tendon, which is attached to the anterior portion of the internal face of the trochanter major of the femur (Fig. 2, Plate 91).

DISSECTION.—Section the quadratus femoris muscle (Plate 98), and reflect the portions of the muscle to the tuberosity of the ischium and the trochanter major of the femur, respectively; cut them away, as in Plate 99. Find the nerve and artery entering the anterior surface of the inner portion of the muscle; cut the nerve close to the muscle. Clear the posterior surface of the obturator externus muscle, and determine the internal circumflex artery and its branches.

48. Internal Circumflex Artery, Plates 98, 99, and 100.—This artery (venæ comites), branch of the profunda femoris (pages 117 and 119; Plates 63, 64, and 65; and Fig. 2, Plate 66), presents anterior to the quadratus femoris muscle, and there bifurcates; one branch is projected to the posterior region of the thigh between the quadratus femoris and the adductor magnus muscles (page 173); the other is an articular branch, which takes an external, and superior, course to the hip-joint.

49. Obturator Externus Muscle, Plates 95 to 100, inclusive; Plates 59, 66, and 91.—The anterior face of this muscle has been described (page 121) and illustrated (Plates 64, 65, and 66); the posterior face of its external portion is shown, as it appears upon the removal of the quadratus femoris muscle (Plate 99). Internally, it comes from the anterior surface of the pelvis (Plate 59); externally, it passes, parallel with, and inferiorly to the compound tendon of the obturator internus and the gemelli muscles, to its attachment, at the digital fossa on the internal face of the trochanter major of the femur.

DISSECTION.—Section the compound tendon of the obturator internus, the gemellus inferior, and the gemellus superior muscles (Plate 99); reflect the muscles internally. In reflecting the gemellus inferior muscle note its nerve supply. Determine the bursa anterior to the inner portion of the obturator internus muscle. Cut the obturator internus muscle at the small sacro-sciatic foramen and the gemelli muscles from their internal attachments, as in Plate 100. Section the obturator externus muscle (Plate 99); reflect it internally and cut it where it passes anterior to the tuberosity of the ischium, as in Plate 100.

50. Nerve to the Gemellus Inferior Muscle, Plates 99 and 100.—The nerve to this muscle enters its anterior face; it is a branch of the nerve to the quadratus femoris muscle.

51. Bursa of the Obturator Internus Muscle, Fig. 1, Plate 4.—This large bursa is anterior to the obturator internus muscle, near the small sacro-sciatic foramen.

DISSECTION.—Section the gluteal artery and the superior gluteal nerve (Plate 99) and clear away their branches; cut the gluteus minimus muscle (Plate 99) and reflect it, superiorly, to its ilial attachment, from which it may be cut away, as in Plate 100. Section the pyriformis muscle (Plate 99) and reflect it internally; cut it close to the great sacro-sciatic foramen, as in Plate 100. Follow the nerve to the quadratus femoris muscle, superiorly (Plate 99). Determine the parts passing through the great and small sacro-sciatic foramina.

52. Nerve to the Quadratus Femoris Muscle, Plates 99 and 100.—This nerve, from the sacral plexus, emerges from the pelvic cavity by the great sacro-sciatic foramen, from the anterior of the pyriformis muscle; it continues inferiorly, upon the bone (ischium), anterior to the gemellus superior, obturator internus, and gemellus inferior muscles; it sends a branch to the gemellus inferior muscle, and its terminal portion enters the anterior surface of the quadratus femoris muscle. It is accompanied by a small branch from the sciatic artery.

53. Parts Emerging at the Great Sacro-Sciatic Foramen, Plate 100.—The parts emerging from this foramen are: the pyriformis muscle; the pudic, the gluteal, and the sciatic arteries, with their comites veins; the great sciatic, the inferior and superior gluteal, the small sciatic, and the pudic nerves; also the nerves to the obturator internus and the quadratus femoris muscles.

54. Parts Passing through the Small Sacro-Sciatic Foramen.—The parts passing through this foramen are: from within outwards, the obturator internus muscle; from without inwards, the pudic artery and vein, the pudic nerve, and the nerve to the obturator internus muscle.

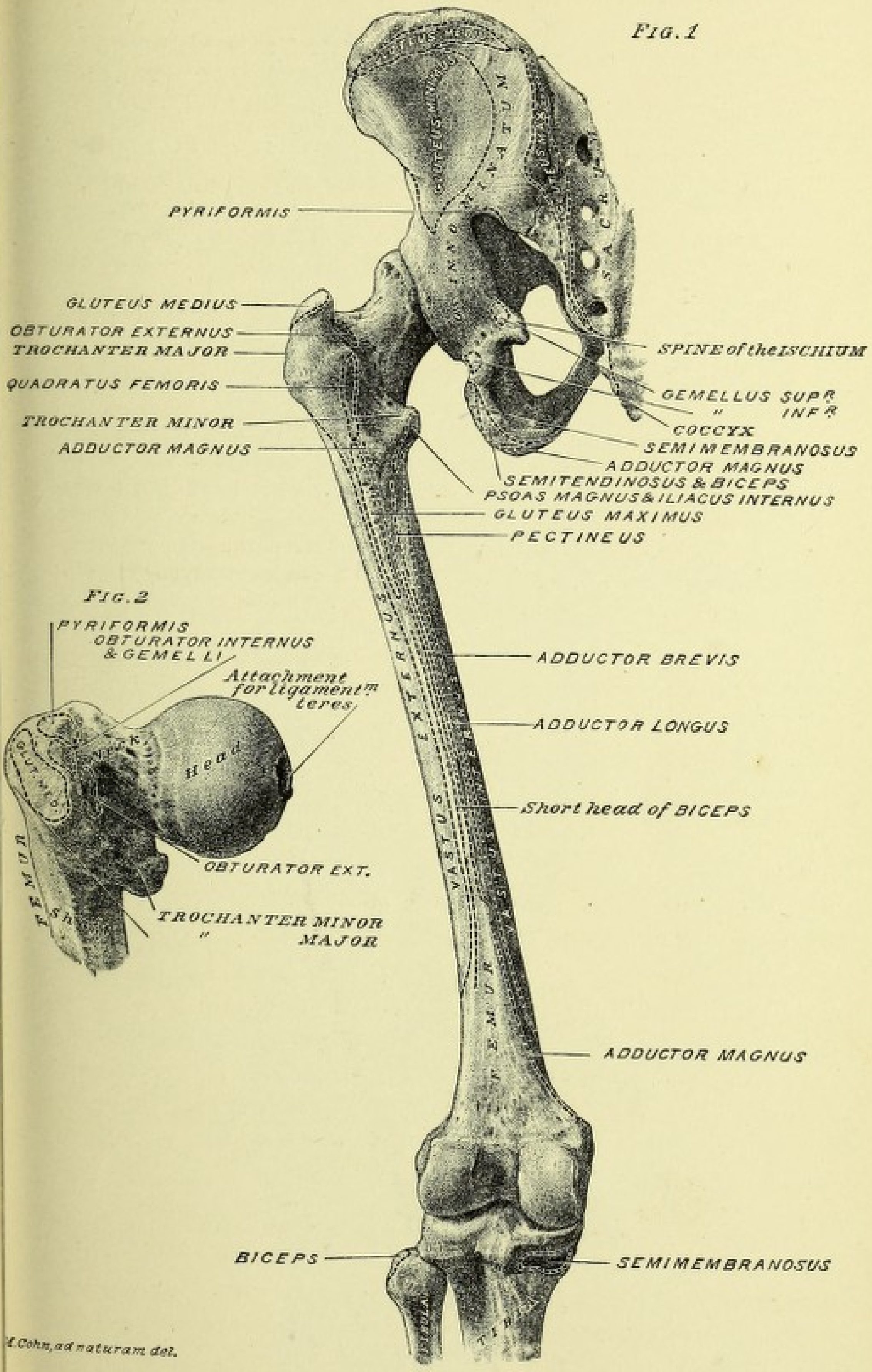
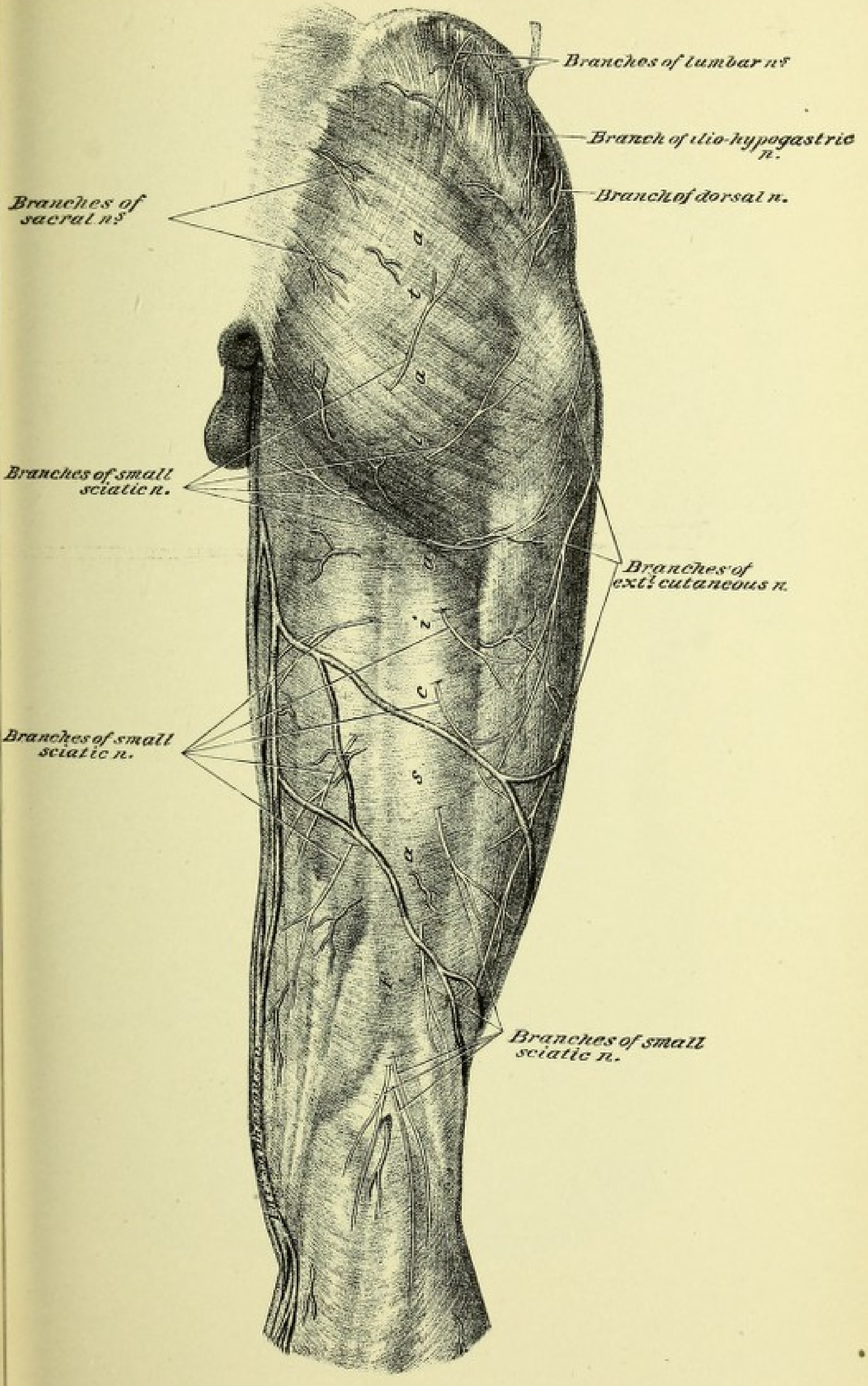
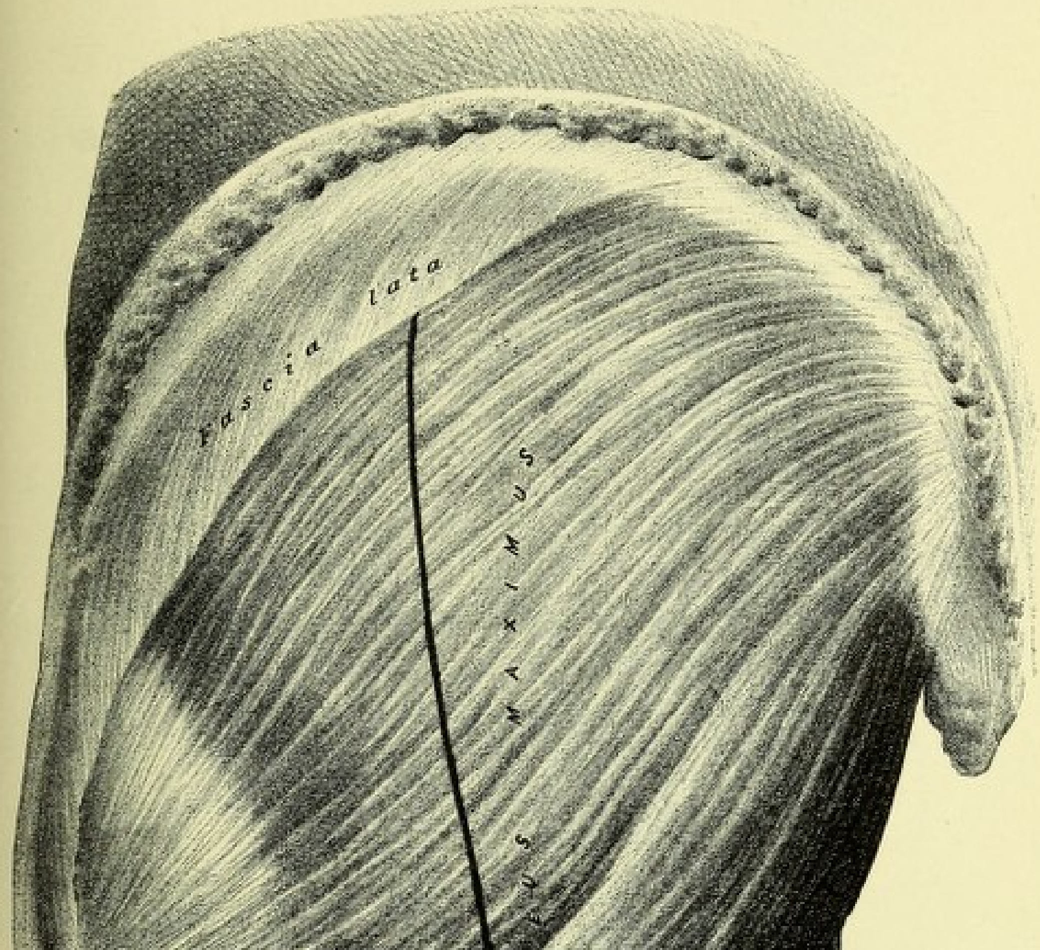


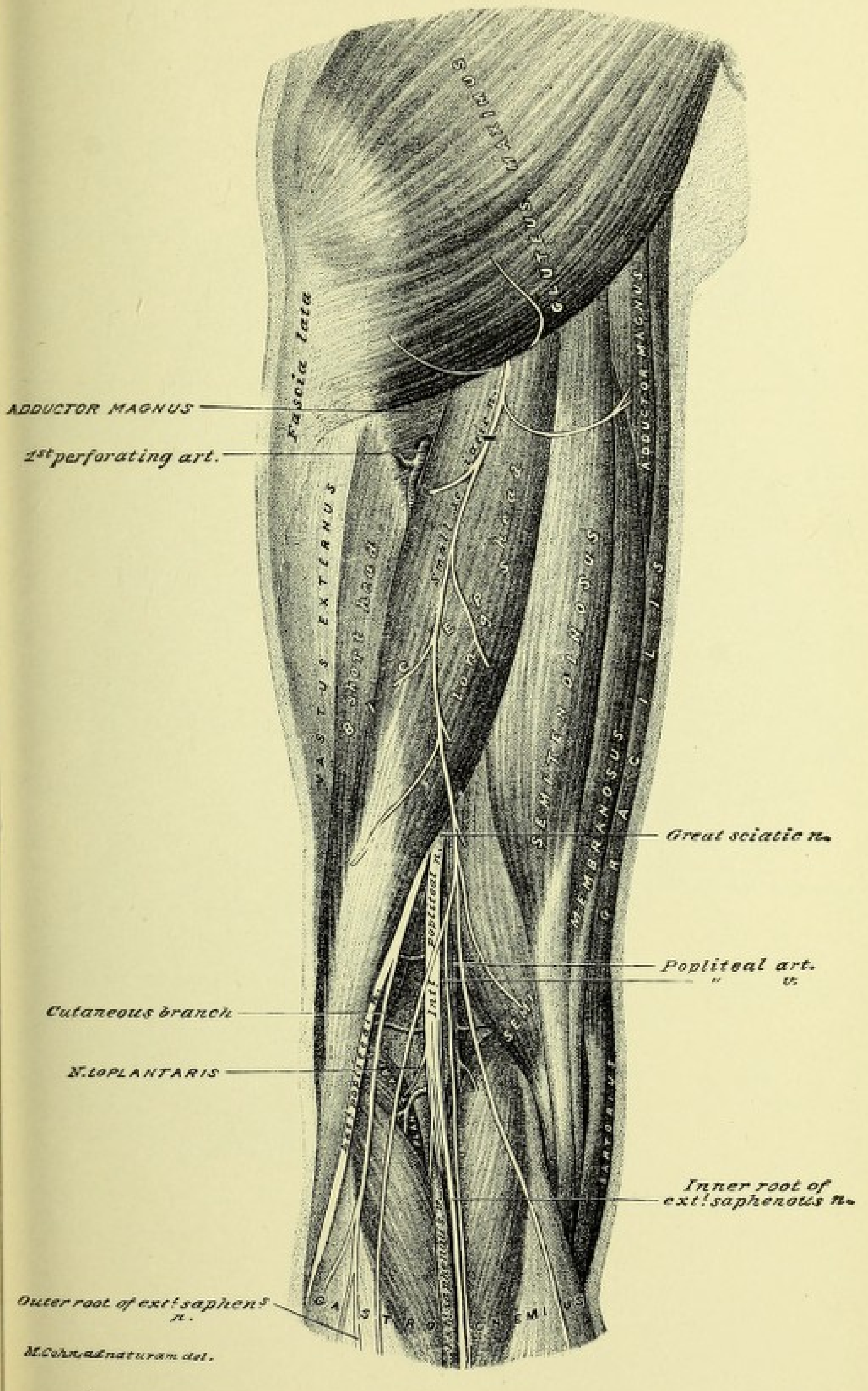
FIG. 1
PYRIFORMIS
GLUTEUS MEDIUS
OBTURATOR EXTERNUS
TROCHANTER MAJOR
QUADRATUS FEMORIS
TROCHANTER MINOR
ADDUCTOR MAGNUS
SPINE of the ISCHIUM
GEMELLUS SUPR.
" INFR.
COCCYX
SEMIMEMBRANOSUS
ADDUCTOR MAGNUS
SEMITENDINOSUS & BICEPS
PSOAS MAGNUS & ILIACUS INTERNUS
GLUTEUS MAXIMUS
PECTINEUS
ADDUCTOR BREVIS
ADDUCTOR LONGUS
Short head of BICEPS
ADDUCTOR MAGNUS
BICEPS
SEMIMEMBRANOSUS
VASTUS EXTERNUS
FEMUR
SACRUM
FIG. 2
PYRIFORMIS
OBTURATOR INTERNUS & GEMELLI
Attachment for ligamentm teres
Head
OBTURATOR EXT.
TROCHANTER MINOR
" MAJOR
FEMUR
M. Cohn, ad naturam del.


Branches of lumbar n^s
Branch of ilio-hypogastric n.
Branch of dorsal n.
Branches of sacral n^s
Branches of small sciatic n.
Branches of ext^l cutaneous n.
Branches of small sciatic n.
Branches of small sciatic n.



M. Cahr, ad naturam del.

PLATE 94



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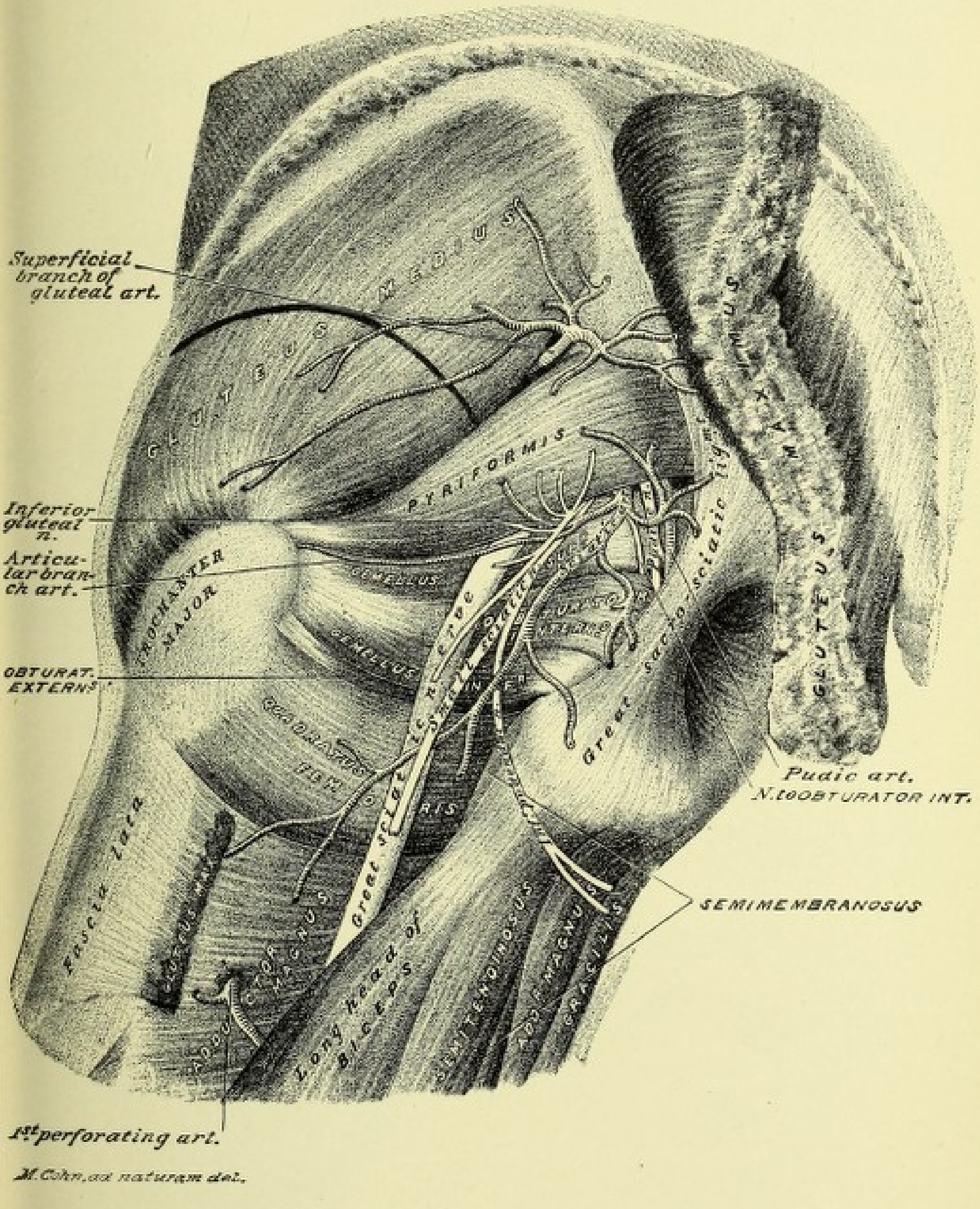

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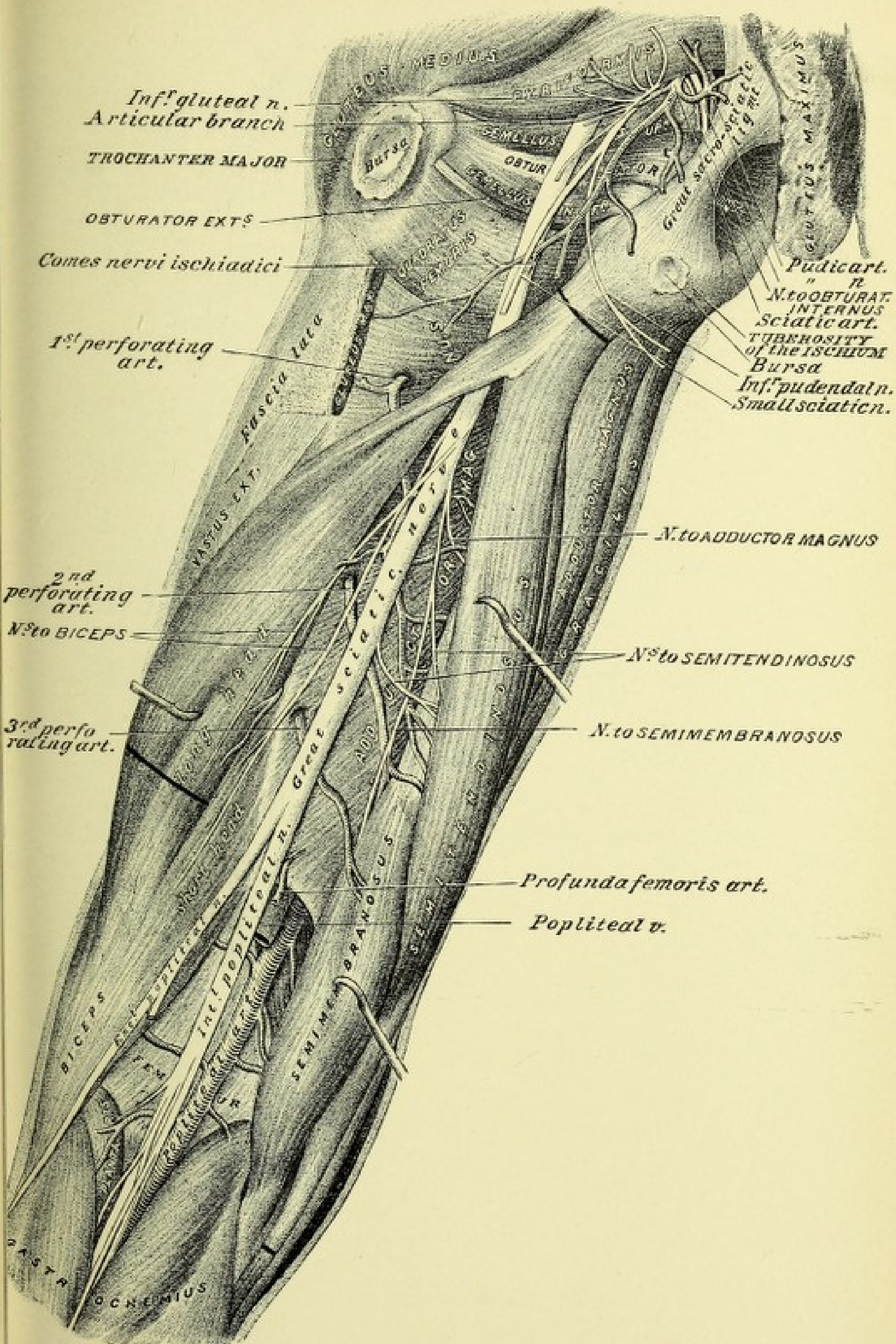

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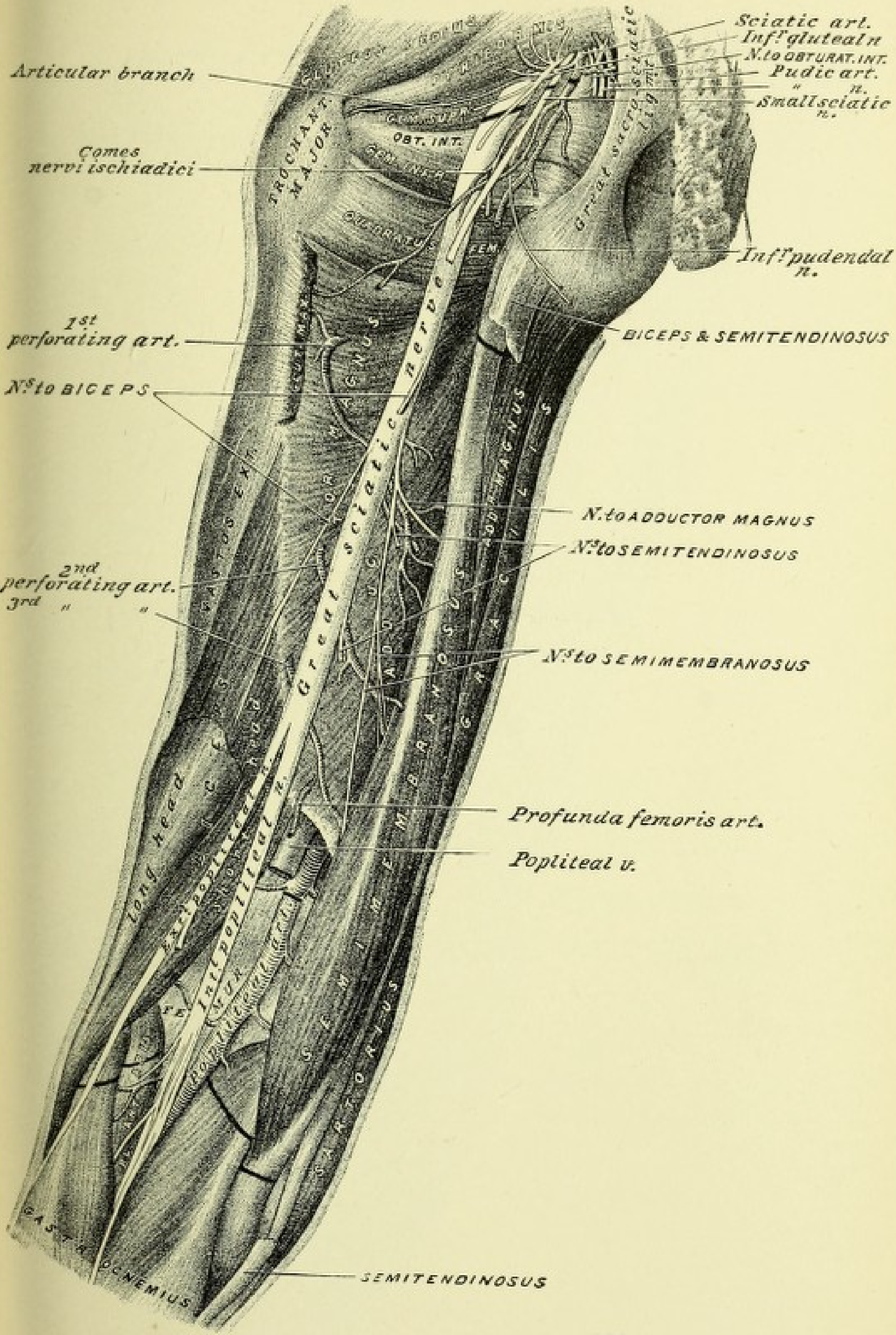
PLATE 97



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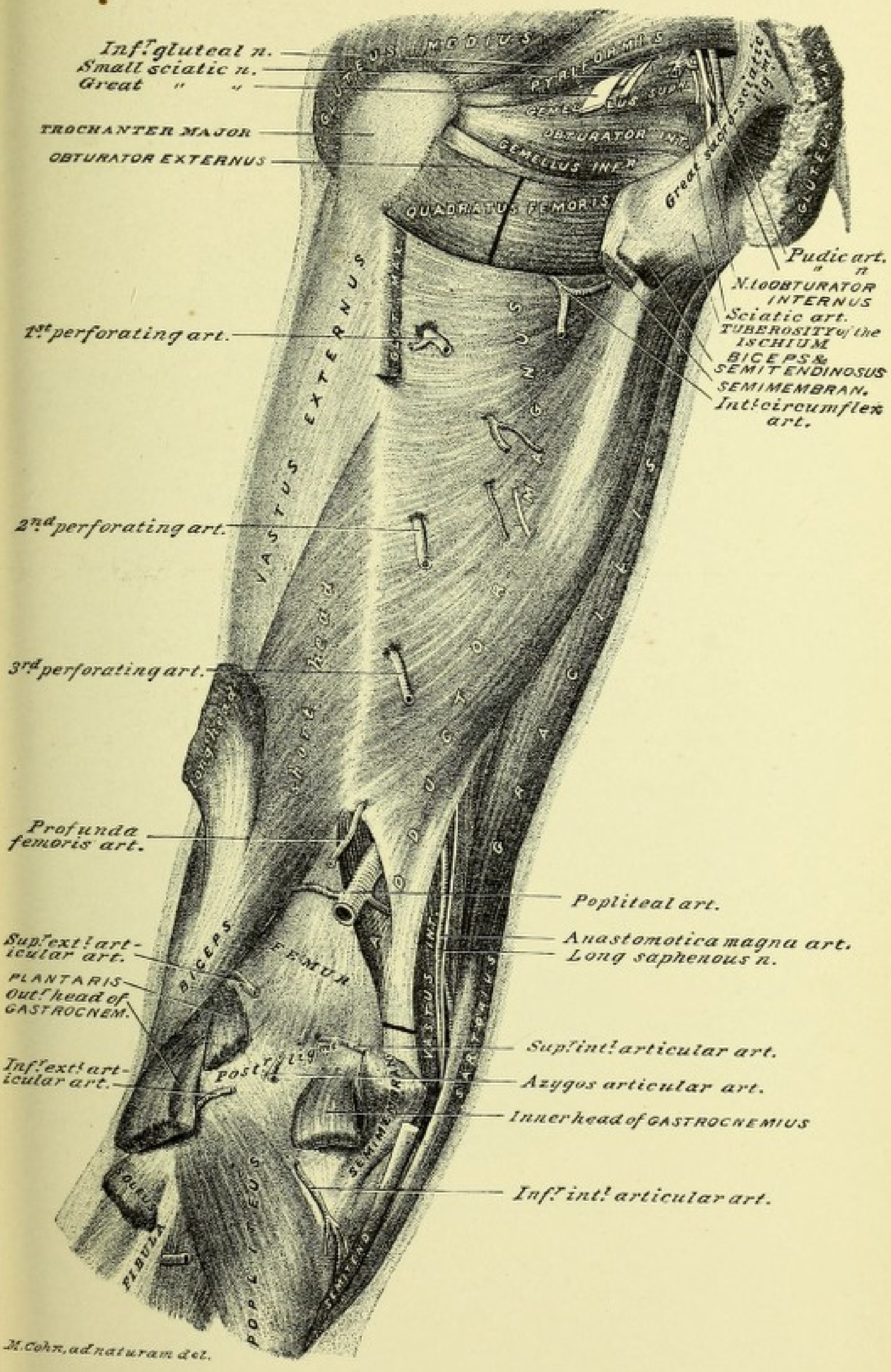
Infr. gluteal n.
Small sciatic n.
Great " "
TROCHANTER MAJOR
OBTURATOR EXTERNUS
GLUTEUS MEDIUS
PYRIFORMIS
GEMELLUS SUPR.
OBTURATOR INT.
GEMELLUS INFR.
QUADRATUS FEMORIS
Great sacro-sciatic ligt.
GLUTEUS MAX.
Pudic art.
" "
N. to OBTURATOR INTERNUS
Sciatic art.
TUBEROSITY of the ISCHIUM
BICEPS & SEMITENDINOSUS
SEMIMEMBRAN.
Intl. circumflex art.
1st perforating art.
VASTUS EXTERNUS
ADDUCTOR MAGNUS
2nd perforating art.
3rd perforating art.
GRACILIS
Profunda femoris art.
Popliteal art.
Anastomotica magna art.
Long saphenous n.
BICEPS
FEMUR
Supr. extl. articular art.
PLANTARIS
Outr. head of GASTROCNEM.
Supr. intl. articular art.
Azygos articular art.
Inner head of GASTROCNEMIUS
Infr. extl. articular art.
Post. ligt.
Infr. intl. articular art.
VASTUS INT.
SARTORIUS
SEMIMEMBRAN.
POPLITEUS
FIBULA
M. Cohn, ad naturam del.

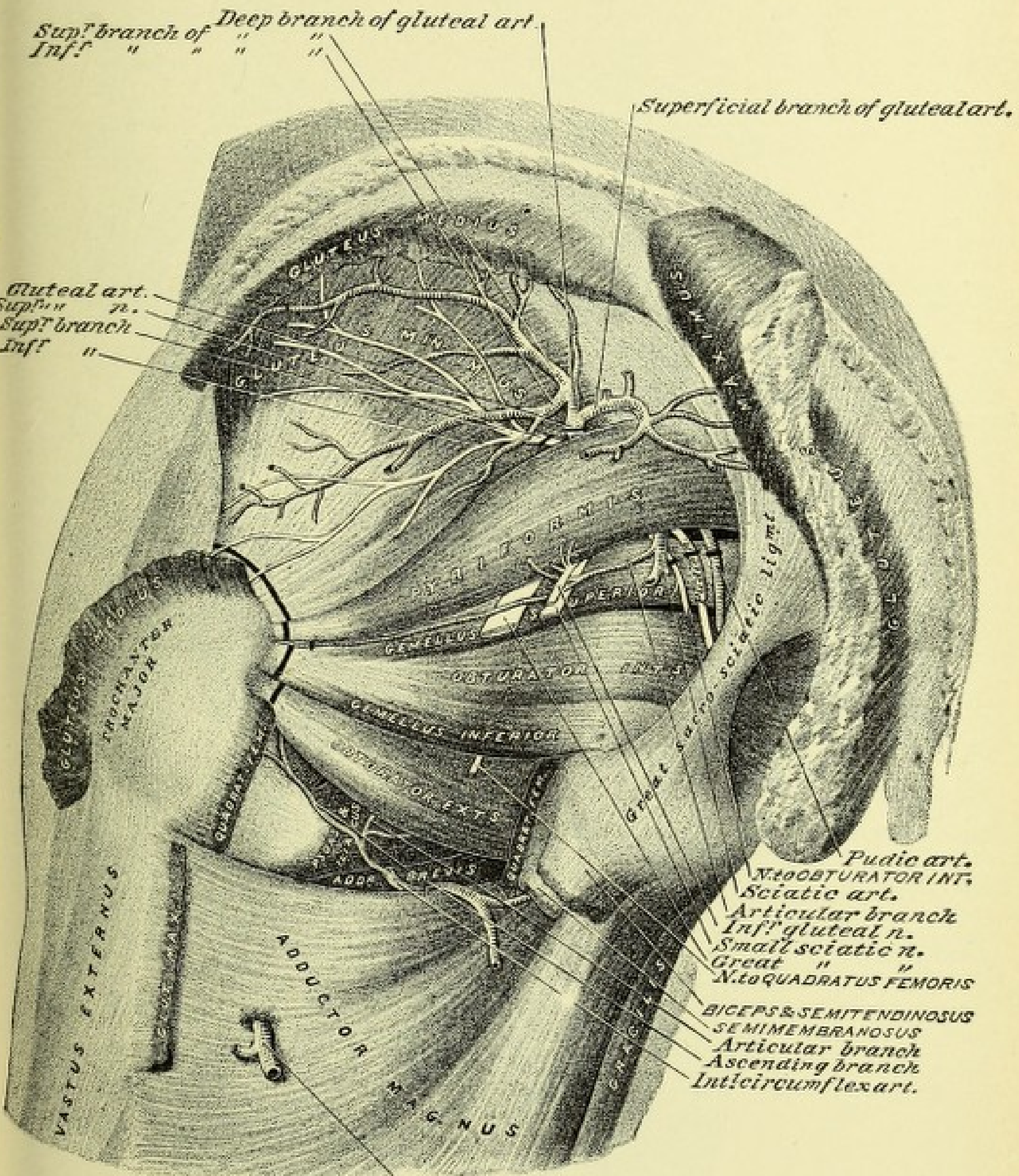

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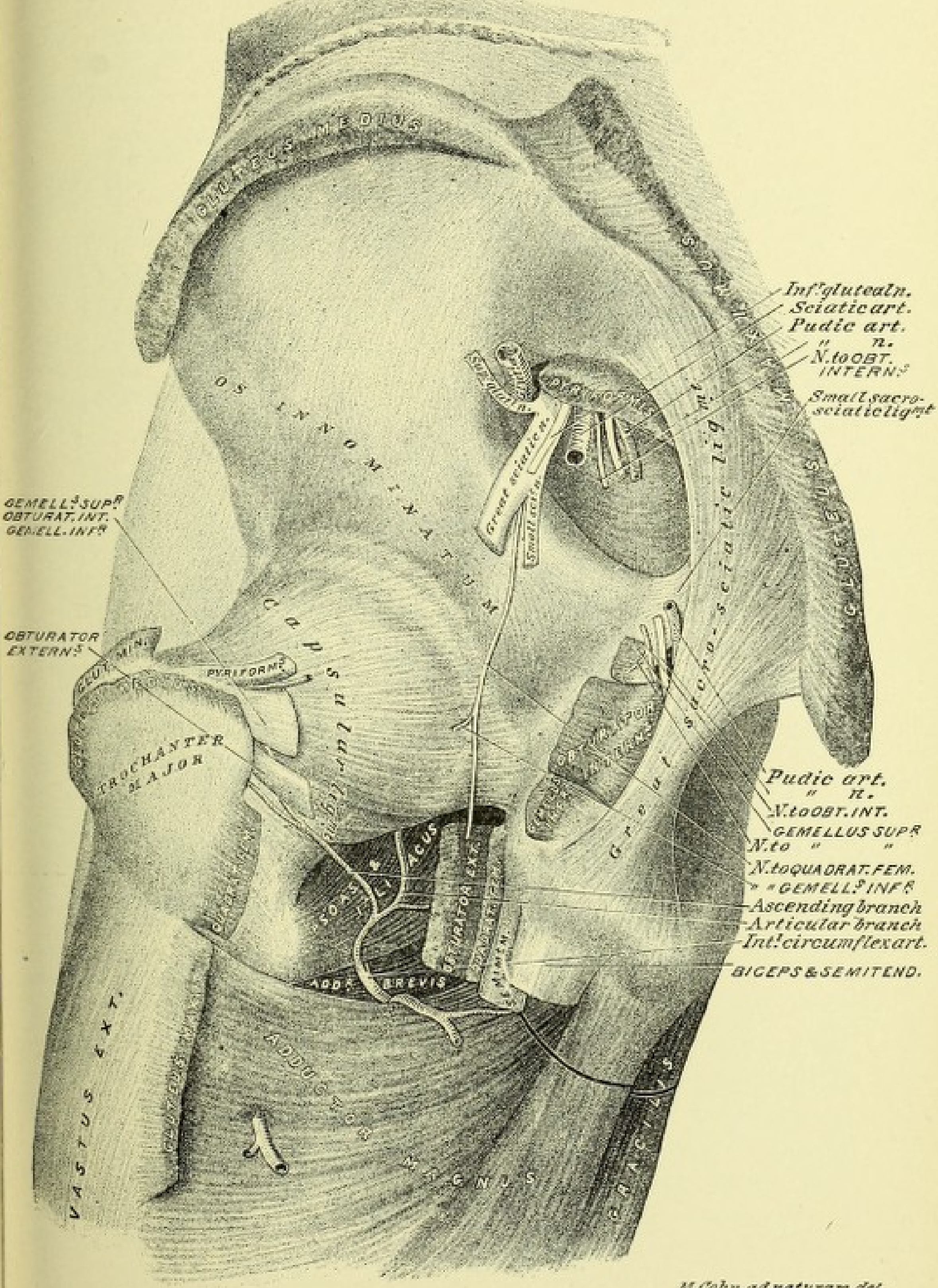
PLATE 100



M. Cohn, ad naturam del.

FOURTEENTH DISSECTION.

ARTICULATIONS OF ANKLE, FOOT, LEG, KNEE, AND HIP.

DISSECTION.—At this stage of the dissection of the lower extremity the vertebral column should be disarticulated, between the fourth and fifth lumbar vertebræ, so as to allow the limbs to be turned, as the dissection of their articulations may require. (The dissectors of the back will by this time have completed their work.)

ARTICULATION OF THE ANKLE.

DISSECTION.—Raise the knee by blocks so as to flex it over them, and allow the foot to rest on the table.

Terms of Relation.—The terms *distal* (from the trunk), *proximal* (toward the trunk), *anterior surface*, *posterior surface*, *inner side*, and *outer side* will be used.

Bones of the Ankle-Joint, Plates 68 and 83.—The bones directly concerned in the construction of this joint are: the astragalus at its distal side; the articulated tibia and fibula (by the inferior (distal) tibio-fibular articulation) at its proximal side. The calcaneum contributes to this joint, in affording partial attachments to its lateral ligaments.

DISSECTION.—Clear the surfaces of the external lateral, the internal lateral, and the anterior ligaments.

1. External Lateral Ligament, Plates 101 and 103.—This ligament has its proximal attachment to the distal end of the fibula (external malleolus); it spreads, by three slips, to its distal attachments: an anterior, to the outer side of the neck of the astragalus; a middle, to the outer surface of the calcaneum; a posterior, to the outer side of the body of the astragalus.

2. Internal Lateral Ligament, Plates 102 and 103.—This ligament has its proximal attachment to the distal end of the tibia; it spreads, deltoid-shaped, over the inner side of the ankle-joint to its distal attachment, to the astragalus and the border of the sustentaculum tali of the calcaneum (Plate 75).

3. Anterior Ligament, Plates 101 and 103; Fig. 1, Plate 102.—This ligament has its proximal attachment to the anterior borders of the distal ends of the tibia and fibula; it bridges across the joint, to its distal attachment to the inner, the dorsal, and the outer surfaces of the distal portion of the neck of the astragalus. Some of its superficial fibres are continued to the dorsal surface and the inner side of the scaphoid bone, blending with the dorsal astragalo-scaphoid ligament. At its inner side it meets the internal lateral ligament; at its outer side is the anterior slip of the external lateral ligament.

Dissection.—Turn the limb so as to bring the posterior surface of the ankle-joint uppermost; flex the foot. Clear the ligaments at the posterior face of the joint.

4. External and Internal Lateral Ligaments of the Ankle-Joint, Fig. 2, Plate 102.—At the outer side of the posterior face of the ankle-joint is seen the posterior slip of the external lateral ligament; at its inner side the posterior border of the internal lateral ligament presents.

5. Posterior Ligament.—This ligament consists of scattered fibres that pass from the outer lip of the groove on the posterior surface of the distal end of the tibia (for the tendons of the flexor longus digitorum and the tibialis posticus muscles), to the posterior surface of the body of the astragalus.

ARTICULATIONS OF THE FOOT.

Dissection.—Place the limb in the same position as for the dissection of the ankle-joint (page 177). Cut the tendons of the tibialis posticus and the tibialis anticus muscles, as in Plate 103; reflect their proximal portions to the proximal side of the ankle, where they may be cut.

Terms of Relation.—The terms *plantar surface, dorsal surface, outer side, inner side, proximal* (toward the heel), and *distal* (from the heel) will be applied to indicate position and direction of ligaments. The regions of the foot will be designated as *digital, metatarsal,* and *tarsal.*

Bones of the Foot, Plates 68 and 75.—Twenty-six bones enter into the construction of the foot. In the digital region there are fourteen (page 123). In the metatarsal region five: the *five metatarsals.* In the tarsal region seven: the *three cuneiform*—internal, middle, and external; the *cuboid;* the *scaphoid;* the *calcaneum;* and the *astragalus.* The dorsal, the plantar, and some of the lateral surfaces of the bones present areas for the attachments of ligaments.

Articulations of the Foot.—The twenty-six bones of the foot form the following articulations: the *nine digital,* by which the fourteen bones of the digital region are arranged into the five digits; the *five metatarso-phalangeal,* which join the digits to the heads of the metatarsal bones; the *cuneo-metatarsal,* or the joining of the first, second, and third metatarsals with the internal, middle, and external cuneiform, respectively; the *cubo-metatarsal,* the contiguity of the fourth and fifth metatarsals with the cuboid; the *intercuneiform,* the three cuneiform with each other; the *cubo-cuneiform,* the cuboid with the external cuneiform; the *scapho-cuneiform,* the three cuneiform with the scaphoid; the *scapho-cuboid,* the cuboid with the scaphoid; the *calcaneo-cuboid,* the cuboid with the calcaneum; the *astragalo-scaphoid,* the scaphoid with the distal end of the astragalus; the *astragalo-calcaneal,* the superior surface of the calcaneum to the inferior surface of the astragalus.

Dissection.—Clear the dorsal, the plantar, and the lateral surfaces of the digital articulations; expose the ligaments at these surfaces respectively.

1. Articulations of the Digits, Plates 104 and 101; Fig. 1, Plate 102.—These nine articulations have each four ligaments: two lateral, a dorsal, and a plantar. The *lateral ligaments* are situated one at either side of each joint, in the dorsal half of the lateral surfaces of the digit. The *dorsal ligament* occupies the dorsal surfaces of the joint between the dorsal borders of the lateral ligaments. (Some authors ignore this ligament, others regard it as the dorsal portion of the synovial membrane of the joint.) The *plantar ligament* (Fig. 2, Plate 104) fills the space between the plantar borders of the lateral ligaments, bridging between the plantar surfaces of the bones forming the joint. It includes a plate of fibro-cartilage, whose plantar surface is covered by the sheath of the flexor tendons of the digit.

DISSECTION.—Clear the surfaces of the metatarso-phalangeal articulations. Expose the four distal intermetatarsal interosseous ligaments.

2. Metatarso-Phalangeal Articulations.—These joints, five in number, have the same construction as the digital. The plantar ligaments (Figs. 2 and 3, Plate 104) differ from those of the digits in that the plates of fibro-cartilage are much thicker. The two sesamoid bones opposite the joint of the first digit take the place of the fibro-cartilage plates of the joints of the other digits (page 149 ; Fig. 1, Plate 82).

3. Distal Intermetatarsal Ligaments, Figs. 1 and 2, Plate 104.—These four interosseous ligaments bridge between the plantar halves, of the opposed surfaces, of the distal ends of the metatarsal bones.

DISSECTION.—Expose the dorsal ligaments: intermetatarsal; cuneo-metatarsal; cubo-metatarsal; intercuneiform; cuneo-cuboid; scapho-cuneiform; and scapho-cuboid.

4. Dorsal Intermetatarsal Ligaments, Plates 101 and 103.—These ligaments, three in number, pass between the dorsal surfaces of the proximal ends of the second, third, fourth, and fifth metatarsal bones.

5. Dorsal Cuneo-Metatarsal Ligaments, Plates 101 and 103 ; Fig. 1, Plate 102.—These ligaments pass from the dorsal surfaces of the first, second, third, and fourth metatarsal bones to the dorsal surfaces of the three cuneiform bones : from the first and second to the internal cuneiform ; from the second to the middle cuneiform ; from the second, third, and fourth to the external cuneiform. At the inner side of the articulation of the first metatarsal with the internal cuneiform the dorsal cuneo-metatarsal ligament passes to the plantar plane of the joint, to become continuous with its plantar ligament.

6. Dorsal Cubo-Metatarsal Ligaments, Plates 101 and 103.—These ligaments bridge from the bases of the fourth and fifth metatarsal bones to the cuboid bone.

7. Dorsal Intercuneiform and Cuneo-Cuboid Ligaments.—These ligaments are three in number: two intercuneiform, between the three cuneiform bones; one cuneo-cuboid, between the cuboid and the external cuneiform.

8. Dorsal Scapho-Cuneiform Ligaments, Plates 101 and 103; Fig. 1, Plate 102.—These ligaments, three in number, pass from the internal, middle, and external cuneiform bones to the scaphoid. The internal dorsal scapho-cuneiform ligament continues over the inner border of the foot to the plantar region, where it meets the internal plantar scapho-cuneiform ligament.

9. Dorsal Scapho-Cuboid Ligament, Plates 101 and 103.—This ligament bridges from the inner side of the cuboid to the scaphoid bone.

DISSECTION.—Section the tendons of the peroneus brevis and longus muscles (Plate 103); depress the longus tendon so as to expose its entrance into the groove on the plantar surface of the cuboid bone (Plate 101). Reflect the proximal ends of the peronei muscles to the posterior surface of the fibula, where they may be cut.

10. Tendons of the Peroneus Brevis and the Peroneus Longus Muscles.—These tendons appear along the outer side of the tarsal region of the foot, from the posterior surface of the distal end of the fibula; they pass to their respective attachments, as before described (page 129).

DISSECTION.—Expose the dorsal calcaneo-cuboid ligament; also, the outer borders of the short and long calcaneo-cuboid ligaments of the plantar region.

11. Dorsal Calcaneo-Cuboid Ligament.—This ligament passes from the dorsal surface of the cuboid bone to that of the distal end of the calcaneum. Its fibres are continued upon the outer side of the opposed bones into the plantar region of the foot, where they meet the fibres of the short calcaneo-cuboid ligament.

12. Dorsal Calcaneo-Scaphoid Ligament.—This ligament bridges from the outer side of the scaphoid to the dorsal surface of the distal end of the calcaneum.

13. External Astragalo-Calcaneal Ligament, Plates 101 and 103; Fig. 2, Plate 106.—This ligament is located at the outer side of the astragalus, from the dorsal surface of the distal, and inner, portion of the calcaneum to the outer side of the neck of the astragalus.

14. Dorsal Astragalo-Scaphoid Ligament, Plates 103 and 101; Fig. 1, Plate 102.—This ligament crosses from the dorsal surface and the inner side of the scaphoid to the same surface and side of the head of the astragalus. The superficial fibres of the anterior ligament of the ankle-joint fuse with this ligament, so as to make it appear as if the anterior ligament was attached to the scaphoid bone (page 178). The inner portion of this ligament winds upon the inner face of the joint between the two bones, to the plantar region, where it meets the plantar calcaneo-scaphoid ligament (Fig. 1, Plate 106).

DISSECTION.—Extend the foot, with its plantar surface uppermost. Clear the surface of the ligaments and tendons of the plantar region, cutting away all muscles, vessels, etc.

15. Plantar Intermetatarsal Ligaments, Plate 105; Fig. 1, Plate 106.—These ligaments, three in number, bridge between the plantar surfaces of the proximal ends of the second, third, fourth, and fifth metatarsal bones.

16. Long Calcaneo-Cuboid Ligament.—This superficial ligament, of the plantar region, has a proximal attachment to the distal half of the plantar surface of the calcaneum. Its distal attachments are: its deep fibres, to the proximal border of the peroneal groove of the cuboid bone; its superficial fibres spread as expansions across the plantar surface of the tendon of the peroneus longus muscle, which are attached to the proximal ends of all the metatarsal bones—the strongest being those to the third, fourth, and fifth metatarsal bones. The plantar surface of the metatarsal expansions of this ligament affords attachments to the adductor pollicis and the flexor brevis minimi digiti muscles.

17. Tendon of the Tibialis Posticus Muscle, Plate 105.—The plantar portion of the tendon of this muscle was referred to in the eleventh and twelfth dissections (pages 145 and 162). It passes directly to its primary attachment to the tubercle of the scaphoid bone—on its way thereto it projects an attachment to the sustentaculum tali of the calcaneum. Superficial fibres of the tendon expand: a direct slip passes to the plantar surface of the internal cuneiform bone; a deflected portion passes, to the outer side, to the dorsal surface of the long calcaneo-cuboid ligament, and distally, to the dorsal surface of the tendon of the peroneus longus muscle.

18. Tendon of the Tibialis Anticus Muscle, Fig. 1, Plate 102; Plate 105; Fig. 1, Plate 106.—The tendon of this muscle winds over the inner border of the tarsal region, to its plantar attachments, to the internal cuneiform bone and the proximal end of the first metatarsal bone.

Dissection.—Section the long calcaneo-cuboid ligament (Plate 105); reflect the distal portion to its cuboid and metatarsal attachments, and the proximal portion to the calcaneum; cut the ligament away, as in Fig. 1, Plate 106. Demonstrate the course, lodgement, and attachment of the tendon of the peroneus longus muscle, and cut it away (Fig. 1, Plate 106). Cut the tendon of the tibialis posticus muscle; clear away its calcaneal and internal cuneiform expansions; section its outer and distal expansions and trace them to their several attachments. Clear the surfaces of the plantar scapho-cuboid, the short calcaneo-cuboid, and the plantar calcaneo-scaphoid ligaments.

19. Fibro-Osseous Canal for the Tendon of the Peroneus Longus Muscle, Plate 105; Fig. 1, Plate 106.—The plantar portion of this tendon passes from the outer border of the tarsal region, at the cuboid bone, to its attachment to the outer side of the proximal end of the first metatarsal bone. In its first portion, it is lodged in the plantar groove of the cuboid bone; in its second portion, it lies between the expansions of the long calcaneo-cuboid ligament, at its plantar surface, and the expansions of the tibialis posticus tendon, at its dorsal surface. As lodged it is invested by a synovial sheath, which is closed at its outer end (Plate 101).

20. Expansions of the Tendon of the Tibialis Posticus Muscle, Fig. 1, Plate 106.—The plantar attachments of this tendon have been partly described above—to the scaphoid, the calcaneum, and the internal cuneiform bones. The deflected portion may now be traced: to the cuboid bone; to the middle and external cuneiform bones; and to the proximal ends of the metatarsal bones, second to fifth, inclusive.

21. Plantar Scapho-Cuboid Ligament. — This ligament passes from the cuboid to the scaphoid bone.

22. Short Calcaneo-Cuboid Ligament, Plate 105; Fig. 1, Plate 106.—This ligament is located at the dorsal surface of the long ligament. It is a short band of fibres between the plantar surfaces of the two bones. At its outer side it meets the fibres of the dorsal calcaneo-cuboid ligament (page 181; Plate 101), that are continued over the outer border of the tarsus.

23. Plantar Calcaneo-Scaphoid Ligament.—This is a strong band of fibrous tissue, which bridges from the calcaneum to the scaphoid bone; on its dorsal surface is lodged the head of the astragalus. At its inner border it is met by the fibres of the dorsal astragalo-scaphoid ligament (page 182; Fig. 1, Plate 102), that are continued over the inner border of the tarsal region.

Dissection.—Dissect away the metatarsal expansions of the tendon of the tibialis posticus muscle (Fig. 1, Plate 106). Expose the plantar cubo-metatarsal, cuneo-metatarsal, intercuneiform, cuneo-cuboid, and scapho-cuneiform ligaments.

24. Plantar Cubo-Metatarsal Ligaments, Fig. 1, Plate 106.—These ligaments unite the fifth and fourth metatarsal bones to the cuboid bone.

25. Plantar Cuneo-Metatarsal Ligaments. — These ligaments pass from the plantar surfaces of the proximal ends of the first, second, and third metatarsal bones to those of the internal, middle, and external cuneiform bones.

26. Plantar Intercuneiform Ligaments.—These ligaments, two in number, bridge between the plantar surfaces of the three contiguous cuneiform bones, as do the dorsal ligaments (Plate 103); they are not as well marked as the dorsal.

27. Plantar Cuneo-Cuboid Ligament. — This ligament crosses from the plantar surface of the cuboid to the same of the external cuneiform bone.

28. Plantar Scapho-Cuneiform Ligaments. — These ligaments, three in number, bind the three cuneiform bones to the scaphoid bone.

Dissection.—Disarticulate the metatarsal bones from the three cuneiform and the cuboid bones; cut apart the bases of the metatarsal bones; disarticulate the cuboid and scaphoid bones from the calcaneum and astragalus; separate the scaphoid from the cuboid; stand the three cuneiform and the cuboid bones upon their distal surfaces, clear away their plantar ligaments, and spread the bones apart (Fig. 3, Plate 106); section the ligaments of the ankle-joint; turn off the astragalus from the calcaneum (Fig. 2, Plate 106). In making these disarticulations note the interosseous ligaments that present passing between the opposed surfaces of the bones.

29. Interosseous Ligaments of the Metatarsus and Tarsus.—Between the surfaces of the bases of the metatarsal bones are four proximal interosseous ligaments (Fig. 3, Plate 104). Ligaments unite the internal cuneiform to the second metatarsal, and the external cuneiform to the fourth metatarsal. At the opposed angles of the scaphoid and cuboid bones a ligament passes, and an offshoot from it joins them to the contiguous angle of the calcaneum. Between the plantar halves of the opposed surfaces of the three cuneiform and the cuboid bones ligaments bridge (Fig. 3, Plate 106). A posterior astragalo-calcaneal ligament passes from the dorsum of the calcaneum to the posterior border of the astragalus (Fig. 2, Plate 102). The opposed surfaces of the calcaneum and the astragalus are united by an interosseous ligament (Fig. 2, Plate 106).

ARTICULATIONS OF THE TIBIA AND FIBULA.

Terms of Relation.—Same as for the description of the ankle-joint (page 177).

Bones and Articulations, Fig. 1, Plate 67; Plate 83.—The bones are: the tibia and the fibula. The articulations are: the inferior (distal) tibio-fibular and the superior (proximal) tibio-fibular; the shafts of the bones are bound to each other by an interosseous ligament.

Dissection.—Clear the anterior and posterior surfaces of the inferior (distal) tibio-fibular articulation. Dissect away the posterior (inferior) distal tibio-fibular ligament, so as to expose the interosseous ligament of the joint.

1. Inferior (Distal) Tibio-Fibular Articulation, Plates 101 and 103; Fig. 2, Plate 102.—This articulation is formed by the distal ends of the fibula and tibia. Its ligaments are: anterior, posterior, and interosseous. The *anterior inferior* (*distal*) *tibio-fibular ligament* extends, obliquely, from the anterior and inner border of the distal end of the fibula to the anterior and outer border of the distal end of the tibia. The *posterior inferior (distal) tibio-fibular ligament* bridges, obliquely, from the inner lip of the groove (for the tendons of the peroneus longus and brevis muscles) on the posterior surface of the distal end of the fibula, to the posterior surface of the distal end of the tibia. Cutting away the last-described ligament the *inferior (distal) interosseous tibio-fibular ligament* is seen between the opposed surfaces of the bones.

DISSECTION.—Clear the anterior and posterior surfaces of the shafts of the tibia and fibula, and those of the tibio-fibular interosseous ligament between them. Note the areas of the muscle attachments.

2. Muscle Attachments to the Shafts of the Tibia and Fibula and to the Interosseous Ligament, Plates 67 and 83.—To their posterior surfaces are attached : the flexor longus digitorum, the tibialis posticus, the soleus, and the popliteus, to the tibia; the flexor longus pollicis, the tibialis posticus, and the soleus, to the fibula; the tibialis posticus, to the interosseous ligament. To the outer surface of the fibula: the peroneus longus and the peroneus brevis muscles. To the anterior and inner surfaces of the fibula the extensor longus digitorum, peroneus tertius, and flexor proprius pollicis muscles. To the outer surface of the tibia: the tibialis anticus muscle.

3. Tibio-Fibular Interosseous Ligament, Fig. 1, Plate 67; and Plate 83.—This ligament bridges from the inner border of the shaft of the fibula to the outer border of the shaft of the tibia. It presents a distal opening for the transit of the anterior peroneal artery (page 162; Plate 90); a proximal one for the anterior tibial artery (page 132; Plate 74); and intermediate ones for branches of the anterior tibial artery.

DISSECTION.—Clear the anterior and posterior surfaces of the superior (proximal) tibio-fibular articulation. Preserve the stumps of the attachments of the soleus and biceps muscles, to the fibula; also, the external lateral and posterior ligaments of the knee-joint.

4. Superior (Proximal) Tibio-Fibular Articulation, Plate 107; Fig. 2, Plate 108; Fig. 1, Plate 109.—This joint is formed by the opposing of the proximal end of the fibula to the facet on the distal surface of the outer tuberosity of the tibia. The ligaments are: an anterior and a posterior. The *anterior* *superior* (*proximal*) *tibio-fibular ligament* passes from the inner border of the anterior surface of the proximal end of the fibula to the outer tuberosity of the tibia. The *posterior superior* (*proximal*) *tibio-fibular ligament* bridges from the border of the posterior surface of the proximal end of the fibula to the outer tuberosity of the tibia. The external lateral ligament of the knee-joint, by its distal attachment to the proximal end of the fibula, is accessory to this joint (Fig. 1, Plate 107).

ARTICULATION OF THE KNEE.

Terms of Relation.—The terms in the description of this articulation are those used for the ankle (page 177).

Bones of the Knee-joint, Plates 59, 83, and 91.—The bones which enter into the construction of the knee-joint are: the tibia, the femur, and the patella, directly; with the fibula, indirectly, in its affording attachment to a ligament of the joint.

DISSECTION.—Clear the posterior, the lateral, and the anterior surfaces of the knee-joint, preserving the muscle attachments in its vicinity.

1. Muscle Attachments to the Surfaces of the Knee, Plates 59, 67, 83, 107, 108, and 109; Figs. 1 and 2 of Plate 110.—To the *tibia* are attached: the quadriceps extensor femoris muscle (page 115), at the tubercle of the bone (ligamentum patellæ) and at the antero-lateral surfaces of the tuberosities (lateral expansions of the aponeurosis); the compound aponeurosis of the sartorius, the semitendinosus, and the gracilis muscles to the antero-lateral face of the inner tuberosity; the semimembranosus and the popliteus, to the posterior surface of the inner tuberosity. To the *fibula:* the biceps and the soleus. To the *patella:* included as this bone is (sesamoid bone) in the compound aponeurosis of the quadriceps extensor femoris muscle, it receives, at the anterior surface of its proximal and lateral borders, the four muscles contributed to the aponeurosis (Plate 59); the latter projects from its distal tip and lateral borders as the ligamentum patellæ and lateral expansions of the aponeurosis. To the *femur:* the plantaris and gastrocnemius (outer head), to the proximal side of the outer condyle; the adductor magnus and gastrocnemius (inner head), to the proximal side of the inner condyle; the popliteus, to the outer face of the outer condyle (Fig. 2, Plate 110).

2. **Posterior Ligament,** Fig. 2, Plate 108.—This ligament has its distal attachment to the tibia; its proximal attachment is to the femur, at the proximal side of its condyles. It meets on either side the posterior borders of the respective lateral ligaments of the joint. At its inner side it is contributed to by the tendon of the semimembranosus muscle (page 171). At its middle it is perforated by the azygos articular branch of the popliteal artery, and by the articular branches from the internal popliteal and obturator (page 118; Plate 64) nerves.

3. **External Lateral Ligament,** Fig. 1, Plate 107.—This, a short, round ligament, bridges from the proximal end of the fibula to the outer condyle of the femur.

4. **Tendon of the Popliteus Muscle,** Fig. 1, Plate 107; Fig. 2, Plate 108; Fig. 1, Plate 109; Fig. 2, Plate 110.—The proximal attachment of this muscle is to the outer condyle of the femur, within the ligaments of the joint; its tendon winds to the posterior surface of the knee, where it emerges from within the ligaments, at a point between the external lateral ligament and the border of the outer fibro-cartilage of the joint; in its course it is attached to the convex border of the latter. The muscle expands, as it passes to its distal attachment, to the posterior surface of the proximal end of the tibia (Plates 88, 90, and 98).

5. **Internal Lateral Ligament,** Fig. 2, Plate 107.—This ligament bridges from the inner tuberosity of the tibia to the inner condyle of the femur; some of its fibres wind round to be attached to the posterior surface of the tuberosity of the tibia.

6. **Anterior Ligament,** Plates 64, 65, and 107; Fig. 1, Plate 108; Fig. 2, Plate 109.—This ligament was cut at the circumference of the patella, and partly described, at page 116. It is attached to the anterior of the femur proximally to its con-

dyles; the borders of the patella; and the anterior borders of the tibial tuberosities and the lateral ligaments. Interiorly it is lined by the synovial membrane of the joint.

DISSECTION.—Section the popliteus muscle and the external lateral ligament (Fig. 1, Plate 109); then dissect up the proximal end of the tendon of the popliteus muscle and cut it to the proximal side of its attachment to the convexity of the outer fibro-cartilage (Fig. 1, Plate 110). Cut, transversely, through the internal lateral ligament, the posterior ligament, and the anterior ligament of the joint. Manipulate the joint so as to expose the anterior and posterior surfaces of the two crucial ligaments, *in situ*. Section the crucial ligaments; display their portions, following them to their distal and proximal attachments, respectively. Expose the fibro-cartilages, their transverse and coronary ligaments.

7. Crucial Ligaments, Figs. 1 and 2, Plates 109 and 110. —Flexing the knee-joint, the anterior surfaces of these two ligaments are seen crossing each other between the tibia and femur (Fig. 2, Plate 109); extending the joint, their posterior surfaces are exposed (Fig. 1, Plate 109). The *anterior* or *external* bridges from the depression anterior to the spine—between the articular surfaces—of the tibia, to the outer wall of the intercondyloid notch of the femur. The *posterior* or *internal* passes from the depression posterior to the spine—between the articular surfaces—of the tibia, to the inner wall of the intercondyloid notch of the femur. Besides the attachments given of these ligaments, they are, respectively, attached to the contiguous tips of the fibro-cartilages.

8. Fibro-Cartilages, Fig. 1, Plate 110; Fig. 2, Plate 109.—These are two semilunar plates of fibro-cartilage, which are thick at their convex and thin at their concave borders; they are lodged upon the articular surfaces of the inner and the outer tuberosity, respectively, of the tibia; the inner being the larger of the two. The horns of these fibro-cartilages approach each other, at the depressions anterior and posterior to the spine of the tibia, where they are attached. As before stated, the tibial attachments of the crucial ligaments intervene between the fibro-cartilages; some of the ligament fibres are attached to their tips. The tendon of the popliteus muscle is attached to the convex border of the outer fibro-cartilage (page 188).

9. Transverse Ligament, Fig. 1, Plate 110.—This ligament passes between the anterior borders of the fibro-cartilages.

10. Coronary Ligament.—This is a circumferential ligament, that bridges from the convexities of the fibro-cartilage plates to the border of the tibia; anteriorly and posteriorly, fibres of the crucial ligaments are continued to it.

ARTICULATION OF THE HIP.

DISSECTION.—Raise the pelvis on a block with its posterior surface uppermost. Cut away all the muscles attached to the surfaces of the os innominatum and the proximal end of the femur.

Terms of Relation.—The general terms of relation (page 2) will be used in the description of the hip-joint.

Bones of the Articulation, Plates 59 and 91.—The femur—head and neck—and the os innominatum—cotyloid cavity (acetabulum)—are the bones forming the ilio-femoral articulation or hip-joint.

DISSECTION.—Clear the posterior surface of the capsular ligament of the joint.

1. Posterior Portion of the Capsular Ligament, Fig. 1, Plate 111.—The posterior portion of the circumference of the neck of the femur, internal to the muscle attachments to the trochanter major and minor of the femur (Plates 99 and 100), affords attachment to the external end of this portion of the capsular ligament. Its internal attachment is to the posterior part of the rim and of the exterior surface of the cotyloid cavity of the os innominatum.

DISSECTION.—Turn the pelvis upon the block with its anterior surface uppermost.

2. Anterior Portion of the Capsular Ligament, Plate 112, and Fig. 1, Plate 66.—The capsular ligament is continued circumferentially from its posterior portion, around the neck of the femur and the exterior of the cotyloid cavity of the os innominatum. The anterior portion presents a complete sheet of fibrous tissue, in which can be defined three bands: the ilio-femoral band, the ilio-femoral ligament, and the pubio-femoral band. The *ilio-femoral band* forms the superior portion of the capsular ligament, from the internal face of the trochanter major, to the exterior surface of the superior portion of the cotyloid cavity of the ilium. The *ilio-femoral ligament* passes from the anterior surface of the neck of the femur—along the anterior intertrochanteric line—to the anterior portion of the exterior surface of the cotyloid cavity—as high as the anterior-inferior spinous process of the ilium. The *pubio-femoral band* bridges from the neck of the femur, externally and superiorly to the trochanter minor, to the anterior surface of the horizontal ramus of the pubic portion of the os innominatum, internally to the attachment of the ilio-femoral ligament.

DISSECTION.—Section the anterior, the superior, and the inferior portions of the capsular ligament, circumferentially; fold its inferior and external portions back, like the sleeve of a coat, upon the trochanters of the femur; slit its superior part, as in Fig. 2, Plate 111, and reflect the portions, internally. Dislocate the head of the femur from the cotyloid cavity, and allow the femur to hang by the ligamentum teres and the posterior portion of the capsular ligament.

3. Cotyloid Fibro-Cartilage (Cotyloid Ligament), Fig. 2, Plate 111; Fig. 3, Plate 110.—This is a circumferential fibro-cartilage, that rims the border of the cotyloid cavity. When the head of the femur is lodged in the cotyloid cavity, it applies itself to it—like a tight india-rubber band—and holds the ball-like head of bone into the socket of the joint.

4. Ligamentum Teres.—This is an interosseous ligament, that passes from a depression in the inferior half of the convexity of the head of the femur, to the internal portion of the cotyloid cavity of the os innominatum.

5. Transverse Ligament.—This is the name given to that portion of the cotyloid fibro-cartilage, that bridges across the notch at the internal border of the cotyloid cavity. Its interior surface is articular, being applied to the circumference of the head of the femur.

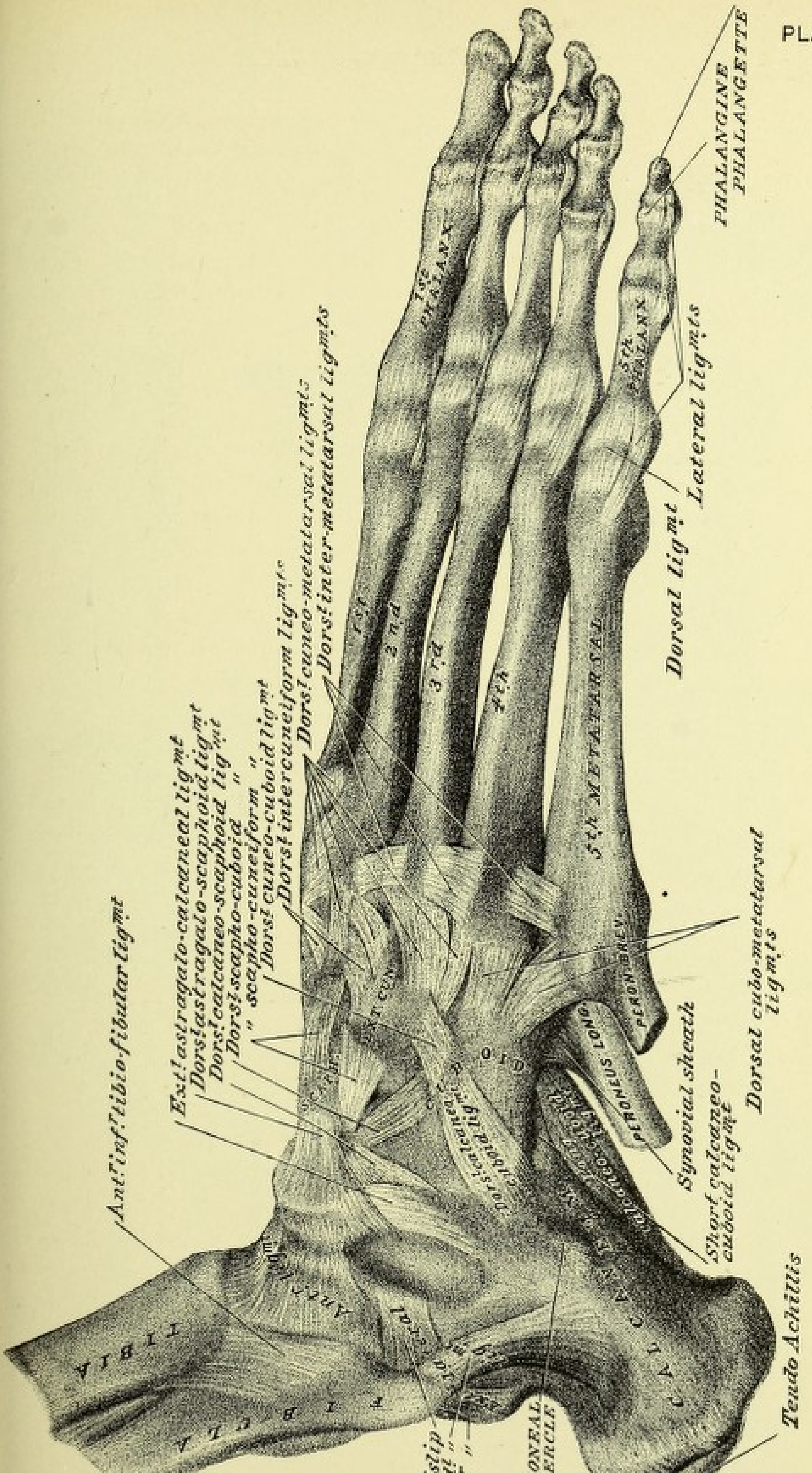
DISSECTION.—Section the ligamentum teres and the posterior portion of the capsular ligament, thus removing the femur and exposing the cotyloid cavity. Cut the transverse ligament from its superior attachment to the cotyloid notch and reflect it, inferiorly, as in Fig. 3, Plate 110; demonstrate the cotyloid attachment of the ligamentum teres to the interior surface of the transverse ligament. Expose the articular branch of the obturator artery and nerve, respectively, that pass through the cotyloid notch, into the ligamentum teres; also the articular branch of the internal circumflex artery.

6. Cotyloid Cavity.—This is a half-egg shaped cavity, at the exterior of the os innominatum, having an articular and a non-articular portion. The *articular portion* occupies the circumference of the interior of the cavity, from the free border thereof, inwardly—with a deficiency at the notch; it is applied, when articulated, to the circumference of the head of the femur. The *non-articular portion* is at the internal part of the cavity, forming an oval depression; when the head of the femur is articulated, this portion of the cavity allows the ligamentum teres to be lodged without being compressed.

7. Cotyloid Attachment of the Ligamentum Teres.—This attachment of the ligament is to the non-articular part of the cotyloid cavity and to the interior of the transverse ligament, directly opposite the foramen formed by the notch and the transverse ligament.

8. Cotyloid Notch, Plate 59; Fig. 3, Plate 110.—This notch is a gap in the internal wall of the cotyloid cavity, which the transverse ligament portion of the cotyloid fibro-cartilage converts into a foramen. The concavity of the notch is at the level of the non-articular portion of the cotyloid cavity.

9. Articular Arteries and Nerve, Fig. 3, Plate 110.—The obturator and the internal circumflex arteries have, each, an articular branch, which supply the joint, by entering the cotyloid notch to reach the ligamentum teres; one is larger than or may take the place of the other. The obturator nerve supplies an articular branch, which accompanies the articular vessels into the joint.


PHALANGINE
PHALANGETTE
1st PHALANX
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Lateral ligmts
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5th METATARSAL
Dors.l cuneo-metatarsal ligmts
Dors.l inter-metatarsal ligmts
Ant.r inf.r tibio-fibular ligmt
Ext.l astragalo-calcaneal ligmt
Dors.l astragalo-scaphoid ligmt
Dors.l calcaneo-scaphoid ligmt
Dors.l scapho-cuboid "
" scapho-cuneiform "
Dors.l cuneo-cuboid ligmt
Dors.l intercuneiform ligmts
Dorsal cubo-metatarsal ligmts
PERON. BREV.
PERONEUS LONG.
CUBOID
Dors.l calcaneo-cuboid ligmt
Synovial sheath
Short calcaneo-cuboid ligmt
TIBIA
FIBULA
CALCANEUM
Ant.r slip
Midd.e "
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PERONEAL TUBERCLE
Tendo Achillis

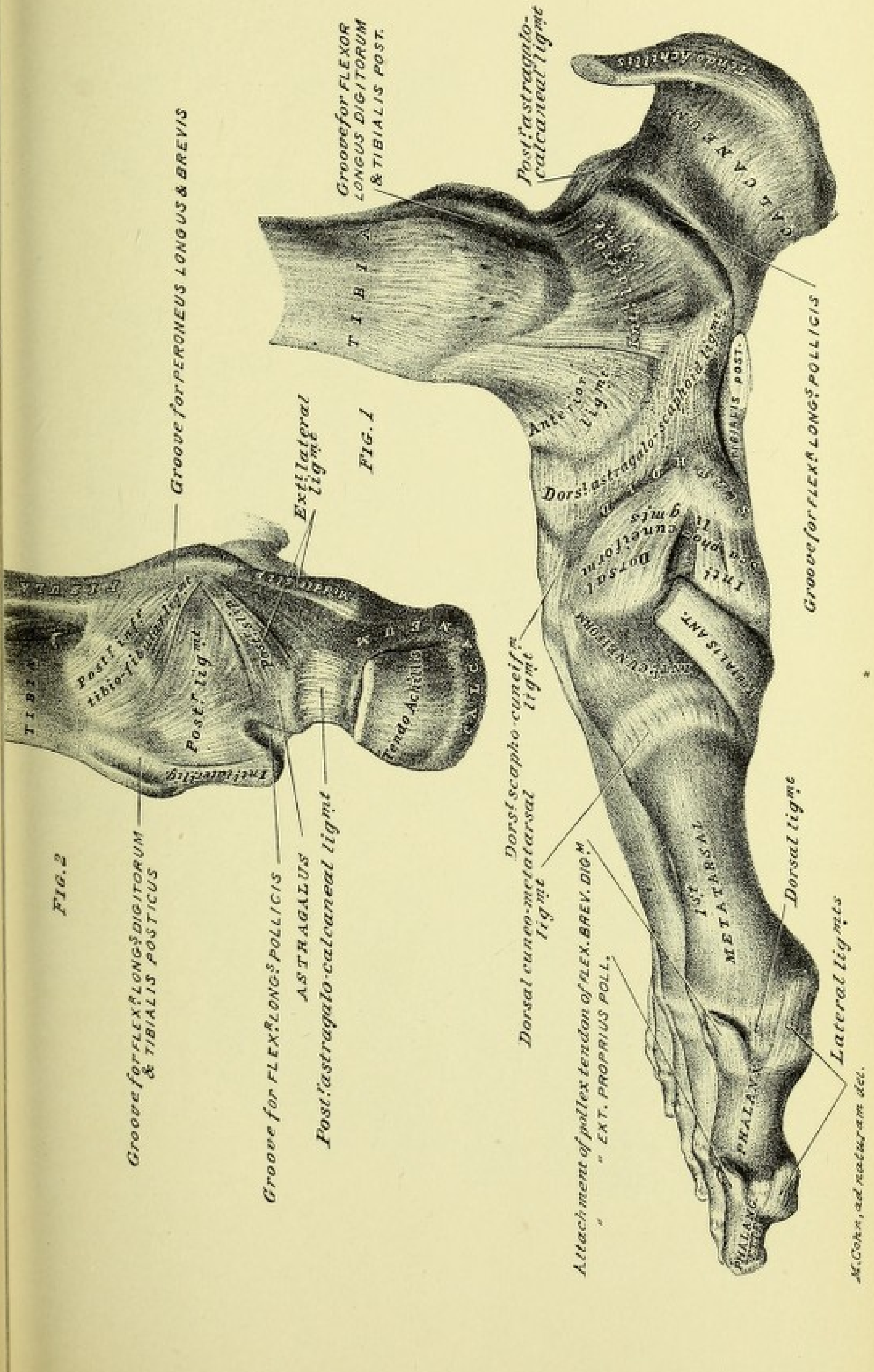
Groove for FLEX.R LONG.S DIGITORUM & TIBIALIS POSTICUS
Groove for PERONEUS LONGUS & BREVIS
Ext.l lateral ligm.t
FIBULA
TIBIA
Post.r inf.r tibio-fibular ligm.t
Post.r ligm.t
Int.l lateral lig.
CALCANEUM
Tendo Achillis
Groove for FLEX.R LONG.S POLLICIS
ASTRAGALUS
Post.r astragalo-calcaneal ligm.t
Groove for FLEXOR LONGUS DIGITORUM & TIBIALIS POST.
Post.r astragalo-calcaneal ligm.t
Tendo Achillis
CALCANEUM
TIBIA
Groove for FLEX.R LONG.S POLLICIS
TIBIALIS POST.
Anterior ligm.t
Dors.l astragalo-scaphoid ligm.t
SCAPHOID
Dorsal cuneiform ligm.ts
Int.l scapho-cuneif.m ligm.ts
TIBIALIS ANT.
Dors.l scapho-cuneif.m ligm.t
Dorsal cuneo-metatarsal ligm.t
1.st METATARSAL
Dorsal ligm.t
Lateral ligm.ts
PHALANX
PHALANX
Attachment of pollex tendon of FLEX. BREV. DIG.M
" " EXT. PROPRIUS POLL.
M. Cohn, ad naturam del.

FIG. 1

FIG. 2

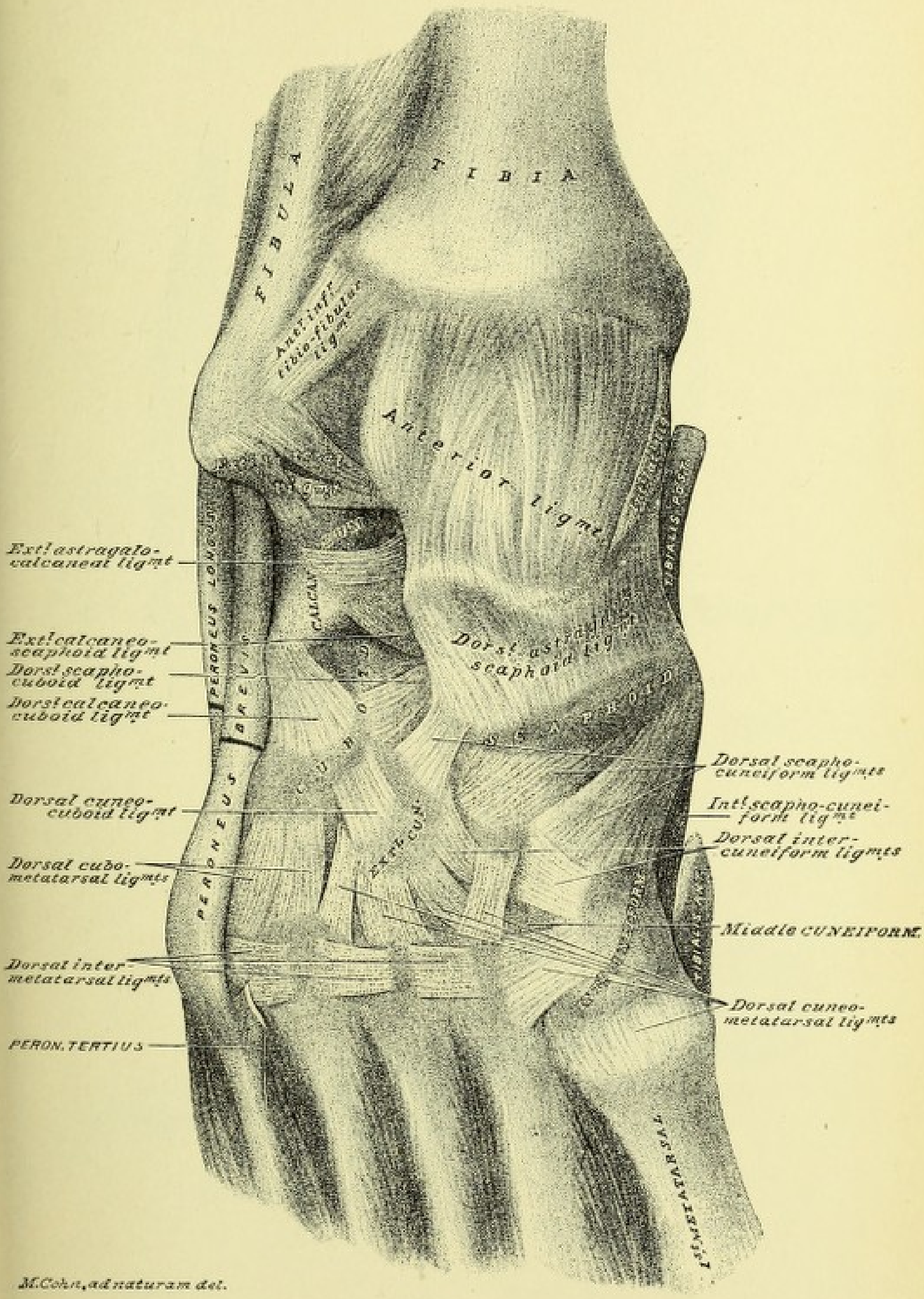

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FIG. 1 FIG. 2

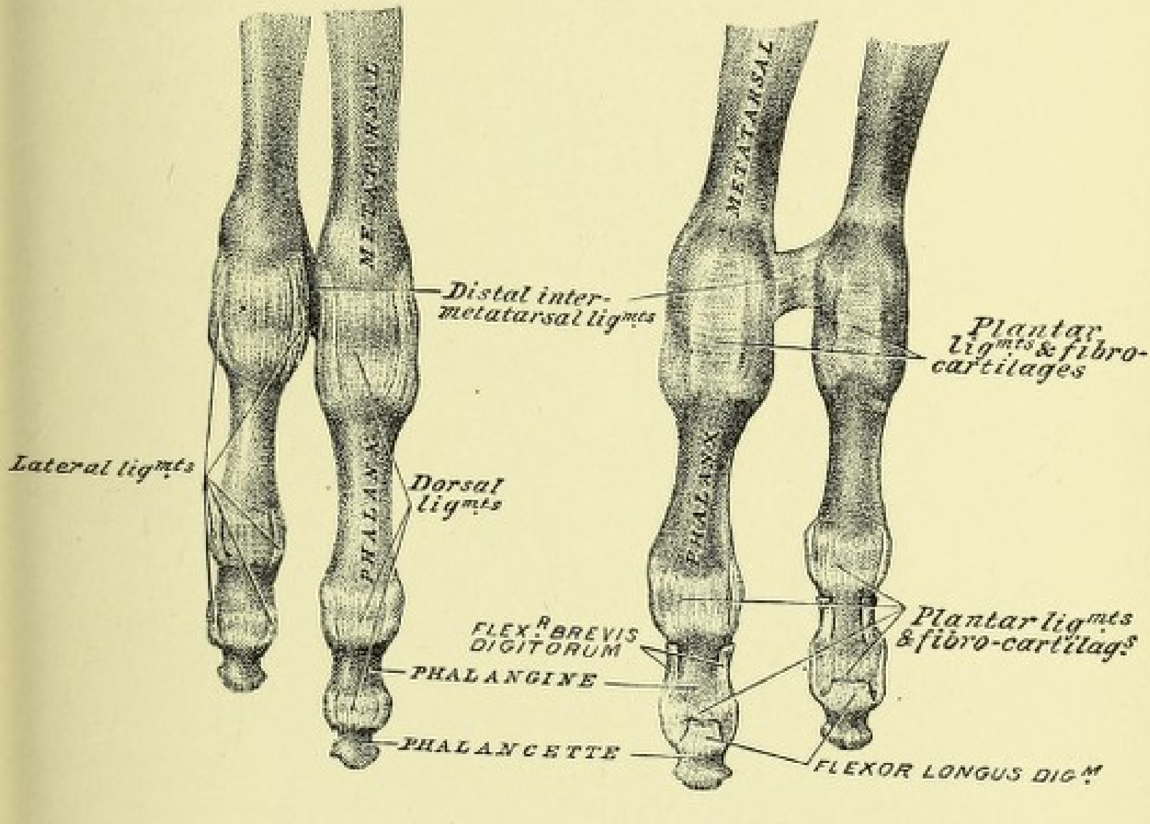
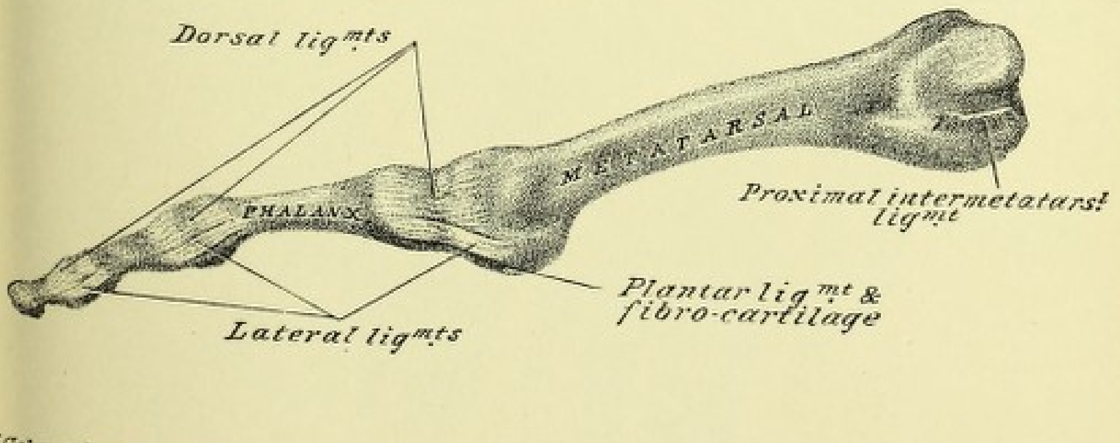


FIG. 3



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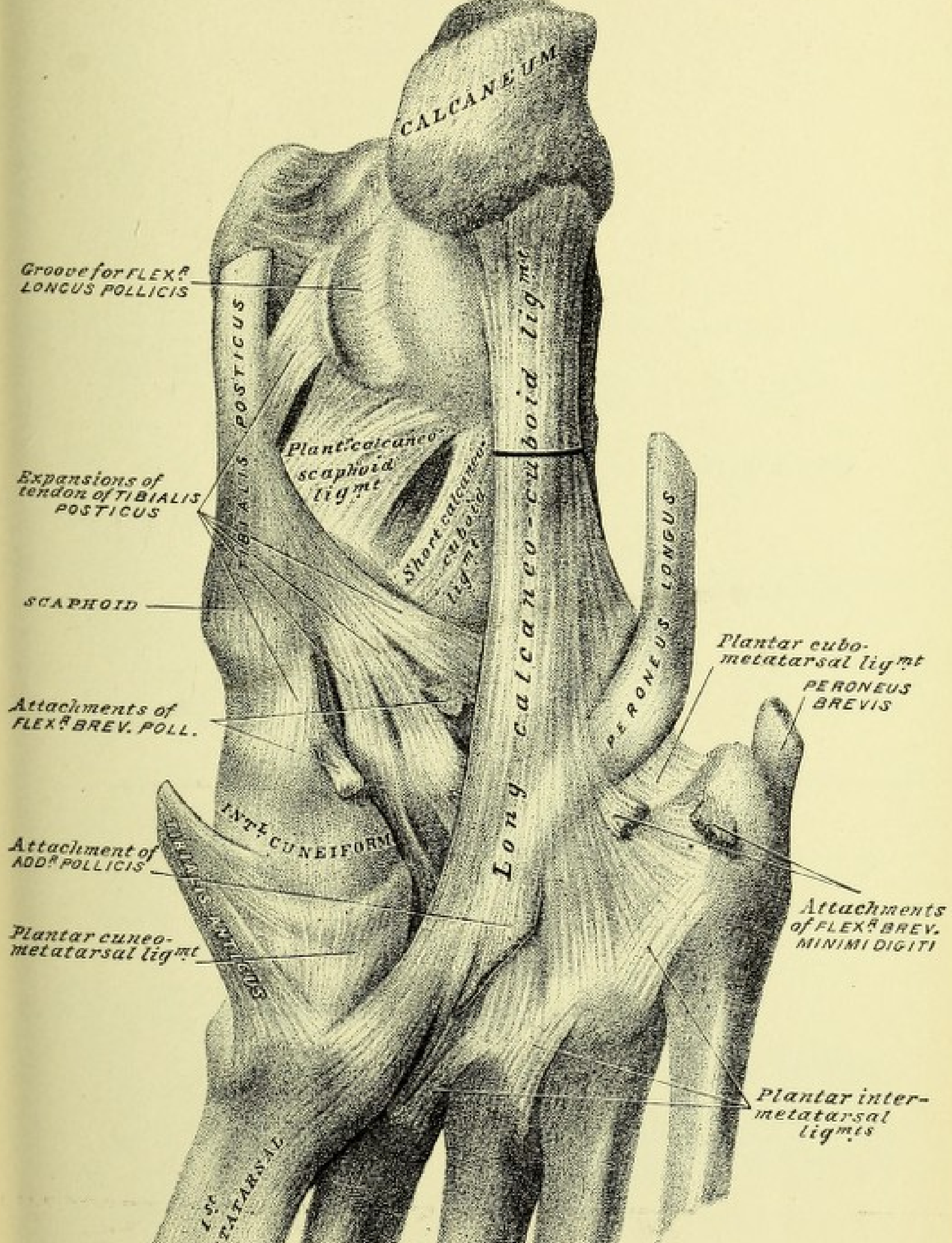

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FIG. 1

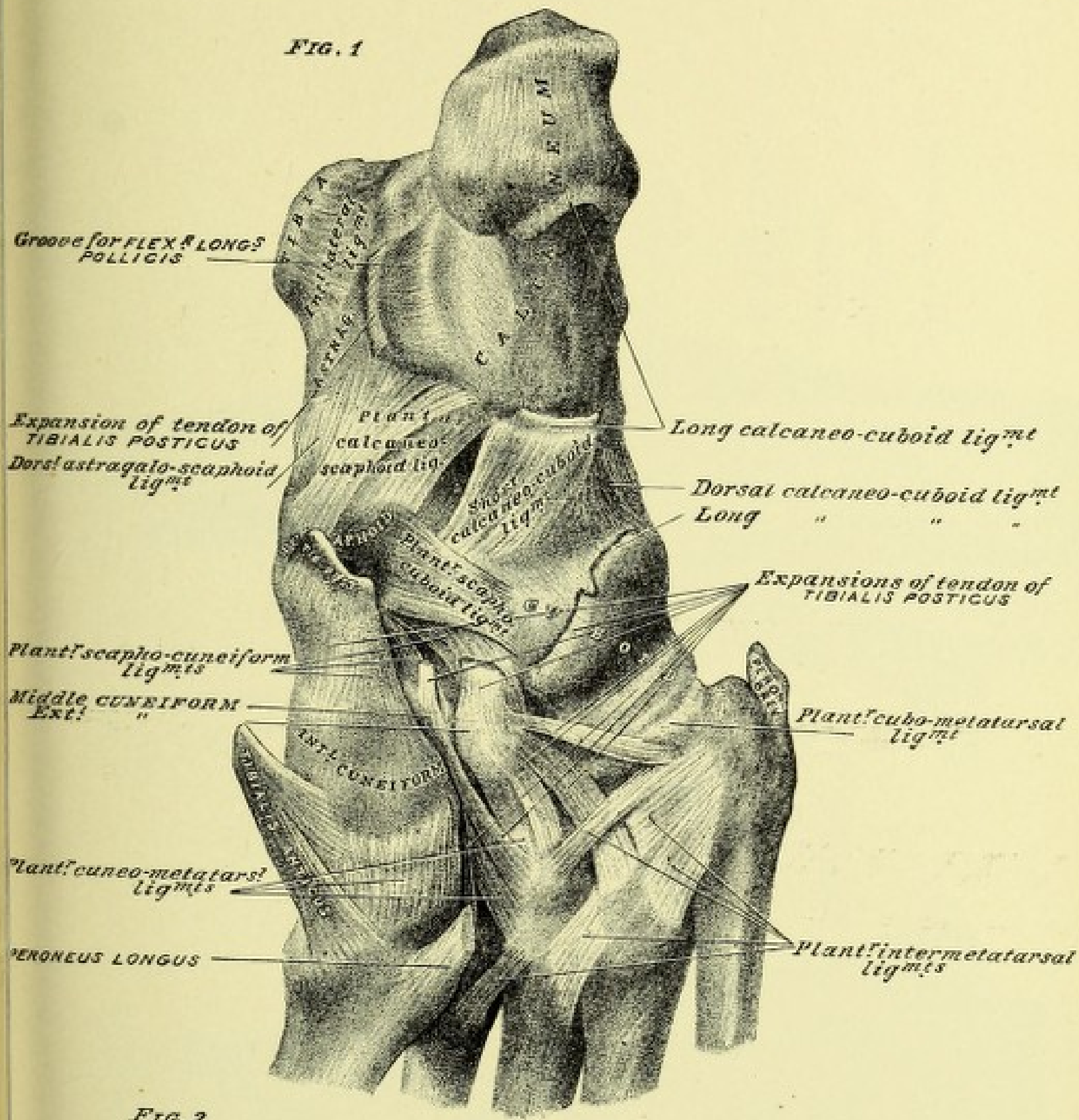


FIG. 2

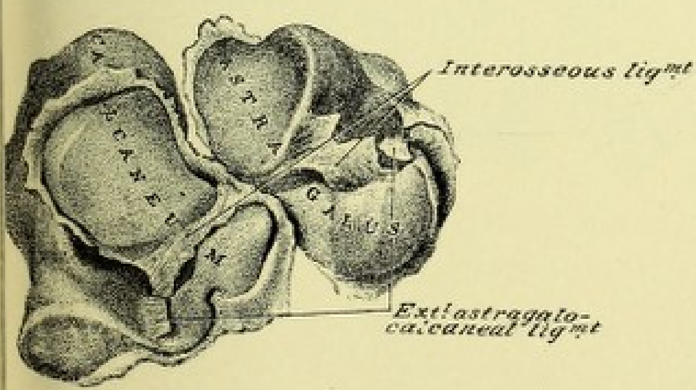
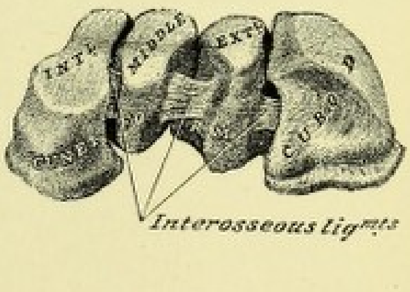


FIG. 3



Colin, ad naturam del.

FIG. 1

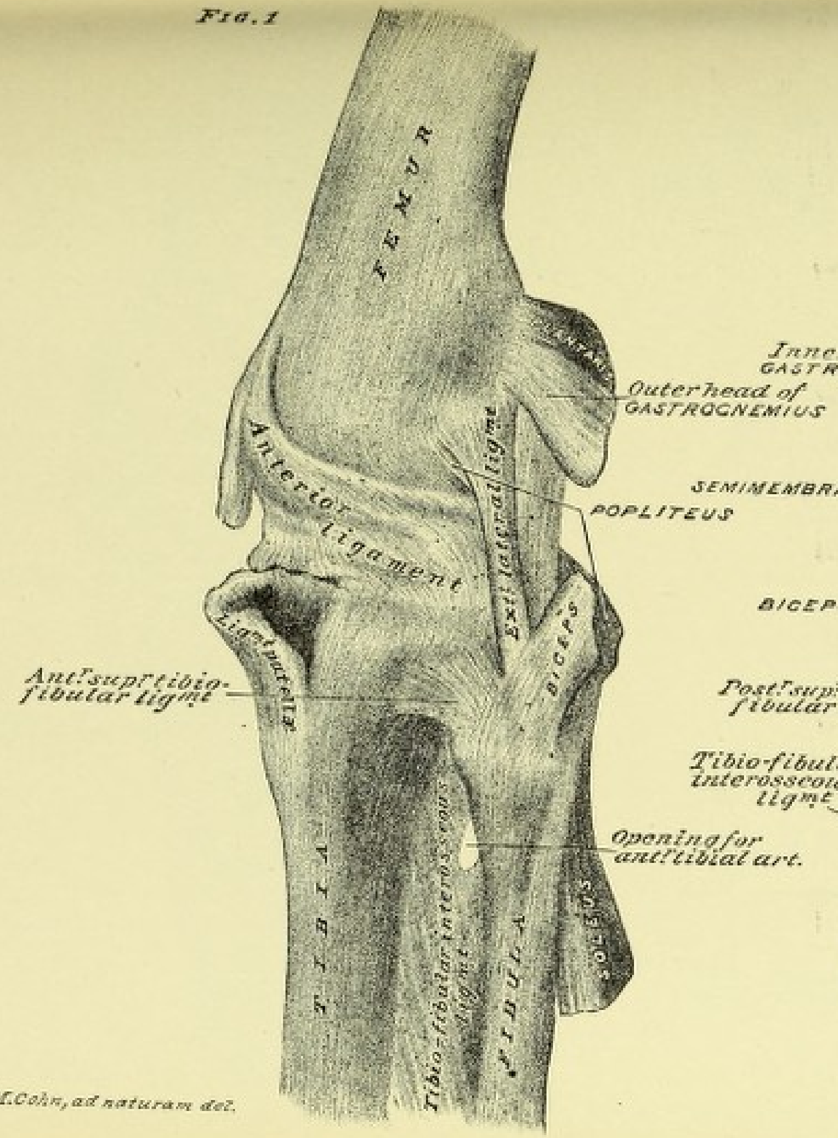
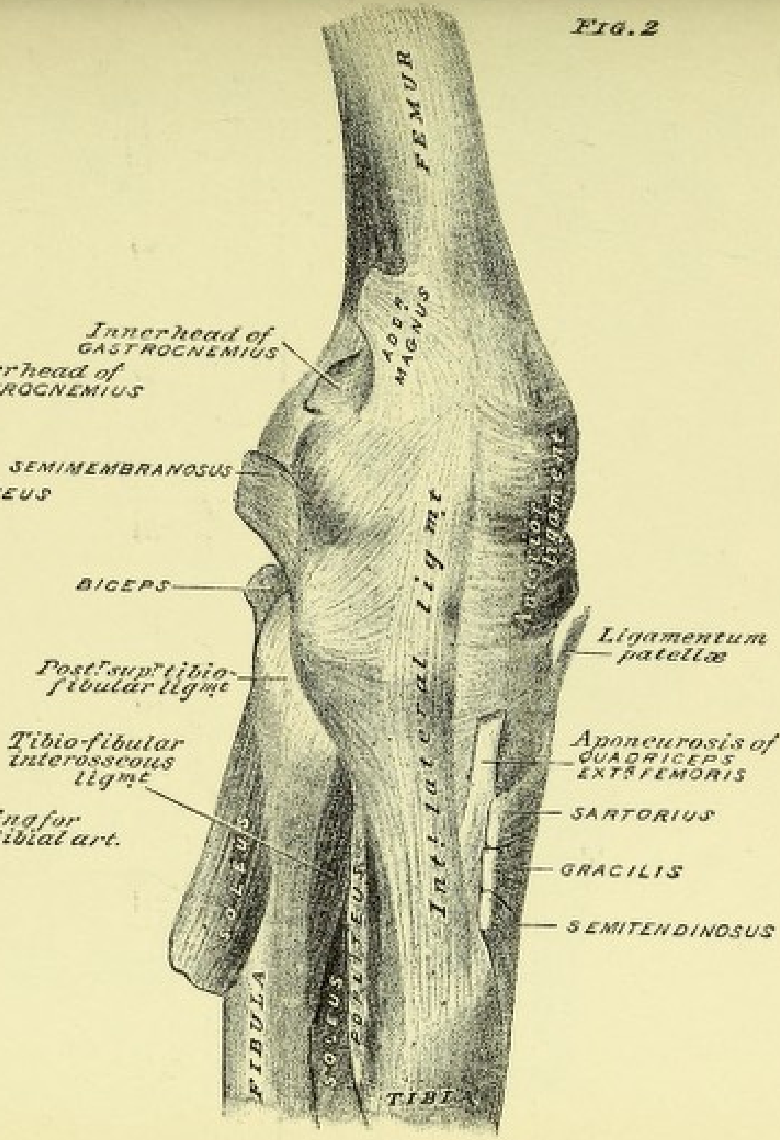


FIG. 2



M. Cohn, ad naturam del.

FIG. 1

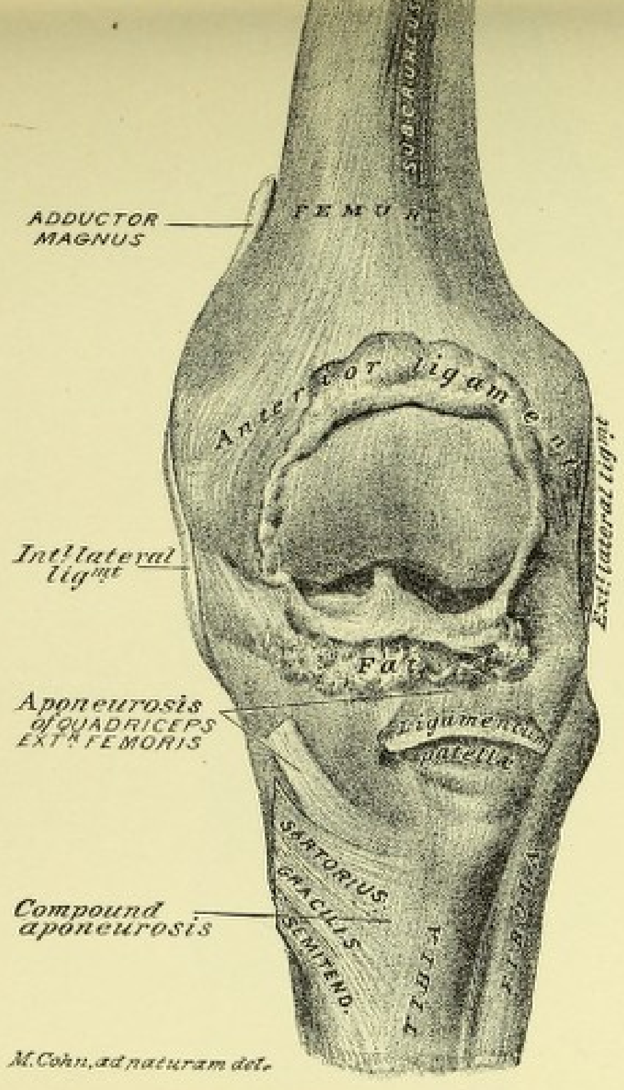
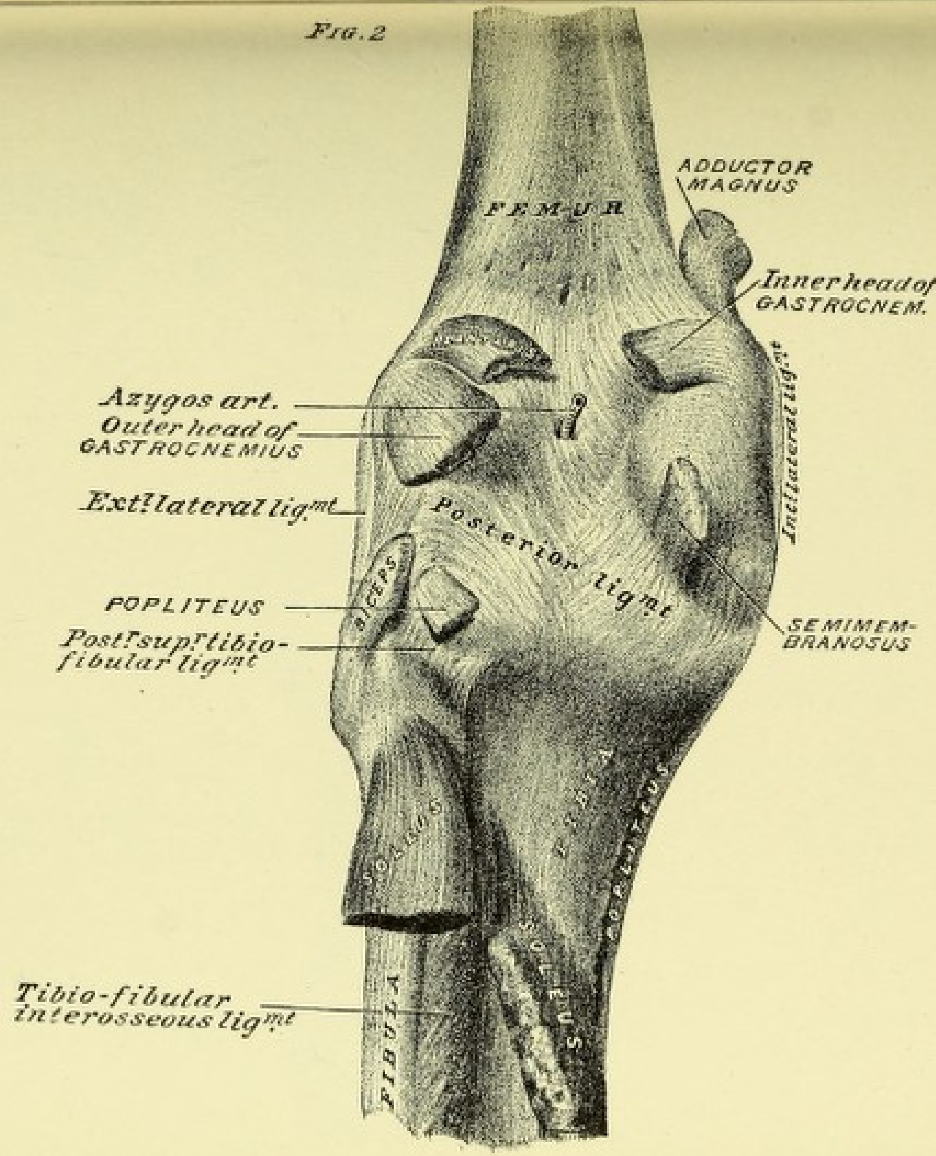


FIG. 2



M. Cohn, ad naturam del.

FIG. 1

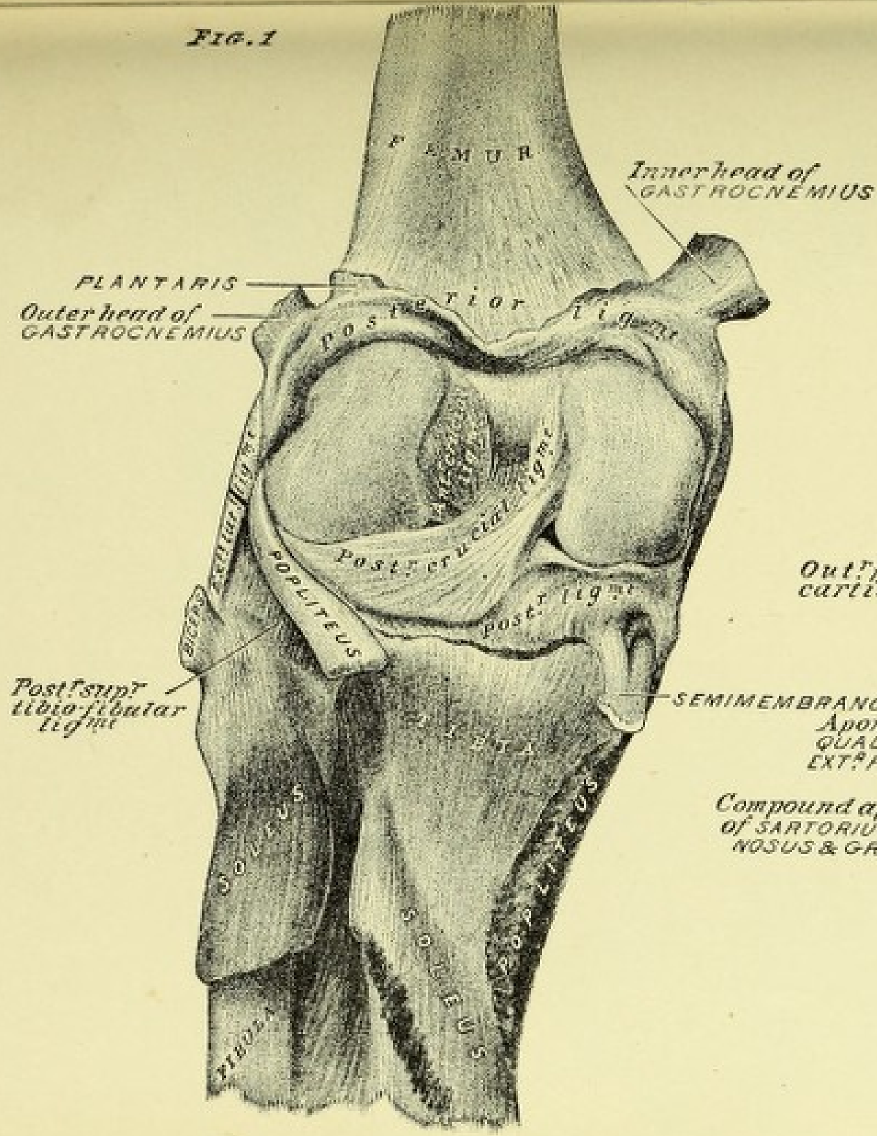
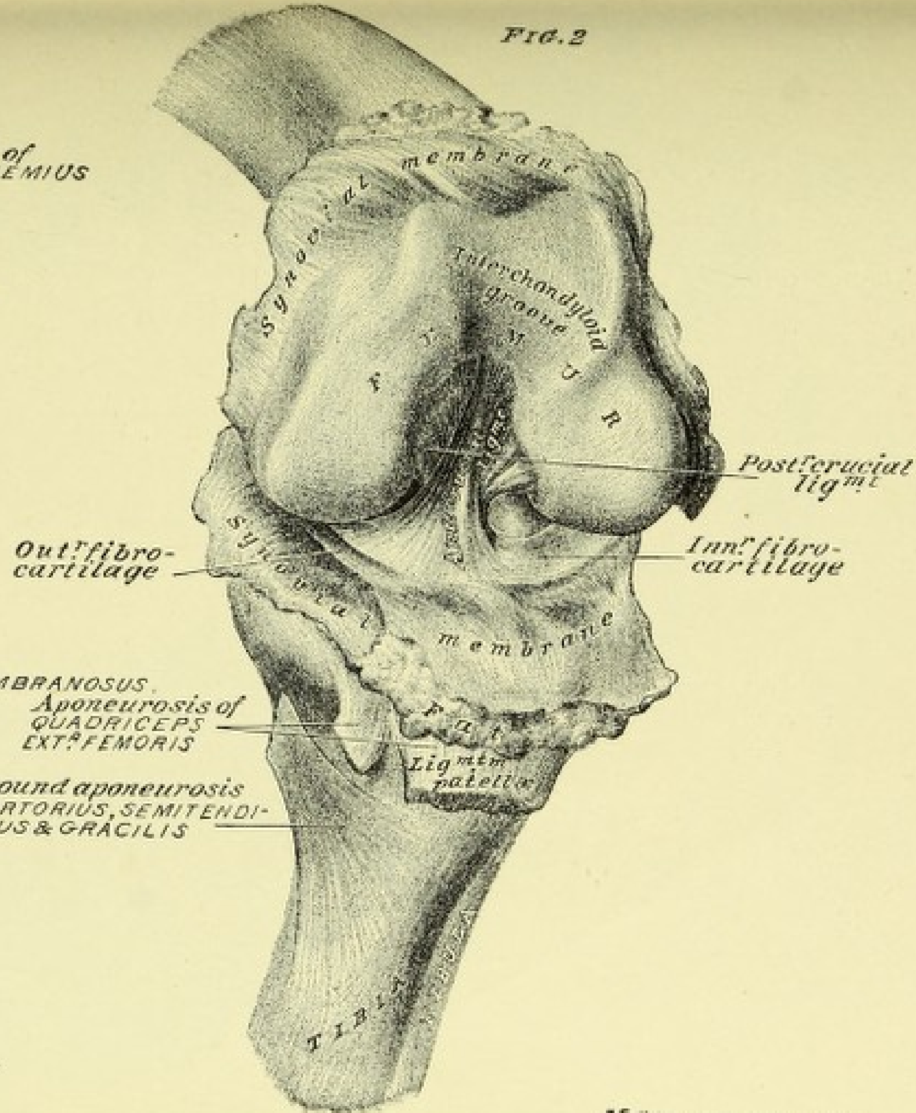


FIG. 2



M. Cohn, ad naturam del.

FIG. 1

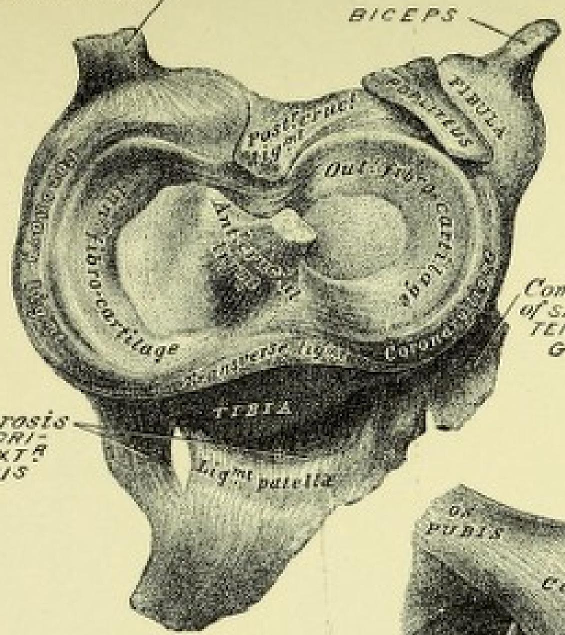


FIG. 2

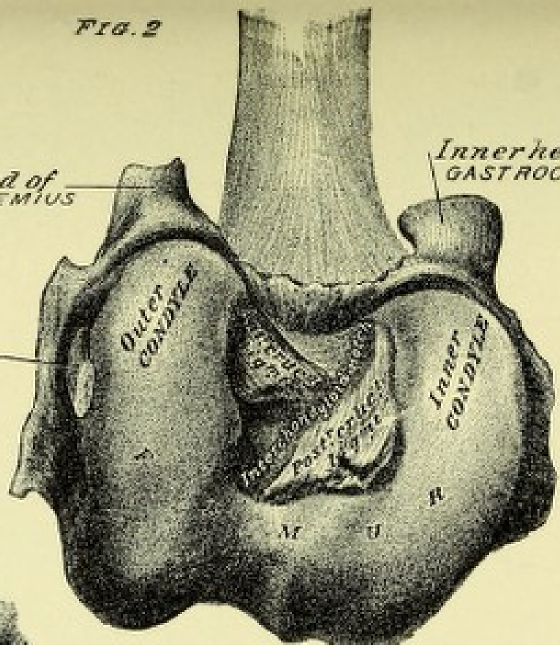
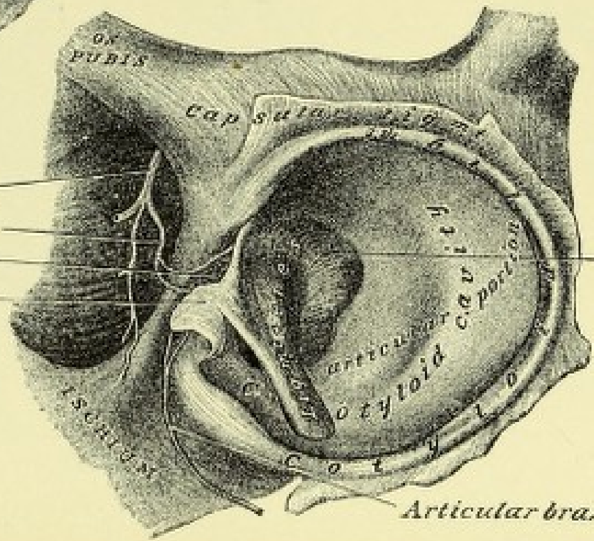


FIG. 3



M. Cohn, ad naturam del.

Fig. 2

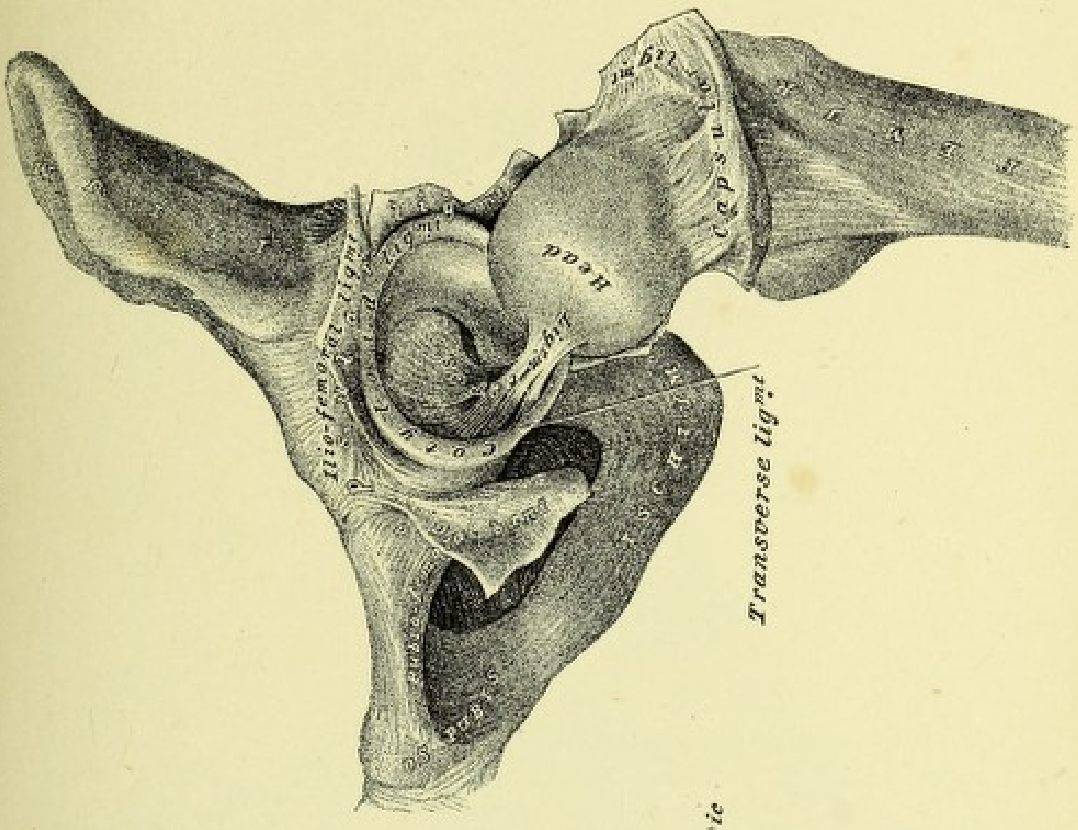
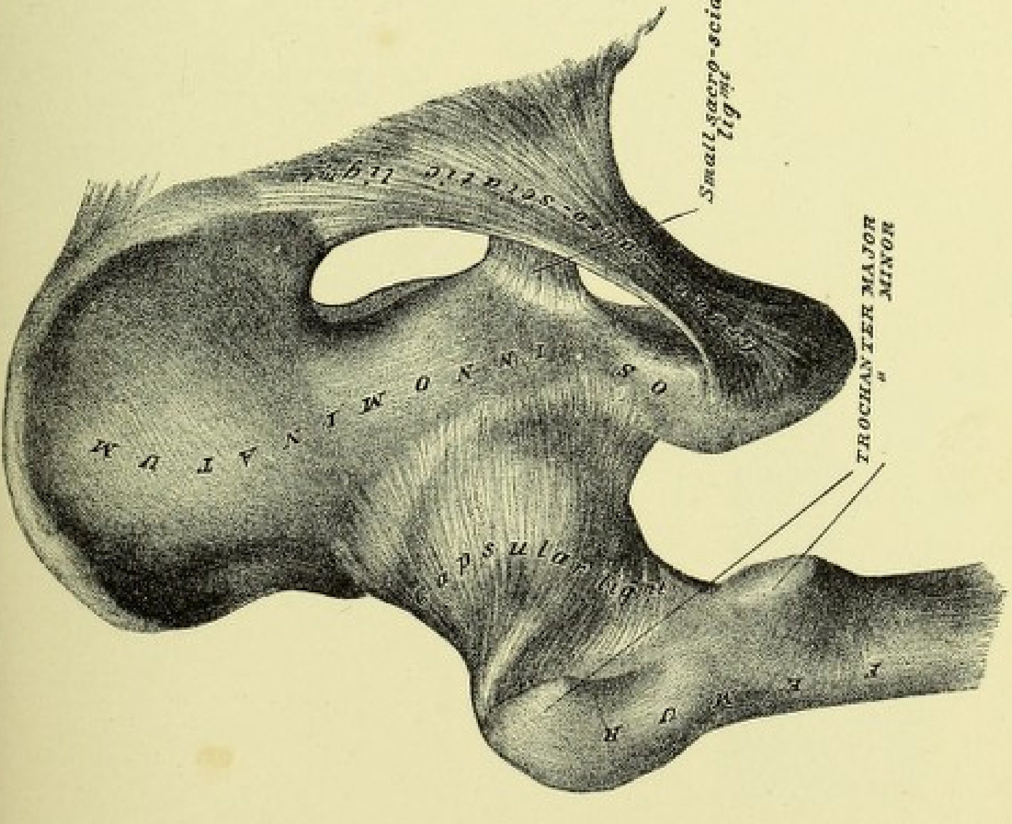
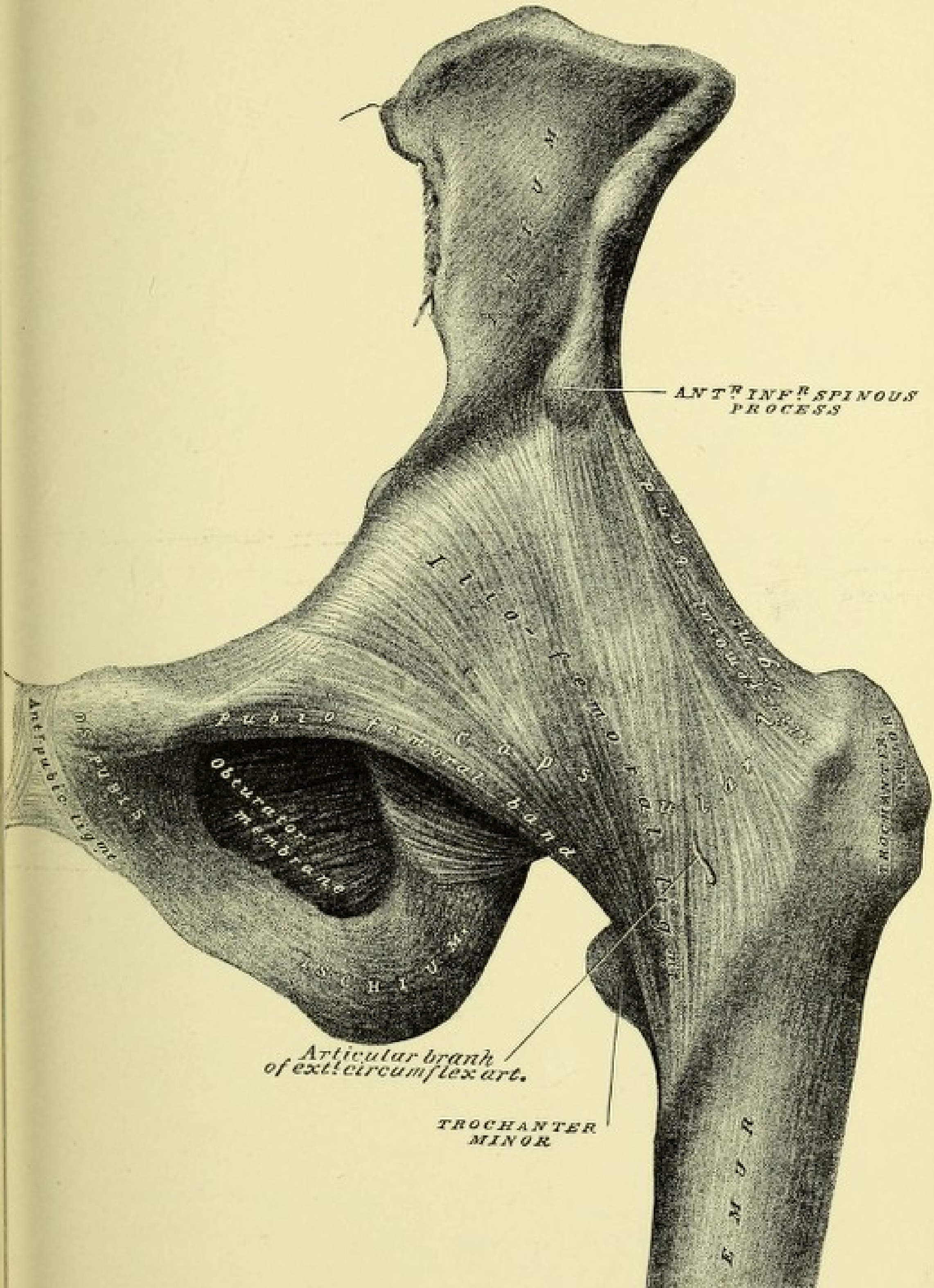


Fig. 1



H. Cohn, ad naturam del.


ANTR INFR SPINOUS PROCESS
Ilio-femoral
Pubio femoral band
Obcurator membrane
ISCHIUM
Articular branh of extl circumflex art.
TROCHANTER MINOR
FEMUR
M. Cohn, ad naturam del.

UPPER EXTREMITY.

FIFTEENTH DISSECTION.

ANTERIOR OF THORAX, AXILLA, AND ARM.

DISSECTION.—The subject lying upon the back, place a block under the thorax; upon the block lay a board, five inches wide and long enough to reach beyond the tips of the fingers of the outstretched limbs. The two upper extremities should be extended, upon their dorsal surfaces, on the board and the ends of the fingers tacked thereto.

Terms of Relation.—To the anterior of the thorax and the axilla the general terms of relation (page 2) are applied. For the anterior of the arm are used the general terms *anterior* and

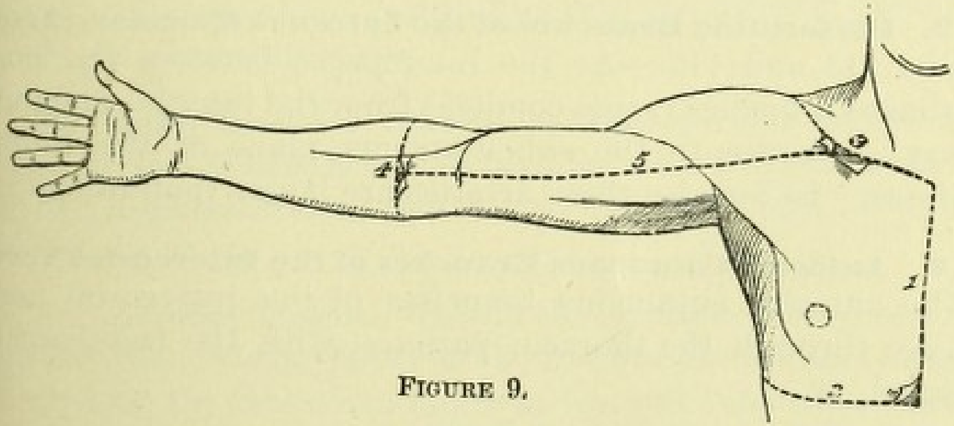


FIGURE 9.

posterior; the special terms *proximal* (toward the trunk), *distal* (from the trunk), *inner side*, and *outer side* to its respective lateral surfaces.

Bone Areas, Plate 113.—The anterior surfaces of the following bones, parts of bones, and cartilages form the framework of this dissection, and afford attachments to muscles: the sternum; the six superior costal cartilages and ribs; the inferior border of the clavicle; the body (anterior surface and external border) and the coracoid process of the scapula; the shaft and condyles of the humerus; the proximal ends of the radius and ulna.

DISSECTION.—Make the skin incisions 1, 2, 3, 4, and 5 of Figure 9 (page 193); reflect skin flaps as indicated, thereby exposing the anterior of the thorax and arm; make a circular incision around the nipple. Expose the mamma (especially in the female) and its vessels; dissect the gland from the superficial fascia and section it so as to see its structure. As the mamma is removed, section its supplying vessels, at the points where they emerge through the thoracic parietes and wind over the anterior fold of the axilla.

1. Mamma, Plate 114.—This is one of two glands, lodged, between a superficial and a deep layer of the subcutaneous tissue, upon the fascia of the anterior parietes of the thorax. At the nipple the orifices of the lactiferous tubes appear, which may be demonstrated, at times, by the introduction of bristles; it presents, on section, a dense, milk-white structure.

DISSECTION.—Remove the subcutaneous tissue from the fascia of the anterior of the thorax and the anterior of the arm. Expose and preserve the vessels and nerves emerging at the interspaces between the costal cartilages; note the thoracic attachment of the platysma myoides muscle; also the ends of the sternal, clavicular, and acromial nerves, from the cervical plexus.

2. Perforating Branches of the Internal Mammary Artery, Plates 114 and 115.—At the interspaces between the costal cartilages branches (venæ comites) from the internal mammary artery perforate to the subcutaneous plane of the thoracic parietes. In females these arteries are larger than in males.

3. Anterior Cutaneous Branches of the Intercostal Nerves.—The anterior cutaneous branches of the intercostal nerves emerge through the thoracic parietes, with the last-described arteries.

4. Platysma Myoides Muscle, Plate 115.—This subcutaneous muscle has its thoracic attachment to the superficial fascia inferiorly to, and parallel with, the clavicle.

5. Sternal, Clavicular, and Acromial Nerves of the Cervical Plexus.—The terminal portions of these nerves emerge into the subcutaneous tissue of the respective areas of their distribution.

DISSECTION.—Trace the subcutaneous veins of the anterior of the arm and elbow.

6. **Cephalic Vein.**—This vein has a longitudinal and proximal course, in the outer half of the anterior of the arm. It results from the confluence of the radial and median-cephalic veins. At its proximal end it perforates the fascia at the intermuscular space between the deltoid and pectoralis major muscles.

7. **Basilic Vein.**—This vein is subcutaneous for the distal third of the inner half of the anterior of the arm. At its distal end it is formed by the joining of the ulnar and the median-basilic veins; at its proximal end it perforates the superficial fascia, at about the middle of the inner side of the arm.

8. **Median Vein.**—This vessel appears at the middle of the proximal third of the anterior surface of the forearm, where it bifurcates into the median-cephalic and the median-basilic veins.

DISSECTION.—Find the cutaneous nerves of the anterior and inner side of the arm.

9. **Internal Cutaneous Nerve.**—This nerve perforates the fascia of the arm, in company with the basilic vein; it has a distal course posteriorly to the basilic vein, and continues into the ulnar side of the forearm; a branch runs along the outer side of the basilic vein, continuing into the forearm posteriorly to the median-basilic vein.

10. **Small Internal Cutaneous Nerve.**—This nerve comes through the fascia near the exit of the internal cutaneous nerve; it distributes to the skin of the distal half of the inner side of the arm.

11. **Axillary Fascia.**—This is that portion of the superficial fascia, which bridges between the folds of the axilla. It is perforated by the intercosto-humeral (second intercostal) and the lateral cutaneous branches of the third, fourth, fifth, and sixth intercostal nerves.

12. **Intercosto-Humeral Nerve.**—This nerve is the lateral cutaneous branch of the second intercostal nerve, which perforates the axillary fascia and communicates with the lateral cutaneous branch of the third intercostal nerve; it supplies the skin of the proximal half of the inner side of the arm.

13. Inferior Cutaneous Branch of the Musculo-Spiral Nerve.—This nerve appears, for a portion of its course, at the outer side of the radial vein; it is continued to the radial side of the forearm.

Dissection.—Remove the fascia from the pectoralis major muscle and the humeral ends of the latissimus dorsi and teres major muscles; expose the serrations of the serratus magnus muscle. Dissect out of the adipose tissue in the axilla the arteries and nerves upon the axillary surfaces of these muscles. Display the boundaries of the axilla.

14. Pectoralis Major Muscle, Plates 113 and 116.—This is the superficial muscle of the anterior thoracic parietes. It extends from the sternum, the costal cartilages—second to sixth, inclusive—and the internal half of the antero-inferior border of the clavicle. It is attached, externally, to the outer lip of the bicipital groove of the humerus; an interval presents between its sternal and clavicular portions. Its inferior border forms the anterior fold or border of the axilla.

15. Latissimus Dorsi Muscle, Plates 113, and 116 to 120, inclusive.—The superior end of this muscle winds from the posterior of the trunk, to reach its humeral attachment. Its anterior free border, from the thorax to the humerus, forms the posterior fold of the axilla.

16. Teres Major Muscle.—This muscle lies posteriorly to the humeral end of the latissimus dorsi muscle, extending from the posterior surface of the scapula, near its angle, to the humerus. It contributes to the posterior fold of the axilla.

17. Serratus Magnus Muscle, Plate 116.—The exteriors of the third, fourth, fifth, and sixth serrations of this muscle form the thoracic floor of the exposed portion of the axilla between the pectoralis major and the latissimus dorsi muscles. Those to the fifth and sixth ribs form an interdigitation with the superior digitation of the obliquus externus muscle.

18. Lateral Cutaneous Branches of the Intercostal Nerves and Arteries.—The lateral cutaneous branches of the second, third, fourth, fifth, and sixth intercostal nerves emerge between the serrations of the serratus magnus muscle. They are accompanied by the lateral branches of the corresponding intercostal arteries.

19. Axilla and its Boundaries.—The axilla is a pyramidal space, inferiorly to the shoulder-joint; its anterior wall is formed by the pectoralis major and pectoralis minor muscles; its posterior wall is contributed to by a portion of the latissimus dorsi, the teres major, and the subscapularis muscles. Its internal wall is the lateral thoracic pariètes, covered by the serratus magnus muscle. Superiorly, it is bounded by the coraco-brachialis and the biceps (short head) muscles, the scapulo-humeral joint, and the deltoid muscle. The folds of the axilla bound its outlet; the anterior is formed by the inferior border of the pectoralis major muscle; the posterior is contributed to by the latissimus dorsi and the teres major muscles. Between these folds bridges the axillary fascia, through which lateral cutaneous branches of intercostal nerves pass. Within the axilla are lodged the axillary artery and vein with their branches; also the axillary portion of the brachial plexus of nerves.

Dissection.—Section the cephalic vein (Plate 115) and reflect it upon the forearm. Remove the fascia from the anterior portion of the deltoid muscle; trace into the shoulder the proximal end of the cephalic vein; find the humeral branch of the acromio-thoracic artery.

20. Deltoid Muscle, Plates 113, and 116 to 120, inclusive.—The anterior or clavicular portion of this muscle covers the anterior and outer face of the shoulder-joint; its fibres extend from the external half of the antero-inferior border of the clavicle to the outer side of the shaft of the humerus, at about the junction of its proximal and middle thirds.

21. Cephalic Vein, Plate 116.—This vein continues its proximal course, from the point where it perforates the fascia (Plate 115), in the intermuscular space between the pectoralis major and the deltoid muscles.

22. Humeral Branch of the Acromio-Thoracic Artery, Plates 116 and 117.—This artery (vena comes) has a distal course, in company with the proximal end of the cephalic vein.

Dissection.—Remove the fascia from the arm, thereby exposing the anterior surfaces of portions of the biceps, brachialis anticus, supinator longus, and extensor carpi radialis longior muscles.

23. Biceps Muscle, Plate 116.—This muscle is continued into the arm from the posterior of the pectoralis major muscle;

it has a longitudinal course through the arm, to the elbow, where its tendon and the fascial expansion of the same (bicipital fascia) pass to the forearm.

24. Brachialis Anticus Muscle.—A portion of this muscle appears to the outer side of the distal half of the biceps muscle.

25. Supinator Longus Muscle.—The proximal portion of this muscle is located to the outer side of the brachialis anticus muscle. It is continued to the forearm upon the outer side of the anterior surface of the elbow.

26. Extensor Carpi Radialis Longior Muscle. — At the elbow a portion of this muscle appears, along the outer side of the supinator longus muscle.

Dissection.—Expose the nerves, artery, and veins at the inner side of the biceps muscle; also portions of the triceps and coraco-brachialis muscles; find the musculo-cutaneous nerve at the outer side of the distal portion of the biceps muscle (Plate 116).

27. Basilic Vein.—This vein has a proximal course to the axilla, which it enters posteriorly to the pectoralis major muscle.

28. Median Nerve.—This nerve emerges from the axilla, from the posterior surface of the pectoralis major muscle; it takes a distal course along the inner side of the arm, between the basilic vein and the inner border of the biceps muscle.

29. Brachial Artery.—Posteriorly to the median nerve this artery (venæ comites) will be found, having a longitudinal and distal course, from the distal border of the humeral end of the teres major muscle along the inner side of the arm, posteriorly to the inner third of the biceps muscle.

30. Internal Cutaneous Nerve.—This nerve comes out of the axilla, posteriorly to the pectoralis major muscle; it runs along the inner side of the arm, posteriorly to the basilic vein. It perforates the fascia, as before shown (page 195; Plate 115), to become subcutaneous; it sends off branches, which are continued into the forearm.

31. Small Internal Cutaneous Nerve.—This nerve accompanies the last-described nerve from the axilla, running posteriorly to it; it perforates the fascia and distributes as before shown (page 195; Plate 115).

32. Triceps Muscle.—The inner surface of this muscle presents posteriorly to the biceps. The two last-described nerves and the basilic vein lie upon its surface.

33. Coraco-Brachialis Muscle.—A portion of this muscle is brought into view in the triangular interval between the pectoralis major muscle, the biceps muscle, and the median nerve.

DISSECTION.—Section the pectoralis major muscle (Plate 116) and reflect its external portion over the outer surface of the arm; note its attachment to the outer lip of the bicipital groove of the humerus (Plate 113). Clear the surface of the proximal ends of the biceps muscle and that of the coraco-brachialis muscle. Section the small internal cutaneous and the intercosto-humeral nerves (Plate 116).

34. Biceps Muscle, Plates 113, 116, 117, 119, and 120. —The proximal end of this muscle presents two portions or heads: the *long* or outer *head*, lodged in the bicipital groove of the humerus, passes over the head of the humerus, within the capsular ligament of the shoulder-joint; the *short* or inner *head* passes to the coracoid process of the scapula, where it has a common attachment with the coraco-brachialis muscle.

35. Coraco-Brachialis Muscle, Plates 113, and 116 to 120, inclusive.—This muscle lies along the inner side of the short head of the biceps; it has a proximal attachment to the coracoid process of the scapula, in common with the short head of the biceps; its distal attachment is to the inner side of the shaft of the humerus, a little to the proximal side of its middle.

DISSECTION.—Reflect the internal portion of the pectoralis major muscle (Plate 116); turn it off toward its respective sternal and clavicular attachments (Plate 117). Find the branches of the short and acromio-thoracic arteries and the anterior thoracic nerves entering its deep surface; cut the same as they enter the muscle. Expose the costo-coracoid membrane and the fascia of the pectoralis minor muscle; note how the latter is perforated by vessels and nerves.

36. Costo-Coracoid Membrane, Plate 117.—This is a double layer of fibrous tissue, which encloses the subclavius muscle: one layer is posterior, the other anterior to the muscle. Their attachments are: to the clavicle, superiorly; the first rib and coracoid process of the scapula, inferiorly.

37. Fascia of the Pectoralis Minor Muscle.—This layer of fascia springs from the anterior layer of the costo-coracoid membrane, passing inferiorly, to the exteriors of the two superior ribs and costal cartilages and the superior and internal border of the pectoralis minor muscle ; it splits into an anterior and a posterior layer to include the muscle ; at the inferior and external border of the muscle the two layers unite again, to blend with the axillary fascia. Superiorly to the pectoralis minor muscle, it is perforated by branches of the short and acromio-thoracic arteries, and those of the anterior thoracic nerves.

DISSECTION.—Clear the anterior surfaces of the pectoralis minor and the subclavius muscles.

38. Pectoralis Minor Muscle, Plates 113 and 117.—This muscle has an oblique and inferior course : its superior and external attachment is to the coracoid process of the scapula ; its inferior and internal attachments are to the exterior surfaces of the anterior ends of the third, fourth, and fifth ribs.

39. Subclavius Muscle, Plates 119 and 120.—This is a short muscle, located parallel with and inferiorly to the clavicle. It has an internal attachment to the exterior surface of the cartilage of the first rib ; and an external one to the inferior surface of the clavicle, externally to the middle of the bone.

DISSECTION.—Clear away the adipose tissue from the axillary area between the borders of the pectoralis minor muscle, anteriorly, and the latissimus dorsi and teres major muscles, posteriorly. Expose and follow, superiorly, the long thoracic and subscapular arteries ; strip them of their venæ comites, and note the muscles they supply. Demonstrate the anterior circumflex artery. Trace, superiorly, the posterior thoracic and the subscapular nerves—from the serratus magnus, the latissimus dorsi, the teres major, and the subscapularis muscles. Display, in part, the anterior surface of the subscapularis muscle.

40. Long Thoracic Artery, Plates 116, 117, 119, and 120.—This artery (venæ comites) has an inferior course from its origin from the axillary artery, appearing along the external border of the pectoralis minor muscle ; it sends branches to the latter and to the serratus magnus muscle.

41. Subscapular Artery.—This vessel (vena comes) is given off from the axillary artery ; it has an inferior course, anteriorly to the external fold of the axilla, giving off the dorsal scapular artery; it also affords muscle branches to the subscapularis, teres major, latissimus dorsi, and serratus magnus muscles.

42. Dorsal Scapular Artery.—This artery (venæ comites) is the first and largest branch given off from the subscapular; it winds to the dorsum of the scapula, through the space between the subscapularis and teres major muscles.

43. Anterior Circumflex Artery, Plates 117, 119, and 120. —This artery (vena comes) arises from the superior surface of the axillary artery; it passes posteriorly to the coraco-brachialis and the biceps (its two heads) muscles, disappearing posteriorly to the anterior border of the deltoid muscle.

44. Posterior Thoracic Nerve, Plates 116, 117, 119, and 120.—This nerve has an inferior course, into the axilla, from the cervical portion of the brachial plexus; it lies upon the surface of the serratus magnus muscle, distributing branches to it.

45. Subscapular Nerves (First and Second) to the Subscapularis and Latissimus Dorsi Muscles.—These nerves can be traced, superiorly and internally, from the axillary surfaces of the muscles, toward the axillary portion of the brachial plexus.

Dissection.—Clear the surfaces of the portions of the triceps and pronator radii teres muscles at the inner side of the arm; expose the long and the inner heads of the former muscle. Display the axillary vein, the median, the ulnar, the internal cutaneous, the small internal cutaneous, and the intercosto-humeral nerves through the portion of the axilla externally to the pectoralis minor muscle. Trace the axillary vein and the nerves into the arm.

46. Triceps Muscle, Plates 113, and 116 to 120, inclusive. —The inner side of the long and the inner heads of this muscle present at the posterior part of the inner side of the arm. The long head comes out, from the direction of the shoulder (Plate 113), posteriorly to the humeral end of the teres major muscle.

47. Pronator Radii Teres Muscle, Plates 113, 116, and 118.—The proximal portion of this muscle appears at the inner side of the anterior of the distal end of the humerus; it continues into the forearm upon the inner portion of the anterior of the elbow.

48. Axillary Vein, Plates 117 and 118.—This vein runs through the axilla, inferiorly to the axillary artery and the nerves of the axillary portion of the brachial plexus. It is formed by the confluence of the basilic vein and the venæ comites of the brachial artery; it receives the venæ comites of the branches of the axillary artery.

49. Median Nerve.—This nerve, before spoken of (page 198), can be traced from the arm into the axilla, where it is seen to divide into two branches, called *legs;* the latter pass, respectively, to the outer and inner sides of the axillary artery. At its distal end the nerve gives off branches to muscles of the forearm.

50. Ulnar Nerve.—This nerve can be followed in a proximal direction to the external border of the pectoralis minor muscle, inferiorly to, and to the inner side of, the axillary artery; it is given off from the inner cord of the axillary portion of the brachial plexus, which bifurcates into the ulnar nerve and the inner leg of the median nerve. The nerve is continued into the arm, posteriorly to the axillary and brachial arteries; in the proximal third of the arm it diverges from the brachial artery, to be continued upon the inner surface of the long and inner heads of the triceps muscle (Plates 118 and 119), in a direction toward the inner condyle of the humerus.

51. The Internal Cutaneous Nerve.—This nerve can be traced internally, inferiorly to the last-described nerve, to where it disappears, posteriorly to the pectoralis minor muscle.

52. Small Internal Cutaneous Nerve.—This nerve may be followed into the axilla, parallel with, and inferiorly to, the last-described nerves.

53. Intercosto-Humeral Nerve.—This nerve may now be demonstrated as formed by the lateral cutaneous branch of the second intercostal nerve and an anastomotic branch from the small internal cutaneous nerve.

DISSECTION.—Section the biceps muscle (Plate 116) and reflect its portions as in Plate 118; find the vessels and nerves entering its deep surface; trace them to their parent trunks and cut them short. Clear the surface of the brachialis anticus muscle; trace the musculo-cutaneous nerve and its branches.

54. Brachialis Anticus Muscle, Plates 113, 116, and 118. —This muscle lies between the biceps muscle and the distal half of the humerus. Its proximal attachment is to the anterior of the distal half of the shaft of the humerus; its distal attachment is to the anterior of the proximal end of the shaft of the ulna.

55. Musculo-Cutaneous Nerve, Plates 116 to 119, inclusive. —This nerve comes out from the posterior surface of, and at the inferior border of, the pectoralis minor muscle, superiorly, and externally, to the axillary artery and the outer leg of the median nerve. It sends a branch to the coraco-brachialis muscle, then passes through the muscle, to emerge from the anterior of its distal half. It is continued through the arm between the biceps and the brachialis anticus muscles, entering between them at the inner side of the biceps; it appears from the posterior surface of the distal portion of the biceps muscle, at its outer side. In its course between the muscles (Plate 118) it gives them their nerve supply. From the arm, at the outer half of its distal end, it is continued into the subcutaneous plane of the forearm.

DISSECTION.—Replace the biceps muscle, *in situ*, and sew its cut ends together. Hook the median nerve to the outer side, and the basilic vein to the inner side (Plate 118); expose the external portion of the axillary artery and the brachial artery, with the venæ comites of the latter.

56. Axillary Artery, Plates 117, 118, and 119.—The external portion of this artery is continued from the posterior surface of, and at the inferior and external border of, the pectoralis minor muscle, to its terminus at the distal border of the humeral end of the teres major muscle: anteriorly, is the median nerve and the fork of its legs; externally, the musculo-cutaneous nerve; inferiorly, the ulnar, the internal cutaneous, and the small internal cutaneous nerves, and the axillary vein.

57. Brachial Artery, Plates 117 and 118.—This artery (venæ comites), before referred to (page 198), is continued from the terminus of the axillary artery. It lies along the inner side of the coraco-brachialis and biceps muscles. In its course it gives off the superior profunda, the inferior profunda, the anastomotica magna, and muscle branches. Its proximal portion has the median nerve to its outer side ; at its mid-portion it is crossed by the nerve ; for its distal third the nerve lies to its inner side.

DISSECTION.—Section the pectoralis minor muscle (Plate 117) ; reflect its superior portion as in Plate 119, and its inferior portion to its thoracic attachments, where it may be cut away. Clear the exterior surfaces of the external intercostal muscles between the ribs, and the fibrous tissue plane between the costal cartilages. Cut the axillary vein, as in Plate 119 ; dissect its distal portion away, also the basilic vein and the venæ comites of the brachial artery. Demonstrate the outer and inner cords of the axillary portion of the brachial plexus ; also, the nerves projected from them into the upper extremity.

58. External Intercostal Muscles and their Anterior Intercostal Aponeurosis, Plates 113 and 120.—These muscles form the exterior plane in the intercostal spaces, to the anterior ends of the ribs ; in the interchondral spaces, the plane is continued, by aponeurosis, to the border of the sternum.

59. Outer Cord of the Axillary Portion of the Brachial Plexus, Plate 119.—This nerve trunk lies superiorly to, and parallel with, the internal third of the axillary artery ; it terminates by bifurcating into the musculo-cutaneous nerve and the outer leg of the median nerve.

60. Inner Cord of the Axillary Portion of the Brachial Plexus.—This nerve trunk runs parallel with, and inferiorly to, the internal third of the axillary artery ; it gives off the small internal cutaneous and the internal cutaneous nerves, which run inferiorly to the nerve cord ; the cord terminates by bifurcating into the ulnar nerve and the inner leg of the median.

DISSECTION.—Hook the median nerve and the brachial artery to the outer side ; find the superior profunda, the inferior profunda, and the anastomotica magna arteries.

61. Superior Profunda Artery, Plates 118 and 119.—This artery (venæ comites) is the first and largest branch of the brachial artery ; it is given off from the inner side of, and close to, the commencement of the brachial from the axillary artery. It has a distal course upon the inner surface of the long head of the triceps muscle, and passes in between the long and inner heads of that muscle, in company with the musculo-spiral nerve and its branches.

62. Inferior Profunda Artery.—This artery (venæ comites) is the second branch from the inner side of the brachial artery; it is smaller than the last-described branch. It has a distal course upon the surface of the inner head of the triceps muscle joining the ulnar nerve, which it accompanies to the elbow.

63. Anastomotica Magna Artery.—This artery (venæ comites) is given off from the inner side of the distal third of the brachial artery; it runs to the inner side of the anterior of the elbow.

64. Inner Intermuscular Septum, Plate 119.—This is a fibrous tissue septum between the brachialis anticus muscle and the inner head of the triceps muscle; it defines the anterior and posterior regions of the inner side of the arm.

Dissection.—Section the axillary artery (Plate 119) and its branches; also, the outer and inner cords of the axillary portion of the brachial plexus, the musculo-cutaneous, internal, and small internal cutaneous nerves (Plate 119). Reflect the axillary artery and the cords of the brachial plexus, with their branches, distally, upon the arm. (Do not cut away these reflected parts, as they are to be replaced, *in situ.*) Display the posterior cord of the axillary portion of the brachial plexus, and its branches. Note the posterior circumflex artery.

65. Posterior Cord of the Axillary Portion of the Brachial Plexus, Plate 120.—This cord of the plexus runs through the axilla, parallel with, and in a plane posteriorly to, the axillary artery and the outer and inner nerve cords. It gives off the first and second subscapular nerves, which may now be traced, superiorly, to its inferior side: the first is a short nerve, to the subscapularis muscle; the second is a long nerve, to the latissimus dorsi muscle. The cord terminates by bifurcating into the circumflex and musculo-spiral nerves.

66. Circumflex Nerve.—This nerve lies upon the anterior surface of the subscapularis muscle; at the external border of this muscle, in the space between it and the teres major muscle, it winds to the posterior surface, and outer side, of the proximal end of the shaft of the humerus—the surgical neck.

67. **Musculo-Spiral Nerve,** Plates 119 and 120.—This nerve, near its origin, runs superiorly to, and parallel with, the circumflex nerve; it has a distal course into the arm, lying, consecutively, upon the anterior surfaces of the subscapularis muscle, the humeral ends of the latissimus dorsi and teres major muscles, and the inner side of the long head of the triceps muscle. It enters between the long and inner heads of the triceps muscle, to be continued, through the middle third of the arm, in the spiral groove on the posterior surface of the shaft of the humerus; its latter portion is accompanied by the superior profunda artery. Its branches are: the third subscapular nerve and branches to the triceps muscle.

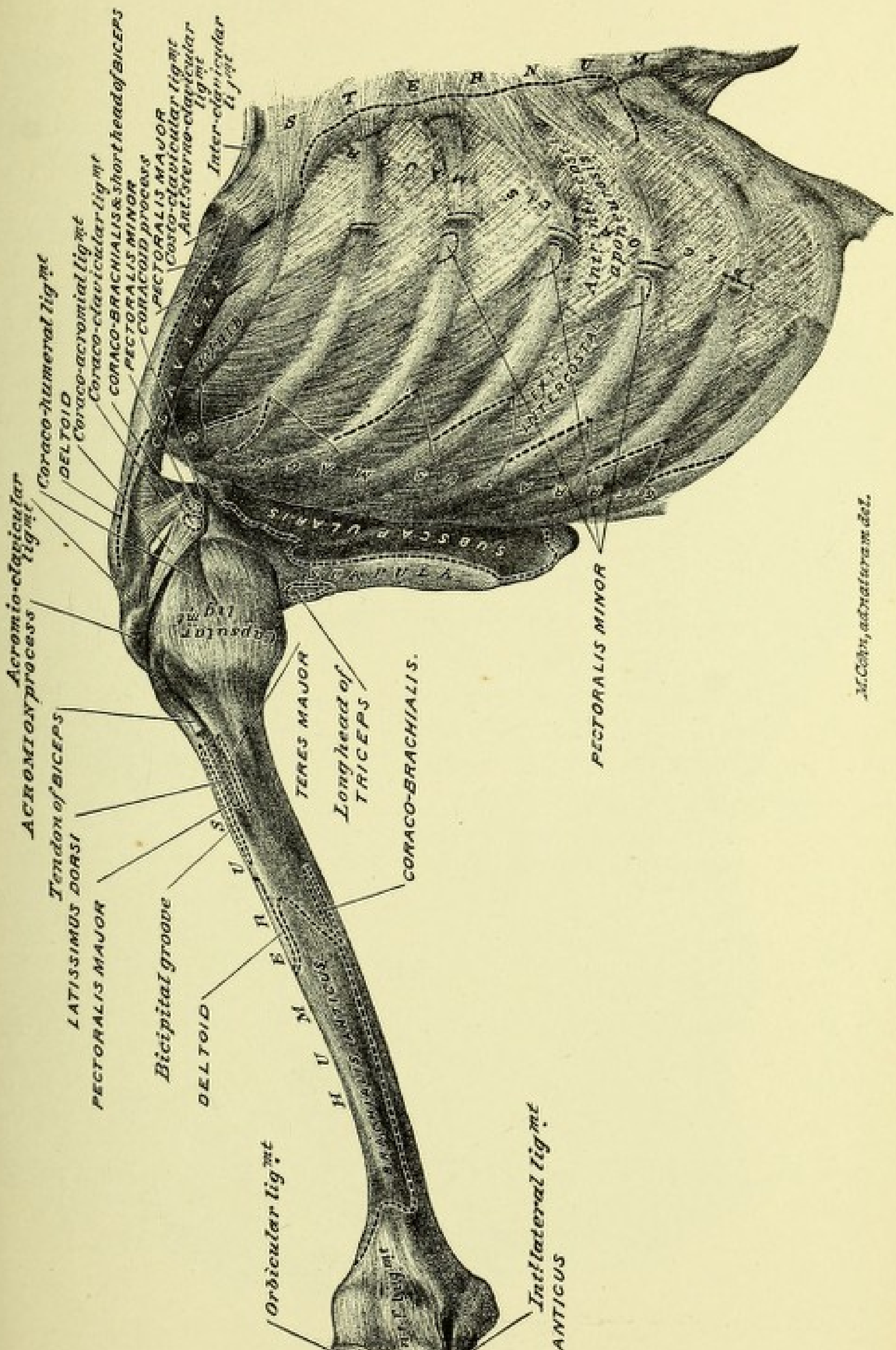
68. **Third Subscapular Nerve.**—This nerve, a branch of the musculo-spiral, has an inferior and external course to distribute to the subscapularis and teres major muscles.

69. **Nerves to the Triceps Muscle.**—The musculo-spiral nerve gives off a number of branches: the first distributes to the long head of the triceps; the second divides and supplies the inner head of the same muscle; the other branches enter, with the trunk of the nerve, between the long and inner heads of the muscle.

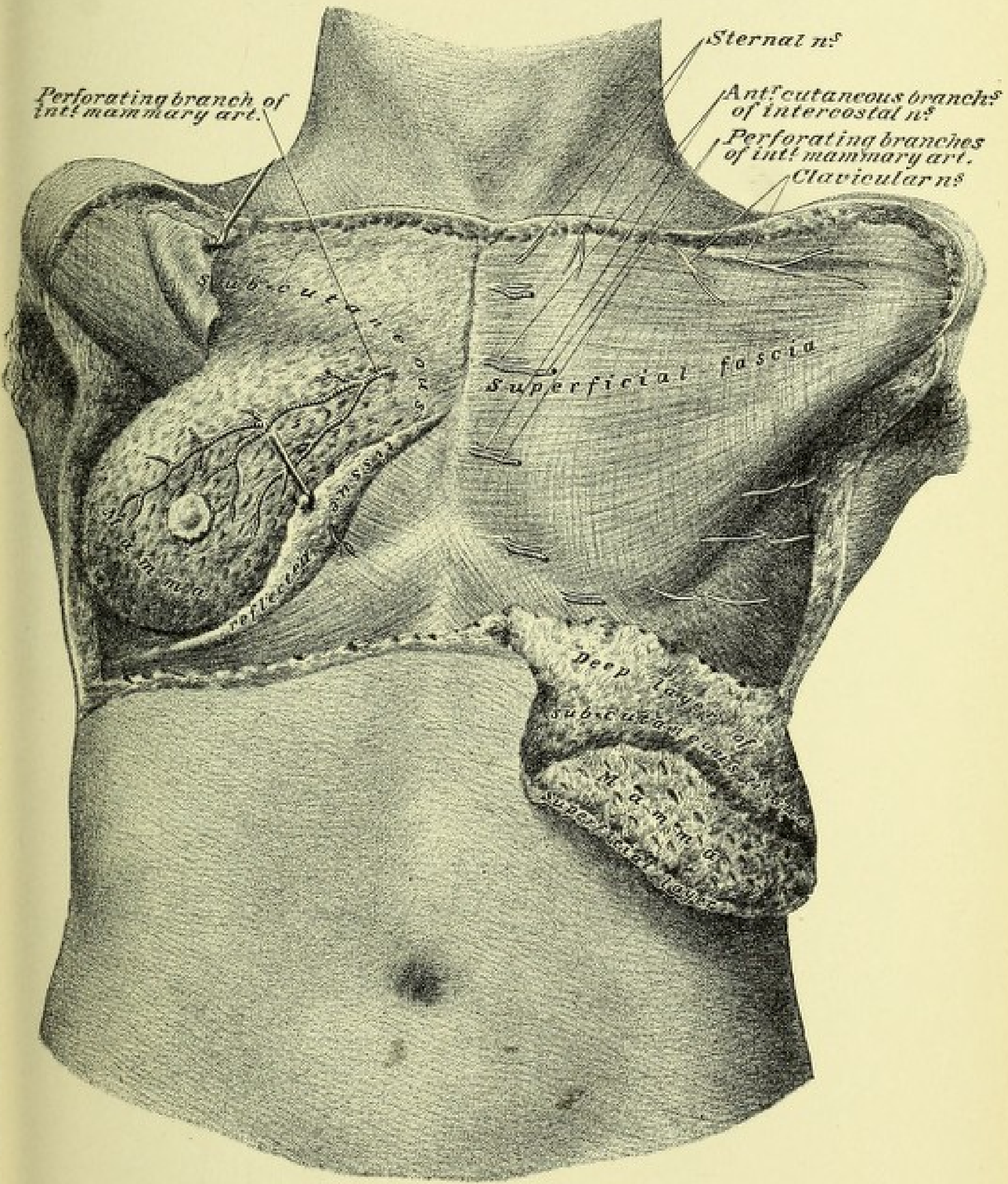
70. **Posterior Circumflex Artery,** Plate 120.—This artery (venæ comites), branch from the posterior of the axillary artery, accompanies the circumflex nerve from the axilla (page 205).

Dissection.—Replace the axillary and brachial arteries, the sectioned cords of the brachial plexus, and the branches of the plexus, before proceeding to the dissection of the anterior region of the forearm.

PLATE 113

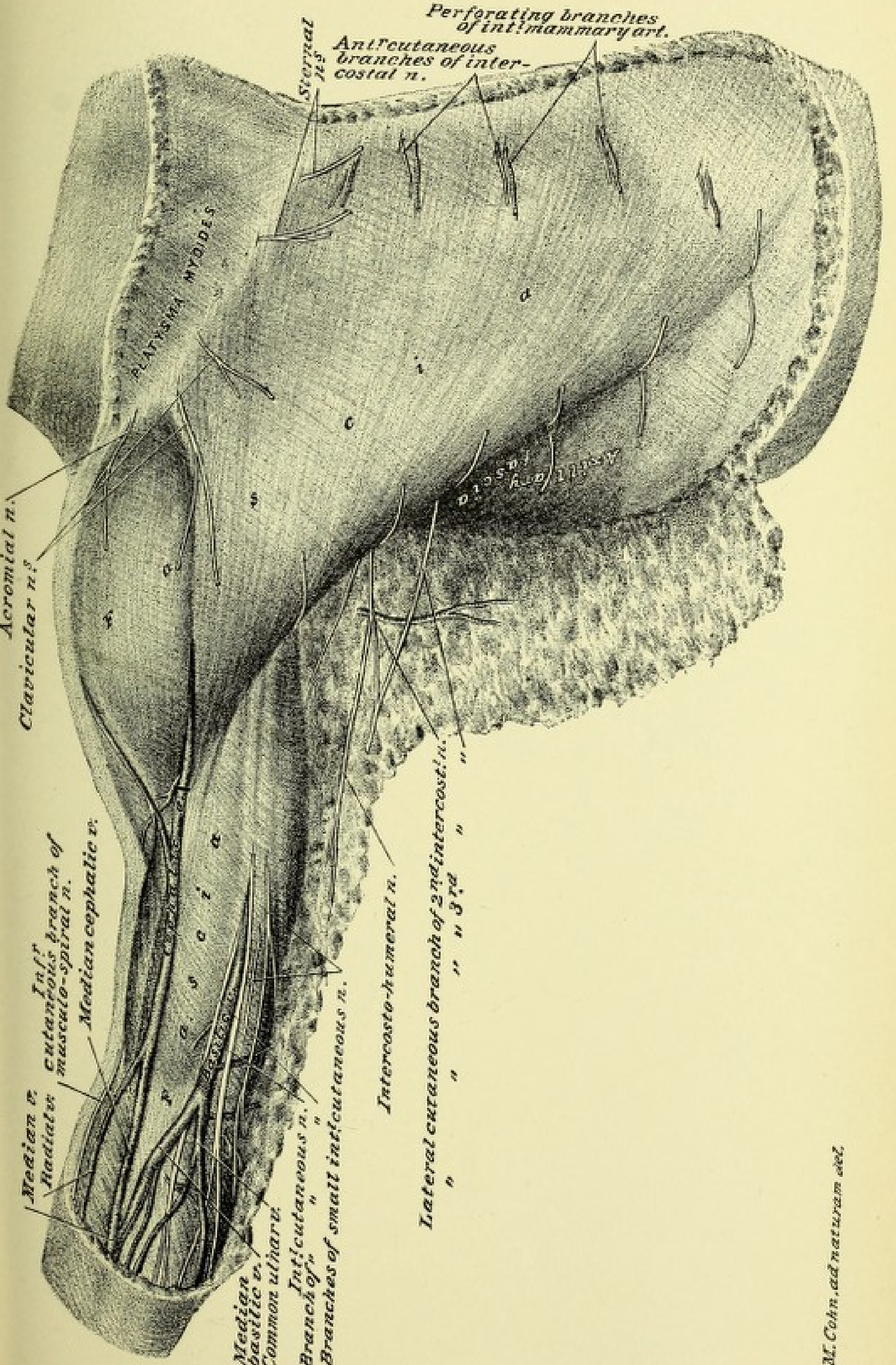


Acromio-clavicular ligmt
Coraco-humeral ligmt
DELTOID
Coraco-acromial ligmt
Coraco-clavicular ligmt
CORACO-BRACHIALIS & Short head of BICEPS
PECTORALIS MINOR
CORACOID process
PECTORALIS MAJOR
Costo-clavicular ligmt
Ant. Sterno-clavicular ligmt
Inter-clavicular ligmt
STERNUM
CLAVICLE
ACROMION process
Tendon of BICEPS
LATISSIMUS DORSI
PECTORALIS MAJOR
Bicipital groove
DELTOID
HUMERUS
Capsular ligmt
TERES MAJOR
Long head of TRICEPS
CORACO-BRACHIALIS.
SUBSCAPULARIS
SCAPULA
EXT. INTERCOSTAL
Ant. intercostal aponeurosis
PECTORALIS MINOR
Orbicular ligmt
Int. lateral ligmt
Ant. ligmt
BRACHIALIS ANTICUS
BICEPS
RADIUS
ULNA
M. Cohn, ad naturam del.

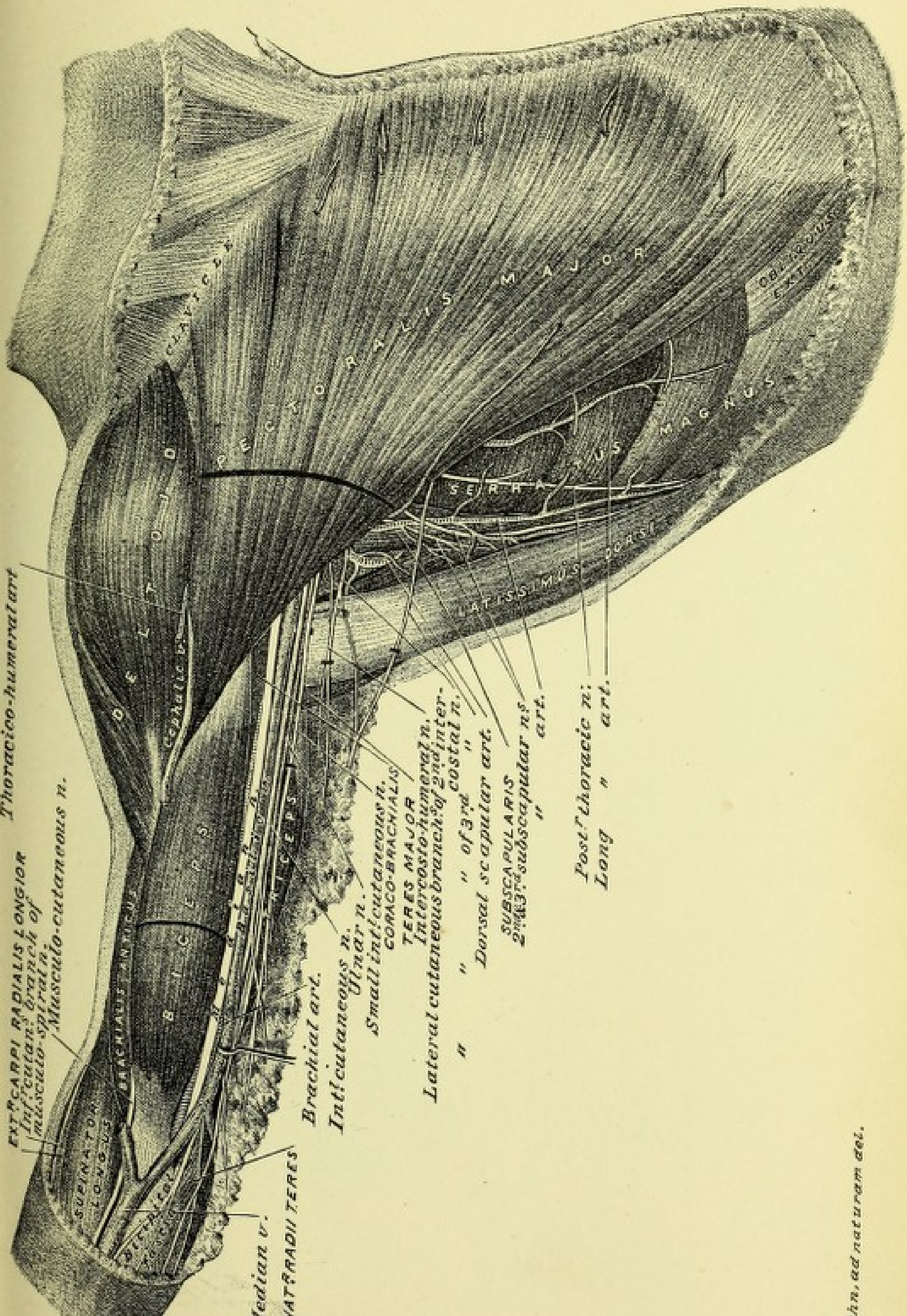


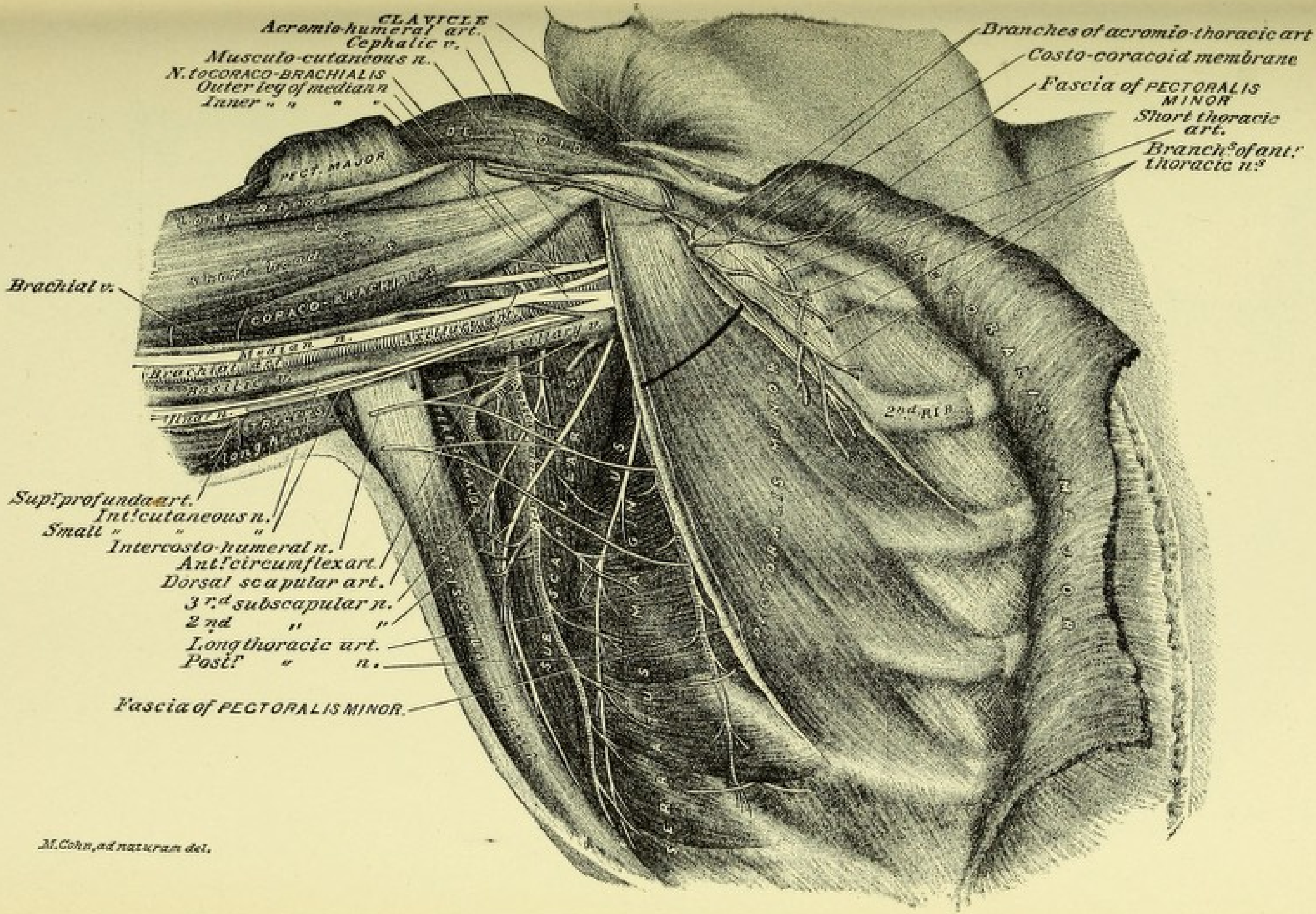
M. Cohn, ad naturam del.

PLATE 115

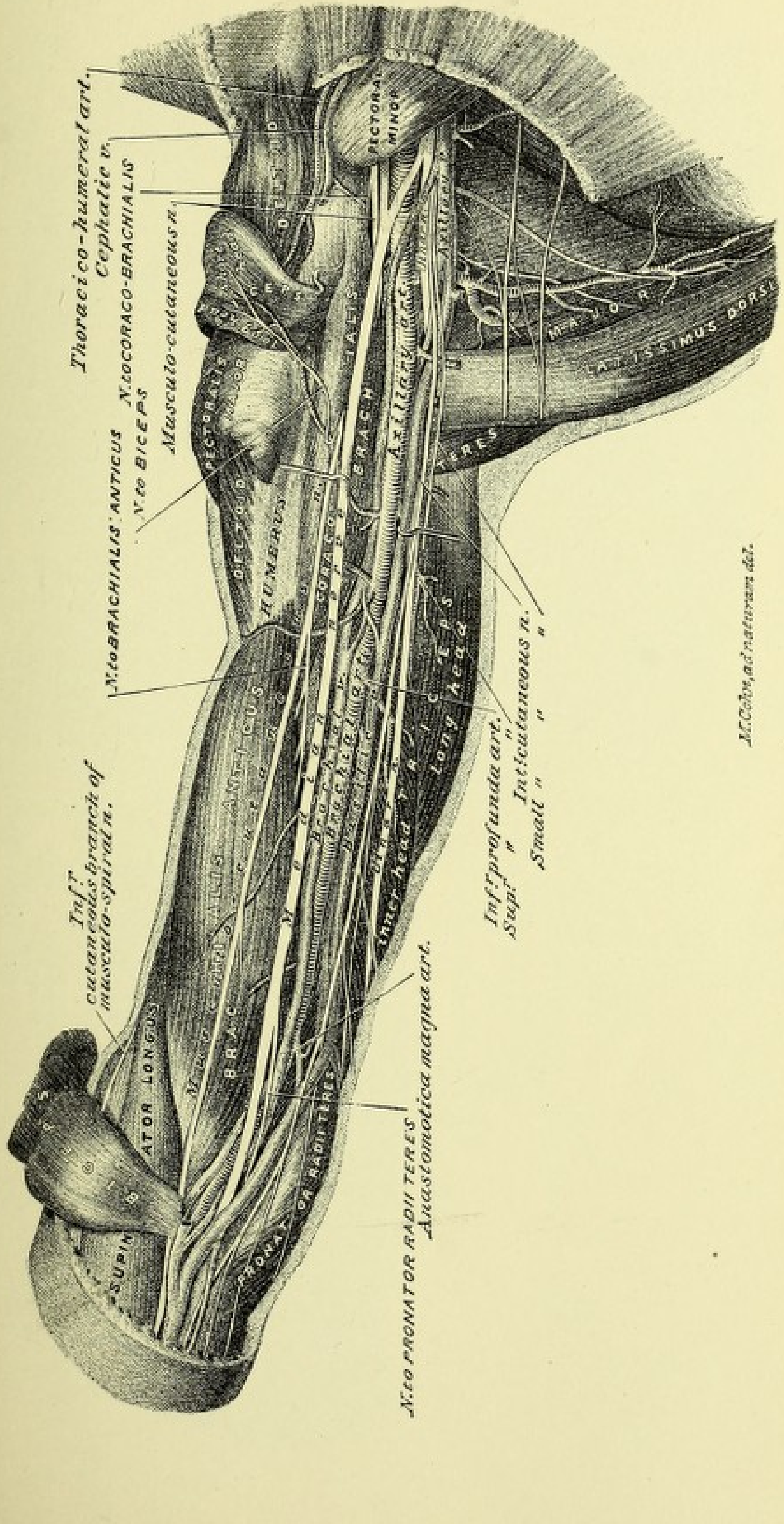


Perforating branches of int! mammary art.
Ant! cutaneous branches of intercostal n.
Sternal n.s
PLATYSMA MYOIDES
Axillary fascia
Acromial n.
Clavicular n.s
Inf.r cutaneous branch of musculo-spiral n.
Median cephalic v.
Median v.
Radial v.
Median basilic v.
Common ulnar v.
Int! cutaneous n.
Branch of " "
Branches of small int! cutaneous n.
Intercosto-humeral n.
Lateral cutaneous branch of 2nd intercost! n.
" " " 3rd "
" " " "
M. Cohn, ad naturam del.

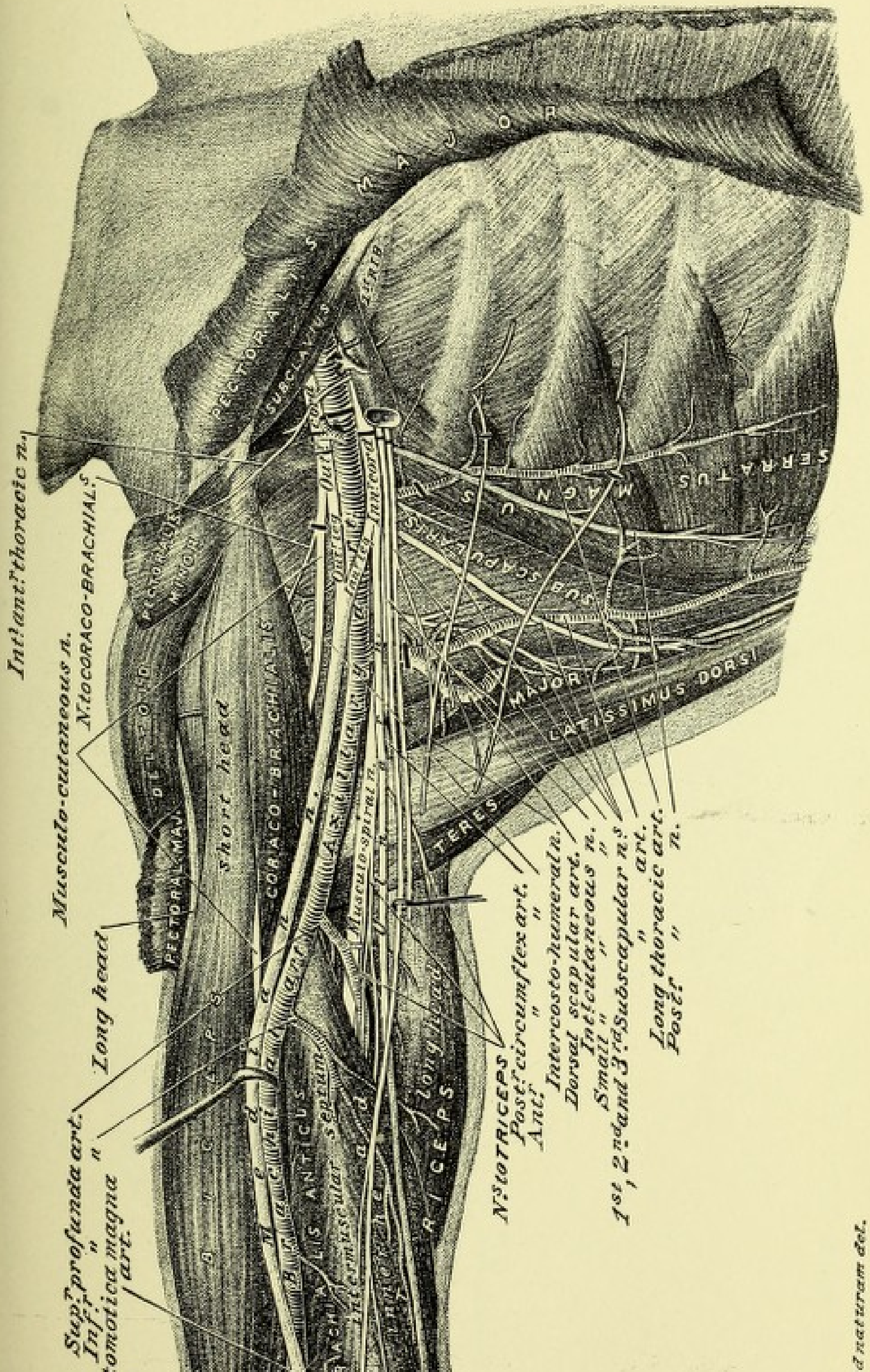

CLAVICLE
PECTORALIS MAJOR
DELTOID
Cephalic v.
BICEPS
BRACHIALIS ANTICUS
SUPINATOR LONGUS
SERRATUS MAGNUS
LATISSIMUS DORSI
OBLIQUUS EXT.
TRICEPS
Thoracico-humeral art.
EXTR CARPI RADIALIS LONGIOR
Inf. cutan. branch of musculo-spiral n.
Musculo-cutaneous n.
Brachial art.
Int. cutaneous n.
Ulnar n.
Small int. cutaneous n.
CORACO-BRACHIALIS
TERES MAJOR
Intercosto-humeral n.
Lateral cutaneous branch of 2nd intercostal n.
" " of 3rd "
Dorsal scapular art.
SUBSCAPULARIS
2nd & 3rd subscapular n.s
" art.
Post. thoracic n.
Long " art.
Median v.
PRONATR RADII TERES
M.Cohn, ad naturam del.



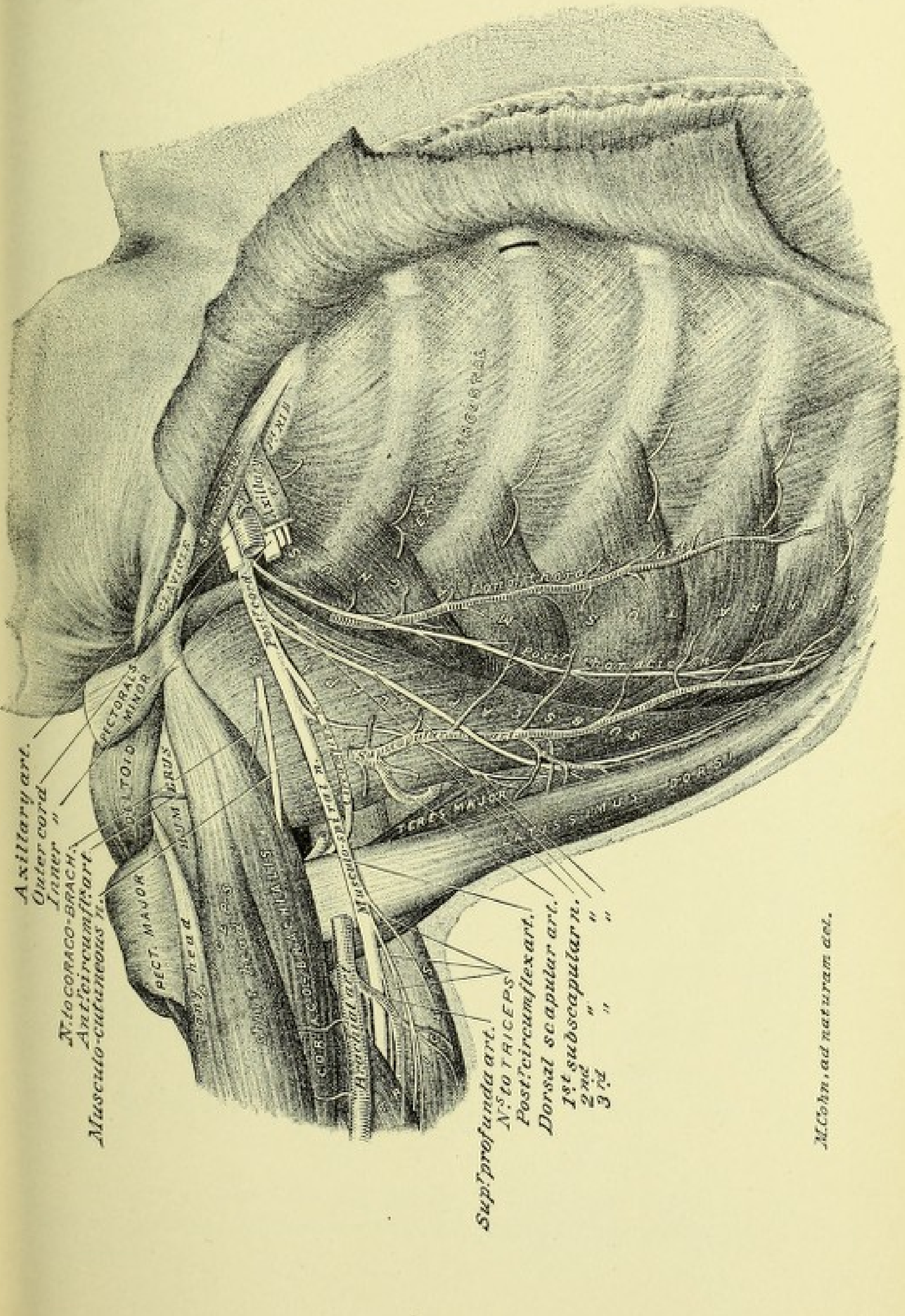
M. Cohn, ad naturam del.



M. Cohn, ad naturam del.



M. Cohn, ad naturam del.


Axillary art.
Outer cord
Inner "
N. to CORACO-BRACH.
Ant. circumflex art.
Musculo-cutaneous n.
PECTORALIS MINOR
DELTOID
PECT. MAJOR
CLAVICLE
TERES MAJOR
LATISSIMUS DORSI
Sup! profunda art.
N. to TRICEPS
Post. circumflex art.
Dorsal scapular art.
1st subscapular n.
2nd "
3rd "
M. Cohn, ad naturam del.

SIXTEENTH DISSECTION.

ANTERIOR OF ELBOW, FOREARM, AND HAND.

DISSECTION.—The upper extremity is placed in the same position as for the fifteenth dissection (page 193).

Terms of Relation.—To the elbow and forearm: the general terms *anterior* and *posterior;* with the special terms *proximal* and *distal; outer* and *inner sides.* To the palm of the hand (carpus and metacarpus), the special terms *proximal* and *distal; palmar* and *dorsal surfaces; outer* or *pollex* and *inner* or *minim sides.* To the digits, the special terms *proximal* and *distal; palmar* and *dorsal surfaces;* and the *lateral digital surfaces.* The regions of the hand will be referred to as the *carpal* (carpus), the *metacarpal* (metacarpus), and the *digital* (digits).

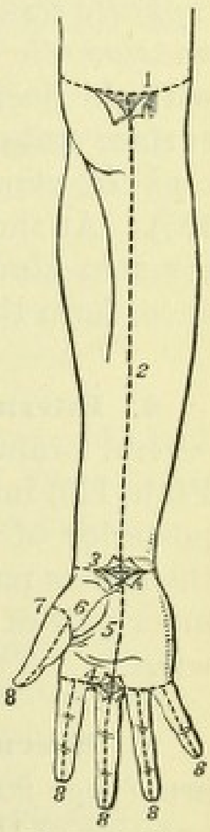


FIGURE 10.

Bones and Bone Areas, Plates 121 and 122.—The anterior surfaces of the following bones form the osseous framework of this dissection: the distal end of the humerus; the radius; the ulna; the seven bones of the carpus—scaphoid, semilunar, cuneiform, pisiform, trapezium, trapezoid, os magnum, and unciform; the bones of the metacarpus—first to fifth, inclusive; the fourteen bones of the digits—five phalanges, four phalangines, and five phalangettes (page 123). All these bones afford attachments to muscles, except the scaphoid, the semilunar, and the cuneiform. Each metacarpal and digital bone has: a *base*, a *shaft*, and a *head.*

DISSECTION.—Make the skin incisions 1, 2, and 3, of Figure 10, and reflect flaps as indicated. Expose the veins and nerves in the subcutaneous plane of the dissection.

1. Subcutaneous Tissue and Veins of the Anterior of the Elbow and Forearm, Plates 123 and 115.—The subcutaneous tissue of the anterior of the elbow and forearm presents a network of veins and nerves. The veins are not *comites* to arteries; they occupy a plane superficial to the nerves, and they are subject to many variations. To the inner side is the *anterior ulnar vein*, which has a longitudinal and proximal course to the elbow; toward its proximal end it receives the *posterior ulnar vein*, from the posterior of the forearm; the resultant vein is the *common ulnar vein* at the inner side of the elbow. At the outer side of the forearm is the *radial vein*, which has a proximal course to the elbow. At the middle of the forearm is a more or less well-developed vein, the *median:* it commences at the wrist, from which it has a proximal course to the elbow, where it bifurcates into the *median-basilic* and the *median-cephalic veins;* near or at its point of bifurcation it gives off an *anastomotic branch*, which perforates the fascia to anastomose with the deep or comites veins of the region. At the anterior surface and outer side of the elbow the *radial* and the *median-cephalic* veins join to form the *cephalic* vein of the arm (page 195). At the anterior surface and inner side of the elbow the *common ulnar* and the *median-basilic* veins, by their confluence, form the *basilic* vein of the arm (page 195).

2. Internal Cutaneous Nerve.—This nerve is continued, by several branches, from the inner side of the arm (page 195; Plate 115) into the forearm; the proximal one passes to the posterior of the forearm, along the inner side of the elbow; the others pass, posteriorly to the median-basilic vein, into the inner half of the anterior surface of the forearm, as far as the wrist.

3. Musculo-Cutaneous Nerve.—This nerve enters from the arm (page 203; Plates 116 and 118) into the outer half of the anterior of the forearm, passing, as it crosses the elbow, posteriorly to the median-cephalic vein; it is continued to the palm of the hand, and anastomoses with the radial nerve.

4. Inferior External Cutaneous Branch of the Musculo-Spiral Nerve.—At the outer side of the elbow this nerve enters from the arm, and is continued to the posterior of the forearm;

in its course it runs parallel with, and posteriorly to, the radial vein.

DISSECTION.—Clear the subcutaneous tissue from the fascia of the elbow and forearm, preserving the subcutaneous veins and nerves.

5. Fascia of the Forearm.—This fascia is continuous with that of the arm.

6. Palm, Plate 124.—Three areas present to the palm: a middle depression, the *palmar fossa;* an outer elevation, the *pollex* (thenar) *eminence;* an inner elevation, the *minim* (hypothenar) *eminence.*

DISSECTION.—Make the skin incisions of the palm, 4, 5, 6, and 7, of Figure 10 (page 207), and reflect flaps as indicated. Expose the palmaris brevis muscle, and find the palmar cutaneous branches of the median, the ulnar, and the musculo-cutaneous nerves.

7. Palmaris Brevis Muscle.—This flat, subcutaneous muscle is located at the proximal portion of the minim eminence of the palm. It is attached to the inner border of the palmar fossa portion of the palmar fascia, and to the skin along the minim side of the hand. Its degree of development varies, from a few stray fibres to a well-defined plane of muscle.

8. Palmar Cutaneous Branch of the Median Nerve.—This branch of the median nerve perforates the fascia at the wrist and distributes in the subcutaneous plane of the proximal portion of the palmar fossa.

9. Palmar Cutaneous Branch of the Ulnar Nerve.—This branch of the ulnar nerve distributes in the subcutaneous plane of the minim eminence of the palm.

10. Palmar Branch of the Musculo-Cutaneous Nerve.—A terminal branch of this nerve is continued, from the anterior of the wrist, to the surface of the pollex eminence.

DISSECTION.—Clear the surface of the palmar fascia and note the superficial transverse ligament. Find, at the distal limit of the palm, the palmar digital arteries with their bifurcations and continuations into the palmar collateral digital arteries; also, the palmar collateral digital nerves.

11. Palmar Fascia.—This is formed by the fascia continued from the forearm, which is specially thickened for the needs of the palm. When present, the palmaris longus tendon contributes to it. The middle or *palmar fossa portion* commences at the proximal limit of the palmar fossa ; it widens as it advances to the distal third of the metacarpus. At its distal limit it divides into four slips : their central fibres are projected to the palmar surfaces of the digital sheaths of the flexor tendons, on the digits, second to fifth, inclusive ; their lateral fibres pass to the transverse metacarpal ligament and the lateral surfaces of the heads of the metacarpal bones, second to fifth, inclusive. Transverse fibres bridge across the distal divisions of the palmar fossa portion of the palmar fascia—the *superficial transverse ligament* of the fingers. The outer or *pollex eminence portion* of the fascia invests the eminence, and extends around the pollex side of the metacarpal region to its dorsal surface. The inner or *minim eminence portion* occupies that eminence, with the palmaris brevis muscle on its palmar surface ; it winds to the dorsal surface of the metacarpal region, over its minim side.

12. Palmar Digital Arteries.—These arteries (venæ comites), second to sixth, inclusive, appear at the distal limit of the palm. The third, the fourth, and the fifth are projected between the distal divisions of the palmar fossa portion of the palmar fascia, from the dorsal surface of the same, into the webbing between the digits, second to fifth, inclusive ; they there bifurcate into the palmar collateral digital arteries, fourth to ninth, inclusive ; before bifurcation, they each receive an interosseous artery, from the deep palmar arch. The second digital (radialis indicis) appears opposite the pollex side of the distal end of the second metacarpal bone, where it is continued, as the third palmar collateral digital artery, to the outer lateral digital surface of the second digit. The sixth digital is projected along the minim side of the palm, to be continued, as the tenth palmar collateral digital artery, to the inner lateral digital surface of the fifth digit.

13. Palmar Collateral Digital Nerves.—These nerves pass from the dorsal surface, of the palmar fossa portion, of the palmar fascia ; they join the palmar collateral digital arteries, entering the lateral digital surfaces.

DISSECTION.—Section (Plate 123) the proximal ends of the internal cutaneous and musculo-cutaneous nerves, and strip them from the fascia of the forearm; section the radial, the ulnar, the median, the median-cephalic, and the median-basilic veins; then clear away the veins from the anterior of the forearm, reflecting their proximal portions on the arm. Follow the palmar cutaneous branch of the median nerve, to the latter, by slitting the fascia. Incise the fascia of the forearm in the same lines as the skin incisions 1, 2, and 3, of Figure 10; reflect flaps of the fascia to the inner and outer sides of the limb, exposing the subjacent muscles, etc.

14. Flexor Carpi Radialis Muscle, Plates 121, 125, and 127. —This muscle has a longitudinal, and slightly oblique, course, from the anterior surface of the internal condyle of the humerus, to the palmar surface of the base of the second metacarpal bone; to reach the latter point, its tendon passes, to the dorsal surface of the anterior annular ligament and the proximal ends of the muscles of the pollex eminence.

15. Palmaris Longus Muscle.—This muscle (sometimes absent) has a proximal attachment to the anterior of the inner condyle of the humerus. Its course is parallel with, and to the inner side of, the last-described muscle; its distal end expands into the palmar fascia (page 210; Plate 124).

16. Flexor Carpi Ulnaris Muscle.—This muscle is located along the inner side of the forearm, from the inner condyle of the humerus, to its distal attachment to the pisiform bone.

17. Supinator Longus Muscle, Plates 121 and 125.—This muscle lies along the outer half of the anterior surface of the forearm: its proximal attachment is to the external condyloid ridge of the humerus; its distal to the outer side of the distal end of the radius, proximal to its styloid process.

18. Extensor Carpi Radialis Longior Muscle.—This muscle runs parallel with, but posteriorly to, the last-described muscle; at about the distal third of the forearm, its tendon passes to the posterior of the limb.

19. Radial Nerve, Plate 125.—At a variable point, at the outer side of the supinator longus muscle, this nerve is projected from its posterior surface; it has a distal course to the dorsal surface of the carpus.

20. Extensor Ossis Metacarpi Pollicis Muscle, Plates 121, 125, and 127.—The distal end of the tendon of this muscle winds, from the posterior surface of the forearm, to the anterior of the outer side of the carpus, to reach its attachment at the anterior surface of the base of the first metacarpal bone.

21. Radial Artery, Plates 125, 127, and 134.—This artery (venæ comites) has a longitudinal course through the radial half of the anterior region of the forearm. At its proximal end it emerges, from the posterior of the bicipital fascia, to the anterior surface of the tendon of the biceps, where it is located to the outer side of the proximal end of the supinator longus muscle; it then passes to the posterior surface of the latter muscle; at the distal and tendinous portion of the muscle, it emerges from its posterior surface, to run parallel with it, and to its inner side, as far as the carpus, where it winds to the posterior surface of the latter. From its proximal portion, the radial recurrent is given off, from its outer side; from its distal portion, the superficialis volæ and the anterior radial carpal branch from its inner side.

DISSECTION.—Clear the surface of the distal portion of the biceps muscle, its tendon, and the bicipital fascia. (Where the dissection of the arm has preceded this dissection this will have been done; the same is here directed, and described, to give completeness to the present dissection.)

22. Biceps Muscle, Plates 125 and 126.—The distal quarter of this muscle is located anteriorly to the distal end of the humerus; its tendon is projected into the proximal portion of the forearm, where it disappears posteriorly to the proximal border of the pronator radii teres muscle. The *bicipital fascia* is a process of fascia from the inner side of the tendon, which spreads as a fascial investment of the pronator radii teres muscle, and is attached to the intermuscular septum between the latter and the flexor carpi radialis muscle.

DISSECTION.—Section the bicipital fascia (Plate 125); dissect it off of the pronator radii teres muscle.

23. Pronator Radii Teres Muscle, Plates 121, 125, and 126. This muscle has an oblique course along the outer side of the proximal portion of the flexor carpi radialis muscle. Its proximal attachments are to the anterior surface of the internal condyle of the humerus, proximally to the compound flexor attachment thereto, and to the inner side of the coronoid process of the ulna; its distal end passes to the outer side of the shaft of the radius, a little proximal to its middle.

DISSECTION.—Display the boundaries of the anconeal space, and the division of the same, into inner and outer portions, by the distal end of the biceps muscle.

24. Anconeal Space, Plates 125 and 126.—This space is located anteriorly to the elbow-joint, including the adjoining quarters of the arm and forearm; it is the analogue of the popliteal space of the lower extremity. The distal boundaries of the space are formed by the proximal, and opposite, borders of the pronator radii teres and supinator longus muscles. Its proximal boundaries are not as well defined, extending as they do to about three finger-breadths from the elbow-joint: on the outer side is the supinator longus muscle; on the inner side is the inner intermuscular septum, with the distal end of the inner head of the triceps muscle, posteriorly to it. The distal end of the biceps muscle, as projected into the proximal portion of the forearm, divides the anconeal space into two portions: the inner and the outer.

25. Inner Portion of the Anconeal Space.—This is bounded at its outer side by the biceps muscle and its tendon; at its inner side by the pronator radii teres muscle and the inner intermuscular septum.

DISSECTION.—Insert a hook into the proximal border of the pronator radii teres muscle and turn it off inferiorly (Plate 126). Expose the nerves and vessels in the inner portion of the anconeal space; clear the muscle area of its floor.

26. Median Nerve.—A part of the trunk of this nerve has a longitudinal course through the inner portion of the anconeal space; its proximal end appears from the posterior surface of the inner side of the biceps muscle, its distal end passes into the forearm between the superficial and deep portions of the pronator radii teres muscle.

27. Nerves to the Pronator Radii Teres, Flexor Carpi Radialis, Palmaris Longus, and Flexor Sublimis Digitorum Muscles, Plate 126.—*Three* nerves, the proximal branches of the median nerve, are distributed to these muscles. They are given off from the inner side of the nerve, at the anconeal space portion of its course: the *first*, to the pronator radii teres, bifurcates, one branch supplying the anterior, the other the posterior portion of that muscle; the *second* and *third*, pass into the forearm, posteriorly to the posterior portion of the pronator radii teres muscle, to reach their respective muscles (the second, to the second and third muscles; the third, to the fourth muscle).

28. Brachial, Radial, and Ulnar Arteries, Plates 125 and 126.—The distal part of the *brachial artery* (venæ comites) enters the proximal end of the inner portion of the anconeal space, from the posterior surface, and at the inner side, of the biceps muscle; it has a distal course, between the median nerve, to the inner side, and the biceps muscle, to the outer side, to where it bifurcates into the radial and ulnar arteries. The *radial artery* (venæ comites) runs along the inner side of the tendon of the biceps and is continued through the forearm, as before described (page 212). The proximal portion of the *ulnar artery* (venæ comites) curves to the inner side, and leaves the distal limit of the anconeal space, posteriorly to the posterior portion of the pronator radii teres muscle.

29. Anastomotica Magna Artery.—This artery (venæ comites) is a branch from the inner side of the brachial, as the latter enters the anconeal space. It is distributed to the inner side of the elbow, where it anastomoses with the anterior and posterior ulnar recurrent arteries, thus contributing to the periarticular plexus.

30. Brachialis Anticus Muscle, Plate 126.—The anterior surface, of the inner two-thirds, of the distal portion of this muscle forms the floor of the inner portion of the anconeal space.

31. Inner Intermuscular Septum.—This is a strip of fibrous tissue, which is attached to the inner condyloid ridge of the humerus; it separates the brachialis anticus muscle from the inner head of the triceps muscle.

32. Triceps Muscle.—A portion of the inner head of this muscle lies posteriorly to the inner intermuscular septum.

33. Ulnar Nerve and Inferior Profunda Artery.—A short segment of this nerve, accompanied by this artery, lies upon the surface of the inner head of the triceps muscle, to the proximal side of the inner condyle of the humerus, and posteriorly to the inner intermuscular septum.

34. Outer Portion of the Anconeal Space.—This portion of the space is bounded: to the inner side, by the biceps muscle and its tendon; to the outer side, by the supinator longus muscle.

DISSECTION.—Section the supinator longus muscle (Plate 125) and hook its proximal portion to the outer side. Find and display the musculo-spiral, the radial, the posterior interosseous nerves—with the branches of the first and third—also, the musculo-cutaneous nerve. Expose the radial recurrent and the superior profunda arteries. Clear the areas of the portions of the muscles forming the floor of the outer portion of the anconeal space.

35. Musculo-Spiral Nerve.—The distal end of this nerve appears at the proximal limit of the outer portion of the anconeal space, between the brachialis anticus and the supinator longus muscles. From its outer side it gives off one branch to the supinator longus muscle, and two branches to the extensor carpi radialis longior muscle.

36. Radial Nerve.—This nerve arises from the bifurcation of the musculo-spiral nerve; it is projected into the forearm through the outer portion of the anconeal space. It has a course to the outer side of the tendon of the biceps and the radial artery.

37. Posterior Interosseous Nerve.—This, the largest of the branches of bifurcation of the musculo-spiral nerve, has a distal course from its origin to its point of transit through the supinator brevis muscle, by which it reaches its distribution at the posterior region of the forearm. The anconeal portion of this nerve lies parallel with, and to the outer side of, the radial nerve. It gives off two branches: an outer, to the extensor carpi radialis brevior muscle; an inner, to the supinator brevis muscle.

38. Radial Recurrent Artery.—This artery (venæ comites) is given off from the outer side of the radial artery; it crosses upon the anterior surface of the tendon of the biceps muscle, and is projected into the outer portion of the anconeal space, through which it has a proximal course parallel with, and posteriorly to, the radial nerve. Branches from it distribute to contiguous muscles.

39. Superior Profunda Artery.—The distal end of this artery (venæ comites) presents at the proximal limit of the outer portion of the anconeal space, accompanying the musculo-spiral nerve. It anastomoses with the last-described artery.

40. Muscles Contributing to the Floor of the Outer Portion of the Anconeal Space.—The outer border of the distal portion of the brachialis anticus muscle, the anterior surfaces of the proximal portions of the extensor carpi radialis longior and brevior muscles, and a part of the anterior surface of the supinator brevis muscle, contribute to form the floor of this portion of the anconeal space.

DISSECTION.—Replace the pronator radii teres and the supinator longus muscles, *in situ*. Clear the three forearm intertendinous spaces, at the distal third of the anterior of the region (Plate 125); loop the tendons of the palmaris longus and the flexor carpi ulnaris muscles to the inner side. Find the radial artery (venæ comites), the median nerve, the ulnar artery (venæ comites), and the ulnar nerve; display the portions of the pronator quadratus, flexor longus pollicis, and flexor sublimis digitorum muscles, which form the floors of these spaces.

41. Forearm Intertendinous Spaces, Plates 125 and 127.—Three intertendinous spaces present at the distal third of the anterior of the forearm: the outer, the middle, and the inner.

The outer intertendinous space has the tendons of the supinator longus and the extensor ossis metacarpi pollicis muscles to the outer side; and the tendon of the flexor carpi radialis muscle to the inner side; it contains the distal end of the forearm portion of the radial artery (venæ comites), which gives off the superficialis volæ and anterior radial carpal arteries from its inner side, before passing to the dorsum of the carpus. It has for its floor portions of the flexor longus pollicis and the pronator quadratus muscles.

The middle intertendinous space is between the tendons of the flexor carpi radialis and palmaris longus muscles; it contains the median nerve, giving off its palmar cutaneous branch (page 209); the tendon of the flexor longus pollicis muscle forms its floor.

The inner intertendinous space is located between the tendons of the palmaris longus and the flexor carpi ulnaris muscles; along the outer side of the latter tendon is lodged the ulnar artery (venæ comites), the ulnar nerve, and the palmar cutaneous branch of the latter; the floor of the space is formed by the tendons of the flexor sublimis digitorum muscle.

Dissection.—Remove the pollex eminence portion of the palmar fascia; expose the muscles and vessels of the eminence (Plate 127).

42. Abductor Pollicis Muscle, Plates 122, 127, and 129.—This is the superficial muscle of the pollex eminence, extending from the palmar surface of the scaphoid bone and the anterior annular ligament, to the outer side of the base of the phalanx of the first digit.

43. Superficialis Volæ Artery, Plate 127.—This artery (venæ comites), is given off from the inner side of the distal end of the forearm portion of the radial artery; it enters the proximal portion of the pollex eminence, to the dorsal surface of the abductor pollicis muscle, and appears at the inner side of the muscle, where it completes the superficial palmar arch, by anastomosing with its ulnar artery portion.

44. Flexor Brevis Pollicis Muscle (outer head), Plates 122, 127, and 129.—This head of the muscle has a proximal attachment to the palmar surface of the trapezium and the anterior annular ligament; a distal one to the outer tubercle, at the palmar surface of the base of the phalanx of the first digit (pollex), to the inner side of that of the last-described muscle. It is located parallel with, and to the inner side of, the abductor pollicis muscle. It lies in a plane dorsal to the latter muscle.

45. Sheathed Tendon of the Flexor Longus Pollicis Muscle, Plate 127.—This is lodged to the inner side of the outer head of the flexor brevis pollicis muscle.

DISSECTION.—Dissect away the palmaris brevis muscle and the minim eminence portion of the palmar fascia (Plate 127), exposing the muscles, nerves, and vessels at the palmar surface of the eminence.

46. Abductor Minimi Digiti Muscle, Plates 122, 127, and 129.—This muscle is located at the minim border of the palm: it extends from its proximal attachment to the pisiform bone, to its distal attachment to the inner side of the base of the phalanx of the fifth digit.

47. Ulnar Nerve, Plate 127.—At the distal end of the forearm portion of this nerve, where it approaches the outer side of the pisiform bone, it bifurcates into the deep and the superficial palmar nerves. The *deep palmar nerve* is continued along the outer side of the pisiform bone, giving off two muscle branches from its inner side. These branches, with the deep palmar nerve, pass to a deep plane of the palm, by an interval between the proximal ends of the abductor and the flexor brevis minimi digiti muscles. The *superficial palmar nerve* is continued to the palmar surface of the proximal end of the flexor brevis minimi digiti muscle, where it bifurcates into the fifth and the sixth digital nerves. The *fifth digital nerve* has a distal course, passing to the dorsal surface of the sixth digital artery, and entering the palmar fossa region of the palm; it runs parallel with, and to the inner side of, the commencement of the superficial palmar arch. The *sixth digital nerve* has a distal course, upon the palmar surface of the flexor brevis minimi digiti muscle, and the sixth digital artery.

48. Ulnar Artery.—This artery (venæ comites) enters the palm to the outer side of the ulnar nerve. At the carpal portion of the minim eminence, it is lodged at the inner side of the palmar surface of the anterior annular ligament of the carpus. It gives off the deep palmar artery, which joins the deep palmar nerve, described above, on its way to a deep plane of the palm. The trunk of the artery (palmar arch) curves to the outer side, upon the palmar surface of the proximal end of the flexor brevis minimi digiti muscle, and enters the palmar fossa; before leaving the minim eminence it gives off the sixth digital artery. The latter branch has a distal course, upon the palmar surface of the flexor brevis minimi digiti muscle and the fifth digital nerve, and is continued to the inner lateral digital surface of the fifth digit.

49. Flexor Brevis Minimi Digiti Muscle, Plates 122, 127, and 129.—This muscle is located between the abductor minimi digiti muscle and the minim or fourth tendon of the flexor sublimis digitorum muscle. It has a proximal attachment to the process of the unciform bone; at its distal end it is attached to the inner side of the base of the phalanx of the fifth digit, in common with the abductor minimi digiti muscle. Upon its palmar surface are lodged the sixth digital artery and nerve. Between the proximal portions of it and the abductor minimi digiti muscle a triangular interval presents, for the transit, to a deep plane of the palm, of the deep palmar artery (page 218) and nerve, with the inner muscle branches of the latter.

DISSECTION.—Remove the middle portion of the palmar fascia, working from the pollex to the minim side, and in a distal direction to the digits, second to fourth, inclusive. Clear the tendons of the flexor sublimis digitorum muscle, longitudinally, from where they emerge from the dorsal surface of the anterior annular ligament to the digits. Note and probe their synovial sheaths (Fig. 2, Plate 4).

50. Anterior Annular Ligament, Plate 127.—This is a transverse stretch of fibrous tissue across the anterior of the carpus, between the proximal limits of the pollex and minim eminences of the palm—from the scaphoid and trapezium bones, on the outer side, to the unciform and pisiform bones, on the inner side. It forms, with the anterior surface of the bones of the carpus a channel, for the run of the tendons of the flexor sublimis and flexor profundus digitorum muscles and the median nerve, from the forearm into the palmar fossa region of the palm.

51. Superficial Palmar Arch.—This arterial arch (venæ comites) is the palmar curve of the ulnar artery, from the palmar surface of the proximal portion of the minim eminence to the inner border of the pollex eminence, where the arch is completed by anastomosing with the superficialis volæ branch of the radial artery (page 217). The arch lies upon the palmar surface of the flexor tendons, with its convexity at about the line of junction of the proximal and middle thirds of the palm.

52. Sheathed Tendons of the Flexor Sublimis Digitorum Muscle (second to fifth digit, inclusive), Plate 127, and Fig. 2, Plate 4.—Four tendons emerge into the palmar fossa, from the dorsal surface of the anterior annular ligament; they are enclosed in a common synovial sheath in the palm. The tendons diverge to pass to the palmar surfaces of the digits, second to fifth, inclusive, where they are contained in the digital synovial sheaths. The common palmar sheath may be opened and probed, to show: its prolongation into the distal portion of the forearm, posteriorly to, and to the proximal side of, the annular ligament; also, its independence of the digital sheaths, with the exception of that of the fifth digit.

53. Palmar Intertendinous Spaces, Plate 127.—Four longitudinal, intertendinous spaces are present in the palm. The *first*, between the tendon of the flexor longus pollicis and the first (second digit) tendon of the flexor sublimis digitorum muscle—it includes the parts upon the outer side of the second metacarpal bone. The *second*, between the first (second digit) and second (third digit) tendons of the flexor sublimis muscle—it leads to the webbing between the second and third digits. The *third*, between the second (third digit) and third (fourth digit) tendons of the flexor sublimis muscle—it leads to the webbing between the third and fourth digits. The *fourth*, between the third (fourth digit) and fourth (fifth digit) tendons of the flexor sublimis muscle—it leads to the webbing between the fourth and fifth digits. The webbings between the proximal ends of the digits lead to the palmar lateral digital surfaces of the digits. The palmar intertendinous spaces are bridged by the superficial palmar arch, and at these points the arch gives off the digital arteries—third, fourth, and fifth.

Dissection.—Expose the vessels, the nerves, and the muscle in the first palmar intertendinous space.

54. Adductor Pollicis Muscle, Plates 127 and 129.—The distal border of this muscle bridges between the pollex digit (phalanx of) and the palmar fossa; it has a muscle branch from the superficial palmar arch ramifying upon its palmar surface.

55. Second Digital Artery, Plate 127.—This artery (venæ comites), branch of the deep palmar arch, appears from the dorsal surface of the last-described muscle, along the outer side of the distal portion of the first dorsal interosseous muscle. It receives an anastomotic branch from the superficial palmar arch, and is projected to the outer lateral digital surface of the second digit.

56. Second Digital Nerve.—This nerve emerges from the dorsal surface of the outer head of the flexor brevis pollicis muscle, running parallel with, and to the outer side of, the first (second digit) tendon of the flexor sublimis digitorum muscle; it passes to the dorsal surface of the superficial palmar arch, and to the palmar surface of the anastomotic branch, from the arch, to the second digital artery. It occupies the palmar surface of the first lumbricalis muscle, to which, from its proximal end, it gives a branch.

57. First Lumbricalis Muscle.—This muscle lies upon the palmar surface of the adductor pollicis muscle, and to the outer side of, and parallel with, the first (second digit) tendon of the flexor sublimis digitorum muscle; it winds over the outer side of the metacarpo-phalangeal articulation of the second digit, to the dorsal surface of that digit. Its palmar surface receives its nerve, from the second digital nerve.

DISSECTION.—Expose the parts in the second palmar intertendinous space.

58. Third Digital Nerve.—This nerve emerges from the dorsal surface of the anterior annular ligament, into the second palmar intertendinous space; it has a distal course, to the dorsal surface of the superficial palmar arch. It bifurcates into the fourth and fifth palmar collateral digital nerves. At its proximal end, it supplies a branch to the second lumbricalis muscle.

59. Third Digital Artery.—This artery (venæ comites) is a branch of the superficial palmar arch, where the latter bridges the second space; it has a distal course, to the dorsal surface of the third digital nerve, to the webbing between the proximal ends of the second and third digits, where it bifurcates into the fourth and fifth palmar collateral digital arteries.

60. Second Lumbricalis Muscle.—This muscle is lodged in this space; the third digital nerve and artery being lodged upon its palmar surface. At its proximal portion it receives its nerve from the third digital nerve. Its distal end presents its tendon, which passes over the outer side of the metacarpo-phalangeal articulation of the third digit, to the dorsal surface of said digit.

DISSECTION.—Display the anatomical elements of the third palmar intertendinous space.

61. Fourth Digital Nerve.—This nerve has a distal course, from where it emerges, into this space, from the dorsal surface of the anterior annular ligament; it passes to the dorsal surface of the superficial palmar arch, distal to which it bifurcates into the sixth and seventh palmar collateral digital nerves.

62. Fourth Digital Artery.—This artery (venæ comites) is given off from the superficial palmar arch, where the latter bridges the third palmar intertendinous space; it has a distal course, along the inner side of the last-described nerve, to the webbing between the third and fourth digits, where it bifurcates into the sixth and seventh palmar collateral digital arteries.

63. Third Lumbricalis Muscle.—This muscle is located in the third palmar intertendinous space, having the fourth digital nerve and artery upon its palmar surface. Its tendon passes to the dorsal surface of the fourth digit, along the outer side of its metacarpo-phalangeal articulation.

DISSECTION.—Expose the parts occupying the fourth palmar intertendinous space.

64. Fifth Digital Nerve.—This nerve was described from its origin, from the superficial palmar branch of the ulnar nerve (page 218), to where it enters the palmar fossa. In this intertendinous space it bifurcates into the eighth and ninth palmar collateral digital nerves.

65. Fifth Digital Artery.—This branch (venæ comites) of the superficial palmar arch has a distal course in this space, to the webbing between the fourth and fifth digits, where it bifurcates into the eighth and ninth palmar collateral digital arteries. It runs to the dorsal side of the last-described nerve.

66. Fourth Lumbricalis Muscle.—This muscle forms the floor of the fourth palmar intertendinous space, with the last-described nerve and artery upon its palmar surface. Its tendon passes over the outer side of the metacarpo-phalangeal articulation of the fifth digit, to the dorsal surface of the same.

DISSECTION.—Make the skin incisions 8, 8, 8, 8, 8, of Figure 10 (page 207), on the digits, first to fifth, inclusive; reflect skin flaps well off the lateral digital surfaces; trace the palmar collateral digital nerves, and arteries, and clear the digital sheaths of the flexor tendons; open the latter and probe the same (Fig. 2, Plate 4).

67. Palmar Collateral Digital Nerves, Plate 127. These nerves, ten in number, are located in the palmar halves of the lateral digital surfaces; they are continued from (second and sixth), and result from the bifurcation of (first, third, fourth, and fifth), the digital nerves. Each digit has two nerves, one at each palmar half of a lateral digital surface. Each nerve sends a dorsal digital branch to the dorsal surface of the phalangine and phalangette segments of the digit.

68. Palmar Collateral Digital Arteries, Plates 127, 131, 132, and 133.—These arteries (venæ comites), ten in number, accompany the last-described nerves, and run at their dorsal surfaces. They are given off (first, second, fourth, fifth, sixth, seventh, eighth, and ninth), from the bifurcation of the first, third, fourth, and fifth digital arteries; the third and tenth are continued from the second and sixth digital arteries, respectively. Each digit has two arteries, one in the palmar half of each lateral digital surface. Each artery of the digits, second to fifth inclusive, gives off a dorsal branch, opposite the phalangine of those digits (Plate 127). The two arteries of a digit anastomose at the palmar surface of its phalangette.

69. Digital Sheaths of the Flexor Tendons, Plate 127; Fig. 2, Plate 4.—The palmar surface of each digit, second to fifth inclusive, presents a sheath of investment of the flexor tendons there lodged. They are attached to the lateral digital surfaces of the phalanx and phalangine of the digit. If opened and probed they will be found to be limited to the digit (second, third, and fourth); that of the fifth digit being continued into the common sheath of the long flexor tendons, in the palmar fossa. The sheath of the flexor longus pollicis tendon is continued into the pollex eminence, and even to the carpal portion of the tendon, and to the distal end of the forearm portion of the tendon.

Dissection.—Section the two proximal branches of the median nerve (Plate 126), the flexor carpi radialis, and the palmaris longus muscles (Plate 125). Turn off the distal portions of the muscles, with that of the supinator longus, to the outer side. Cut the anterior portion of the proximal half of the pronator radii teres muscle (Plate 125), and reflect it, with the proximal portions of the flexor carpi radialis and palmaris longus muscles, off of the inner side of the elbow. Note the compound flexor attachment, of the superficial flexor muscles of the forearm, to the internal condyle of the humerus.

70. Compound Flexor Attachment (of the superficial flexor muscles), Plates 121, 128, 129, 130, and Fig. 1, Plate 134. —The flexor carpi radialis, the palmaris longus, and the humeral attachments of the flexor sublimis digitorum, and the flexor carpi ulnaris muscles become fused to form the compound flexor attachment to the anterior and inner surfaces of the internal condyle of the humerus. The proximal ends of the two first may now be traced thereto, and left hanging therefrom.

71. Pronator Radii Teres Muscle, Plates 121, 125, 126, 128, 129, 130; and Fig. 1, Plate 134.—This muscle has an obliquely longitudinal course across the elbow and the proximal third of the forearm. Its proximal half has two portions, an anterior and a posterior: the *anterior portion* has its proximal attachment to the internal condyle of the humerus, to the proximal side of that of the compound flexor attachment; the *posterior portion* has its proximal attachment to the inner side of the anterior surface of the coronoid process of the ulna. In the distal half of the muscle the two portions fuse into one muscle, which is continued to the outer side of the radius, where it winds over the same, for attachment to the postero-lateral surface of the shaft of the bone, at about the junction of its proximal and middle thirds (Plate 169). Between the proximal portions of the muscle the median nerve passes into a deep plane of the forearm (Plate 126).

Dissection.—Trace the radial artery and nerve through their forearm portions. Section the posterior portion, of the inner part, of the pronator radii teres muscle; raise it from beneath the median nerve; and reflect it off of the inner side of the elbow; turn the distal portion of the muscle off of the outer side of the forearm. Display the proximal border of the flexor sublimis digitorum muscle; also its radial and ulnar attachments. Follow the median nerve, to where it passes to the posterior surface of the flexor sublimis digitorum muscle; note its branch to the latter muscle, also its anterior interosseous branch, with the muscle branches of the latter nerve. Expose the proximal portion of the ulnar artery, to where it passes to the posterior surface of the flexor sublimis digitorum muscle; also, its anterior ulnar recurrent, posterior ulnar recurrent, and common interosseous branches.

72. Radial Artery, Plates 128 and 130.—This artery (venæ comites) has been partially described (page 212); at present its whole course through the forearm is exposed, from its origin, from the bifurcation of the brachial, to its winding to the dorsum of the carpus, at the outer side of the latter. It lies, successively, upon the anterior surfaces of the tendon of the biceps, the flexor sublimis digitorum, flexor longus pollicis, and pronator quadratus muscles, and upon the anterior surface of the distal end of the radius. Its branches, the radial recurrent (page 216) and the superficialis volæ (page 217), have been described; near the latter branch, it gives off the anterior radial carpal artery, to the anterior of the carpus (Fig. 2, Plate 134).

73. Radial Nerve.—This nerve may now be followed from its origin, at the bifurcation of the musculo-spiral nerve, across the anterior of the elbow, and through the forearm, to where it passes to the dorsal surface of the limb, at its distal quarter. It runs parallel with, and to the outer side of, the tendon of the biceps muscle and the radial artery, upon the anterior surfaces of the supinator brevis, flexor sublimis digitorum, and the flexor longus pollicis muscles.

74. Median Nerve.—This nerve, which was seen passing between the anterior and posterior proximal portions of the pronator radii teres muscle (Plate 126), gives off the anterior interosseous nerve and the nerve to the flexor sublimis digitorum muscle. The nerve-trunk passes to a deep plane, posteriorly to the latter muscle.

75. Anterior Interosseous Nerve and its Muscle Branches.—This nerve, branch from the outer side of the median, gives off muscle branches to the flexor profundus digitorum and the flexor longus pollicis muscles ; the trunk and branches pass to a deep plane, posteriorly to the flexor sublimis digitorum muscle.

76. Nerve to the Flexor Sublimis Digitorum Muscle.—This nerve is given off from the inner side of the median ; it enters the proximal portion of the muscle.

77. Ulnar Artery.—The proximal end of this artery (venæ comites) is exposed from its origin, to where it passes to the posterior surface of the flexor sublimis digitorum muscle. In this portion of its course it gives off the anterior and the posterior ulnar recurrent (from its inner side) and the common interosseous (from its outer side).

DISSECTION.—Section the anterior annular ligament (Plate 127) and cut it away at its attachments ; note the attachments to it, of the pollex and minim eminence muscles. Section the following parts (Plate 127) : the ulnar and the superficialis volæ arteries, also, the anastomosing branch from the superficial palmar arch to the second digital artery ; the first and second palmar collateral digital nerves ; the second, third, and fourth digital nerves ; the superficial palmar nerve from the ulnar nerve. Reflect the superficial palmar arch and its digital branches ; also, the digital nerves upon and between the digits. Clear away the digital sheaths of the flexor tendons. Clear the anterior surface of the flexor sublimis digitorum muscle, tracing its tendons through the carpal, metacarpal, and digital regions.

78. Flexor Sublimis Digitorum Muscle, Plates 121, 128, and 129.—This muscle forms the second muscle plane of the anterior of the forearm. Its proximal attachments are: to the humerus, by the compound flexor attachment to the internal condyle ; to the ulna, at the inner side of the anterior surface of its coronoid process ; to the radius, at the oblique line on its anterior surface. The muscle separates into four portions, each of which has a tendon ; the tendons cross the carpal region, posteriorly to the anterior annular ligament ; from there, the four are projected into the palmar fossa of the hand, from which they are continued upon the palmar surfaces of the phalanges and phalangines of the digits, second to fifth, inclusive. Between the humeral and ulnar attachments, on the inner side, and the radial, on the outer side, a fibrous edge of the muscle bridges : to the posterior surface of this the median nerve, and the anterior interosseous nerve and its branches, also, the ulnar and the anterior interosseous arteries pass to a deeper plane (Plate 128).

Dissection.—Section the tendons of the flexor sublimis digitorum muscle, and reflect the proximal portion of the muscle, cutting it from its radial attachment (Plate 129), then turn it off to the inner side of the proximal portion of the forearm and the elbow (Plate 130); cut its nerve from the median (Plate 128); reflect its distal portions (tendons) off of the digits. Cut the radial artery and nerve, each at two points (Plate 128), and remove their included portions. Trace the median nerve through the forearm (Plate 130) to its carpal portion, where it breaks up into its four terminal branches (Plate 131). Section the abductor pollicis muscle (Plate 127) and reflect its portions; trace the outer terminal branch of the median nerve to the muscles of the pollex eminence (Plate 131). Display the three inner terminal branches of the median nerve (Plate 131). Clear the opponens pollicis muscle; the outer and part of the inner head of the flexor brevis pollicis muscle.

79. Median Nerve, Plates 130 and 131.—This nerve has a distal course through the forearm, from where it passes to the posterior surface of the flexor sublimis digitorum muscle, to reach the anterior surface of the flexor profundus digitorum muscle. At the carpus it ends in *four* branches, as follows: the *first* or outer branch enters the proximal portion of the pollex eminence and bifurcates, the outer branch supplying the abductor and the opponens pollicis muscles, the inner going to the outer head of the flexor brevis pollicis muscle; the *second*, is the first palmar (pollex) digital nerve, to which may be traced the first and second palmar collateral digital nerves; the *third* is the second digital, a branch from which supplies the first lumbricalis muscle; the *fourth* bifurcates into the third and fourth digitals—the third supplying a branch to the second lumbricalis muscle.

80. Opponens Pollicis Muscle, Plates 122, 131, and 132.—This muscle of the pollex eminence has a proximal attachment to the palmar surface of the trapezium, a distal one to the outer side of the palmar surface of the first metacarpal bone.

Dissection.—Cut the flexor brevis minimi digiti muscle from its proximal attachment and turn it off of the minim border of the metacarpal region (Plate 131). Trace the muscle branches of the deep palmar nerve, and clear the opponens minimi digiti muscle.

81. Muscle Branches of the Deep Palmar Nerve, Plate 131.—From its inner side the deep palmar nerve gives off two branches: the first distributes to the flexor brevis minimi digiti and the abductor minimi digiti muscles; the second, to the opponens minimi digiti muscle.

82. Opponens Minimi Digiti Muscle, Plates 122, 131, 132, and 133.—This muscle, the deepest of the muscles of the minim eminence, has its proximal attachment to the process of the unciform bone; its distal to the inner portion of the palmar surface of the fifth metacarpal bone. To the inner side of its proximal end the deep palmar artery and nerve pass to their deep plane of distribution in the palm.

DISSECTION.—Follow the ulnar artery through the forearm (Plate 130) to its bifurcation at the carpus (Plate 131). Trace the ulnar nerve, through the forearm, from its proximal entrance into the region, to its bifurcation into the superficial and deep palmar nerves. Find its branches to the flexor profundus digitorum and flexor carpi ulnaris muscles, also its dorsal and its palmar cutaneous branches. Clear the surfaces of the forearm portions of the flexor carpi ulnaris, the flexor profundus digitorum, and the flexor longus pollicis muscles (Plates 129 and 130). Follow the anterior interosseous nerve and its branches (Plate 130).

83. Ulnar Artery, Plates 128, 130, 131, 132, and Fig. 2, Plate 134.—This artery (venæ comites) has a distal course, from where it passes to the posterior surface of the flexor sublimis digitorum muscle (page 226); it lies upon the anterior surface of the flexor profundus digitorum muscle, and along the outer side of the flexor carpi ulnaris muscle; it continues to where it divides into the (superficial palmar) palmar arch and the deep palmar artery (page 218). It supplies branches to contiguous muscles, and near its bifurcation sends off the anterior ulnar carpal branch (Fig. 2, Plate 134).

84. Ulnar Nerve, Plates 125, 127, 128, 130, 131, 132, 133; Figs. 1 and 2, Plate 134.—This nerve enters the forearm region, from the groove on the posterior surface of the inner condyle of the humerus, passing to the plane between the flexor sublimis and profundus digitorum muscles; at its proximal end it supplies the flexor profundus digitorum muscle from its outer side, and the flexor carpi ulnaris muscle from its inner side. It has a distal course upon the anterior surface of the flexor profundus, and to the outer side of the flexor carpi ulnaris muscles; for the distal half of the forearm it runs to the inner side of the ulnar artery. In its distal third it gives off: a dorsal branch, which winds around the inner side of the forearm to the dorsum of the hand; and a palmar cutaneous branch, which passes to the hand, upon the anterior surface of the ulnar artery. At its carpal portion it bifurcates as before shown (page 218).

85. Flexor Carpi Ulnaris Muscle, Plates 121, 125, and 127 to 134, inclusive.—The proximal attachments of this muscle (page 211) are: to the inner condyle of the humerus, by the compound flexor attachment thereto (page 224); to the inner side of the olecranon process of the ulna; by an aponeurotic portion, which invests the flexor profundus digitorum muscle, to the internal and posterior ridge of the shaft of the ulna.

86. Anterior Interosseous Nerve and its Muscle Branches, Plates 128 and 130.—This nerve, branch of the median (page 225), has a distal course from its origin, to where it passes to a deep plane between the flexor profundus digitorum and the flexor longus pollicis muscles. It gives off, from its inner side, two branches to the former muscle, which pass posteriorly to the median nerve; from its outer side, three branches are afforded: two to the flexor longus pollicis muscle; and one to the flexor profundus digitorum muscle.

Dissection.—Clear the palmar surface of the tendons of the flexor profundus digitorum muscle. Expose the relations, of the digital portions, of the tendons of the flexor sublimis and profundus digitorum muscles. Display the palmar surfaces of the four lumbricales muscles; also, the tendon of the flexor longus pollicis muscle.

87. Flexor Profundus Digitorum Muscle, Plates 121, 130, and 131.—This muscle has a proximal attachment to the anterior surface and inner side of the shaft of the ulna, and, also, to the anterior surface of the radio-ulnar interosseous ligament; the distal forearm portion of the muscle projects four tendons into the metacarpal region, which are continued to the palmar surfaces of the digits, second to fifth, inclusive.

88. Relations of the Digital Portions of the Tendons of the Flexor Sublimis and Flexor Profundus Digitorum Muscles, Plates 121, 129, 131, and 132.—A tendon of the flexor sublimis digitorum (perforatus) muscle splits opposite the phalanx of a digit; the portions continue distally, curling so as to bring their dorsal surfaces uppermost, and then unite; the splitting and reunion of the tendon forms a button-hole-like channel (Plate 131); the reunited portions split again, the slips passing to be attached to the halves of the palmar surface of the phalangine of a digit. A tendon of the flexor profundus digitorum (perforans) muscle enters upon the palmar surface of the phalanx of a digit to the dorsal surface of a sublimis tendon, it then passes through the opening in a tendon of the flexor sublimis digitorum (perforatus), and is continued, upon the phalangine, to its attachment to the palmar surface of the base of the phalangette. The tendons, as lodged in their sheaths (page 223), are held to the phalanges and phalangines of the digits, by folds of synovial membrane lining the sheath of, and covering, the tendons—*vincula accessoria tendinum;* by these, vessels pass to and from tendons.

89. Lumbricales Muscles, Plates 127, 129, 131, 132, and 133.—These four muscles were located in the palmar intertendinous spaces (pages 221, 222, and 223); they have their proximal attachments to the outer sides of the metacarpal portions of the tendons of the flexor profundus digitorum muscle; they pass in a distal direction to the webbing between the digits, where they have been described (pages 221, 222, and 223) passing to the dorsal surfaces of the phalanges of the digits, second to fifth, inclusive.

90. Flexor Longus Pollicis Muscle, Plates 121, and 127 to 131, inclusive.—This muscle extends, from its proximal attachment to the anterior surface of the shaft of the ulna, through the forearm; its tendon crosses the carpus, posteriorly to the anterior annular ligament, into the pollex eminence, where it is lodged between the heads of the flexor brevis pollicis muscle; from there, it is projected upon the palmar surface of the first or pollex digit, to its distal attachment to the palmar surface of the base of the phalangette of the same.

Dissection.—Section the tendons of the flexor profundus digitorum muscle, also the lumbricales muscles (Plate 131); reflect the tendons and the lumbricales muscles off of the digits. In reflecting the third and fourth lumbricales muscles find their nerves, from the deep palmar nerve, entering their dorsal surfaces (Plate 132); leave the nerves *in situ* for appreciation later on (page 233). Cut the tendon of the flexor longus pollicis muscle (Plate 131). and reflect it off of the pollex digit. Cut the median nerve to the proximal side of its terminal branches (Plate 131), and dissect away the branches, as in Plate 132. Clear the palmar surfaces of the flexor brevis (outer and inner heads), the adductor, and the opponens pollicis muscles.

91. Flexor Brevis Pollicis Muscle, Plates 122, 127, 129, 131, and 132. This muscle, of the pollex eminence, has two portions or heads, the outer and the inner. The *outer head* has proximal attachments to the trapezium and the annular ligament ; its distal end is attached, primarily, to the outer sesamoid bone, opposite the palmar surface of the metacarpo-phalangeal articulation of the first (pollex) digit ; secondarily, to the palmar surface of the outer tubercle of the base of the phalanx of the first digit, to the inner side of the attachment of the abductor pollicis muscle. The *inner head* has a proximal attachment to the palmar surfaces of the trapezoid and os magnum of the carpus, and the base of the third metacarpal bone ; its distal end is attached, primarily, to the inner sesamoid bone, opposite the metacarpo-phalangeal articulation of the first digit ; and, secondarily, to the palmar surface of the inner tubercle of the base of the phalanx of the same digit, in common with the adductor pollicis muscle. A furrow exists at the palmar surface, between the two heads of the muscle, for the lodgment of the tendon of the flexor longus pollicis muscle (Plates 127, 129, 131, and 132).

92. Adductor Pollicis Muscle.—This muscle has an inner attachment to the palmar surface of the third metacarpal bone (Plate 122) ; it crosses the second intermetacarpal space, the second metacarpal bone, and the first intermetacarpal space, to reach its outer attachment, to the inner tubercle on the palmar surface of the base of the phalanx of the first or pollex digit (Plate 122), in common with the distal end of the inner head of the flexor brevis pollicis muscle.

93. Opponens Pollicis Muscle, Plates 122, 131, and 132.—This muscle, at the outer side of the flexor brevis pollicis, and the dorsal surface of the abductor pollicis, is attached : proximally, to the trapezium and anterior annular ligament ; distally, to the palmar surface of the first metacarpal bone.

DISSECTION.—Section the abductor minimi digiti muscle (Plate 131); reflect its portions and cut them away with the flexor brevis minimi digiti muscle, as in Plate 132. Section the opponens, the flexor brevis (outer and inner heads), and the adductor pollicis muscles (Plate 132); reflect their portions and cut them away, as in Plate 133. In reflecting the flexor brevis and the adductor pollicis muscles find their supplying nerves from the deep palmar nerve, and cut them where they enter the muscles; dissect the distal ends of the heads of the flexor brevis pollicis muscle from the sesamoid bones, leaving the latter *in situ* (Plate 133). Display the deep palmar arch and its branches; also, the deep palmar nerve and its branches (Plates 132 and 133).

94. Nerves to the Inner Head of the Flexor Brevis Pollicis and the Adductor Pollicis Muscles, Plate 133.—In reflecting the proximal portion of the former and the inner portion of the latter muscle, their nerves, from the deep palmar branch of the ulnar nerve, enter the inner border of the former and the dorsal surface of the latter.

95. Deep Palmar Arch, Plates 132 and 133.—The deep palmar arch is formed by the entrance of the radial artery into the deep plane of the palm, at the proximal end of the first intermetacarpal space. The arterial arch (venæ comites) crosses the proximal ends of the metacarpal bones (second to fifth, inclusive), and the interossei muscles, dorsal and palmar. At its inner end the arch is completed by anastomosing with the deep palmar branch of the ulnar artery, which enters the deep plane of the palm, from the dorsal surface of the proximal end of the opponens minimi digiti muscle.

96. Branches of the Deep Palmar Arch.—The branches of the deep palmar arch are distal, dorsal, and proximal. The distal branches are: the first and the second digital, the first, the second, and the third interosseous. The *first digital artery* (venæ comites) has a distal course between the palmar surface of the first metacarpal bone (Plate 133) and the flexor brevis pollicis muscle, to a point opposite the distal end of the bone, where, between the heads of the muscle, it bifurcates into the palmar collateral digital arteries (first and second) of the first (pollex) digit. The *second digital artery* (venæ comites) runs upon the palmar and outer surfaces of the first dorsal interosseous muscle, to a point opposite the metacarpo-phalangeal articulation of the second digit, where it becomes its outer palmar collateral digital artery (the third). The *first*, the *second*, and the *third interosseous arteries* (venæ comites) are given off from the arch opposite the intermetacarpal spaces, second to fourth, inclusive; they have a distal course, upon the palmar surfaces of the interossei muscles (first palmar, third dorsal, and fourth dorsal, respectively) to their anastomoses with the third, fourth, and fifth digital arteries, respectively, before the distal bifurcation of the latter (page 210); they supply contiguous muscles in the deep plane of the palm. The *dorsal* or *perforating branches* (venæ comites) are given off opposite the proximal ends of the second, third, and fourth dorsal interossei muscles; they perforate the muscles to reach the dorsal surface of the metacarpal region. The *proximal branch* or *recurrent carpal*, has a recurrent course, to the palmar surface of the carpus.

97. Deep Palmar Nerve.—This nerve, branch of the ulnar (page 218), enters the deep plane of the palm, to the dorsal surface of the proximal end of the opponens minimi digiti muscle, with, and to the proximal side of, the deep palmar artery. It crosses the palm: for its first half, it lies to the proximal side of the deep palmar arch; opposite the base of the third metacarpal bone it passes, at the dorsal side of the arch, to the distal side of the outer portion of the arch; opposite the proximal portion of the second intermetacarpal space it has its terminal bifurcation. It has *five distal and two terminal muscle branches*. The five distal muscle branches are: the *first* (Plate 132) bifurcates to distribute to the third palmar interosseous and the fourth lumbricalis; the *second*, to the fourth dorsal interosseous; the *third* bifurcates to supply the second palmar interosseous and the third lumbricalis; the *fourth*, to the third dorsal interosseous; the *fifth*, to the second dorsal interosseous; the *sixth* (Plate 133), to the adductor pollicis (page 232). Of the two terminal muscle branches: the proximal one distributes to the inner head of the flexor brevis pollicis (page 232); the distal one bifurcates to supply the first palmar and the first dorsal interosseous (Plate 133).

Dissection.—Follow the distal portion of the flexor carpi radialis muscle to its attachment. Clear the fascia from the palmar surfaces of the interosseous muscles, palmar and dorsal; display the transverse metacarpal ligament. Then, cut the ligament away so as to expose the distal ends of the latter muscles.

98. Flexor Carpi Radialis Muscle, Plates 121, 125, and 128 to 133, inclusive.—This muscle (page 211) may now be followed to its distal attachment to the palmar surface of the base of the second metacarpal bone (Plate 121). It will be found lodged, in a special compartment, at the outer side of the space, posteriorly to the anterior annular ligament.

99. Transverse Metacarpal Ligament, Plates 132 and 133. —This is a transverse stretch of fibrous tissue uniting the palmar metacarpo-phalangeal ligaments, thereby binding them together. They cover the palmar surfaces of the distal ends of the tendons of the interosseous muscles, palmar and dorsal.

100. Interosseous Muscles, Plates 122, 132, and 133.—These seven muscles—three palmar and four dorsal—are located in the four intermetacarpal spaces: the first dorsal interosseous muscle occupies the first intermetacarpal space; the first palmar and the second dorsal interosseous muscles are located in the second intermetacarpal space; the third dorsal and the second palmar interosseous are in the third intermetacarpal space; the fourth dorsal and the third palmar interosseous appear in the fourth intermetacarpal space. The three palmar appear only at the palmar surface of the metacarpal region; the four dorsal present at both the palmar and the dorsal surfaces. The *palmar interosseous* have their proximal attachments, as follows: the first, to the inner side of the palmar surface of the second metacarpal bone; the second and third, to the outer sides of the palmar surfaces of the fourth and fifth metacarpal bones, respectively. The *dorsal interosseous* have palmar surface attachments, as follows: the first and second, to the outer sides of the palmar surfaces of the second and third metacarpal bones, respectively; the third and fourth, to the inner sides of the palmar surfaces of the third and fourth metacarpal bones, respectively. (The complete dissection of the dorsal interosseous, and of the distal ends of the palmar interosseous and the lumbricales muscles are left, until the dissection of the dorsum of the hand.)

Dissection.—Section (Plate 130) the median nerve and its branches, the ulnar artery, the ulnar nerve, and its branch to the flexor carpi ulnaris muscle. Cut the nerves of the flexor profundus digitorum and the flexor longus pollicis muscles (Plate 130); section the former of these muscles longitudinally, as it is in Fig. 1, Plate 134, and dissect its outer portion from the anterior surfaces of the ulna (Plate 121), the radio-ulnar interosseous ligament, and the pronator quadratus muscle; be careful to preserve the interosseous artery and its branches; also, the anterior interosseous nerve upon the anterior surface of the radio ulnar interosseous ligament. Cut away the flexor longus pollicis muscle from the radius (Plate 121) and the pronator quadratus muscle. Cut away the proximal portions of the pronator radii teres, the flexor carpi radialis, the flexor sublimis digitorum, and the palmaris longus muscles, as in Fig. 1, Plate 134.

101. Interosseous Arteries, Plate 130, and Fig. 1, Plate 134.—The ulnar gives off the *common interosseous artery* (page 225 and 226), which divides into the posterior and the anterior interosseous arteries. The *posterior interosseous artery* (venæ comites) perforates the radio-ulnar interosseous ligament to reach the posterior region of the forearm. The *anterior interosseous artery* (venæ comites) has a distal course, reaching the anterior surface of the radio-ulnar interosseous ligament, between the flexor profundus digitorum and the flexor longus pollicis muscles (Plate 130); it runs parallel with the nerve of the same name, and passes to the dorsal surface of the pronator quadratus muscle. Its branches supply contiguous muscles, and some of them perforate to the posterior region of the forearm.

102. Anterior Interosseous Nerve.—This nerve, branch of the median nerve (page 225), after having passed between the flexor longus pollicis and the flexor profundus digitorum muscles (Plate 130), to reach the deep plane of the anterior of the forearm, has a distal course, upon the radio-ulnar interosseous ligament, to where it passes to the posterior surface of the pronator quadratus muscle. It accompanies the last-described artery.

103. Pronator Quadratus Muscle, Plates 121, 128, 129, 130; and Figs. 1 and 2, Plate 134.—This muscle is located, transversely, across the distal portion of the anterior surface of the forearm. It is attached (Plate 121) to the anterior surfaces of the radius and the ulna, respectively, well over the inner side of the former.

104. Biceps Muscle, Plates 121, 128, 129, 130, and Fig. 1, Plate 134.—The distal end of the tendon of this muscle passes, around the inner side of the tubercle of the radius, to reach its attachment to the posterior surface of the same (Fig. 1, Plate 174). A bursa is located upon the anterior surface of the tubercle, between it and the tendon (Plate 121).

105. Brachialis Anticus Muscle, Plates 121, 126, 128, 129, 130; and Fig. 1, Plate 134.—The distal end of this muscle is attached to the anterior surface of the proximal end of the ulna, distal to its coronoid process.

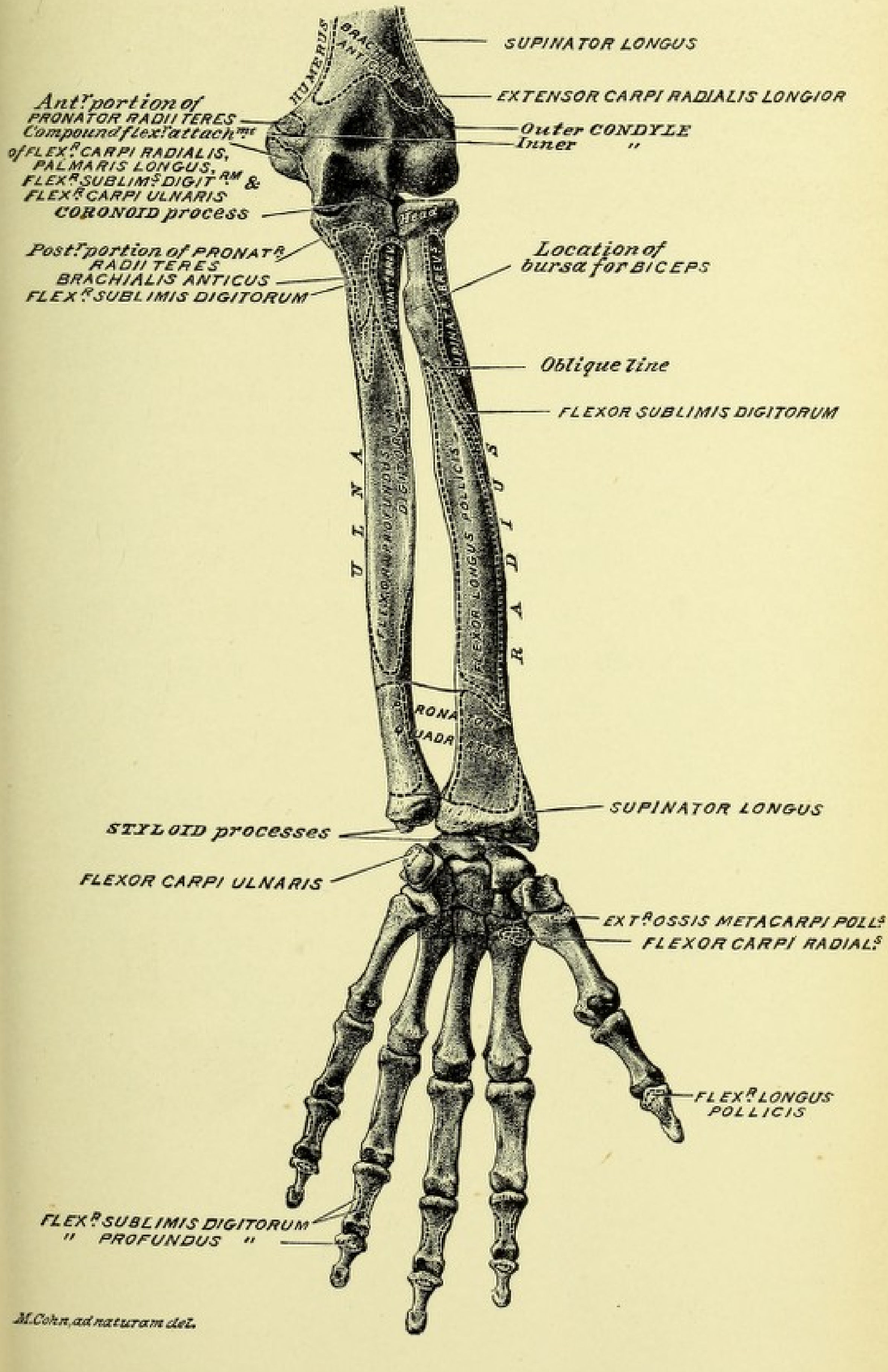
106. Supinator Brevis Muscle.—The anterior surface of this muscle presents between the tendon of the biceps and the extensor carpi radialis brevior muscle, being attached to the anterior surface, and outer side, of the radius, between the head and oblique line of the bone. It also has an anterior attachment to the outer side of the coronoid process of the ulna.

DISSECTION.—Section the pronator quadratus muscle, and reflect its portions (Fig. 2, Plate 134). Trace the anterior interosseous artery: its branches to the pronator quadratus muscle; and its anastomoses with the arteries at the anterior of the carpus. Expose the distribution of the anterior interosseous nerve to the pronator quadratus muscle and to the carpus.

107. Anterior Carpal Arteries, Plate 134.—At the anterior of the carpus there are the free anastomoses of the anterior radial carpal, the anterior ulnar carpal, the recurrent carpal, and the anterior interosseous (terminal branches) arteries.

108. Terminal Distribution of the Anterior Interosseous Nerve, Fig. 2, Plate 134.—This nerve has a terminal distribution to the pronator quadratus muscle and to the anterior of the joints of the carpus.

DISSECTION.—Keep the anterior surfaces of the hand, forearm, elbow, and shoulder articulations, thoroughly moist and soft, for their subsequent dissection.



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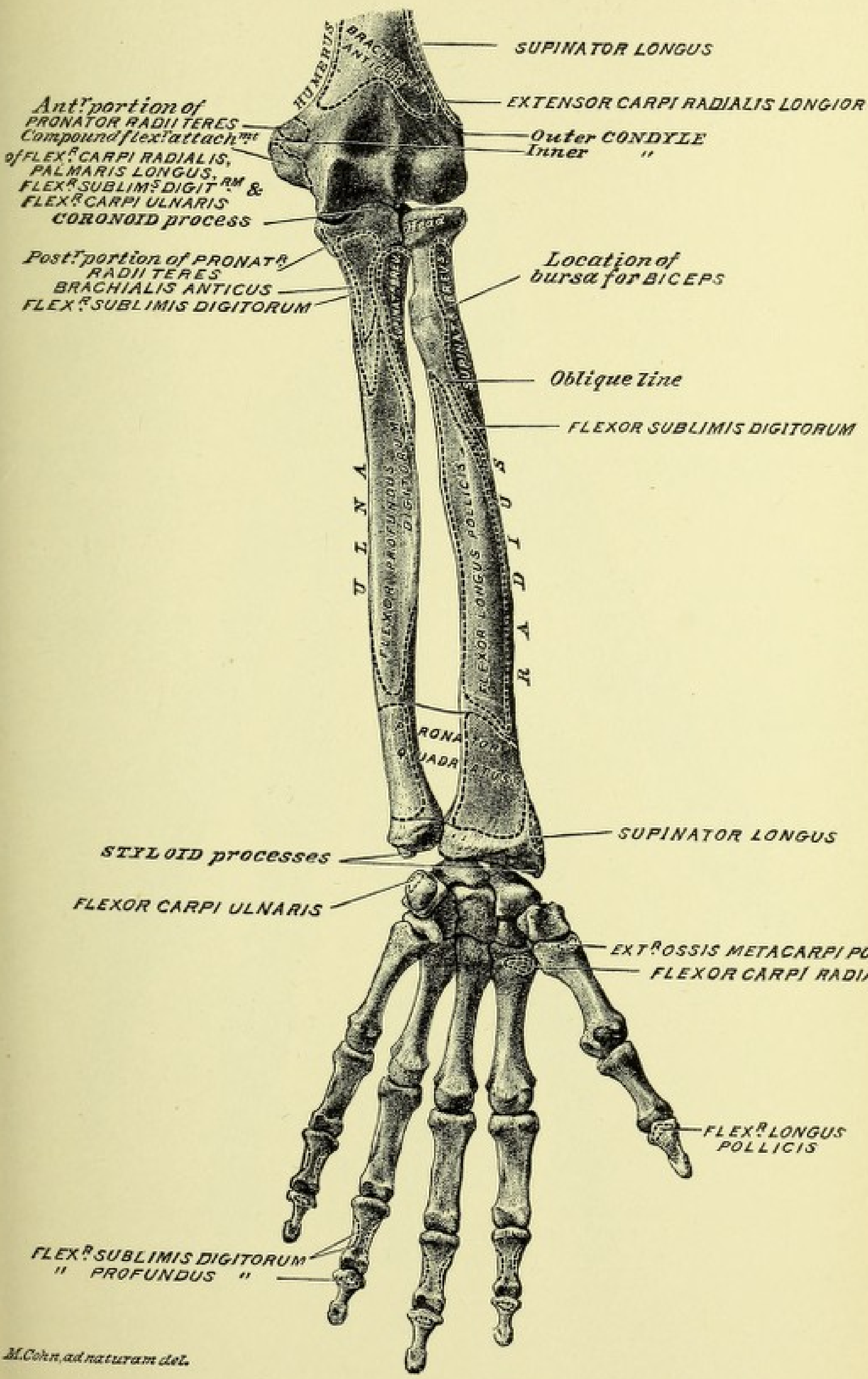

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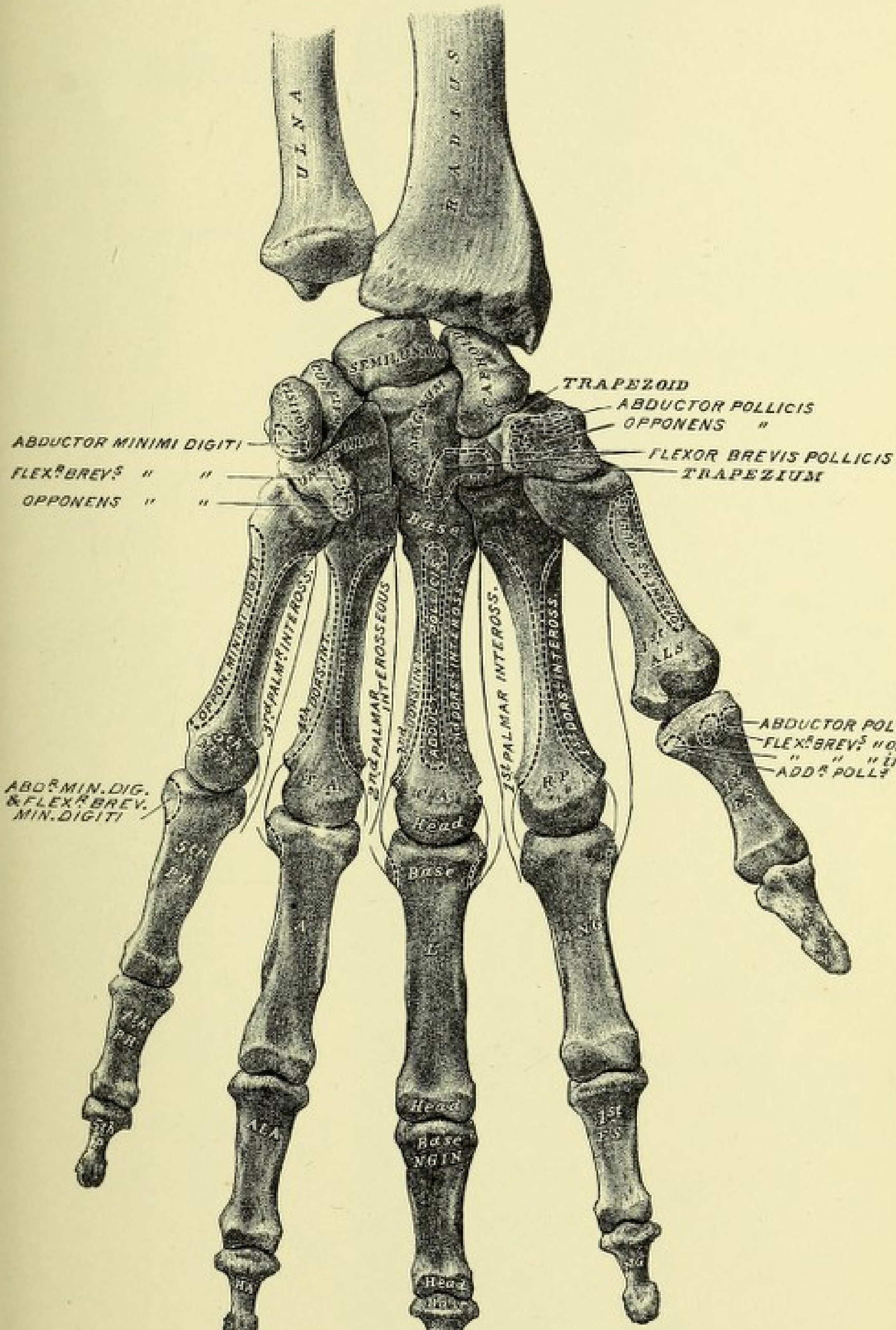

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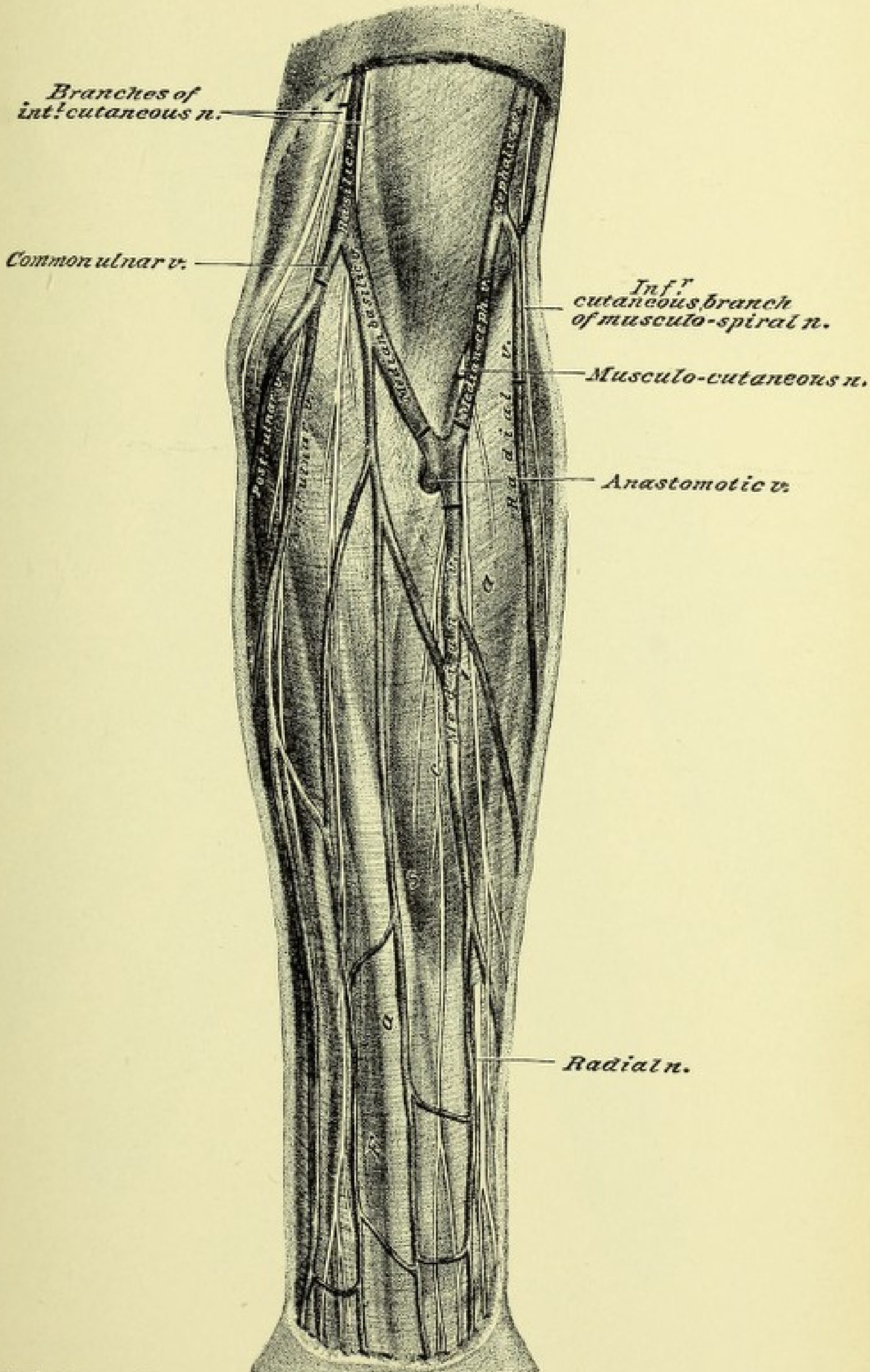
PLATE 123



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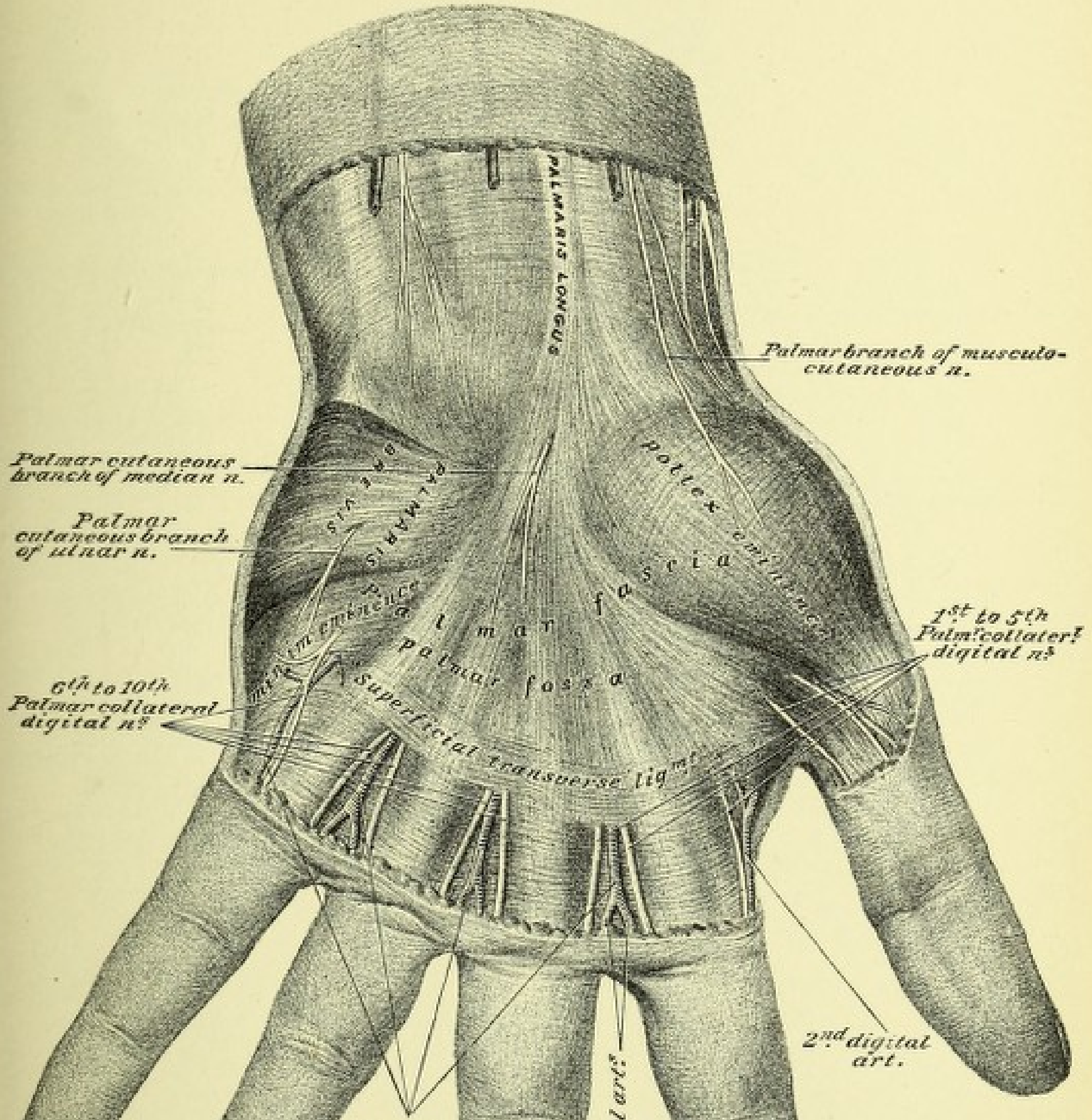

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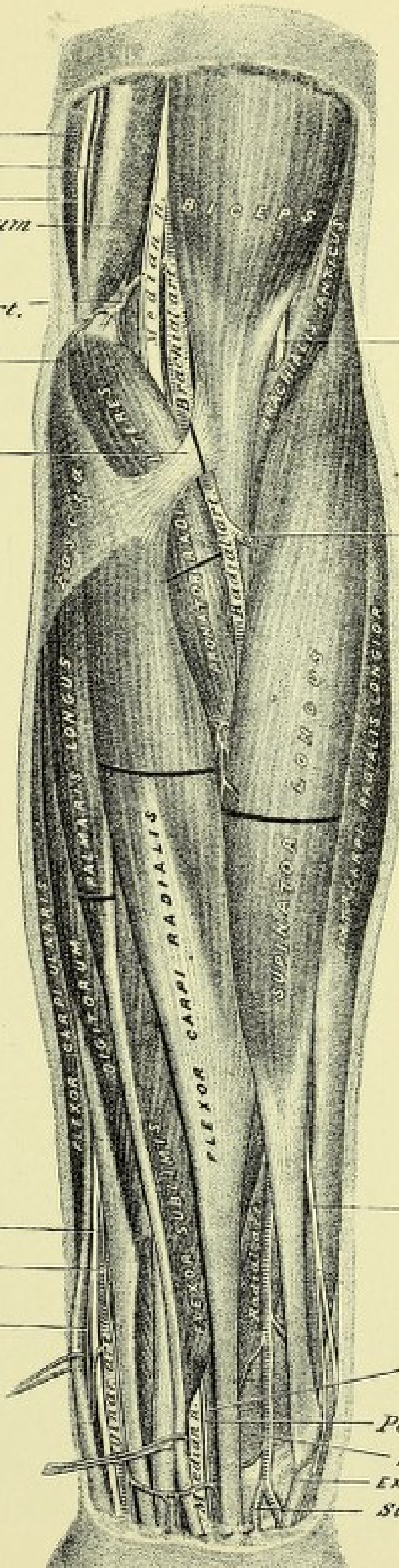

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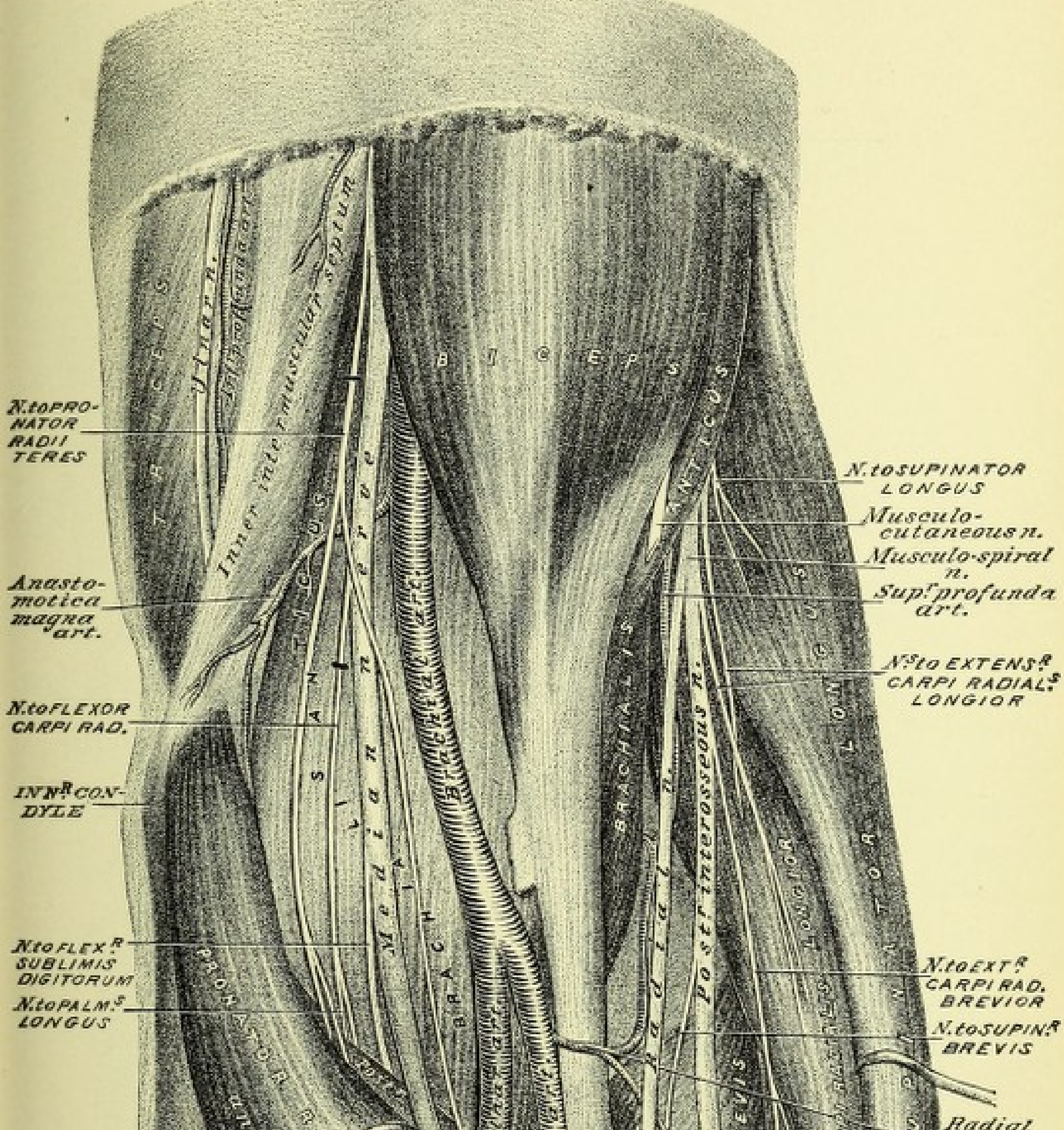
PLATE 126



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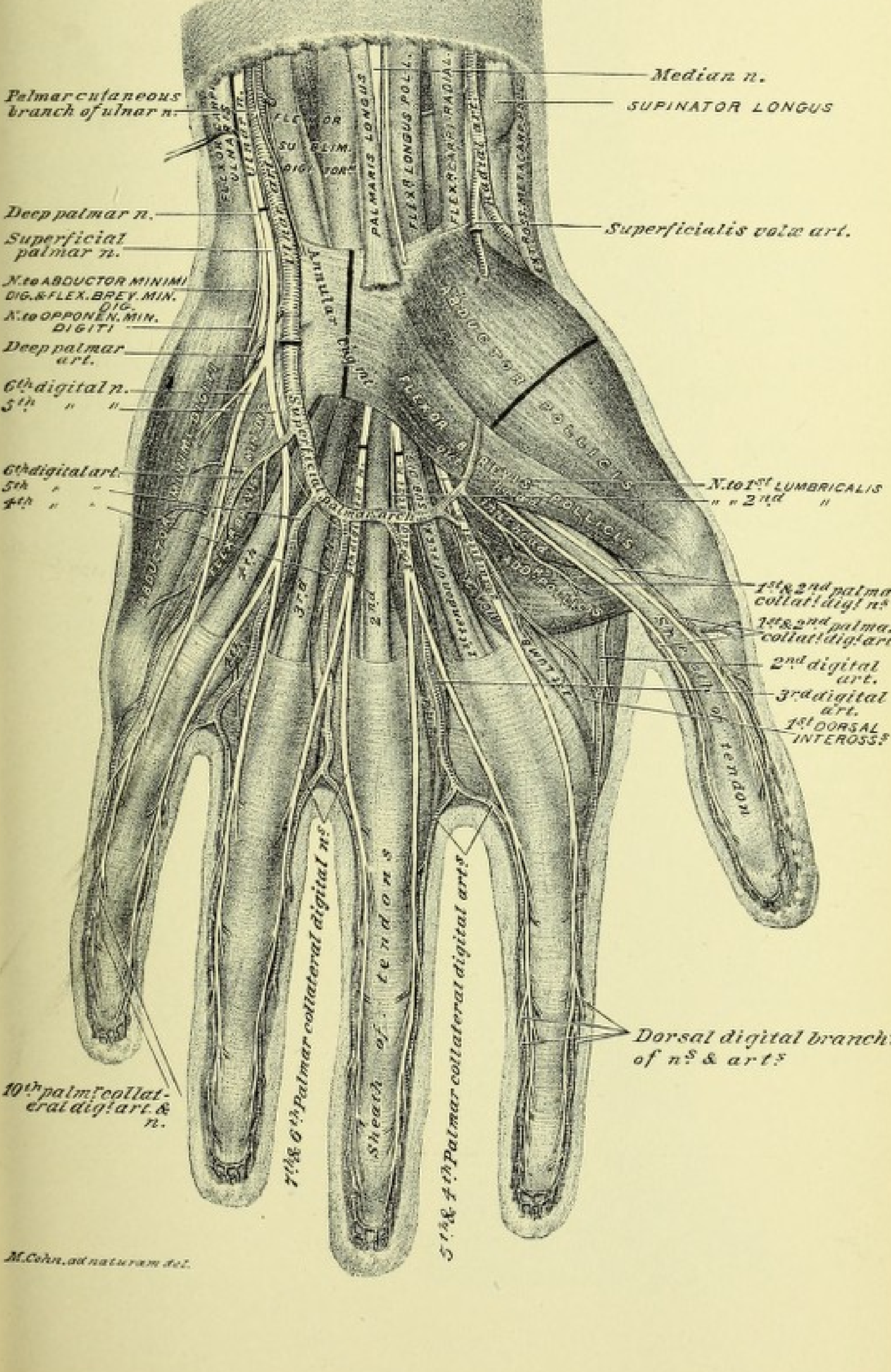

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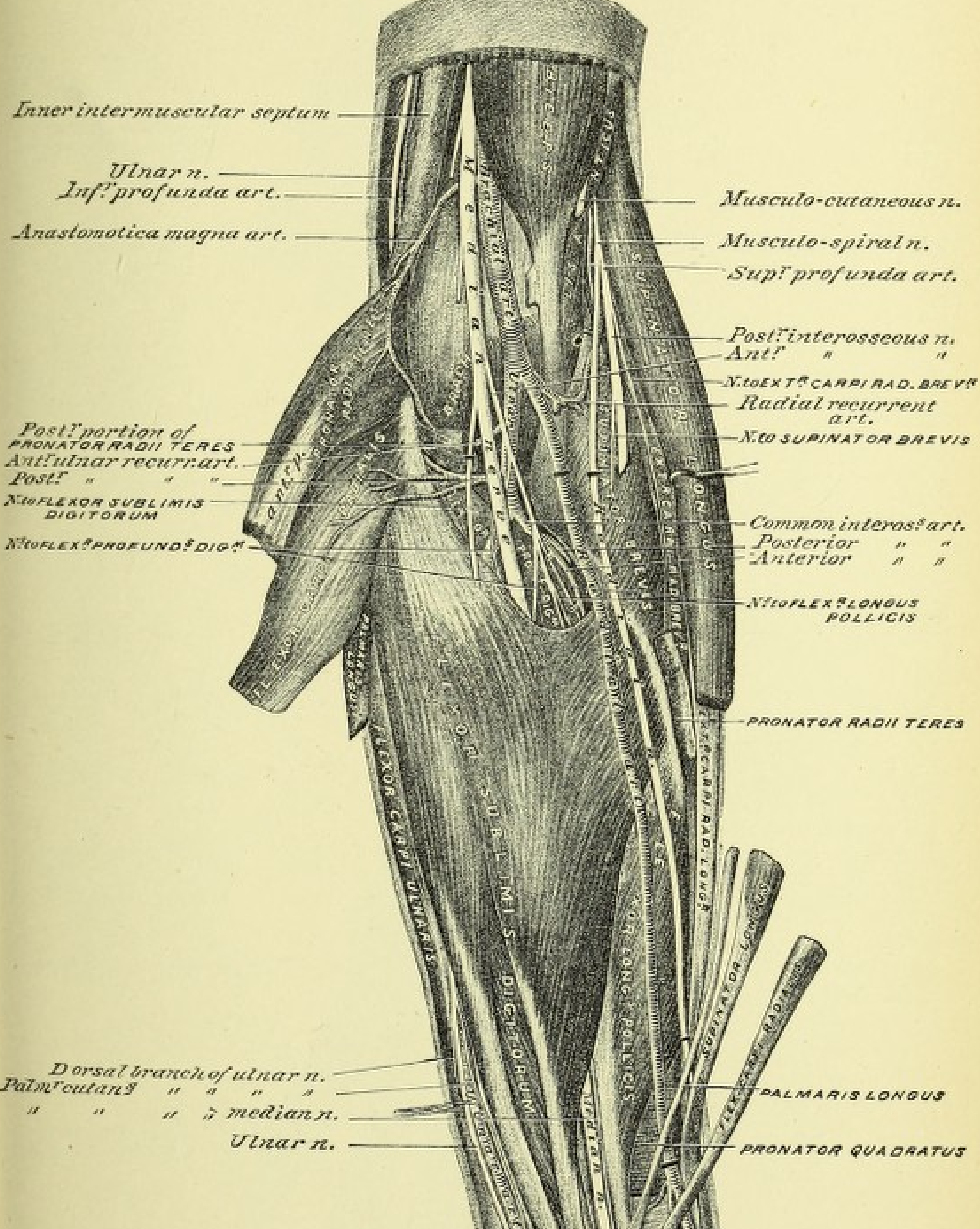
PLATE 128



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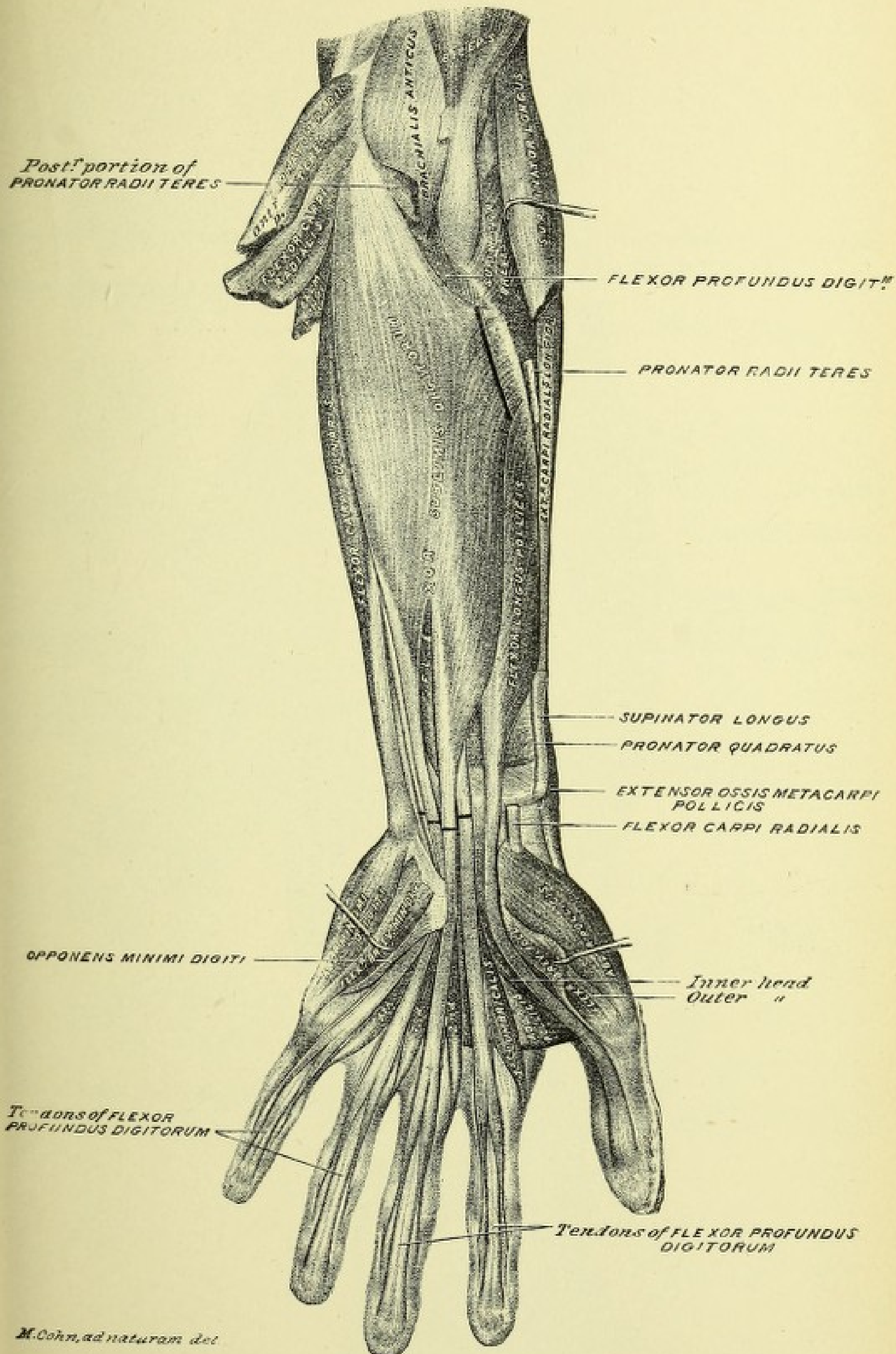
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FLEXOR CARPI RADIALIS
OPPONENS MINIMI DIGITI
Inner head
Outer "
Tendons of FLEXOR
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Tendons of FLEXOR PROFUNDUS
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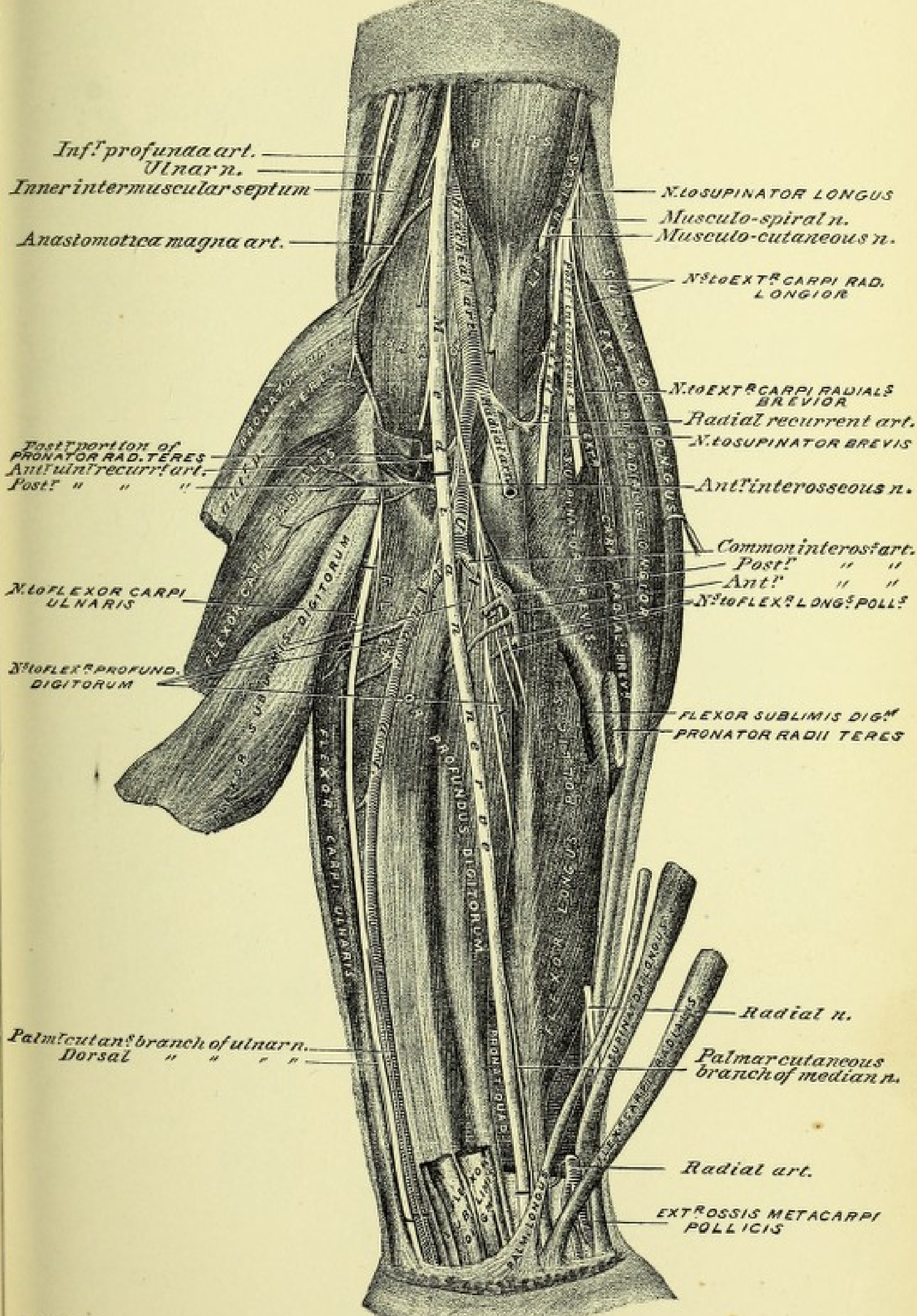

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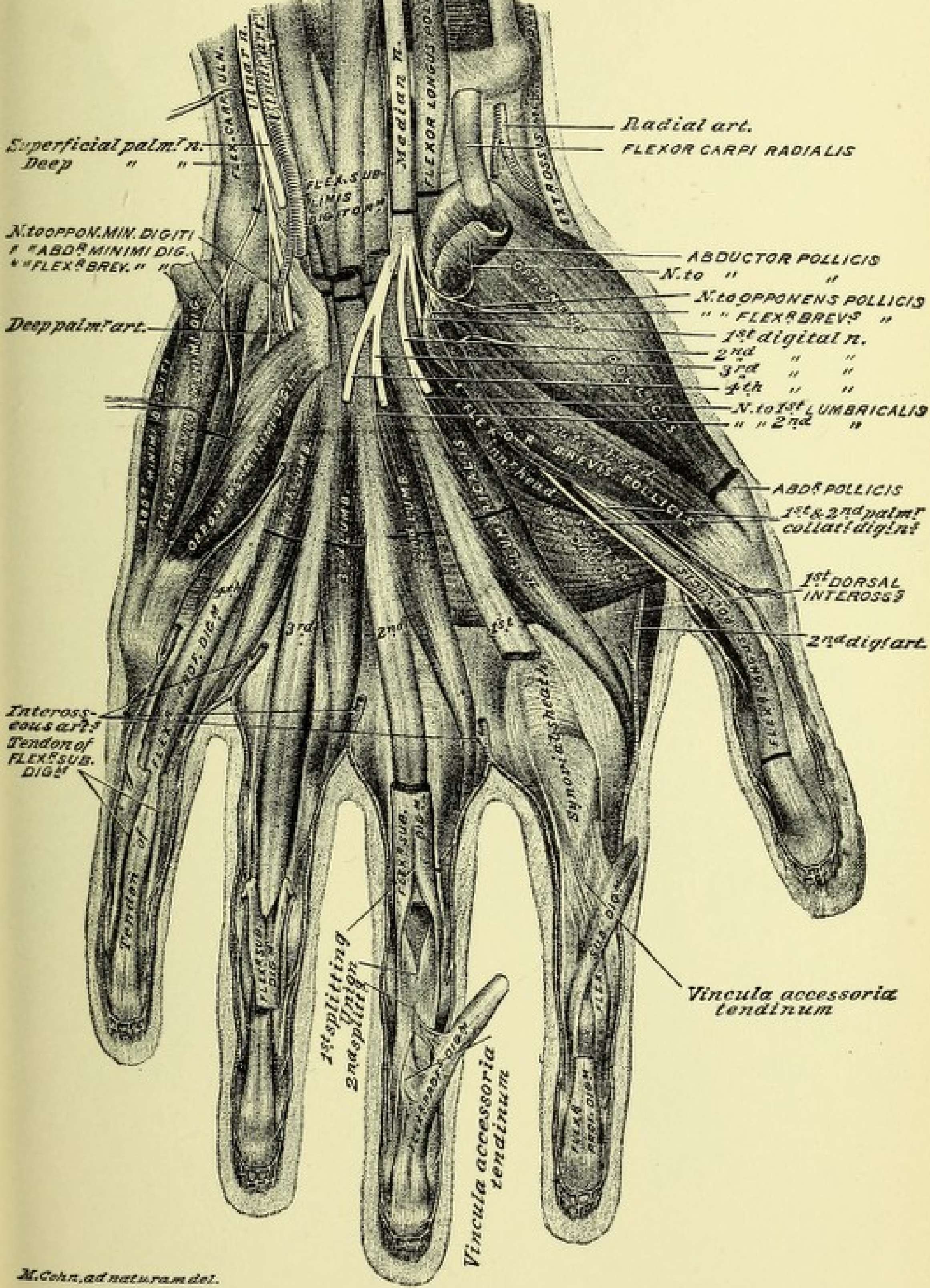

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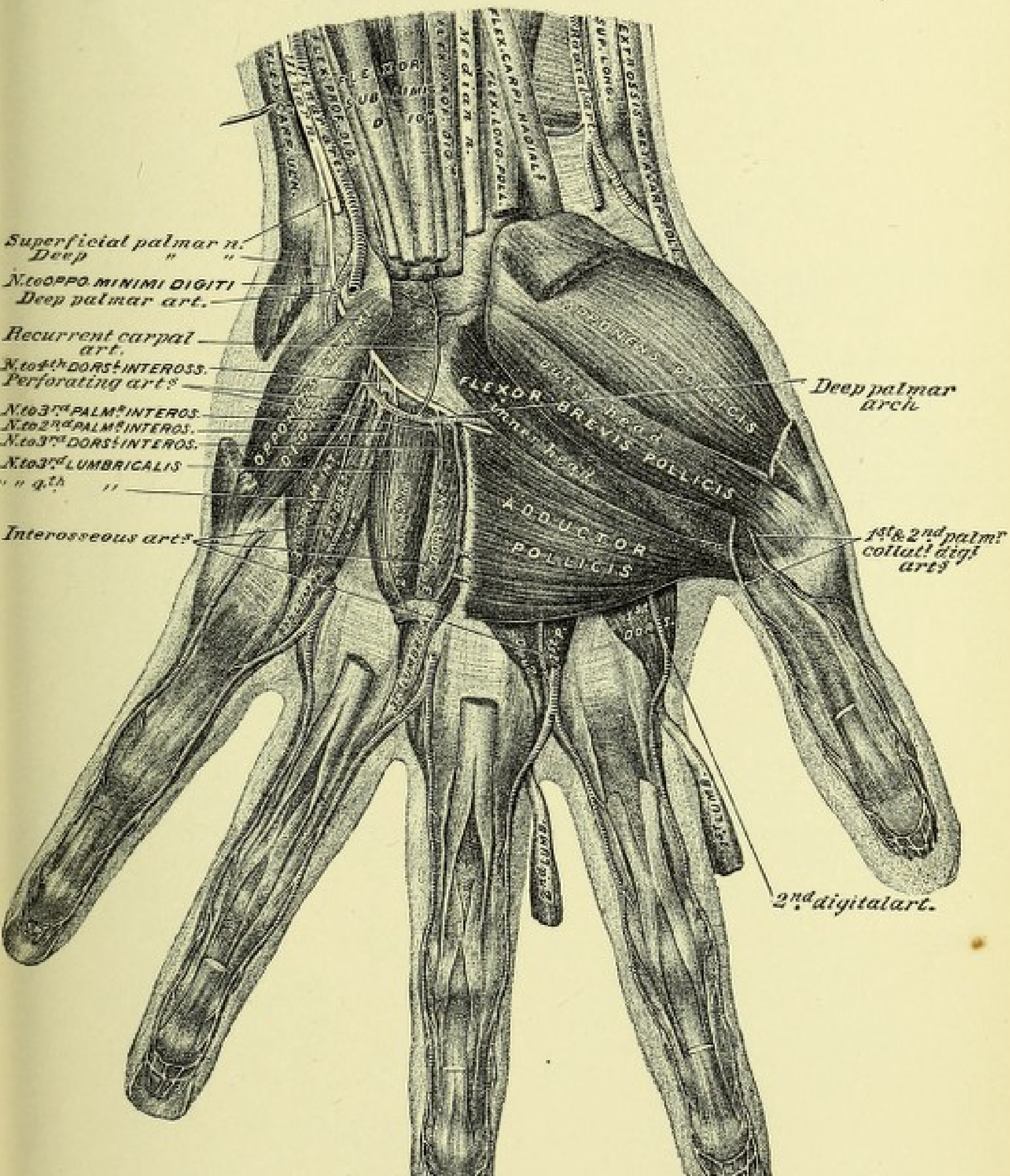

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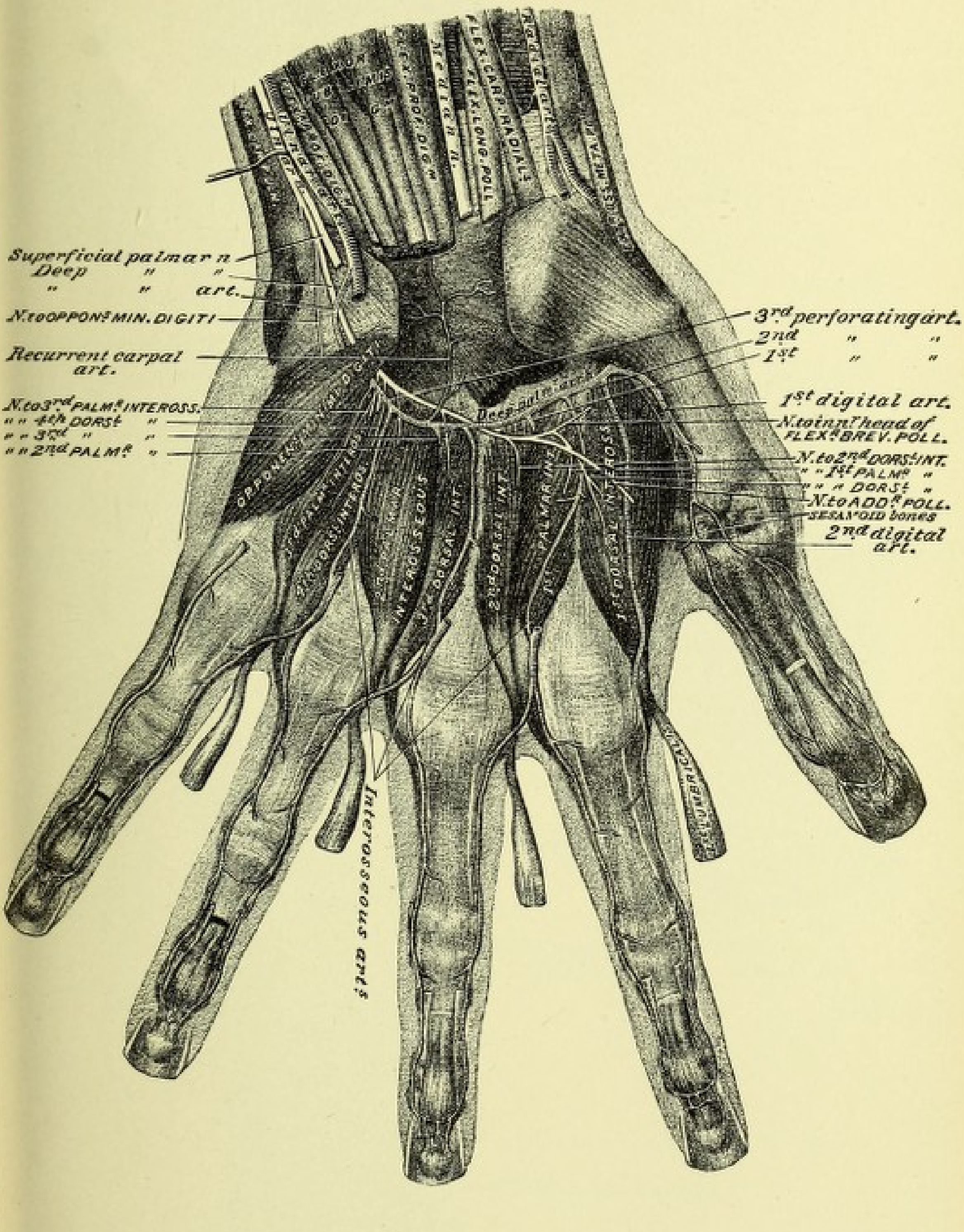

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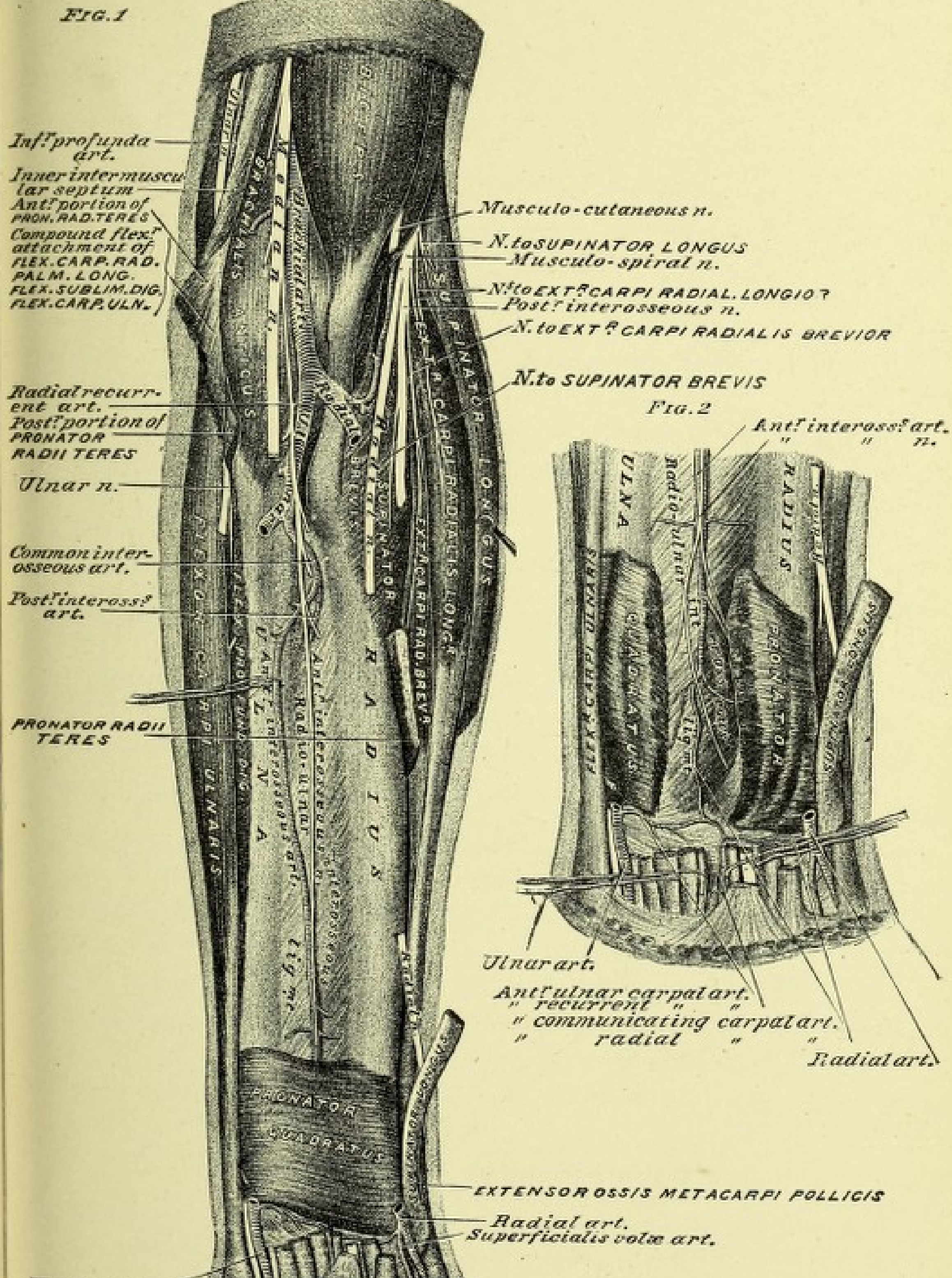

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TRUNK.

SEVENTEENTH DISSECTION.

ANTERIOR OF THE THORACIC PARIETES; THORACIC VISCERA IN SITU; INTERIOR OF THE THORACIC CAVITY.

Dissection.—The thorax and upper extremities should remain as placed for the fifteenth dissection (page 193). Dissect away the pectoralis major muscle from its sternal and costal cartilage attachments (Plate 120).

Terms of Relation.—The general terms (page 2); and the special terms *exterior* and *interior* (relatively to those respective surfaces of the thoracic parietes) are used in locating and describing the anatomical elements of this dissection.

Bones and Cartilages; Muscle Areas of Bones and Cartilages, Plates 113 and 135.—The sternum, the superior six pairs of costal cartilages, the antero-lateral portions of the superior nine pairs of ribs, and the dorsal vertebræ, form the skeleton of the included portion of the thoracic parietes. All the costal cartilages and all the bones—with the exception of the anterior surfaces of the bodies of the eight inferior dorsal vertebræ—afford areas for the attachments of muscles.

ANTERIOR OF THE THORACIC PARIETES.

Dissection.—Clear the anterior surface of the sterno-clavicular articulation (Plate 113), and demonstrate its anterior ligaments. Open the anterior of the joint and expose its fibro-cartilage (Plate 136), and its posterior ligament.

1. Sterno-Clavicular Articulation, Plates 113 and 136.—This articulates the internal end of a clavicle with the facet at an angle of the base of the sternum. Its anterior ligaments are: the *anterior sterno-clavicular*, which passes across the joint, from the edge of the internal end of a clavicle to the border of the facet, at an angle of the base, of the sternum; *the interclavicular ligament* bridges the interclavicular notch at the base of the sternum, between the superior borders of the internal ends of the clavicles, right and left; *the costo-clavicular ligament* binds the inferior border of the internal end of a clavicle to the exterior surface of the first costal cartilage of its side. The opening of the joint brings into view the *inter-articular fibro-cartilage* (Plate 136); also, the *posterior sterno-clavicular ligament*, from the posterior border of the internal end of the clavicle to the posterior border of the clavicular facet of the sternum.

Dissection.—Section carefully—with a knife—the six superior pairs of costal cartilages near their external ends, as shown on the third costal cartilage in Plate 120; cut through the muscles of the right and left sixth intercostal spaces, close along the inferior borders of the sixth pair of costal cartilages, as far as the sternum; section the sternum, on the line of the inferior borders of the sixth pair of costal cartilages. In sectioning the cartilages, and cutting the intercostal muscles, be very careful not to cut into the interior serous membranes—pleuræ and pericardium—and viscera. When the sixth pair of costal cartilages are freed, raise one side, with the fingers of one hand, and turn off the sternal plate (sternum, costal cartilages, etc.), superiorly, from the right and left pleuræ, the pericardium, and the contents of the anterior mediastinum, by cutting, with a knife or curved scissors in the other hand, the following parts: the right and left internal mammary arteries, at their inferior and superior ends, also their branches into the mediastinum; the attachments of the sterno-hyoid, and thyroid muscles (right and left) at the interior of the superior end of the sternum; the attachments of the fascial slips (right and left) of the omo-hyoid muscles, to the cartilages of the first ribs; also, the sternal attachments of the sterno-cleido-mastoid muscles (right and left) at the exterior of the superior end of the sternum. Place the sternal plate with its exterior surface uppermost and clear: the exterior surfaces of the sternum and the costal cartilages; the anterior sterno chondral ligaments; the perforating arteries; and the anterior intercostal aponeuroses. Dissect away the anterior intercostal aponeuroses of the second and third interchondral spaces; expose the anterior surfaces of the internal intercostal muscle planes of those spaces; trace the anterior intercostal arteries of the spaces, and follow them to their origins from the internal mammary artery, by cutting away portions of the internal intercostal muscles (Fig. 1, Plate 135). Dissect away an anterior sterno-chondral ligament, and display a superior and an inferior sterno-chondral ligament. Turn the sternal plate with its interior surface uppermost; clear the interior of the sternum, noting the attachments of the sterno-hyoid and sterno-thyroid muscles (right and left), near its superior end. Display the interior surface of the triangularis sterni muscles and the interior branches of the internal mammary arteries. Dissect away the triangularis sterni muscles and trace the internal mammary artery, where it runs exteriorly to this muscle. Demonstrate a posterior sterno-chondral ligament.

2. Sterno-Chondral Articulations, Plate 135.—The costal cartilages in contiguity with the facets at the borders of the sternum form these joints. The ligaments of each joint are: an *anterior*, a *superior*, an *inferior* (Fig. 1, Plate 135) and a *posterior* (Fig. 2, Plate 135) *sterno-chondral.*

3. External Intercostal Muscles, Plates 113, 120; and Fig. 1, Plate 135.—The exterior musculo-aponeurotic plane of an intercostal space is formed (page 204): by an *external intercostal muscle*—to the anterior ends of the ribs; and an *anterior intercostal aponeurosis*—in the interchondral space.

4. Internal Intercostal Muscles, Figs. 1 and 2, Plate 135.—The interior muscle plane of the antero-lateral portion of an intercostal space is formed by an internal intercostal muscle; the same being continued to the sternum in the interchondral space.

5. Triangularis Sterni Muscle, Fig. 2, Plate 135.—This muscle is located at the interior of the sternal plate; it is attached to the inferior portion of the sternum, inferiorly; it expands, superiorly and externally, to be attached to the interior surfaces of the costal cartilages and ribs (anterior ends), sixth to second, inclusive.

6. Internal Mammary Artery.—This artery (venæ comites) runs upon the interior of the anterior thoracic parietes, externally to, and parallel with, the border of the sternum. Its inferior portion lies between the costal cartilages and the internal intercostal muscles, exteriorly, and the triangularis sterni muscle, interiorly. At its superior end it gives off the *comes nervi phrenici* artery, which accompanies the phrenic nerve to the diaphragm. In each of the six superior interchondral spaces, it gives off its exterior branches as follows: the *anterior intercostal arteries*, which perforate the internal intercostal muscle to ramify in the anterior portion of the intercostal space, between the external and the internal intercostal muscles; the *perforating arteries*, which pass through the interchondral planes of tissue, the pectoralis major muscle, and the fascia, to reach the subcutaneous plane of the thoracic parietes. Its interior branches—*sternal, mediastinal pericardial*—pass interiorly, to distribute to the triangularis sterni muscle (sternal), to the areolar tissue of the anterior mediastinum (mediastinal), and to the pericardium (pericardial).

THORACIC VISCERA IN SITU.

DISSECTION.—Display the anterior reduplications of the parietal layers of the right and left pleuræ, and the anterior portion of the parietal layer of the pericardium. Preserve the mediastinal, and the pericardial branches of the internal mammary arteries.

7. **Pleuræ,** Plate 136.—These are two serous membranes, which invest the lungs, right and left, by two layers: the parietal and the visceral. The *parietal layers* line the interior of the thorax, and are reflected anteriorly and posteriorly to the roots of the lungs; the *visceral layers* are expansions of the parietal layers, from the right and left lung-roots, over the lungs, respectively. The antero-internal limits of the parietal layers of the pleuræ advance to the borders of the interior of the sternum, where they are reduplicated, posteriorly, upon the lateral surfaces of the parietal layer of the pericardium, to reach the anterior surfaces of the roots of the lungs. The dotted lines in Plate 136 indicate the limits of the antero-internal projections of the pleuræ during inspiration. (These limits may be shown by inflation of the lungs, by a bellows introduced, and tied, into the inferior end of the sectioned trachea.) From the interior of the circumference of the inferior of the thoracic parietes the parietal layers of the pleuræ are reflected to the superior surface of the diaphragm. From the interior of the posterior parietes of the thorax, the parietal layers of the pleuræ, right and left, are reduplicated, anteriorly, from the lateral surfaces of the bodies of the dorsal vertebræ, upon the œsophagus and aorta, to reach the posterior surfaces of the roots of the lungs, right and left.

8. **Pericardium,** Plates 136 and 137.—The anterior portion of the parietal layer of this serous membrane investment of the heart occupies the interval between the right and left pleuræ. Inferiorly, it is reflected to the superior surface of the diaphragm. It is reflected upon the large vessels, superiorly to the base of the heart.

9. Branches of the Internal Mammary Arteries, Plate 136. —The branches of these arteries present in the mediastinum, where they distribute to the pericardium, the anterior portions of the pleuræ, the thymus gland, etc.

DISSECTION.—Cut away the anterior portions of the right and left pleuræ, thereby exposing the antero-internal borders of the lungs, right and left. (Owing to the collapse of the lungs and the position of the body, the lungs fall, laterally, into either half of the thorax.) Note the anterior portion of the superior surface of the diaphragm. Hold off, by loops, the borders of the lungs, so as to find and trace the right and left phrenic nerves, from the superior of the thorax, to where, inferiorly, they perforate the diaphragm; find and follow the *comes nervi phrenici* arteries, which accompany the nerves. Clear away the areolar tissue from the thymus gland, the vena cava superior, and the right and left innominate veins.

10. Diaphragm, Plates 137 and 138.—The superior surface of this muscle forms the floor of the thorax, anteriorly to, and to the right and left from, the pericardium. It is covered by the parietal layers of the pleuræ, right and left.

11. Lungs, Plate 137.—The anterior borders of the lungs, right and left, appear at the sides of the pericardium; of the right, its superior and middle lobes are seen; of the left, its superior lobe. The dotted lines, in Plate 137, indicate the limits of the internal projections of the antero-internal borders of the lungs during inspiration. (This may be produced by inflation of the lungs, by bellows introduced into the trachea.)

12. Phrenic Nerves.—These nerves, the right and left, enter the thorax from the neck, lying internally, and posteriorly, to the internal mammary arteries; they run, inferiorly, between the pericardium and the right and left pleuræ, to the diaphragm, which they perforate. They are accompanied by the *comes nervi phrenici* arteries (page 239).

13. Thymus Gland.—This ductless gland lies upon the anterior surface of the arch of the aorta, inferiorly to the left innominate vein, and to the left of the vena cava superior. It varies very much at different ages, and in different subjects; in the young it is larger than in the adult. In the adult its longest diameter is from right to left; its inferior border is irregular; its left end is thicker than the right; and, from the left half of its superior border, it projects a portion into the neck, over the anterior surface of the left innominate vein.

14. Right and Left Innominate Veins.—The *right* innominate vein, a short and almost vertical vessel, is projected into the thorax, posteriorly to the internal end of the right clavicle. The *left* vein is long, and emerges from the posterior of the internal end of the left clavicle ; it crosses the median line, to unite with the right, to form the vena cava superior.

15. Vena Cava Superior.—This short, large, venous trunk, as formed by the junction of the two last-described veins, is continued, inferiorly, to where it is invested by the pericardium, being lodged between the right lung and the thymus gland.

DISSECTION.—Section the vena cava superior (Plate 137), and the right and left innominate veins ; dissect away the thymus gland and the portions of the veins between the section lines. Find the right and left pneumogastric nerves ; also, the right and left recurrent laryngeal nerves. Display the right and left cervical cardiac nerves, and the right and left thoracic cardiac nerves, noting their relations to the transverse portion of the arch of the aorta and the innominate artery. Expose the anterior surfaces of the transverse portion of the arch of the aorta ; the innominate artery (and its bifurcation into the right common carotid and right subclavian arteries) ; the left common carotid artery ; and the left subclavian artery. Clear the portions of the trachea, superiorly to, and of the right bronchus, posteriorly to, the arch of the aorta.

16. Pneumogastric Nerves, Plate 138.—These nerves, right and left, enter the thorax from the neck. The *right* appears, in the thorax, anteriorly to the right subclavian artery, continuing, inferiorly, to where it disappears posteriorly to the right bronchus. The *left* passes into the thorax, anteriorly to the left half of the transverse portion of the arch of the aorta ; inferiorly to the aorta, it is continued posteriorly to the left bronchus. Each nerve gives off : a recurrent laryngeal nerve ; and thoracic cardiac nerves, to the cardiac plexus.

17. Recurrent Laryngeal Nerves.—These nerves, the right and left, are given off from the pneumogastric nerves, right and left, respectively : the *right*, inferiorly to the right subclavian artery, posteriorly to which it winds, to take its course, superiorly, into the neck ; the *left*, takes its origin inferiorly to the transverse portion of the arch of the aorta, to the posterior surface of which it winds, to take its course, superiorly, into the neck, where it appears, to the left of the trachea, upon the anterior surface of the œsophagus.

18. Cervical Cardiac Nerves.—These nerves to the cardiac plexuses, from the cervical ganglia of the sympathetic nerve, right and left, and from the inferior of the cervical portions of the pneumogastric nerves, right and left, vary in their relations to the transverse portion of the arch of the aorta, the innominate, the right and left common carotid, and the right and left subclavian arteries. On the *right side*, they run, with but few exceptions, posteriorly to the arteries, on their way to the cardiac plexuses ; a variable number of branches pass anteriorly to the same. On the *left side*, while some of the nerves pass anteriorly to the transverse portion of the arch of the aorta, looping inferiorly to it, to reach the cardiac plexuses, the greater number run posteriorly to the aorta.

19. Thoracic Cardiac Nerves.—These nerves are branches of the right and left pneumogastric nerves, inferiorly to the giving off, from those trunks, of the right and left recurrent laryngeal nerves. The latter nerves (especially the left one) contribute, at times, some of the thoracic cardiac branches. The right thoracic cardiac nerves pass posteriorly to the arch of the aorta ; the left, posteriorly to the pulmonary artery.

20. Cardiac Plexuses.—These plexuses, formed by the right and left cervical and thoracic cardiac nerves, are located between the concavity of the aorta, the common and right pulmonary arteries, and the anterior surface of the bifurcation of the trachea. (The cardiac plexuses are not illustrated, because they require to be dissected out on specially prepared pieces, which would interfere with the exposure of parts of more practical importance.)

21. Transverse Portion of the Arch of the Aorta and its Branches.—This portion of the arch of the aorta is continued from right to left, and obliquely posteriorly, into the superior of the left half of the thorax. Three large arteries are projected from it superiorly, viz. : to the right, the innominate ; to the left, the left common carotid and the left subclavian.

22. Innominate Artery.—This, the largest branch from the transverse portion of the arch of the aorta, is projected to the right. It crosses, in a plane anteriorly to the trachea, to a point posteriorly to the right sterno-clavicular articulation, where it bifurcates into the right common carotid and right subclavian arteries. The former is continued, superiorly, into the neck, along the right of the trachea ; the latter passes into the root of the neck, arching over the right first rib, to be continued as the right axillary artery (page 203, Plate 119).

23. Left Common Carotid Artery.—This artery has a superior course into the neck, to the left side of the œsophagus and trachea. Its origin, within the thorax, from the arch of the aorta, makes its trunk much longer than the right common carotid.

24. Left Subclavian Artery.—This artery, to the left of the last-described artery, is projected, superiorly, into the root of the neck. Its trunk is much longer than the right subclavian, because of its aortic origin. It arches over the left first rib, that it may be continued as the left axillary artery.

25. Trachea.—A portion of the trachea, and of the right bronchus, appear in a plane posteriorly to the arch of the aorta and the innominate artery.

26. Œsophagus.—A portion of this canal lies in a posterior plane between the trachea and the left common carotid artery.

Dissection.—Pass the hand into the thorax, right and left, and free the right and left lungs from the thoracic parietes. Dissect the diaphragmatic portion of the parietal layer of the pericardium from the superior surface of the diaphragm. Section (see Plate 138) the following parts: the innominate, left common carotid, and left subclavian arteries (cutting therewith the right and left cervical cardiac nerves) ; the phrenic nerves and the comes nervi phrenici arteries at their superior and inferior ends, removing their intervening portions ; the left recurrent laryngeal nerve at its origin, and where it appears anteriorly to the œsophagus ; the thoracic cardiac branches of the pneumogastric nerves (right and left) ; and the trachea. Pass the hand into the superior of the thorax, grasping the cut inferior portion of the trachea and the arch of the aorta ; drag the heart and lungs anteriorly, and inferiorly ; with the curved scissors cut the trachea, and the bronchi, from the œsophagus, and the descending portion of the arch of the aorta from the thoracic parietes ; cut also the pulmonary branches of the right and left pneumogastric nerves, so as to leave the trunks of the two latter nerves, *in situ*, upon the œsophagus. Cut the vena azygos major as it enters the posterior surface of the extra-pericardial portion of the vena cava superior—leave the vena azygos major upon the right lateral surface of the vertebral column. Section the descending portion of the arch of the aorta, at its junction with the thoracic aorta, leaving the latter as in Plate 139. Finally, section the vena cava inferior, as it comes through the caval opening of the diaphragm, and remove the thoracic viscera, *en masse* (place them in a solution of arsenite of soda for subsequent dissection). Pleuritic adhesions may make it difficult to remove the thoracic viscera, requiring the pleuræ to be torn away from the interior of the thoracic parietes; at times, even, the lung tissue may have to be cut through with scissors opposite the adherent areas.

INTERIOR OF THE THORACIC CAVITY.

DISSECTION.—Clear the surface of the thoracic portion of the œsophagus, tracing the right and left pneumogastric nerves, inferiorly, upon it; note the branches of these nerves to the œsophagus.

27. Œsophagus, Plate 139.—This portion of the supra-diaphragmatic part of the alimentary canal enters the thorax from the neck. It leaves the thorax by the œsophageal opening of the diaphragm, where it is continued into the abdomen (page 63). In its course, through the thorax, it is located: superiorly, in a plane posteriorly to the transverse portion of the arch of the aorta; in its mid-portion, it advances along the right of the descending portion of the arch of the aorta, and is then projected to the anterior surface of the superior half of the thoracic aorta; inferiorly, it passes to the left of the inferior half of the thoracic aorta.

28. Pneumogastric Nerves.—These nerves, right and left (page 242; Plate 138), are continued, inferiorly, through the thorax upon the œsophagus, sending branches of distribution to it. They leave the thorax with the œsophagus at the œsophageal opening of the diaphragm.

DISSECTION.—Trace the vena azygos major vein and its tributary branches, the right intercostal veins. Expose the thoracic or left lymphatic duct, between the inferior halves of the œsophagus and the vena azygos major vein.

29. Vena Azygos Major, Right Intercostal Veins, and Right Superior Intercostal Vein, Plate 139, and Fig. 1, Plate 140.—The *vena azygos major* has a course, superiorly, from where it enters the thorax through the aortic opening of the diaphragm, upon the anterior surface of the right half of the bodies of the dorsal vertebræ. In its course it receives the *right intercostal veins* from the right inferior nine intercostal spaces. At its superior end it receives the *right superior intercostal vein*, a small vessel formed by the intercostal veins of the right superior three intercostal spaces. The azygos major trunk loops, anteriorly, superiorly to the root of the right lung, to empty into the vena cava superior, before the latter receives its pericardial investment. (This point of junction of the vena azygos major with the vena cava superior was seen, when the former was sectioned, in removing the thoracic viscera, see page 244.)

30. Thoracic or Left Lymphatic Duct, Plate 139.—The inferior third of the thoracic portion of this duct will be found passing, superiorly, from the aortic opening of the diaphragm, to where it disappears posteriorly to the superior two-thirds of the thoracic portion of the œsophagus. In this portion of its course it lies anteriorly to the right intercostal arteries, and between the thoracic aorta, to the left, and the vena azygos major to the right—nearer the former than the latter.

Dissection.—Expose the dorsal portion of the right sympathetic nerve; its branches of communication with the right intercostal nerves, and its splanchnic branches.

31. Dorsal Portion of the Right Sympathetic Nerve, Plate 139.—This portion of the right sympathetic nerve consists of twelve ganglia, each located opposite the anterior surface of the head of a rib, upon an anterior costo-central or stellate ligament. Each ganglion is united to the ganglion superiorly and inferiorly to it, by interganglionic branches; each presents two external branches, which communicate with the anterior division of the dorsal spinal or intercostal nerve, inferiorly to it; and each sends off an internal branch of distribution.

32. Great Splanchnic and other Branches of Distribution of the Dorsal Portion of the Right Sympathetic Nerve.—The dorsal ganglia, sixth to ninth, inclusive, distribute branches, internally, which unite to form the right *great splanchnic nerve;* it passes into the abdomen by perforating the right crus of the diaphragm. The superior six dorsal ganglia give off internal branches: to the posterior pulmonary plexus, to the thoracic aorta, and to other contiguous parts. (The branches of distribution of the six superior dorsal ganglia, of the right side, were cut away in the removal of the thoracic viscera.)

Dissection.—Clear the thoracic aorta and find the œsophageal arteries. Trace the right intercostal vessels and nerves in the intercostal spaces, adjacent to the vertebral column.

33. Thoracic Aorta and its Branches, Plate 139, and Fig. 1, Plate 140.—The thoracic aorta has an inferior course, parallel with, and in a plane posteriorly to, the œsophagus, to where it passes through the aortic opening of the diaphragm, to be continued as the abdominal aorta. Its branches are the œsophageal, to the œsophagus, and the right and left nine or ten intercostal arteries, which are continued, anteriorly, inferiorly to the nine or ten inferior pairs of ribs.

34. Right Intercostal Nerves, Arteries, and Veins.—In each intercostal space, adjacent to the vertebral column, will be found an intercostal nerve, an intercostal artery, and an intercostal vein ; all three lie upon the interior surface of the postero-internal portion of an external intercostal muscle, and are continued anteriorly, between the external and internal intercostal muscle planes of an intercostal space, along the inferior border of the superior rib-boundary of the space. The relations of the three in the intercostal space are : the nerve inferiorly, the vein superiorly, and the artery between the two.

The *intercostal nerves* are the anterior divisions of the dorsal spinal nerves, each having two communicating branches from the dorsal sympathetic ganglion superiorly to it.

The *intercostal arteries* are nine or ten branches from the thoracic aorta, the right being longer than the left.

The *intercostal veins* are, on the right side, tributary to the azygos major vein and the right superior intercostal vein.

Dissection.—Expose, by dissecting away the posterior intercostal aponeurosis and the posterior portion of an internal intercostal muscle of one or more intercostal spaces, the relations of the external and internal intercostal muscles at the postero-internal or vertebral end of an intercostal space.

35. Relations of the External and Internal Intercostal Muscles, at the Vertebral End of an Intercostal Space.—The relations of the posterior portions of these muscle planes are as follows : an *external intercostal muscle* forms the exterior plane of the postero-internal portion of an intercostal space, commencing, internally, opposite the tubercles of the adjacent ribs ; an *internal intercostal muscle* forms the interior plane of the same portion of an intercostal space, commencing at about the angles of the adjacent ribs. Internally to the posterior limit of an internal intercostal muscle, the anterior surface of an external intercostal muscle, lodging the intercostal vessels and nerve, is covered by the continuation of the internal intercostal muscle plane by a plane of fibrous tissue—the *posterior intercostal aponeurosis.*

Dissection.—Section (Plate 139) the œsophagus, and the right and left pneumogastric nerves, at their superior and inferior ends, and remove their included portions. Slit open the segment of the œsophagus and demonstrate its structure. Cut the thoracic aorta superiorly to the aortic opening of the diaphragm, as in Fig. 1, Plate 140 ; also each of its intercostal branches, leaving the latter, *in situ.* Remove the thoracic aorta, being careful not to injure the azygos minor vein, and its tributary branches (the left intercostal veins), posteriorly to it. Expose the vena azygos minor and the left superior intercostal vein. Trace the left intercostal nerves, arteries, and veins. Display the dorsal portion of the left sympathetic nerve.

36. Structure of the Œsophagus.—This canal will be found to have a mucous membrane lining, a submucous plane, a thick muscular coat, and a thin exterior fibrous coat. As slit open, its mucous membrane forms longitudinal folds.

37. Vena Azygos Minor and the Left Inferior Intercostal Veins, Fig. 1, Plate 140.—The *vena azygos minor* enters the thorax through the left crus of the diaphragm ; it runs, superiorly, for a variable distance along the left side of the bodies of the inferior dorsal vertebræ (in the Plate, to the ninth) ; it receives, in its thoracic course, the *left inferior intercostal veins ;* and it crosses the anterior surface of the body of a dorsal vertebra (in the Plate, the ninth), to anastomose with the vena azygos major.

38. Left Superior Intercostal Vein and the Left Superior Intercostal Veins.—The *left superior intercostal vein,* larger than the right (page 245), has a variable length ; it has an inferior course, receiving the *left superior intercostal veins ;* it anastomoses with the vena azygos minor, and by a branch, which crosses the anterior surface of the body of a dorsal vertebra, with the vena azygos major.

39. Left Intercostal Nerves, Arteries, and Veins.—These anatomical elements are lodged in the left intercostal spaces, adjacent to the vertebral column, in the same manner as are those of the right side (page 247 ; Plate 139).

40. Dorsal Portion of the Left Sympathetic Nerve and its Branches.—This portion of the left sympathetic nerve is the counterpart of that of the right (page 246).

DISSECTION.—Expose the superior part of the thoracic portion of the left lymphatic or thoracic duct. Trace the duct to where it enters the neck.

41. Thoracic or Left Lymphatic Duct.—The thoracic portion of this duct has been partly described (page 246), and illustrated (Plate 139). It enters the thoracic cavity at the aortic opening of the diaphragm, along the right of, and in a plane posteriorly to, the aorta; it has a superior, and slightly oblique, course upon the anterior surfaces of the bodies of the ten inferior dorsal vertebræ; it is continued, superiorly, from the third dorsal vertebra, upon the anterior surface of the inferior portion of the left longus colli muscle. It enters the neck, upon the latter muscle, to the left of the œsophagus, and between the left common carotid and subclavian arteries.

42. Mediastinum.—This is the space between the sternum, anteriorly, the bodies of the dorsal vertebræ, posteriorly, and the right and left lungs, laterally. It is occupied by the following anatomical elements: the thymus gland; the heart, invested by the pericardium; the arch of the aorta; the common pulmonary artery; the superior and the inferior venæ cavæ; the bifurcation of the trachea and the roots of the lungs, right and left; the cardiac and pulmonary plexuses; the right and left phrenic, pneumogastric, and great splanchnic nerves; the œsophagus; and the thoracic duct.

DISSECTION.—The dissector of the head and neck section of the body should, in conjunction with the dissector of the thorax, follow the thoracic or left lymphatic duct into the cervical region, to where it empties into the left subclavian vein. Pull out, to the right, from the posterior of the internal end of the left clavicle, the stump of the left innominate vein (by an attached thread), thus making taut the left subclavian and internal jugular veins; loop, internally, the left common carotid artery and left pneumogastric nerve.

43. Cervical Portion of the Thoracic or Left Lymphatic Duct, Fig. 2, Plate 140.—Having entered the neck from the thorax, as above described and illustrated (Fig. 1, Plate 140), this duct lies on the anterior surface of the left longus colli muscle; it arches to the left, passing between the left pneumogastric nerve, anteriorly, and the left vertebral artery, posteriorly; it runs parallel with, and superiorly to, the external and superior part of the first portion of the left subclavian artery; at this point it passes anteriorly to the left inferior thyroid artery, near the origin of the latter from the thyroid axis; it enters between the left internal jugular vein, anteriorly, and the scalenus anticus muscle, posteriorly; it curves abruptly, inferiorly, at the external border of the left internal jugular vein; it is then continued to where it opens into the left subclavian vein, externally to the junction of the latter with the left internal jugular vein. In the latter portion of its course it lies anteriorly to the left phrenic nerve, the left supra-scapular artery, and the left scalenus anticus muscle.

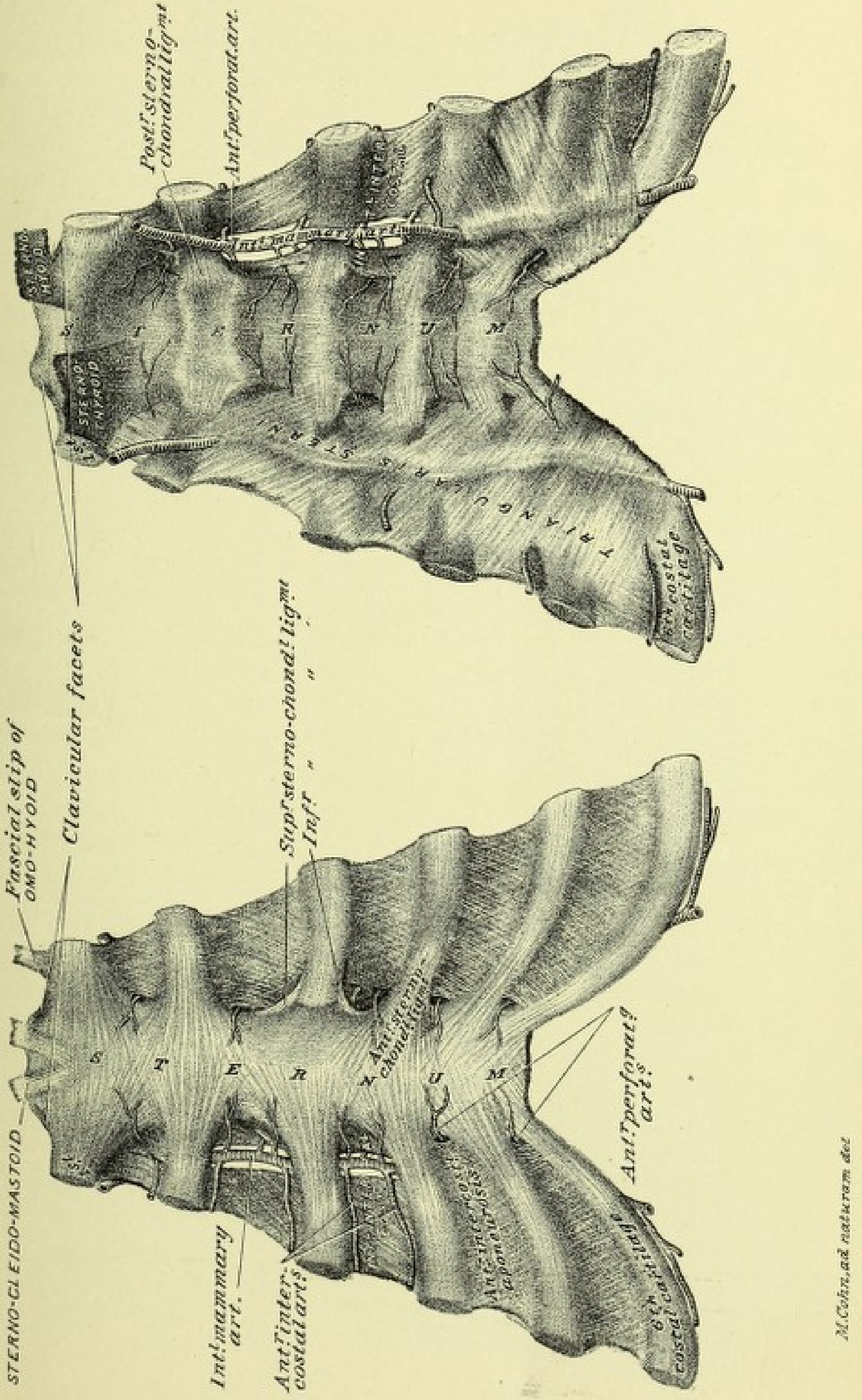
Dissection.—Dissect the pleuræ, right and left, from the superior surface of the diaphragm, and locate its caval, œsophageal, and aortic openings.

44. Diaphragm, Fig. 1, Plate 140.—The superior surface of this muscle has, when the abdominal viscera are *in situ*, an antero-posterior and a lateral convexity; it rises higher on the right side than the left; its circumferential muscle portion and its tendinous centre are easily defined. It slopes to its circumferential attachments to the interior of the inferior portion of the thoracic parietes and (crural attachments) to the interior of the posterior parietes of the abdomen (page 81). Its caval, œsophageal, and aortic openings are located, as follows: the first, to the right of the median line, and somewhat anteriorly; the second, to the left of the median line, and somewhat anteriorly; the third, on the median line, and posteriorly, opposite the body of the twelfth dorsal vertebra.

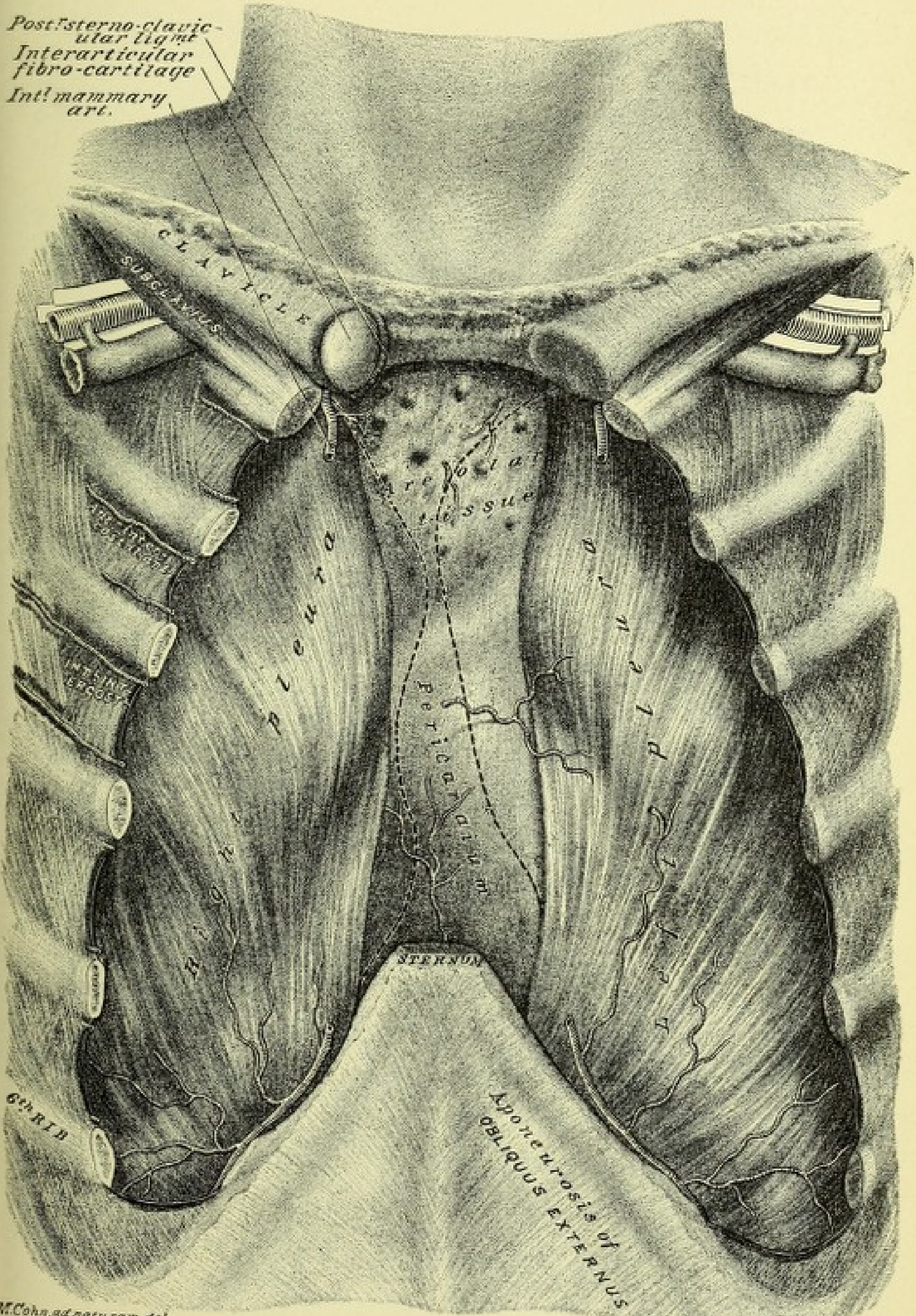
Dissection.—The thoracic viscera may now be dissected or left till later, at the option of the dissector; they will be demonstrated next in order. Care should be taken to keep the interior of the posterior wall of the thorax moist, so as to facilitate the dissection of the articulations of the dorsal vertebræ with each other, and those of the ribs with the dorsal vertebræ.

FIG. 2

FIG. 1



M. Cohn, ad naturam del.



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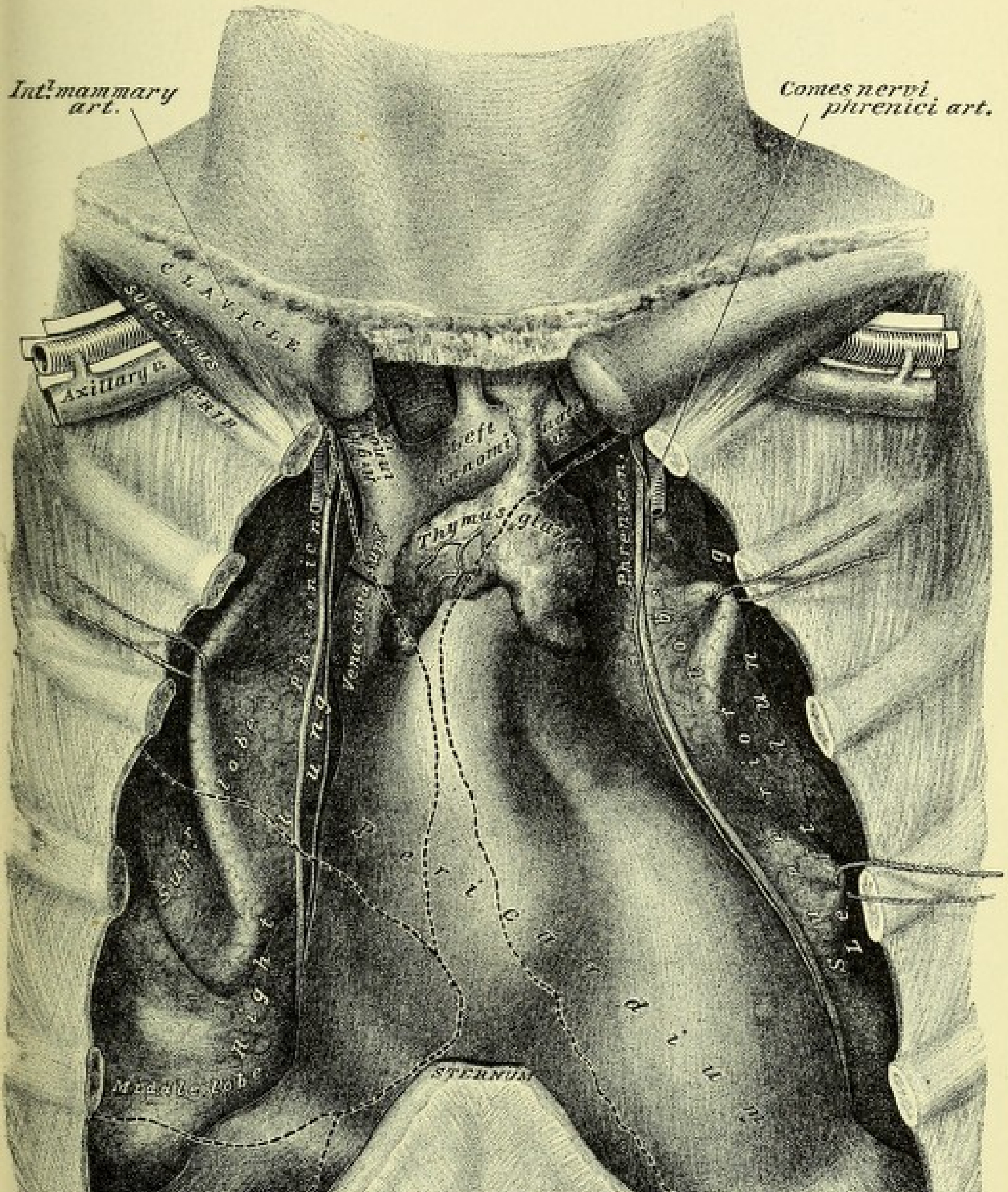

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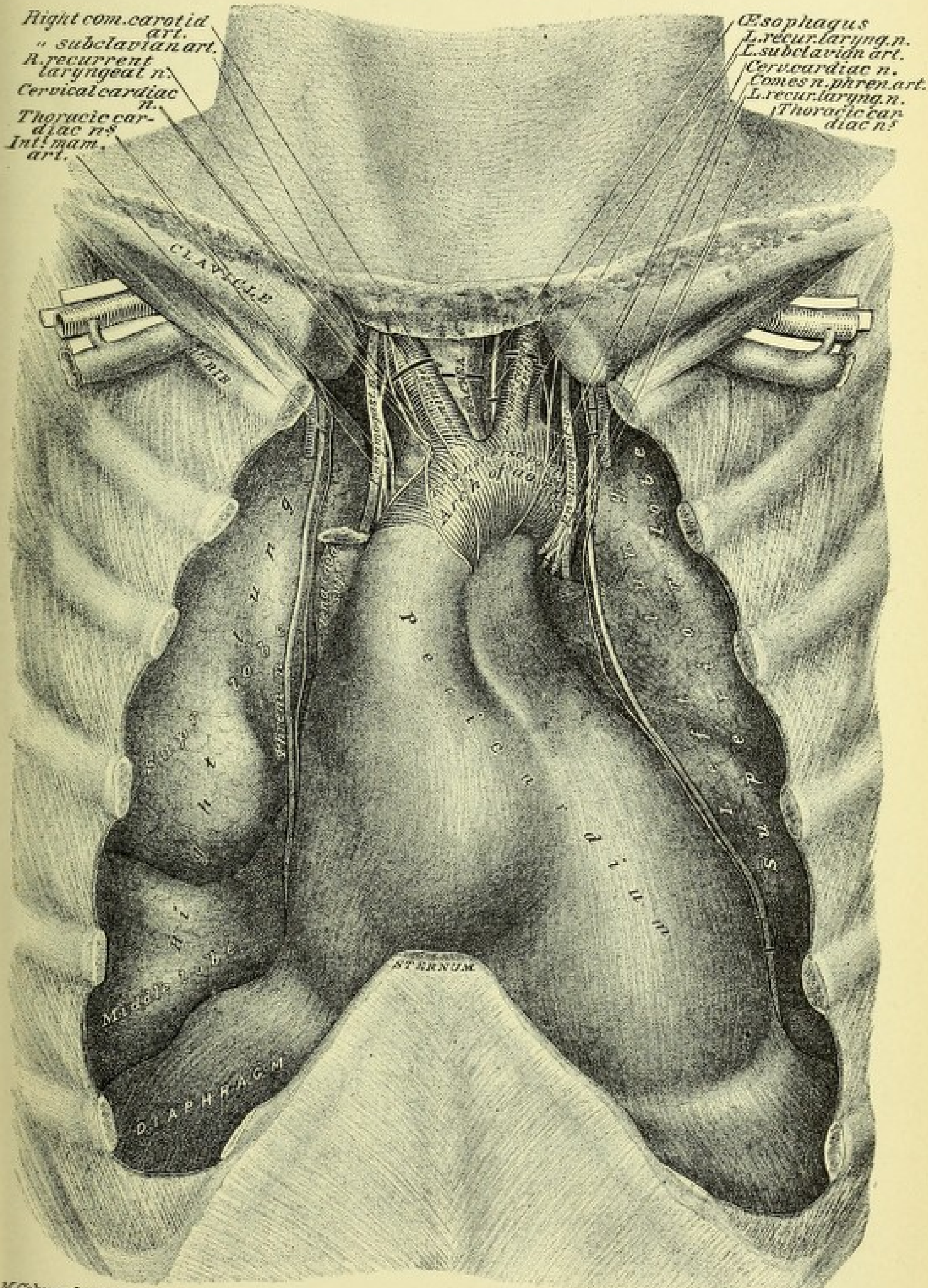

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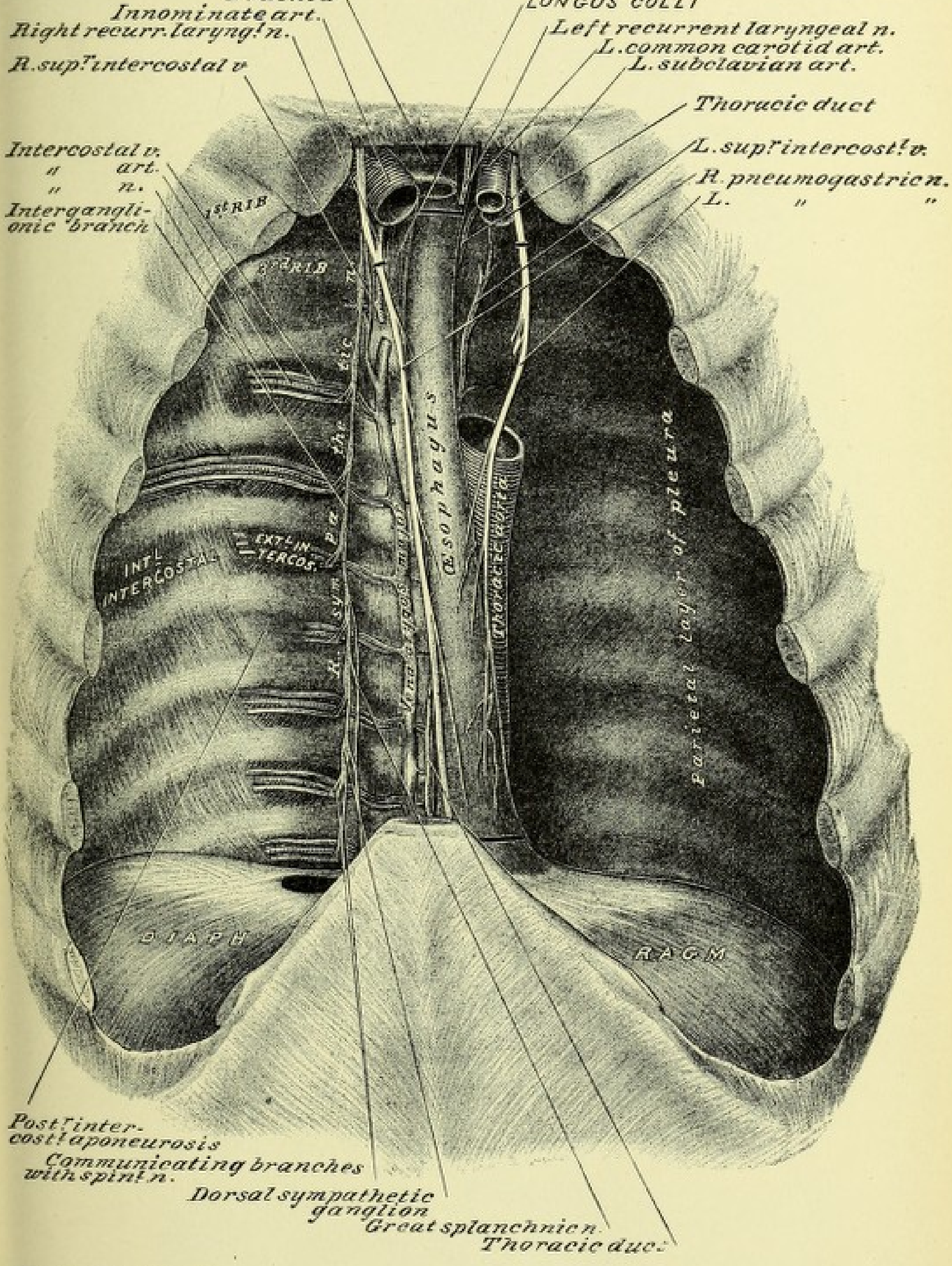

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FIG. 1

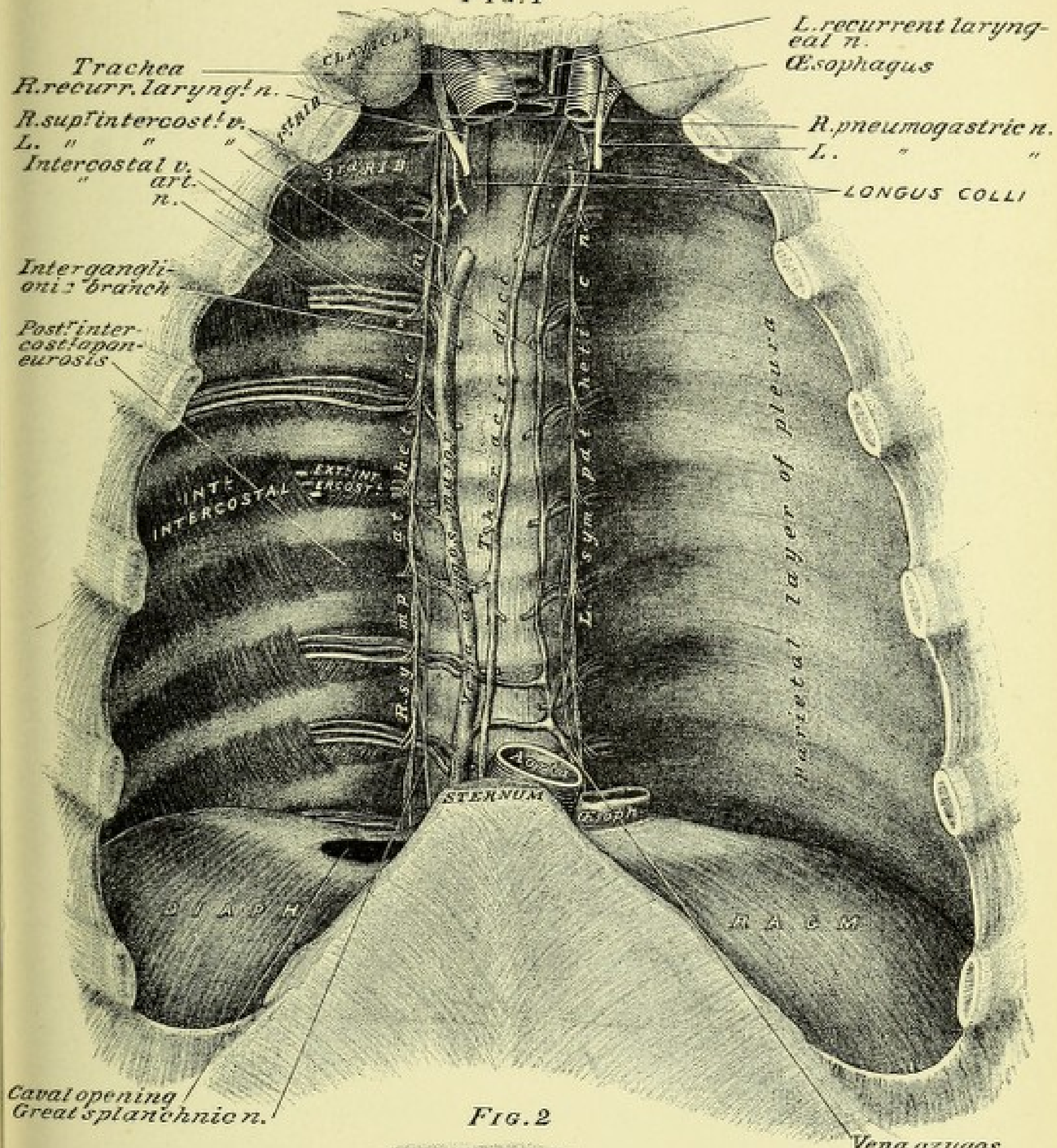
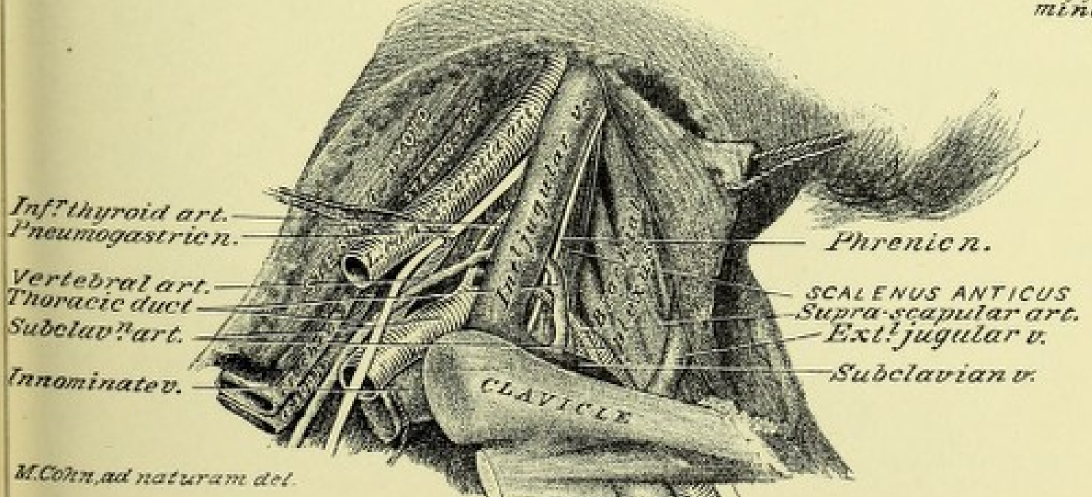


FIG. 2



M. Cohn, ad naturam del.

EIGHTEENTH DISSECTION.

VISCERA OF THE THORAX OUT OF THE BODY.

LUNGS AND HEART TOGETHER.

Dissection.—The thoracic viscera as taken out of the body, *en masse* (pages 244 and 245), should be placed upon a dissecting board, with their anterior surfaces uppermost. The right and the left lung are to be held off, by loops, laterally, so as to expose the pericardial investment of the heart. Slit the parietal layer of the pericardium, from the apex of the heart to the anterior surface of the ascending portion of the arch of the aorta; make two transverse incisions, on a level with the base of the heart. Reflect the four flaps and hold them off, by loops, from the surface of the heart and the cardiac ends of the large vessels from its base.

1. Pericardium, Plate 141.—This membrane invests the heart by two portions: a parietal and a visceral. The *parietal portion*—consisting of an exterior fibrous and an interior serous layer—was partially described (page 240) and illustrated (Plates 136 and 137); its superior attachments, anteriorly, are to the ascending portion of the arch of the aorta, the common pulmonary artery, and the vena cava superior. The *visceral portion* is the reflection of the serous layer of the parietal portion, inferiorly, upon the cardiac ends of the above vessels and the heart.

2. Anterior Surface of the Heart and the Large Vessels at its Base.—The portions of the heart that contribute to its anterior surface are: at the right and anteriorly, the right ventricle surmounted by the appendix of the right auricle, the latter to the right of, and anteriorly to, the cardiac end of the aorta; at the left border, a portion of the left ventricle surmounted by a small portion of the appendix of the left auricle—the latter to the left of the cardiac end of the common pulmonary artery. From the base of the heart, between the appendices of the auricles, are projected the aorta and the common pulmonary artery ; to the right of the aorta is the vena cava superior.

3. Arch of the Aorta.—This large arterial trunk is projected superiorly from the base of the heart ; it arches to the left and posteriorly. It has three portions : the ascending, the transverse, and the descending. The *ascending portion* extends, superiorly, from the heart, a little toward the right ; it is located between the common pulmonary artery, to the left, and the vena cava superior, to the right. The *transverse portion* was before described (page 243) and illustrated (Plate 138). The *descending portion* continues the transverse portion, inferiorly, posteriorly to the root of the left lung.

4. Vena Cava Superior.—This large venous trunk passes, inferiorly, along the right side of the ascending portion of the arch of the aorta ; on its way to the right auricle, it receives its investment of pericardium (page 251).

5. Common Pulmonary Artery.—This vessel is projected from the base of the heart, superiorly, and to the left ; its cardiac end occupies a plane anteriorly to the ascending portion of the arch of the aorta, between the latter and the appendix of the left auricle. It curves to the right into the concavity of the arch, where it bifurcates into the right and left pulmonary arteries.

6. Left Pulmonary Veins.—These two vessels converge to the left side of the heart, in a plane posteriorly to the appendix of the left auricle.

7. Left Pulmonary Artery.—The superior border of this vessel is seen superiorly to, and in a plane anteriorly to, the last-described veins.

Dissection.—Unfasten the loops, which hold aside the lungs and flaps of pericardium, to display the anterior surface of the heart and large vessels. Turn the thoracic viscera, *en masse*, so as to present their posterior surface uppermost. Cut away the descending portion of the aorta, sectioning it between the left common carotid and left subclavian arteries. Trim away the posterior portions of the parietal layer of the right and left pleuræ ; loop the lungs aside so as to expose the heart, the large vessels, the trachea, and the right and left bronchi. Trace the posterior of the parietal portion of the pericardium to its superior line of reflection to the heart, as the posterior of the visceral portion of the same. Demonstrate the portions of the heart that contribute to its posterior surface.

8. Pericardium, Plate 142.—At the posterior surface of the heart the parietal portion of the pericardium (fibrous layer with interior serous layer) is reflected to the heart as its visceral portion (formed by the serous layer of the membrane): along the superior border of the left auricle, superiorly; upon the right and left pulmonary veins, laterally; and upon the vena cava inferior, inferiorly.

9. Posterior Surface of the Heart.—The portions of the heart that contribute to its posterior surface, when the organ is in its normal position, are: the greater part by the left ventricle surmounted by the left auricle; at the right border, a part of the right ventricle surmounted by a portion of the right auricle.

10. Vena Cava Inferior.—With the heart in its normal position, this large venous trunk enters the posterior face of the right auricle, at its inferior angle.

11. Pulmonary Veins.—These veins, two from each lung, converge, right and left, to open into the left auricle.

Dissection.—Clear the posterior surfaces of the trachea, and of the right and left bronchi. Preserve the branches of the bronchial arteries, portions of the posterior pulmonary plexus or nerves therefrom, upon the bifurcation of the trachea and the bronchi. Pull out, superiorly and to the right of the trachea, the vena cava superior; note the stump of the vena azygos major at the posterior surface of the vena cava superior.

12. Trachea and Right and Left Bronchi.—The trachea presents posteriorly to the transverse portion of the arch of the aorta. It bifurcates into the right and left bronchi; each of these, in turn, bifurcate, before they enter the right and left lungs. The posterior walls of these canals present their membranous portions; anteriorly, and laterally, they are constructed of incomplete cartilaginous rings united by fibrous tissue.

13. Bronchial Arteries.—Branches of these arteries, from the concavity of the arch of the aorta, ramify upon the bifurcation of the trachea, and upon the bronchi; they may be traced into the lungs, right and left, upon the bronchi.

14. Anterior and Posterior Pulmonary Plexuses, and the Pulmonary Nerves.—These plexuses are contributed to by the right and left pneumogastric nerves; also, by the right and left superior dorsal ganglia of the sympathetic nervous system. The *anterior* is spread upon the anterior surfaces of the bifurcation of the trachea and the roots of the lungs; the *posterior* upon the posterior surfaces of the same. (These plexuses are not illustrated, as they require to be dissected upon specially prepared organs, as special dissections.) Nerves from these plexuses may be followed along the bronchi, to where they enter the lungs, right and left.

15. Vena Cava Superior and Vena Azygos Major.—The stump of the vena cava superior is lodged anteriorly to the trachea. As brought into view, to the right of the trachea, the *vena azygos major* presents, hanging from the posterior face of the cava; the trunk of this azygos vein is situated posteriorly to the root of the right lung, and loops superiorly to the latter and anteriorly to reach the cava.

DISSECTION.—Expose the right pulmonary artery, inferiorly to the bifurcation of the trachea, and in a plane anteriorly to the same; display the left pulmonary artery, projected to the left, in a plane anteriorly to the left bronchus, and trace it to where it branches and enters the left lung; find the ductus arteriosus between the left pulmonary artery and the concavity of the arch of the aorta.

16. Right Pulmonary Artery.—This artery is projected to the right, from the bifurcation of the common pulmonary artery. It lies between the bifurcation of the trachea and the left auricle of the heart, in a plane anteriorly to the bronchi and pulmonary veins. It bifurcates before entering the right lung.

17. Left Pulmonary Artery.—This artery is projected to the left, from the bifurcation of the common pulmonary artery, superiorly to, and in a plane anteriorly to, the left bronchus; it bifurcates before entering the left lung.

18. Ductus Arteriosus.—This obliterated vessel of fœtal life passes, as a fibrous cord, superiorly and to the left, from the superior of the left pulmonary artery—close to the origin of the latter, from the bifurcation of the common pulmonary artery—to the inferior of the transverse portion of the arch of the aorta.

DISSECTION.—Examine the anatomical elements entering, and coming from, the lungs, which constitute the roots of those organs.

19. Roots of the Lungs.—The following parts, at the internal surface of a lung, collectively, form the, so-called, root of a lung: *first*, a bronchus and its divisions; *second*, a pulmonary artery and its branches; *third*, two pulmonary veins with their tributary branches; *fourth*, the branches of a bronchial artery; *fifth*, nerves from the pulmonary plexuses; *sixth*, lymphatic glands receiving lymphatic vessels from the organ; *seventh*, connective tissue lodged between the anatomical elements of the root of the organ. Of these parts: the branches of the pulmonary and the bronchial arteries, and the nerves from the pulmonary plexuses, enter the lung; the branches converging to the two pulmonary veins, and the lymphatic vessels emerge from the lung.

LUNGS.

DISSECTION.—Section (Plate 142) the right and left pulmonary arteries, and the pulmonary veins, right and left; then separate the heart from the trachea and bronchi. Cut the pulmonary arteries, veins, and nerves close to the lungs, right and left.

1. Lungs, Plate 143.—These organs, two in number, a right and a left, weigh from 36 to 42 ounces, varying according to sex; the right being about 2 ounces heavier than the left. They have a mottled appearance, purple and black (pink in the young); and they crepitate on pressure between the fingers. The right lung is larger than the left, because the left lung, *in situ*, has to be so shaped as to admit of the lodgement of the heart, which occupies much more of the left than of the right half of the thorax.

DISSECTION.—Place the lungs on a dissecting board with their anterior surfaces uppermost.

2. Anterior Surface of the Lungs, Fig. 1, Plate 143.—The anterior surface of these organs was referred to (page 241) and illustrated (Plates 137 and 138). Restored to their normal relations this surface presents: the right lung, three lobes; the left, two lobes. The lobes of a lung are marked off by fissures in the substance of the organ, which do not penetrate its entire mass. The *right superior lobe* is conical in shape, with a sharp apex, superiorly, and a well-marked curved fissure, inferiorly. The *middle lobe* is an oblong portion of the right lung, located at the inferior portion of the anterior face of the organ; it does not include the whole antero-posterior thickness of the lung, but is located inferiorly to the superior lobe, and is appended from the anterior face of the inferior lobe; it is bounded, superiorly, externally, and inferiorly, by fissures that isolate it from the superior and inferior lobes. The *right inferior lobe* presents but a small portion anteriorly; its inferior surface is moulded to the superior face of the right half of the diaphragm. The *left superior lobe* is a conical-shaped portion which forms the anterior face of the lung. Opposite the middle lobe of the right lung, the antero-internal border of the left lung is deeply notched, thereby forming an inferior tongue of lung tissue, which is projected to the right. This deficiency of the antero-internal border of the left lung is for the exposure of the heart, where it applies itself, with only the parietal portion of the pericardium intervening, against the thoracic wall. The *left inferior lobe* is applied to the superior surface of the left half of the diaphragm.

Dissection.—Turn the lungs upon the dissecting board, with their posterior surface uppermost.

3. Posterior Surface of the Lungs, Fig. 2, Plate 143.—This face of these organs presents them united by the bifurcated trachea. The posterior of each lung presents two lobes: a superior and an inferior. Of the *right lung:* the *superior lobe* is conical in shape with its apex directed superiorly; the *inferior lobe* is also conical in shape, with its apex applied to the surface of the superior lobe; adapted as the inferior surface of this lobe is to the superior surface of the diaphragm, its postero-inferior border presents a sharp edge for lodgement, between the diaphragm and the parietes of the thorax, superiorly to the postero-inferior attachments of the diaphragm. Of the *left lung:* the *superior lobe* is conical like the right, larger, and more rounded at its apex; the *inferior lobe* has the shape of the right, but it is smaller than it; it has a similar inferior surface and postero-inferior border, for adaptation to the superior surface of the diaphragm.

4. Orifices of the Pulmonary Vessels.—The orifices of the pulmonary arteries and veins, present at the internal surfaces of the lungs, right and left, in the vicinity of the points of entrance of the bronchi, right and left.

Dissection.—The bronchial tubes, pulmonary arteries, and pulmonary veins should be slit open and traced into the substance of the lungs, to note their respective bifurcations, etc.

HEART.

1. Heart, Plate 144.—This organ is a hollow muscular organ, having a characteristic conical shape; it has a base, and an apex; an anterior and a posterior surface—when spoken of *in situ* (Plates 141 and 142); a right-heart and a left-heart surface (Plate 144)—when the organ is considered structurally. The adult heart has an average weight of about ten ounces, varying as to sex. Septa partition off four cavities within the walls of the heart: a longitudinal septum determines the, so-called, right and left hearts; a transverse septum is common to both sides of the organ. Of the transverse septum: its right portion—the *right auriculo-ventricular septum*—sets off a superior cavity, the *right auricle*, from an inferior cavity, the *right ventricle;* its left portion—the *left auriculo-ventricular septum*—separates a superior cavity, the *left auricle*, from an inferior cavity, the *left ventricle.* Of the longitudinal septum: its superior portion—*interauricular septum*—separates the right from the left auricle; its inferior portion—*interventricular septum*—partitions between the right and the left ventricle. A subpericardial areolar tissue, with more or less adipose tissue along the cardiac vessels (coronary), lies between the visceral portion of the pericardium and the muscle wall of the organ. The *base* of the heart presents eight vessels: six converging to it, the *vena cava superior*, the *vena cava inferior*, and the *four pulmonary veins;* two projected from it, the *pulmonary artery* and the *aorta.* The *apex* of the heart is formed by the inferior portion of the left ventricle.

Dissection.—Place the heart on a dissecting board, with the right-heart surface (right auricle and right ventricle) uppermost. Dissect off the visceral portion of the pericardium from the right-heart surface; clear the right auriculo-ventricular, and the right and left interventricular furrows free of adipose tissue, tracing and preserving the portions of, and the branches of, the coronary arteries. Follow the right coronary artery to its origin from the aorta and display its branches. Expose the anterior surface of the cardiac ends of the aorta, the pulmonary artery, the vena cava superior, and the vena cava inferior. (The last three vessels may be stuffed with oakum or cotton.)

2. Exterior of the Right Heart, Fig. 1, Plate 144.—This heart surface is contributed by the anterior and the right antero-lateral surfaces of the organ when *in situ* (Plate 141). It presents: the right auriculo-ventricular and the right and left interventricular furrows; the right auricle, with its converging cavæ—superior and inferior; the right ventricle and its projected common pulmonary artery; the right coronary artery and a branch of the left coronary artery.

3. Right Auriculo-ventricular and Right and Left Interventricular Furrows.—The right auriculo-ventricular furrow is between the right auricle and ventricle, lodging the trunk of the right coronary artery. The right and left interventricular furrows are at either side of the right ventricle, separating it from the left ventricle; they curve to, and meet at, the apex of the heart; they lodge, respectively, terminal branches of the right and left coronary arteries.

4. Right Auricle.—This portion of the heart is located superiorly to, and obliquely upon, the right half of the base of the right ventricle. It has two portions: a cavity, to the right, and an appendix, to the left. In its collapsed condition it has about one-fourth of the area of the right ventricle. Its shape is somewhat triangular: its base to the right; its apex (the appendix) to the left; its inferior border along the right auriculo-ventricular furrow; its superior face free.

5. Vena Cava Superior and Vena Cava Inferior.—The superior enters the superior wall of the right auricle; the inferior opens into the right auricle at its right wall or base.

6. Right Ventricle.—The area of this cavity of the heart, as undistended, is about four times that of the empty right auricle; it is bounded by the right auriculo-ventricular and the right and left interventricular furrows; its left superior angle is free; the right auricle surmounts, obliquely, the right half of its base. The left ventricle projects beyond its borders and its apex.

7. **Common Pulmonary Artery.**—This, the largest artery in the body, is projected from the left superior angle of the right ventricle.

8. **Right Coronary Artery.**—This artery (vena comes) arises from the anterior surface of the ascending portion of the arch of the aorta, close to the cardiac origin of the same. It is projected anteriorly, between the appendix of the right auricle, to the right, and the common pulmonary artery, to the left. Its course is to the right, in the right auriculo-ventricular furrow; it sends branches, inferiorly, upon the exterior surface of the right ventricle, from which, in turn, branches enter the wall of the ventricle. Small branches are given off from it, superiorly, which enter the wall of the right auricle. Its terminal branch is continued into the right interventricular furrow.

9. **Left Coronary Artery.**—The terminal branch of this artery (vena comes) is lodged in the left interventricular furrow. Its branches anastomose with branches of the right coronary artery.

DISSECTION.—Place the heart upon the dissecting board, with its left-heart surface (left auricle and left ventricle) uppermost. Dissect off the visceral portion of the pericardium from the auricular and ventricular areas; clear the left auriculo-ventricular furrow, displaying, and preserving, in so doing, the coronary vein. Follow the left coronary artery from its origin from the aorta, and trace its branches. Expose the posterior surfaces of the cardiac ends of the aorta and the common pulmonary artery.

10. **Exterior of the Left Heart,** Fig. 2, Plate 144.—This heart surface is formed by the posterior and the left postero-lateral surfaces of the organ, *in situ* (Plate 142). It presents: the left auriculo-ventricular furrow, lodging the coronary vein and the left coronary artery; the left auricle, with its four converging pulmonary veins; the left ventricle with its projecting aorta; the posterior surface of the ascending portion of the aorta, giving off the left coronary artery; the posterior surface of the common pulmonary artery; and that of the vena cava superior.

11. **Left Auriculo-ventricular Furrow.**—This furrow has a transverse course, between the left auricle and the left ventricle.

12. Coronary Vein.—This vein is formed by the confluence of the comites veins of the right and left coronary arteries and their branches. It is lodged in the left auriculo-ventricular furrow, wherein its course is to the right, to empty into the right auricle. It is accompanied by the right branch of the right coronary artery.

13. Left Auricle and Interauricular Furrow.—This portion, of the left-heart surface, is located at the right half of the base of the organ; it surmounts the left ventricle, and has the right auricle, the vena cava superior, and the ascending portion of the arch of the aorta, in a plane anteriorly to it. It consists of a cavity portion, to the right, which is somewhat quadrangular in shape; and an appendix portion, to the left. In its collapsed condition it is about one-fifth the size of the undistended left ventricle. A slight furrow, to the right of it—the *interauricular furrow*—separates its cavity portion from the right auricle; to the right of the furrow is the opening into the right auricle of the vena cava inferior.

14. Pulmonary Veins.—The four pulmonary veins—two from the right and two from the left lung—converge to the left auricle: the right veins open into the right superior angle of the cavity portion of the auricle; the left enter at its left superior angle.

15. Left Ventricle.—The area of this region of the heart, when undistended, is about five times that of the collapsed left auricle, and is located inferiorly to the latter. It is triangular in shape: its base is directed superiorly; being larger than the right ventricle, its lateral borders and its apex project beyond the limits of that ventricle. Its apex forms the apex proper of the organ. It is separated from the left auricle by the left auriculo-ventricular furrow; and from the right ventricle by the right and left interventricular furrows.

16. Ascending Portion of the Arch of the Aorta.—This portion of the arch of the aorta is projected, superiorly, from the base of the left ventricle. It is located in a mid-plane: the appendix of the left auricle, posteriorly; and the right pulmonary artery, anteriorly. From the posterior surface of its cardiac end, the left coronary artery takes its origin.

17. Left Coronary Artery.—This artery (vena comes) arises from the posterior surface of the ascending portion of the arch of the aorta, close to the origin of the latter from the heart. It bifurcates into a right and a left branch: the right branch passes anteriorly to the appendix of the left auricle, into the left auriculo-ventricular furrow and supplies the left auricle and ventricle; the left branch terminates by lodgement in the right interventricular furrow (page 258; Fig. 1, Plate 144); other branches ramify upon the surface of the left ventricle, which it supplies. Branches of the left anastomose with those of the right coronary artery.

Dissection.—Open the cavity of the right auricle by the section lines shown upon its exterior (Fig. 1, Plate 144). Raise the flap of the auricular wall by loops of thread, to expose the interior of the cavity.

18. Interior of the Right Auricle, Fig. 1, Plate 145.—The interior of this cavity presents: a lining of serous membrane —*endocardium;* sub-endocardial muscle fibres, which form ridges upon the collapsed anterior wall of the cavity portion and of the appendix—*musculi pectinati;* the openings into the cavity—for the incoming of blood—of the *vena cava superior*, the *vena cava inferior*, the *coronary vein*, and the *venæ Thebesii* (the latter are the orifices of veins in the wall of the auricle); the right side of the *interauricular septum*, with the *fossa ovalis* (a membrane within a thickened *annulus* or border) of adult life (the *foramen ovale*—the interauricular communication, of fœtal life); the ridge of reduplicated endocardium, *Eustachian valve*, extends from the margin of the orifice of the vena cava inferior to the border of the fossa ovalis (by this, during fœtal life, the blood entering this cavity, by the vena cava inferior, is guided to the foramen ovale to pass into the left auricle); the reduplicated endocardium at the opening of the coronary vein—the *coronary valve;* the *right auriculo-ventricular orifice*—for the outgoing of blood—opening into the right ventricle.

Dissection.—Open the cavity of the right ventricle by the section lines upon its exterior (Fig. 1, Plate 144). Enter the cavity toward the apex of the organ, then, with the scissors, make the diverging cuts: the right, as far as the musculi papillares which afford attachments to the chordæ tendinæ of the cusps of the tricuspid valve; the left, out through the wall of the common pulmonary artery. Raise the flap of the ventricular wall by loops of thread.

19. Interior of the Right Ventricle, Fig. 2, Plate 145.—This cavity is lined by serous membrane—*endocardium;* it presents the right side of the *interventricular septum.* Its interior is irregular from sub-endocardial ridges of muscle tissue—*columnæ carneæ;* some of these masses of muscle tissue have free ends—*musculi papillares.* The openings into the cavity are: the *right auriculo-ventricular orifice*—for the incoming of blood; the *orifice of the common pulmonary artery*—for the outgoing of blood.

20. Tricuspid Valve.—This valve is formed by three *cusps*—flaps of fibrous tissue covered by reduplicated endocardium—from the ventricular face of the border of the right auriculo-ventricular orifice. These cusps—*right, left,* and *posterior*—hang free in the cavity of the right ventricle; from their edges fibrous cords—*chordæ tendinæ*—are projected for attachment to the *musculi papillares.*

21. Common Pulmonary Artery.—This vessel receives the blood from the right ventricle. The ventricular orifice is furnished with, the three *pulmonary semilunar valves:* they are a right anterior, a left anterior, and a posterior; they are constructed of fibrous tissue covered by reduplicated endocardium, and are attached to the circumference of the orifice. The centres of the edges of the ventricular face of the valves present small fibro-cartilaginous prominences—*corpora Arantii.* Where the valves open against the artery, the wall of the latter forms outward pouchings, the *sinuses of Valsalva,* which are located as are the semilunar valves, viz., a right anterior, a left anterior, and a posterior.

DISSECTION.—Lay open (with the scissors) the cavity of the left auricle by the section lines upon its exterior (Fig. 2, Plate 144). Hold off, by loops of thread, the flaps of the auricular wall, to expose the cavity for inspection.

22. Interior of the Left Auricle, Fig. 1, Plate 146.—The sectioned wall is thicker than that of the right auricle. The cavity has a lining of thick serous membrane—*endocardium.* It has *musculi pectinati* ridges, which are limited to the appendix portion. The four openings—for the ingress of blood—of the *pulmonary veins,* two right and two left, appear at the superior angles, respectively, of the cavity. The left side of the *interauricular septum* presents the left side of the *fossa ovalis*. At the floor of the cavity is the *left auriculo-ventricular orifice*—for egress of blood—into the cavity of the left ventricle.

DISSECTION.—Close over the flaps of the left auricle. Cut into the cavity of the left ventricle, along the section lines upon its exterior (Fig. 1, Plate 144). Enter the cavity at the apex, then continue the diverging cuts toward the base of the organ: the right one as far as the bases of the papillæ, which receive the chordæ tendinæ of the anterior cusp of the mitral valve; the left one is continued out through the wall of the aorta (in making this cut turn aside the appendix of the left auricle). Hold off the flap of the ventricular wall by loops of thread.

23. Interior of the Cavity of the Left Ventricle, Fig. 2, Plate 146.—The wall of this cavity is very much thicker than that of the right ventricle. Its interior presents: a lining of *endocardium* (thicker than that of the right ventricle); the left side of the *interventricular septum;* well-marked *columnæ carneæ*, more numerous and more prominent than those of the right ventricle (page 262); *musculi papillares* which are much larger than those of the right ventricle; the *left auriculo-ventricular orifice*—for entrance of blood from the left auricle; the *aortic orifice*—for exit of blood into the aorta.

24. Mitral (Bicuspid) Valve.—This valve has an *anterior* (right) *cusp* and a *posterior* (left) *cusp*, which are attached to the ventricular face of the border of the left auriculo-ventricular orifice. These cusps—reduplications of the endocardium—hang in the cavity of the ventricle; from their free edges *chordæ tendinæ* are projected, which are attached to the *musculi papillares* at the interior of the cavity.

25. Aortic Orifice.—This orifice is furnished with three valves, *aortic semilunar*, which are, respectively, anterior, right posterior, and left posterior. They are constructed of fibrous tissue plates covered by reduplicated endocardium, and are attached to the circumference of the orifice. Their *corpora Arantii* and *sinuses of Valsalva* are the counterparts of those of the pulmonary semilunar valves (page 262). The sinuses of Valsalva have the same relative positions as the aortic valve, viz., anterior, right posterior, and left posterior. At the anterior and the left posterior sinuses of Valsalva the orifices of the *right* or *anterior* and *left* or *posterior coronary arteries* present, respectively.

PLATE 141

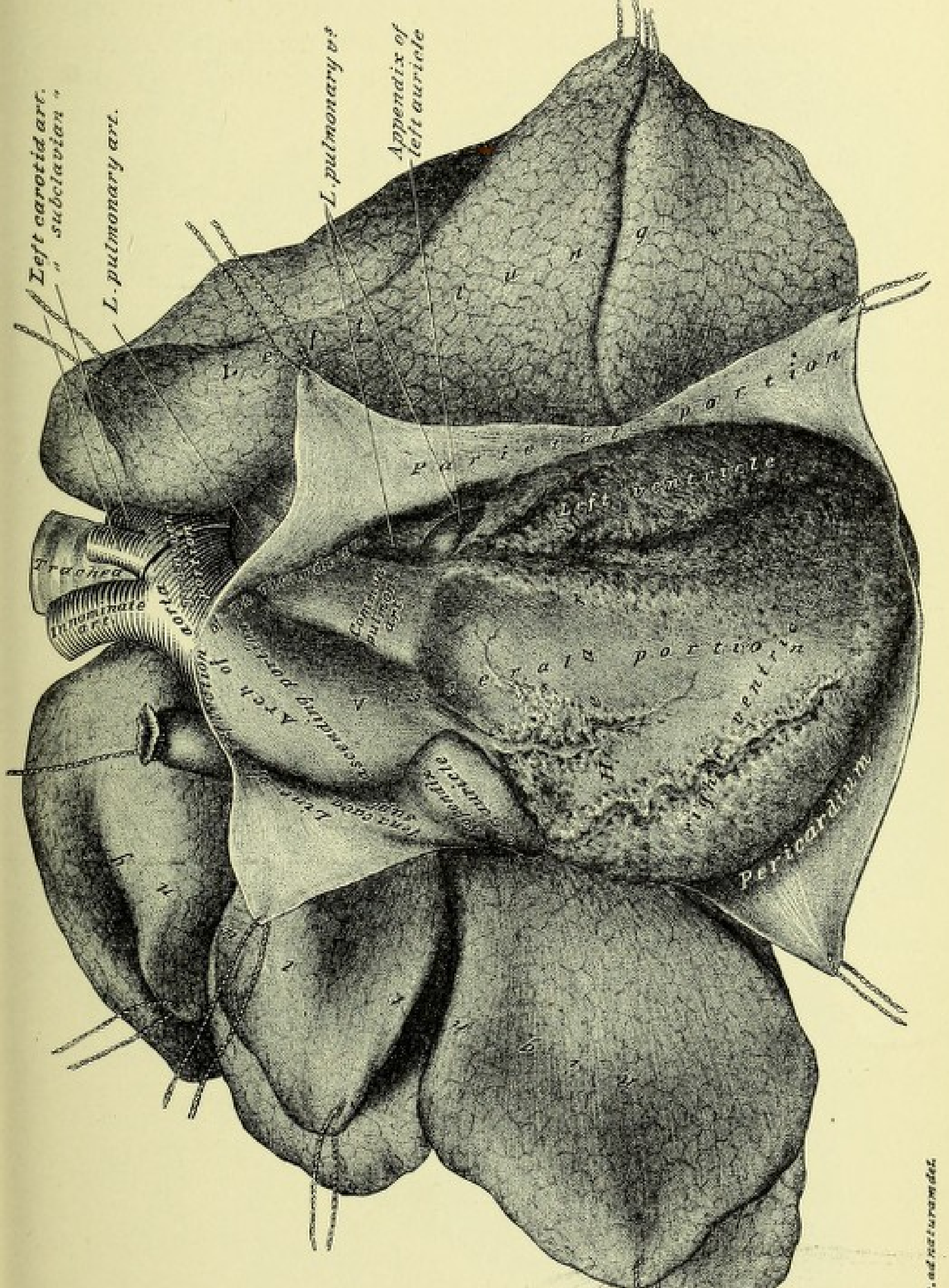

Left carotid art.
" subclavian "
L. pulmonary art.
L. pulmonary vt
Appendix of
left auricle
Left lung
Parietal portion
Left ventricle
Trachea
Innominate
Aorta
Arch of aorta
Ascending portion of aorta
Visceral portion
Right ventricle
Pericardium
Right lung
M. Cohn, ad naturam del.

PLATE 142

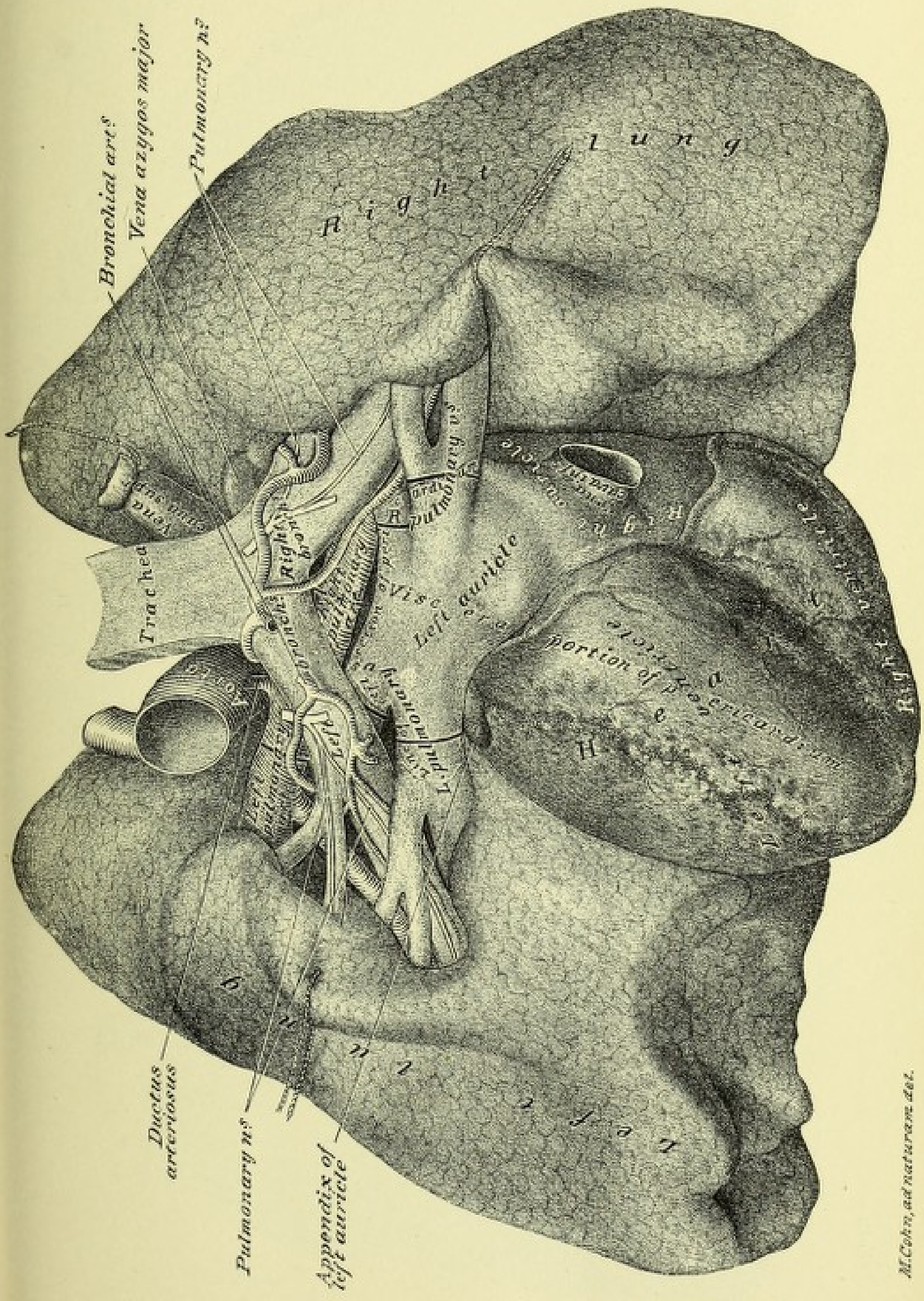

Bronchial art.s
Vena azygos major
Pulmonary n.s
Right lung
Trachea
Left auricle
Right ventricle
Ductus arteriosus
Pulmonary n.s
Appendix of left auricle
Left lung
M. Cohn, ad naturam del.

FIG. 2

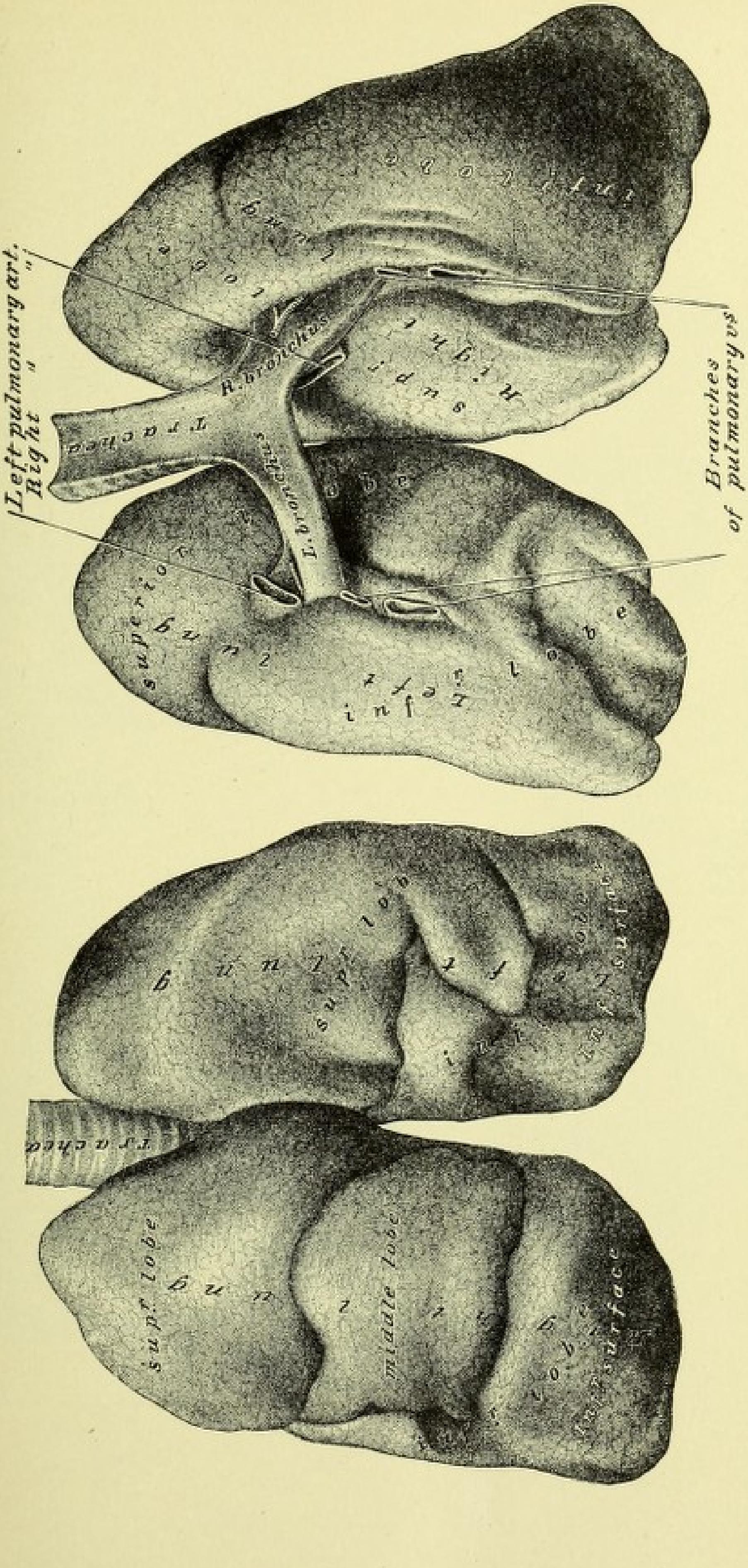


FIG. 1

M. Cohn, ad naturam del.

FIG. 1

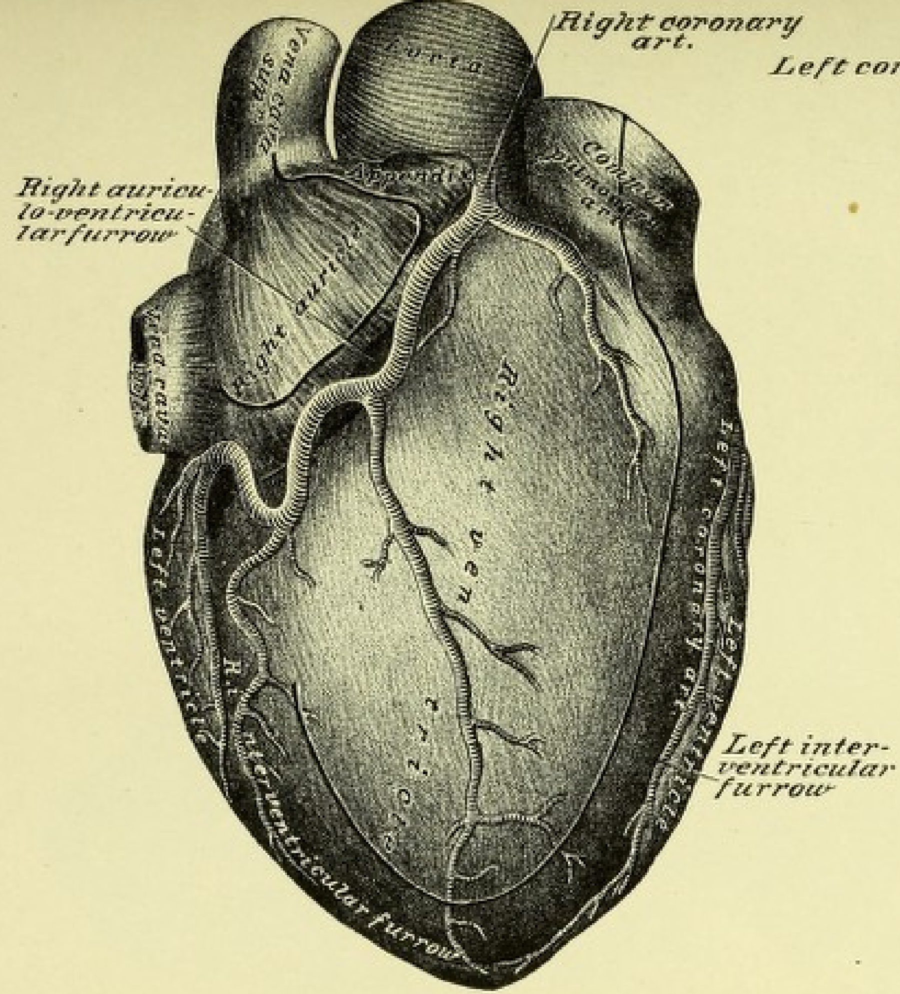
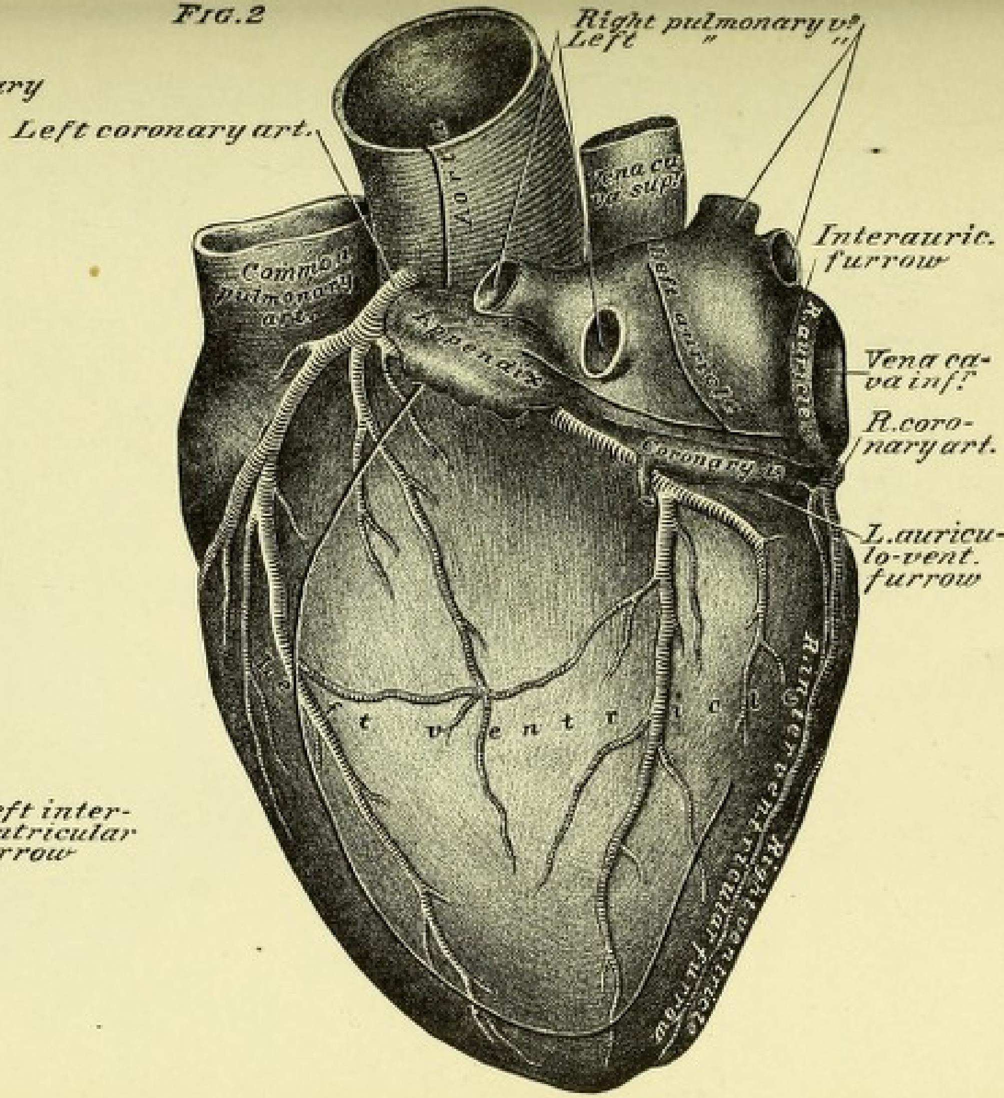


FIG. 2



M. Cohn, ad naturam del.

FIG. 1

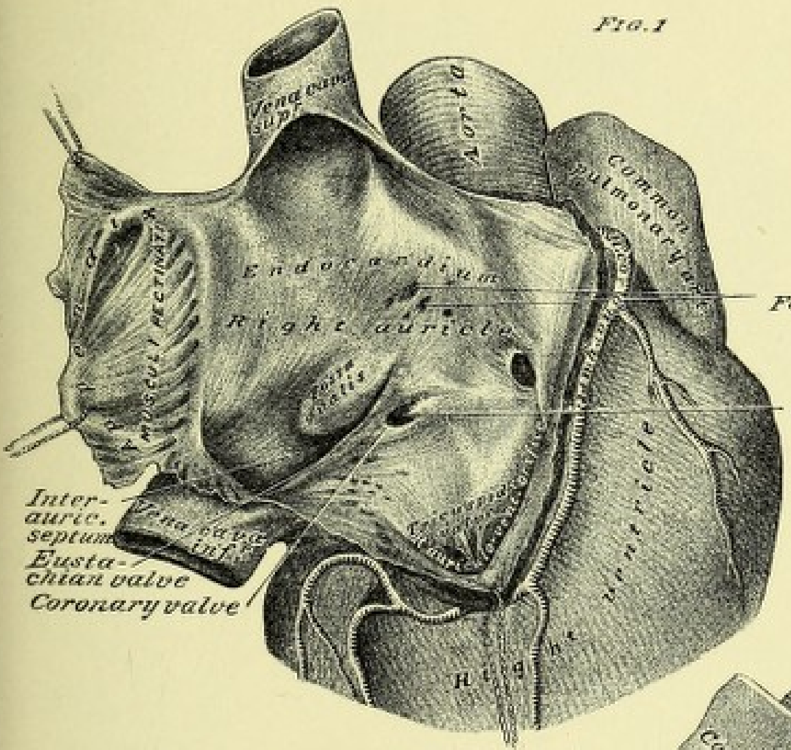
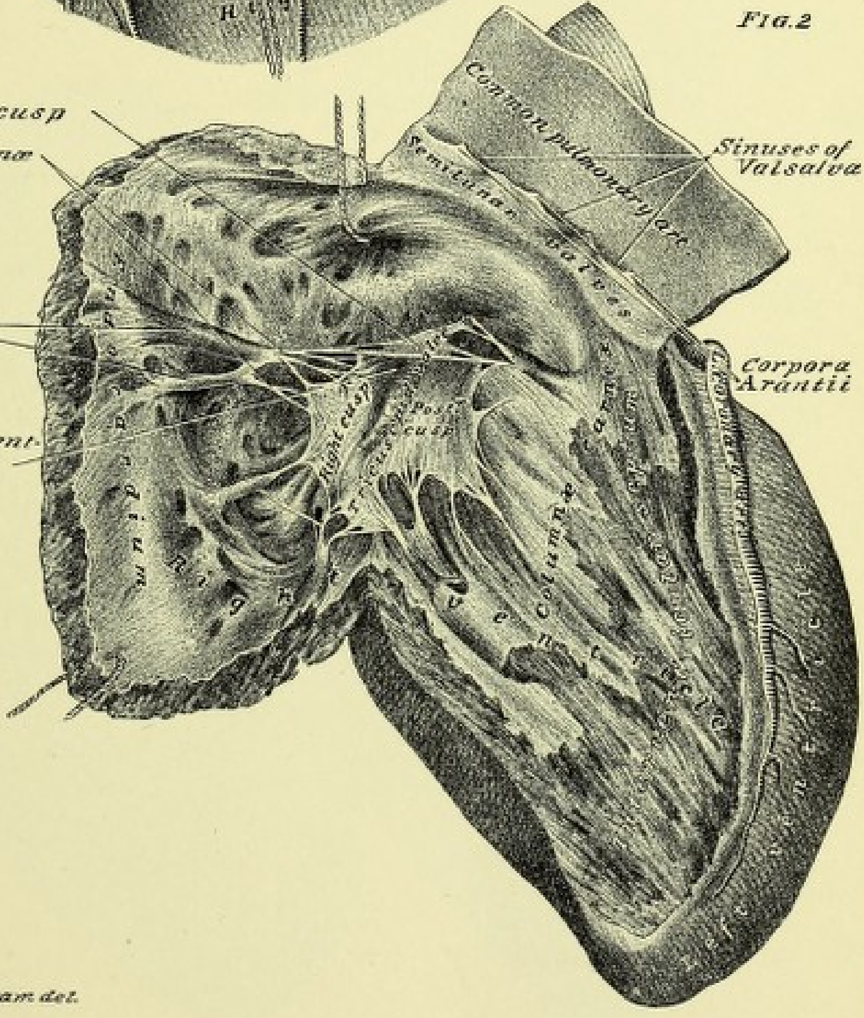


FIG. 2



M. Cohn, ad naturam del.

FIG. 1

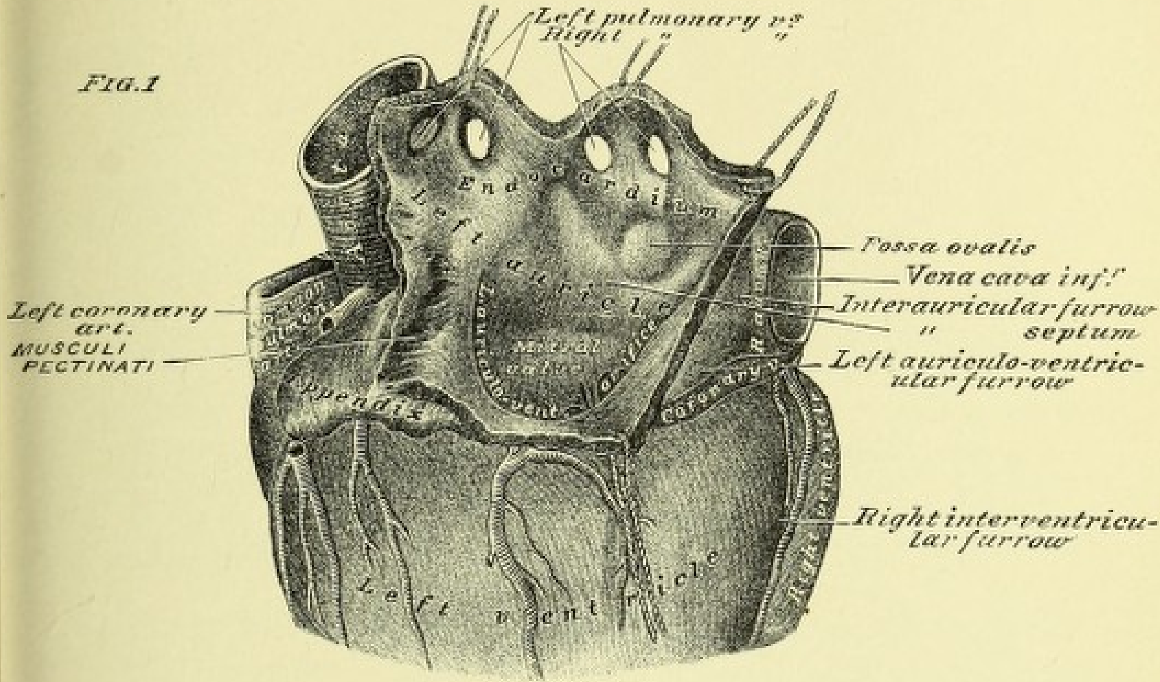
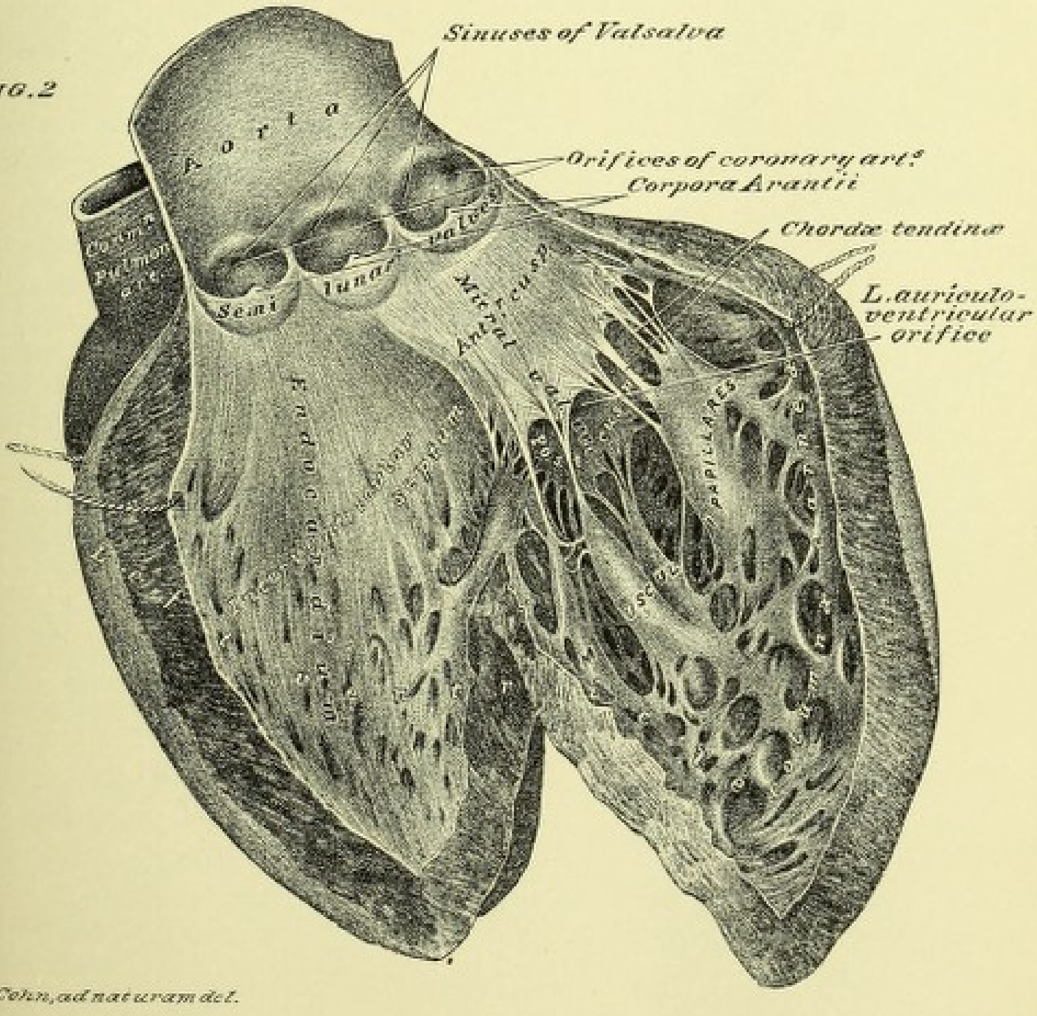


FIG. 2



M. Cohn, ad naturam del.

NINETEENTH DISSECTION.

REGION OF THE BACK; SPINAL CORD IN SITU; VERTEBRAL COLUMN AND ITS LIGAMENTS.

DISSECTION.—Place the subject with the back uppermost; with a block under the thorax, and one under the pelvis. The head should hang to the table; while the upper extremities hang over the sides of the table. (The dissectors of the two upper-extremity and the head-and-neck sections should work together upon the first part of this dissection.)

Terms of Relation.—The general terms (page 2), and the special terms *exterior* and *interior* (toward the skin and the cavities of the trunk, respectively) will be used, in describing this dissection. The regions of the back are the sacral, the lumbar, the dorsal, and the cervical.

Bones and Bone Areas, Plate 147.—The bones are the posterior surfaces of the following: the twenty-four vertebræ, sacrum, and coccyx; the occipital; the twelve pairs of ribs; the scapulæ; the clavicles; and the ossa innominata. They all present areas for the attachments of muscles.

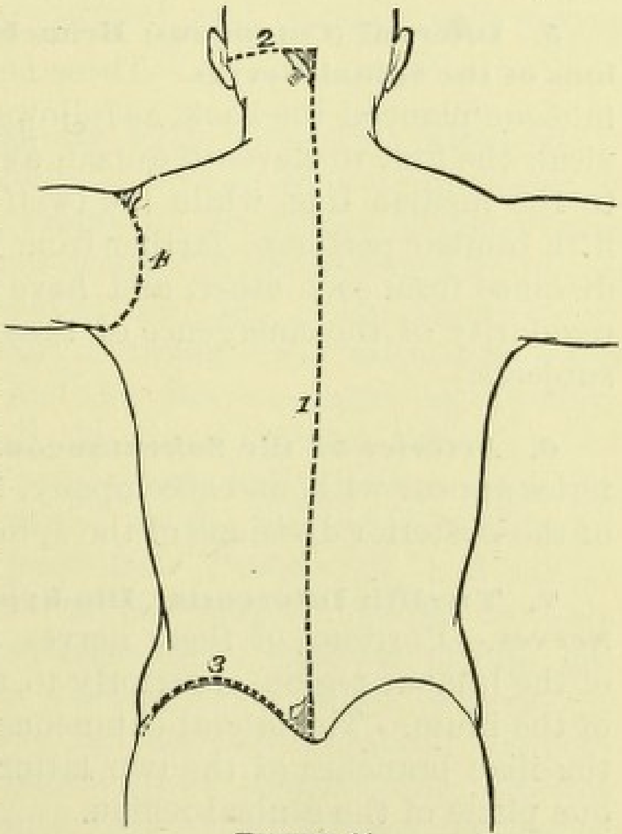


FIGURE 11.

REGION OF THE BACK.

DISSECTION.—Make the skin incisions 1, 2, 3, and 4, of Figure 11; reflect skin flaps, on either side of the median line, as indicated. Trace the nerves and the arteries ramifying in the subcutaneous tissue plane (Plate 148); then clear the fascial plane free of subcutaneous tissue, leaving the arteries and nerves *in situ*.

1. Occipital Artery, Plate 148.—This artery (venæ comites) emerges from the superior portion of the muscles of the neck, and passes to the subcutaneous plane of the occipital region of the scalp.

2. Occipitalis Major Nerve.—This, the internal (cutaneous) branch of the posterior division of the second cervical spinal nerve, appears at the external border of the occipital portion of the trapezius muscle, and ramifies superiorly in the subcutaneous plane of the scalp.

3. Internal (Cutaneous) Branch of the Posterior Division of the Third Cervical Spinal Nerve.—This nerve emerges inferiorly to the last-described nerve, and has the same course.

4. Occipitalis Minor Nerve.—This nerve, a branch from the cervical plexus, runs superiorly, along the posterior border of the sterno-cleido-mastoid muscle ; it enters the subcutaneous plane of the scalp.

5. Internal (Cutaneous) Branches of the Posterior Divisions of the Spinal Nerves.—These nerves emerge to the subcutaneous plane of the back, as follows : the fourth and fifth cervical, the first to eleventh dorsal, and the sacral appear close to the median line, while the twelfth dorsal and the first to fifth lumbar perforate farther from it. They are at a variable distance from each other, and have a course externally. (The regularity of the emergence of these nerves varies in different subjects.)

6. Arteries of the Subcutaneous Plane.—These small arteries appear with, and accompany, the last-described branches of the posterior divisions of the spinal nerves.

7. Twelfth Intercostal, Ilio-hypogastric, and Ilio-inguinal Nerves.—Portions of these nerves appear at the inferior area of the lumbar region, superiorly to, and parallel with, the crest of the ilium. The lateral cutaneous branch of the former and the iliac branches of the two latter pass into the subcutaneous plane of the gluteal region.

8. Superficial Fascia.—A continuous layer of fascia invests the first muscle plane of the back ; the same is continued to the external surfaces of the neck, thorax, and abdomen.

DISSECTION.—Dissect away the fascia from the first plane of muscles of the back; cut the nerves and arteries of the subcutaneous plane, preserving the stumps of the same.

9. Trapezius Muscle, Plates 147 and 149.—This muscle is attached: internally, to the spinous processes of the twelve dorsal and the seventh cervical vertebræ, to the ligamentum nuchæ, and to the internal portion of the superior curved line of the occipital bone; externally, to the postero-superior portion of the surface of the spine of, and the border of the acromion process of, the scapula, and to the postero-superior border of the external third of the clavicle. The fibres of the muscle have a variable direction: the inferior pass superiorly and externally; the middle are directed externally; the superior run inferiorly, externally, and anteriorly. Along its vertebral border it presents an aponeurotic portion of variable breadth—broadest at the inferior cervical and superior dorsal regions. It is perforated, near its median-line attachments, by small arteries and the internal (cutaneous) branches of the posterior divisions of the cervical and dorsal spinal nerves (page 266).

10. Latissimus Dorsi Muscle, Plate 149.—This muscle is attached: internally and inferiorly, to the spinous processes of the six inferior dorsal vertebræ, to the fascia of the erector spinæ muscle, to the internal quarter of the exterior lip of the crest of the ilium (os innominatum), and to the exterior surfaces of the three inferior ribs (between the attachments of the serratus posticus inferior and the obliquus externus muscles, where it interdigitates with the three inferior digitations of the obliquus externus muscle); externally and superiorly, by a narrow tendinous portion, to the bed of the bicipital groove of the humerus (page 196; Plates 113, and 116 to 120, inclusive). The fibres of the muscle have a variable direction: the inferior pass superiorly, externally, and anteriorly; the superior are directed externally, superiorly, and anteriorly. The muscle is thus swathed about the postero-lateral areas of the abdomen and thorax. Its superior portion, lying in a plane anteriorly to the inferior portion of the trapezius, is projected, externally, from the latter muscle, and overlaps the inferior angle of the scapula. Along its line of attachment to the fascia upon the erector spinæ muscle, it is perforated by small arteries and the internal (cutaneous) branches of the posterior divisions of the twelfth dorsal and the first to fifth lumbar spinal nerves (page 266).

11. Scapular Fascia.—In the angle between the superior border of the latissimus dorsi muscle and the external border of the trapezius muscle, a deep fascia appears investing the surfaces of the posterior scapular and the rhomboideus major muscles.

DISSECTION.—Section the trapezius muscle along its median-line attachments, as in Plate 149, and turn it off externally, so as to hang from its scapular and clavicular attachments; cut out the arteries and nerves that perforate it. Section the latissimus dorsi muscle, as in Plate 149, and reflect it from the posterior and lateral areas of the abdomen and thorax; in so doing, it must be cut from its rib attachments. Cut out the arteries and nerves, that perforate the internal portion of the latissimus dorsi muscle, leaving the stumps of the same. Dissect out the artery and nerve, that enter the anterior face of the reflected trapezius muscle. Clear the posterior surfaces of the rhomboideus major, the rhomboideus minor, and the levator anguli scapulæ muscles. Display the arteries, that emerge, posteriorly, from between these three muscles.

12. Superficial Cervical Artery and Spinal Accessory Nerve.—This artery and nerve enter the anterior face of the trapezius muscle.

13. Rhomboideus Major Muscle.—This muscle, of the second plane of muscles of the back, is attached: internally, to the spinous processes of the four superior dorsal vertebræ, and the supraspinous ligaments that bridge between the same; externally, to the posterior lip of the internal border of the infraspinous portion of the scapula. Its internal portion is aponeurotic, and perforated by the internal (cutaneous) branches of the posterior divisions of several dorsal-spinal nerves.

14. Rhomboideus Minor Muscle.—This muscle lies in the same plane with, superiorly to and parallel with, the last-described muscle. It is attached: internally, to the spinous process of the seventh cervical vertebra, and the supraspinous ligament between the latter and the spinous process of the first dorsal vertebra; externally, to the posterior lip of the posterior border of the body of the scapula, opposite the spine of that bone.

15. Levator Anguli Scapulæ Muscle.—This muscle occupies the same plane as the two last-described muscles ; it has a more oblique course, inferiorly. It is attached : internally and superiorly, to the posterior tubercles of the transverse processes of the three or four superior cervical vertebræ ; externally and inferiorly, to the posterior lip of the internal border of the supraspinous portion of the scapula.

16. Posterior Scapular Artery.—This artery appears, posteriorly, in the space between the levator anguli scapulæ and the rhomboideus minor muscles. It is continued internally to, and parallel with, the internal border of the scapula. It has an inferior course anteriorly to the scapular ends of the rhomboideus minor and major muscles. It distributes branches to the rhomboidei, and the serratus magnus muscles.

DISSECTION.—Clear the surfaces of the serratus posticus inferior muscle, and of the postero-internal portions of the obliquus externus and the obliquus internus muscles.

17. Serratus Posticus Inferior Muscle, Plates 149 and 151.—This, one of the second-plane muscles of the back, is located upon the exterior of the inferior portion of the thoracic parietes. It is attached : internally, to the spinous processes and supraspinous ligaments of the two inferior dorsal and the two or three superior lumbar vertebræ, and to the fascia of the erector spinæ muscle at its inferior dorsal and superior lumbar portions ; externally, to the exterior surface of the four inferior ribs.

18. Obliquus Externus and Obliquus Internus Muscles, Plate 149.—The postero-internal portions of these muscles appear, in their respective exterior and interior relations, between the inferior ribs and the crest of the ilium (os innominatum). They contribute to the posterior parietes of the abdomen.

DISSECTION.—Cut the rhomboideus major, the rhomboideus minor, also the levator anguli scapulæ muscles from their vertebral attachments. Reflect the three muscles, externally, upon the scapula. Clear the surface of the serratus posticus superior muscle.

19. Serratus Posticus Superior Muscle, Plate 149 ; Fig. 1, Plate 150 and Plate 151.—This muscle, of the third plane, is attached : internally, to the spinous processes of the seventh cervical and the first, second, and third dorsal vertebræ, and the supraspinous ligaments bridging between the same; externally, by four serrations, to the exterior surfaces of the ribs, second to fifth, inclusive. The internal portion of the muscle is aponeurotic; the aponeurosis being perforated by the internal branches of the posterior divisions of the three superior dorsal spinal nerves. It binds down the splenius capitis and splenius colli muscles.

Dissection.—Dissect away the serratus posticus superior muscle. Clear the surfaces of the splenius capitis and splenius colli muscles.

20. Splenius Capitis Muscle, Plate 149; Fig. 1, Plate 150.—This muscle, of the third plane, is attached: internally and inferiorly, to the spinous processes of several superior dorsal and the seventh cervical vertebræ, and to the inferior portion of the ligamentum nuchæ; externally and superiorly, to the external portion of the superior curved line of the occipital bone, and to the mastoid process of the temporal bone.

21. Splenius Colli Muscle.—This muscle, of the third plane, is attached as follows: internally and inferiorly, to the spinous processes of several superior dorsal vertebræ, inferiorly to those affording attachment to the splenius capitis; externally and superiorly, to the posterior tubercles of the transverse processes of several superior cervical vertebræ. The fibres of this and the last-described muscle strap down or retain in place the cervical supplementary portions of the erector spinæ muscle.

Dissection.—Dissect away the splenius capitis, the splenius colli, and the serratus posticus inferior muscles from their attachments. Expose and then clear away the fascia upon the erector spinæ muscle from the sacral region to the cranium.

22. Fascia upon the Erector Spinæ Muscle, Plate 149.—This is a layer of fascia investing the surface of the erector spinæ muscle, its divisions and supplementary muscles, from the sacrum to the cranium, through the lumbar, dorsal, and cervical regions. In the *sacral region* it is attached: to the spines of the sacrum, internally; to the posterior spinous processes (inferior and superior) of the ilium (os innominatum), externally. In the *lumbar region* it is attached: to the spinous processes and supraspinous ligaments of the vertebræ, internally; to the exterior surface of the posterior aponeurosis of the transversalis abdominis muscle, externally ; it is strengthened by the fusion of the aponeuroses of the latissimus dorsi and the serratus posticus inferior muscles. (This portion is sometimes described as the posterior layer of the lumbar fascia.) In the *dorsal region* it is attached : internally, to the spinous processes and supraspinous ligaments of the dorsal vertebræ ; externally, to the exterior of the ribs, externally to their angles. (This portion is usually described as the vertebral aponeurosis.) In the *cervical region* it presents as a thin layer of fascia between the splenius capitis and the splenius colli muscles posteriorly, and the complexus muscle, anteriorly ; internally, it is attached to the ligamentum nuchæ ; externally, at the external border of the splenius colli muscle, it blends with the deep cervical fascia.

DISSECTION.—Remove the fascia of the erector spinæ muscle, exposing the latter muscle, with its divisions and supplementary muscles—through the lumbar, dorsal, and cervical regions. Trace to their superior attachments the sacro-lumbalis and longissimus dorsi divisions of the erector spinæ muscle.

23. Erector Spinæ Muscle and its Sacro-Lumbalis and Longissimus Dorsi Divisions, Plates 147 and 151.—This muscle with its divisions and their supplementary muscles are of the fourth muscle plane of the back. The *erector spinæ* muscle occupies the sacral and lumbar regions and is attached as follows: to the spines and the external portion of the posterior surface of the inferior half of the sacrum ; to the postero-internal portion of the middle of the crest of the ilium (os innominatum) ; and to the spinous processes of the five lumbar and the twelfth dorsal vertebræ. In the lumbar région it divides into the sacro-lumbalis and the longissimus dorsi divisions.

The *Sacro-lumbalis division* is projected, superiorly and externally, by six tendons which are attached to the exterior of the six inferior ribs (at their angles), respectively.

The *Longissimus dorsi division* is continued superiorly, parallel with the vertebral column, having two lines of attachments: an external, to the exterior surfaces of the inferior ten ribs (between their angles and tubercles) ; an internal, to the transverse processes of the dorsal vertebræ.

DISSECTION.—Reflect the superior portion of the sacro-lumbalis division externally ; expose the musculus accessorius from its inferior to its superior attachments ; then reflect the latter externally, and display the cervicalis ascendens from its inferior to its superior attachments.

24. Musculus Accessorius.—This muscle is the first supplementary muscle of the sacro-lumbalis division of the erector spinæ muscle. It lies upon the exterior of the ribs and the external intercostal muscles, having the following attachments: inferiorly, to the six inferior ribs (their angles), internally to the attachments of the sacro-lumbalis; superiorly, to the six superior ribs (their angles).

25. Cervicalis Ascendens Muscle.—This is the second supplementary muscle of the sacro-lumbalis division of the erector spinæ muscle. It is attached: inferiorly, to the six superior ribs (their angles), internally to the superior attachments of the musculus accessorius; superiorly, to the posterior tubercles of the transverse processes of several inferior cervical vertebræ.

Dissection.—Cut away the musculus accessorius and the cervicalis ascendens muscles, from their inferior and superior attachments. Display the transversalis cervicis, trachelo-mastoid, complexus, and spinalis dorsi muscles.

26. Transversalis Cervicis Muscle.—This muscle is the primary, lateral, supplementary muscle of the longissimus dorsi division of the erector spinæ muscle. It is attached: inferiorly, to the transverse processes of several superior dorsal vertebræ; superiorly, to the posterior tubercles of the transverse processes of the middle cervical vertebræ.

27. Trachelo-Mastoid Muscle.—This muscle is the secondary, lateral, supplementary muscle of the longissimus dorsi division of the erector spinæ muscle. It is attached: inferiorly, to the transverse processes of several superior dorsal vertebræ and to the articular processes of some of the inferior cervical vertebræ; superiorly, to the posterior surface of the mastoid process of the temporal bone.

28. Complexus Muscle, Plates 147, 149, 150, and 151.—This is the longitudinal supplementary muscle of the longissimus dorsi division of the erector spinæ muscle. It is attached: inferiorly, to the transverse processes of the superior dorsal vertebræ, and the articular processes of some of the inferior cervical vertebræ; superiorly, to the exterior of the occipital bone, between its superior and inferior curved lines. Its internal portion is intersected by a fibrous portion (sometimes described as a separate muscle, under the name of the *biventer cervicis*).

29. Spinalis Dorsi Muscle, Plate 151.—This muscle, of the fourth plane, is attached: inferiorly, to the spinous processes of a few inferior dorsal vertebræ; superiorly, to the spinous processes of several superior dorsal vertebræ.

DISSECTION.—Cut away the complexus, the trachelo-mastoid, and the transversalis cervicis muscles from their attachments. Cut (page 271), progressing inferiorly, the longissimus dorsi division of the erector spinæ muscle, from its dorsal vertebræ and rib attachments; also the sacro-lumbalis division from its rib attachments. Cut away the erector spinæ muscle proper from the lumbar vertebræ and from the ilium (os innominatum), as in Plate 152. In dissecting away these muscles be careful to leave, *in situ*, the posterior divisions of the spinal nerves and their accompanying arteries. Dissect away the spinalis dorsi muscle and clear the surfaces of the semispinalis dorsi and the semispinalis colli muscles.

30. Semispinalis Dorsi and Semispinalis Colli Muscles, Plate 152, Fig. 2, Plate 150.—These muscles form the fifth muscle plane of the back. The *semispinalis dorsi* is attached: inferiorly, to the spinous processes of some of the superior lumbar and inferior dorsal vertebræ, also to the transverse processes of the inferior dorsal vertebræ; superiorly, to the spinous processes of the superior dorsal and several inferior cervical vertebræ. The *semispinalis colli* is attached: inferiorly, to the transverse processes of the superior dorsal vertebræ; superiorly, to the spinous processes of the middle cervical vertebræ.

DISSECTION.—Dissect away the semispinalis dorsi and the semispinalis colli muscles. Clear the surfaces of the following muscles of the sixth plane of the back: the multifidus spinæ in the sacral, lumbar, dorsal, and cervical regions; the intertransversales and interspinales; the posterior aponeurosis of the transversalis abdominis; and the levatores costarum. Trace the posterior divisions of the lumbar and dorsal spinal nerves to the intervertebral foramina; find also the small arteries accompanying the nerves.

31. Multifidus Spinæ Muscles, Plate 152.—These muscles, of the sixth plane of muscles, occupy the longitudinal groove between the lines of the spines and lateral tubercles of the sacrum, the spinous and articular processes of the lumbar and cervical vertebræ, the spinous and transverse processes of the dorsal vertebræ; the floor of the groove is formed by the posterior surface of the sacrum, the laminæ of the vertebræ, and the ligamenta subflava between the laminæ. The muscles consist of oblique fibres which are attached: inferiorly, in their groove of lodgment through the sacral region, to the mamillary processes in the lumbar region, to the transverse processes in the dorsal region, and to the articular processes in the cervical region; superiorly, to the lateral surfaces of the spinous processes of the lumbar, dorsal, and cervical (as high as the second) vertebræ. These fibres are laid down in layers of varying length (crossing from one to four vertebral laminæ); the long fibres are posterior to the short ones.

32. Intertransversales Muscles.—These muscles extend between the transverse processes of the vertebræ. In the lumbar region they are best developed. In the dorsal region they are wanting, but are replaced by the *intertransverse ligaments.*

33. Interspinales Muscles.—These are short longitudinal muscles, which bridge between the spinous processes of the vertebræ. They are developed in the lumbar and cervical regions, and are absent in the dorsal region.

34. Posterior Aponeurosis of the Transversalis Abdominis Muscle, Plates 151 and 152.—This aponeurosis passes to the transverse processes of the lumbar vertebræ, between the erector spinæ muscle, posteriorly, and the quadratus lumborum muscle, anteriorly. (This is usually described as the middle layer of the lumbar fascia.)

35. Levatores Costarum Muscles, Plate 152.—These twelve pairs of muscles are located at either side of the dorsal region of the vertebral column. The muscles, of a side, are attached: superiorly, to the transverse processes of the vertebræ, seventh cervical to eleventh dorsal, inclusive; inferiorly, to the superior borders of the ribs (first to twelfth), internally to their angles.

36. Posterior Divisions of the Lumbar and Dorsal Spinal Nerves.—These nerves are projected, posteriorly, from the bifurcations of the spinal nerves. In the lumbar region they are lodged posteriorly to the intertransversales muscles. In the dorsal region they emerge anteriorly to the dorsal intertransverse ligaments, and run internally to, and parallel with, the levatores costarum muscles. They bifurcate, respectively, into an internal (cutaneous) and an external (muscular) branch.

37. Arteries Accompanying the Posterior Divisions of the Lumbar and Dorsal Spinal Nerves.—These arteries are: in the lumbar region, posterior branches of the lumbar arteries; in the dorsal region, posterior branches of the intercostal arteries.

Dissection.—Clear the posterior surfaces of the cranio-vertebral muscles of the *sixth plane of muscles*, which pass from the second and first cervical vertebræ to the occipital bone. In exposing these muscles be careful to preserve the nerves and arteries, which are contiguous to them.

38. Rectus Capitis Posticus Minor, Plate 147 and Fig. 2, Plate 150.—This internal, and longitudinal, muscle is attached: inferiorly, to the superior surface of the posterior arch of the first cervical vertebra; superiorly, to the internal portion of the inferior curved line of the occipital bone.

39. Rectus Capitis Posticus Major Muscle.—This external, and oblique, muscle is attached: inferiorly, to the lateral surface of the spinous process of the second cervical vertebra; superiorly, to the inferior curved line of the occipital bone, externally to the attachment of the last-described muscle.

40. Obliquus Inferior Muscle.—This oblique muscle lies inferiorly to, and parallel with, the last-described muscle. It is attached: internally, to the lateral surface of the spinous process of the second cervical vertebra; externally, to the postero-inferior surface of the transverse process of the first cervical vertebra.

41. Obliquus Superior Muscle.—This muscle is attached: inferiorly and externally, to the superior surface of the transverse process of the first cervical vertebra; superiorly and internally, to the occipital bone, between its superior and inferior curved lines, externally to the attachment of the complexus muscle.

Dissection.—Trace the deep cervical and the cervicalis princeps arteries; also, the posterior branches of the vertebral artery. Display the posterior divisions of the cervical spinal nerves.

42. Deep Cervical Artery, Fig. 2, Plate 150.—This artery, branch of the first intercostal branch of the subclavian, appears, posteriorly, from between the transverse processes of the sixth and seventh cervical vertebræ. It has a superior course, supplying contiguous muscles.

43. Cervicalis Princeps Artery.—This artery, branch of the occipital, is given off opposite the obliquus superior muscle. It passes inferiorly, upon the posterior surface of the obliquus inferior muscle. It distributes to contiguous muscles and anastomoses with the last-described artery.

44. Posterior Branches of the Vertebral Artery.—These branches appear, posteriorly, from between the transverse processes of the cervical vertebræ ; they distribute to contiguous muscles and anastomose with the two last-described arteries.

45. Posterior Divisions of the Cervical Spinal Nerves.—These nerves are eight in number ; the posterior divisions of the second, third, fourth, and fifth bifurcate into external (muscular) and internal (cutaneous) branches.

The *first* or *suboccipital nerve* appears, posteriorly, between the obliquus inferior and the rectus capitis posticus major muscles, supplying them and also the obliquus superior and the rectus capitis posticus minor muscles.

The *second* appears inferiorly to the obliquus inferior muscle, where its bifurcation takes place. Its internal (cutaneous) branch, the largest of the cervical nerves, becomes the *great occipital nerve ;* it has an oblique course, internally and superiorly, upon the posterior surface of the obliquus inferior and the rectus capitis posticus major muscles, to where it perforates the complexus muscle (page 266 ; Plate 149).

The *third* appears inferiorly to the second and bifurcates. Its internal (cutaneous) branch runs inferiorly and internally to, and accompanies, the great occipital nerve ; it also perforates the complexus muscle (page 266 ; Plate 149).

The *fourth* and *fifth* distribute their internal (cutaneous) branches by perforating the muscle planes of the neck (page 266 ; Plate 148).

The *sixth*, *seventh*, and *eighth* distribute both their external and internal branches to the deep posterior muscles of the neck.

DISSECTION.—Dissect away the multifidus spinæ, the obliquus inferior and superior, and the rectus capitis posticus major and minor muscles. Clear the surfaces of the vertebræ, the sacrum, and the coccyx; also those of the posterior intervertebral and costo-transverse ligaments.

46. Posterior Surfaces of the Bones of the Vertebral Column, Plates 147 and 155.—Of the twenty-four vertebræ—seven cervical, twelve dorsal, and five lumbar—their spinous processes (one to each), their right and left laminæ (two to each), their articular processes (two superior and two inferior to each), and their transverse processes (two to each) form the superior portion of the posterior surface of the vertebral column. Inferiorly to them are the posterior surfaces of the sacrum and coccyx.

47. Posterior Ligaments of the Cervical Vertebræ, Fig. 1, Plate 155.—The *posterior occipito-atlantal* bridges between the superior border of the posterior arch of the atlas (first cervical vertebra) and the occipital bone. The *posterior atlanto-axial* passes from the superior border of the laminæ of the axis (second cervical vertebra) to the inferior border of the posterior arch of the atlas. The *ligamentum subflavum* stretches from the superior border of the laminæ of an inferior vertebra to the inferior border of the laminæ of the vertebra superiorly to it. The *capsular ligaments* capsulate the facets of the opposed articular processes—the two superior of an inferior vertebra and the two inferior of the vertebra superiorly to it.

48. Posterior Ligaments of the Dorsal Vertebræ, Fig. 2, Plate 155.—The *supraspinous* extends continuously from tip to tip of the spinous processes, from that of the seventh cervical to that of the twelfth dorsal vertebra. The *interspinous* bridge between the opposite superior and inferior borders of the spinous processes. The inferior portions of the *capsular* of the articular processes, right and left, are demonstrable. The *ligamenta subflava* are not seen posteriorly, as in the cervical region, because of the over-lapping of the laminæ of the vertebræ.

49. Posterior Ligaments of the Lumbar Vertebræ, Fig. 3, Plate 155.—The *supraspinous* is continued from the spinous process of the twelfth dorsal vertebra to the tips of the processes of the lumbar vertebræ and the rudimentary spinous processes of the sacrum. The *interspinous* are similar to those of the dorsal region. The *ligamenta subflava* are demonstrable, but blend with the interspinous and capsular ligaments. The posterior portions of the *capsular* of the articular processes appear ; as do also the capsular of the lumbo-sacral articular-process articulations.

DISSECTION.—Expose the posterior costo-transverse ligaments between the transverse process of a dorsal vertebra and the neck and tubercle of a rib (Fig. 2, Plate 155).

50. Posterior Costo-Transverse Ligaments, Plate 152, and Fig. 2, Plate 155.—Three ligaments—superior, middle, and posterior—present posteriorly : the *superior costo-transverse* (Fig. 2, Plate 155), from the inferior portion of the posterior surface of the transverse process of a dorsal vertebra to the superior border of the neck of the rib immediately inferior to it ; the *middle costo-transverse* (Fig. 2, Plate 155), from the anterior surface of the transverse process of a dorsal vertebra to the posterior surface of the neck of the rib opposed to it ; the *posterior costo-transverse* (Plate 152, and Fig. 2, Plate 155), from the tip of the transverse process of a dorsal vertebra to the contiguous posterior surface of the rib articulated with it.

SPINAL CORD IN SITU.

DISSECTION.—Saw through the posterior portion of the occipital bone, right and left (section lines on Fig. 1, Plate 155) obliquely into the foramen magnum ; dissect away the included piece of the occipital bone. Saw, by two parallel section lines (including the cut internally), through the posterior wall of the vertebral column : for the cervical vertebræ internally to their articular processes (Fig. 1, Plate 155, and Plate 153) ; for the dorsal and lumbar vertebræ at the roots of their transverse processes (Figs. 2 and 3, Plate 155, and Plates 153 and 154) ; for the sacrum internally to its posterior foramina (Plates 147 and 154). As the posterior portions of the vertebræ are sawed through, progressing inferiorly, the pieces may be removed by the hook and forceps. Display the dura mater, sheathing the spinal cord and the cauda equina ; also the roots of the spinal nerves, which are projected from the dura mater to their foramina of exit from the spinal canal.

51. Spinal Canal, Plates 153 and 154.—This canal, as opened, presents the sheath of the spinal cord and cauda equina, from the foramen magnum of the occipital bone to the sacral region of the spinal column. The sheathed spinal cord is separated from the bony walls of the spinal canal by loose connective tissue, in which ramifies a network of veins. Laterally and inferiorly to the sheathed spinal cord and cauda equina sixty-two pairs of roots of spinal nerves are projected, to form the thirty-one pairs of spinal nerves, which leave the spinal canal by the intervertebral foramina of the cervical, dorsal, and lumbar regions, and by the anterior and posterior foramina of the sacral region.

52. Dura Mater of the Spinal Cord.—This is the outer of three membranes that invest the spinal cord and the cauda equina. It projects sheaths upon the sixty-two pairs of roots of the spinal nerves. It is attached: superiorly, to the circumference of the foramen magnum of the occipital bone; laterally, to the circumferences of the foramina of exit from the canal of the twenty-five pairs of spinal nerves, and the anterior and posterior divisions of the five pairs of sacral and one pair of coccygeal spinal nerves; inferiorly, to the posterior surface of the coccyx.

Dissection.—Slit open the dura mater, along the median line, from the level of the foramen magnum of the occipital bone to its inferior end (Plates 153 and 154).

53. Subdural Space.—The dura mater being a loose investment of the spinal cord, a subdural space presents between it and the arachnoid membrane.

54. Spinal Cord Invested by the Arachnoid and Pia Mater Membranes.—The spinal cord, *in situ*, invested by its sheaths of arachnoid and pia mater membranes, is an elongated mass extending from the foramen magnum of the occipital bone, superiorly, to the level of about the first lumbar vertebra, inferiorly. It is large in the cervical region—the *cervical enlargement;* small in the superior two-thirds of the dorsal region; and large in the inferior third of the dorsal region—the *lumbar enlargement.* Its inferior end tapers to a point—the *conus medullaris;* from the latter a slender portion, the *filum terminale*, is continued inferiorly. Inferiorly to the conus medullaris of the spinal cord, the dura mater contains the filum terminale and a leash of twenty pairs of roots of spinal nerves—eight lumbar (second to fifth, inclusive), ten sacral, and two coccygeal—these form the *cauda equina* of the spinal cord.

Dissection.—Make a median-line incision through the arachnoid membrane of the spinal cord ; reflect lateral flaps, and expose the pia mater upon the cord.

55. Arachnoid Membrane, and Subarachnoidean Space.—This is the second sheath of the spinal cord ; it is separated from the pia mater to a variable degree at different points, the intervening space being the *subarachnoidean space*—it is in this space that the large vessels of the spinal cord ramify. This membrane projects sheaths upon the roots of the spinal nerves to their points of exit through the dura mater.

56. Pia Mater and Ligamenta Denticulata.—This is the inner, and third, sheath of the spinal cord ; it invests it intimately, dipping into its fissures. The arteries, to be distributed to the cord, have their primary distribution in this membrane, where they break up into minute vessels. From the lateral surfaces of the cord the pia mater is projected by points, invested by arachnoid—*ligamenta denticulata*—to the interior of the dura mater, in the spaces between the pairs of roots of the cervical and dorsal spinal nerves.

Dissection.—Trace the roots of the spinal nerves from their emergence from the spinal cord to their exits through the dura mater ; cut away the cervical portion of the dura mater, at one side (Plate 153), so as to recognize the anterior and posterior roots of the spinal nerves, respectively. Display the roots, the ganglion, the mixed nerve, and the anterior and posterior divisions of the mixed nerve, of the second cervical spinal nerve. (Other spinal nerves may be traced in a similar manner by cutting away with the saw and bone forceps, the obstructing portions of the contiguous vertebræ.) Find and trace into the foramen magnum the spinal accessory nerve.

57. Roots of the Spinal Nerves.—From the lateral surfaces of the spinal cord and from its conus medullaris sixty-two pairs of roots of spinal nerves—thirty-one pairs of anterior (motor), and thirty-one pairs of posterior (sensory)—are projected to sixty-two pairs of perforations of the dura mater. Each nerve root has an investment from the arachnoid and pia mater membranes. In the cervical region they are projected almost at a right angle from the cord ; inferiorly, they become progressively more vertical, until those from the conus medullaris run parallel with the longitudinal axis of the cord. This variation, in the direction of the roots of the spinal nerves, results in a corresponding variation of the relation of the levels of the points of exit of the nerves from the spinal canal, with the origins of their roots from the spinal cord ; the distances between these levels increasing as you advance to the inferior spinal nerves.

58. Ganglia on the Posterior Roots of Spinal Nerves, Plate 153.—The second cervical spinal nerve, as traced, shows a ganglion upon its posterior (sensory) root, just before the fusion of that root with the anterior (motor) root of the nerve, to form the mixed (containing both motor and sensory fibres) spinal nerve. (The second cervical nerve may be taken as a type of the thirty-one pairs of spinal nerves.) The other ganglia of the cervical region, and those of the dorsal and lumbar regions are close to, or within the intervertebral foramina of exit of the nerves from the spinal canal. In the sacral region the ganglia appear within the sacral canal, together with the resultant mixed sacral nerves ; the latter bifurcate, within the canal, into their anterior and posterior divisions; these anterior and posterior divisions leave the sacral canal by the anterior and posterior sacral foramina, respectively.

59. Spinal Accessory Nerve.—This nerve, of a side, is seen at the lateral surface of, and taking origin from, the cervical portion of the spinal cord. It has a superior course, between the anterior and posterior roots of the cervical spinal nerves, to its entrance into the cranium by the foramen magnum of the occipital bone.

VERTEBRAL COLUMN AND ITS LIGAMENTS.

Vertebral Column, Plates 42, 147, 155, 156, and 189.—This column contains twenty-six bones (adult), viz. : seven cervical, twelve dorsal, and five lumbar vertebræ, the sacrum, and the coccyx.

A *vertebra* is a signet-ring shaped bone with two portions : the signet and the hoop. The signet portion, called the *body* (Fig. 3, Plate 155 ; Figs. 2 and 4, Plate 156), is located anteriorly ; the hoop portion, called the *arch*, is located posteriorly, and is formed by two symmetrical halves, each consisting of a pedicle and a lamina : the *pedicles* (Fig. 3, Plate 155 ; Figs. 3 and 4, Plate 156) spring, right and left, from the posterior or postero-lateral surface of the vertebra—they have *notches* superiorly and inferiorly ; the *laminæ* (Fig. 1, Plate 155), right and left, close the hoop posteriorly, passing from the pedicles to their median-line junction. The body and arch enclose the *vertebral foramen*, and support seven processes, as follows: *four articular*, two superior and two inferior (Plate 155 and Figs. 1, 3, and 4, Plate 156) ; *two transverse*, a right and left (Plates 155 and 156) ; and *one spinous* (Plate 155).

The *sacrum* consists of five incompletely developed vertebræ fused into one bone.

The *coccyx* is four rudimentary vertebræ fused into a single bone.

The *vertebral column* is constructed by the articulation of the above twenty-six bones, whereby the *vertebral canal* (from the foramen magnum of the occipital bone to the inferior end of the sacrum) results, which lodges the spinal cord, with its membranes, vessels, and roots of nerves (Plates 153 and 154). *Intervertebral foramina* (Fig. 4, Plate 156), for the transit of nerves and vessels, are formed by the apposition of the notches superior and inferior—of the pedicles of the arches of the vertebræ ; while *anterior* and *posterior sacral foramina* (Plates 42, 147, and 154) open out of the sacral portion of the vertebral canal.

60. Posterior Cervical, Dorsal, and Lumbar Ligaments. —These include the supraspinous, interspinous, ligamenta subflava, and capsular ligaments of the respective regions of the vertebral column ; they are described at pages 277 and 278, and illustrated Plate 155.

DISSECTION.—Cut the roots of the spinal nerves, right and left (Plates 153 and 154), and remove the cord from the vertebral canal. Disarticulate between the fourth and fifth cervical vertebræ, and display the posterior common ligament of the vertebral column (Fig. 1, Plate 156). Saw the ribs, right and left, at about two inches from their articulations with the transverse processes of the dorsal vertebræ ; also through the bodies of the fourth and seventh dorsal vertebræ. Expose the anterior common ligament of the dorsal vertebræ and their intervertebral discs. Disarticulate between the first and second, and between the fourth and fifth lumbar vertebræ (page 177) ; expose the anterior common ligament and intervertebral discs of the lumbar vertebræ. Note the intervertebral foramina and the parts which pass through them (Fig. 4, Plate 156).

61. Articulations of the Bodies of the Vertebræ, Plates 42, 156, and 198.—The elements entering into these articulations (except that of the first and second cervical vertebræ) are: the opposed surfaces of the *bodies* of the vertebræ (Plates 156 and 198); *intervertebral discs* of fibro-cartilage (Plates 156 and 198)—these are pulpy at their centres and dense at their circumferences (Fig. 3, Plate 156); an *anterior common ligament* (Plate 42; Figs. 2 and 4, Plate 156; Plate 198) extends from the anterior surface of the second cervical vertebra (axis) to the anterior surface of the sacrum—it bridges between the anterior borders of the intervertebral discs; a *posterior common ligament* (Fig. 1, Plate 156) passes upon the anterior wall of the vertebral canal or the posterior surfaces of the bodies of the vertebræ, from the anterior border of the foramen magnum of the occipital bone, superiorly, to the anterior wall of the sacral canal, inferiorly; its fibres stretch from the posterior surface of one intervertebral disc to the other.

Dissection.—Dissect away the superior portion of the posterior common ligament, and expose (Fig. 1, Plate 156): the crucial ligament; the right and left occipito-odontoid and atlanto-axial ligaments. Cut away (Fig. 1, Plate 156) the superior part of the vertical portion of the crucial ligament, and display: the odontoid process of the axis (second cervical vertebra), *in situ*; and the superior occipito-odontoid ligament. Demonstrate the occipito-atlantal capsular ligaments, opening one of them.

62. Crucial Ligament, Fig. 1, Plate 156.—This ligament, as its name implies, has two portions, a vertical and a transverse. The *vertical portion* extends from the posterior surface of the body of the axis to the anterior border of the foramen magnum; it binds in place, by covering its posterior surface, the odontoid process of the axis. The *transverse portion*, the principal part of the ligament, bridges between the internal surfaces of the lateral masses of the atlas crossing the posterior of the odontoid process of the axis.

63. Occipito-odontoid Ligaments.—These, also called *check ligaments*, are three in number—right and left lateral, and superior. The *lateral* pass from the sides of the odontoid process of the axis to the internal surfaces of the right and left condyles of the occipital bone. The *superior* bridges from the tip, or superior end, of the odontoid process to the anterior border of the foramen magnum of the occipital bone.

64. Occipito-atlantal Capsular Ligament.—These ligaments capsulate the joint formed by the articular facets upon the superior surfaces of the lateral masses of the atlas, and the condyles of the occipital bone.

65. Articulations of the Dorsal Vertebræ and Ribs, Fig. 3, Plate 155; Figs. 2 and 3, Plate 156.—A rib forms two articulations with the vertebral column (the eleventh and twelfth ribs excepted): the *costo-vertebral*, where the bodies of two vertebræ and an intervening intervertebral disc are apposed to the head of a rib; the *costo-transverse* formed by the transverse process of a vertebra and the neck and tubercle of a rib.

66. Posterior Costo-transverse Ligaments, Fig. 2, Plate 155.—These ligaments—the *superior*, *middle*, and *posterior costo-transverse*—have been described (page 278).

DISSECTION.—Clear the anterior surfaces of the costo-vertebral articulations, of the portion of the dorsal region with ribs attached (Fig. 2, Plate 156), and display the anterior costo-vertebral ligaments. Dissect away one of the last-named ligaments and expose the interarticular ligament. Expose the anterior costo-transverse ligament and the anterior divisions of the dorsal-spinal nerves.

67. Anterior Costo-vertebral Ligament, Fig. 2, Plate 156. —This ligament, of which there is one for each of the twelve pairs of costo-vertebral articulations, bridges from the lateral surfaces of the bodies of two contiguous vertebræ, and the intervertebral disc between them, to the anterior surface of the head of the rib (in the case of the first, tenth, eleventh, and twelfth dorsal, only from the respective bodies of these vertebræ).

68. Interarticular Ligament, Figs. 2 and 3, Plate 156.—This ligament, covered in by the anterior costo-vertebral, passes from the ridge dividing the articular face of the head of the rib (the first, tenth, eleventh, and twelfth excepted) to the opposed border of the intervertebral disc.

69. Anterior Costo-transverse Ligament, Fig. 2, Plate 156. —This ligament spans between the inferior border of a transverse process of a dorsal vertebra to the superior border of the neck of the rib inferiorly to it.

70. Anterior Divisions of Dorsal-spinal Nerves, Plate 139; Fig. 1, Plate 140; Figs. 2 and 3, Plate 156.—These nerves appear from the intervertebral foramina between the pedicles of the articulated dorsal vertebræ; they are continued, as the intercostal nerves, parallel with the inferior borders of the ribs, as before described (pages 247 and 248) and illustrated (Plate 139, and Fig. 1, Plate 140).

DISSECTION.—Disarticulate the superior and inferior half vertebræ, and the inferior rib of the dorsal segment of vertebral column and articulated ribs (Fig. 2, Plate 156). Disarticulate and turn off the middle rib of the same piece, so as to display the interiors of the costo-vertebral and costo-transverse articulations of a vertebra and a rib (Fig. 3, Plate 156).

71. Interior of the Costo-vertebral Articulation, Fig. 3, Plate 156.—The interior of this articulation presents the following elements: two contiguous half facets of two vertebræ, separated by the border of an intervertebral disc; the articular face of the head of a rib divided by a ridge into two half facets; and an interarticular ligament (page 284). The articulations of the first, tenth, eleventh, and twelfth ribs are exceptions to the above: in the articulation of a single facet on the lateral surfaces of the bodies of the vertebræ, with undivided articular facets on the heads of the ribs.

72. Interior of the Costo-transverse Articulation. — For the pairs of ribs first to tenth, inclusive, the elements presenting of the interior of these articulations are: the transverse process of the dorsal vertebra, with its articular facet; the neck and tubercle of the rib, with the articular facet on the latter; the interior surfaces of the superior, middle, and posterior costo-transverse ligaments (page 278; Fig. 2, Plate 155); and the *capsular ligament*, which capsulates the opposed facets of the transverse process of the vertebra and the tubercle of the rib.

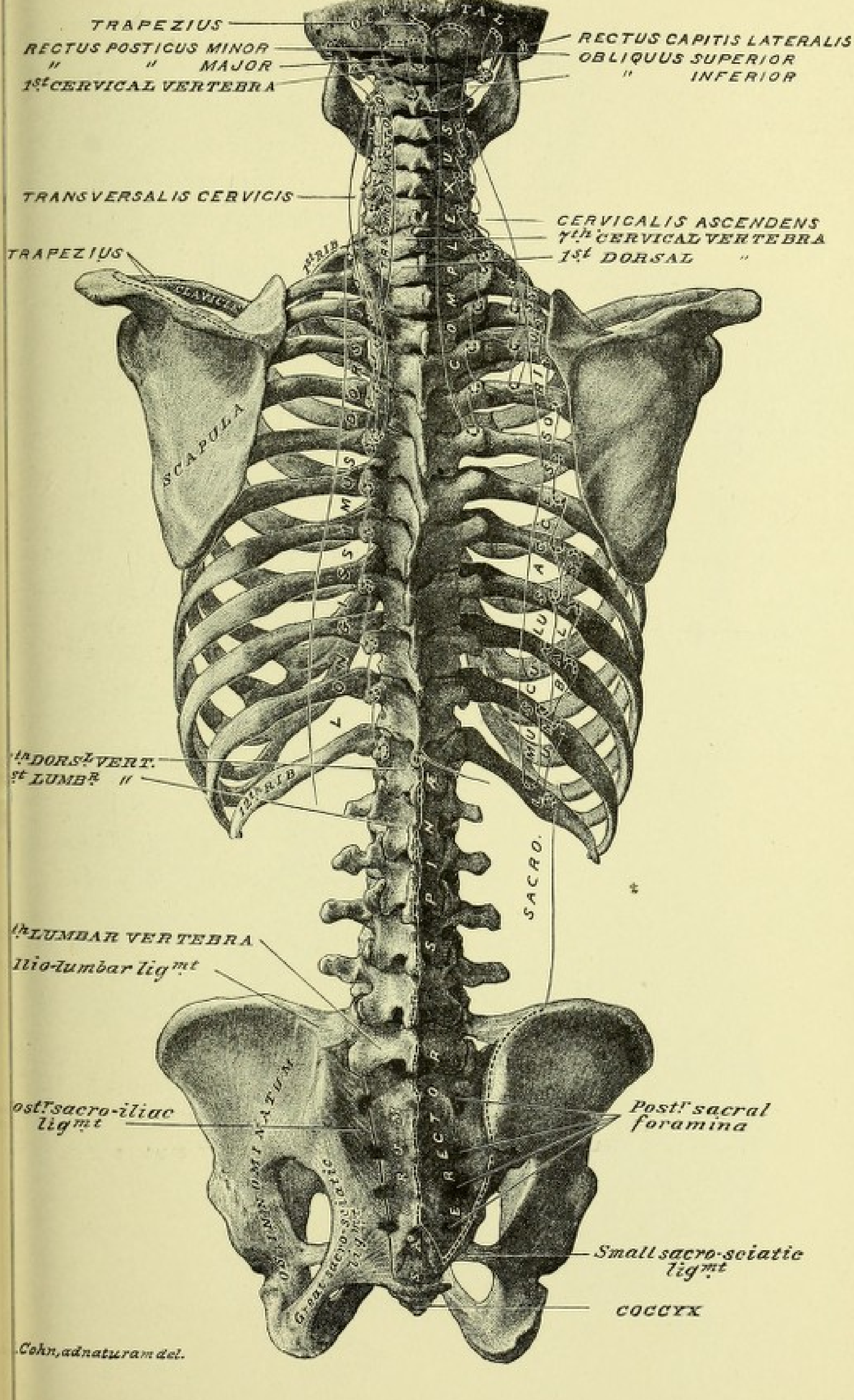
DISSECTION.—Clear the surfaces of the ligaments of the sacro-vertebral and sacro-coccygeal articulations; also the direct and indirect ligaments of the sacro-iliac articulation.

73. Sacro-vertebral Articulation, Plates 42 and 147.—The body of the fifth lumbar vertebra articulates with the base of the sacrum, being bound by an intervertebral disc, and the continuance of the anterior and posterior common ligaments of the vertebral bodies; the inferior lumbar and the sacral articular processes are held opposed by capsular ligaments; a ligamentum subflavum bridges between the laminæ of the fifth lumbar vertebra and the superior border of the posterior wall of the sacral canal.

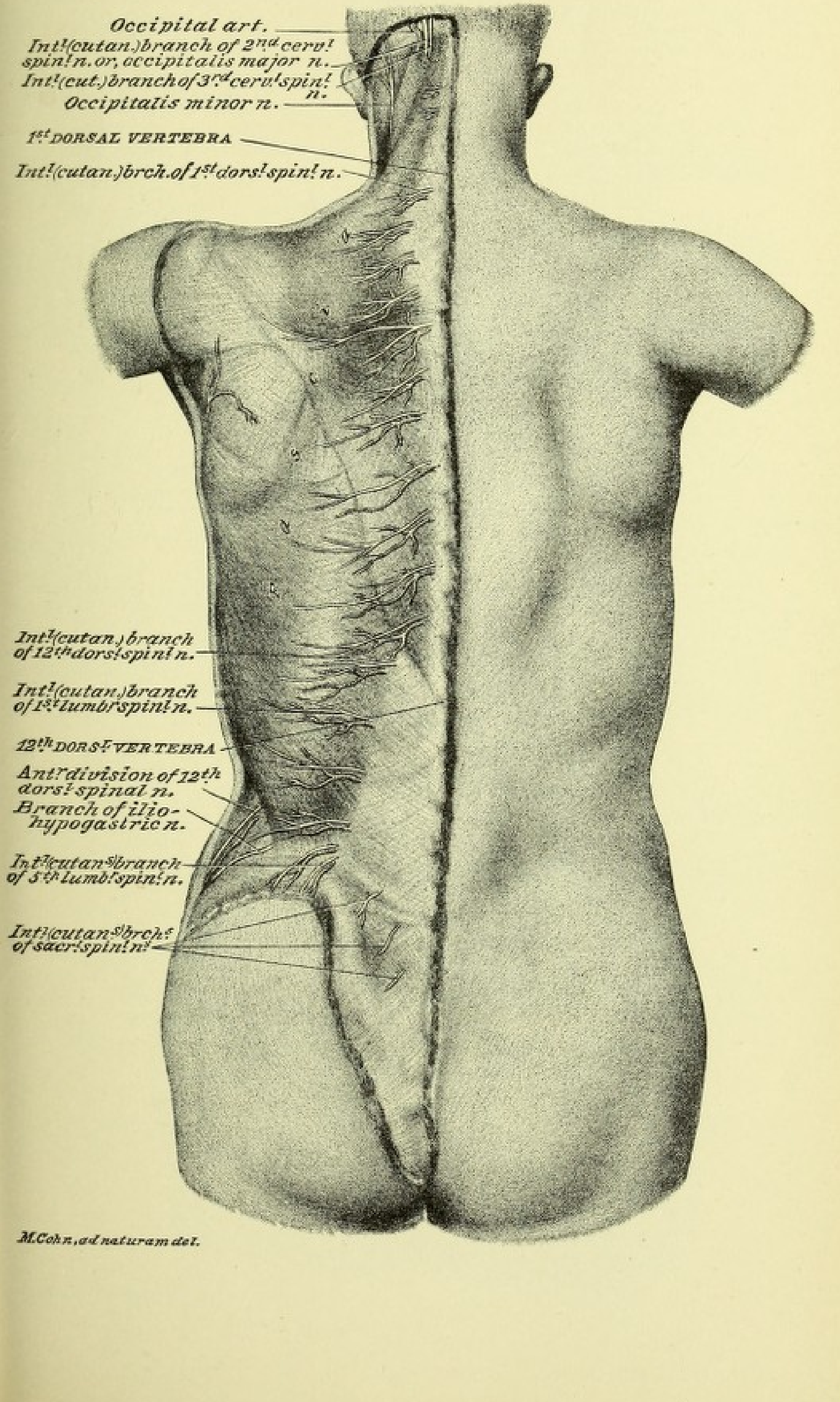
74. Sacro-coccygeal Articulation.—This joint is formed by: the *coccyx* and *sacrum;* an *intervertebral disc* of fibro-cartilage; an *anterior sacro-coccygeal ligament* (page 84); a *posterior sacro-coccygeal ligament* from the posterior surface of the coccyx to the margin of the inferior orifice of the sacral canal; *interarticular ligaments* between the cornua of the coccyx and sacrum; *lateral ligaments* bridge between the contiguous borders of the two bones.

75. Sacro-iliac Articulation, Plate 42; Fig. 1, Plate 45; Plate 147.—This articulation includes the following elements: bones, direct ligaments, and indirect ligaments. The bones are: the *ilium* portion of the innominate bone; the sacrum; the fifth *lumbar vertebra* (transverse process); the *ischium* portion of the innominate bone; and the *coccyx.* The direct ligaments are: the *posterior sacro-iliac* (Plate 147), from the posterior surface of the internal portion of the ilium to the posterior surface of the sacrum; the *anterior sacro-iliac*, before described (page 84) and illustrated (Plate 42 and Fig. 1, Plate 45). The indirect ligaments include: the *ilio-lumbar* (page 84; Plates 42 and 147); the *great sacro-sciatic* and the *small sacro-sciatic* (page 84; Plate 42; Fig. 1, Plate 45; and Plate 147).

PLATE 147



.Cohn, adnaturam del.


Occipital art.
Intl.(cutan.)branch of 2nd cervl. spinl. n. or, occipitalis major n.
Intl.(cut.)branch of 3rd cervl. spinl. n.
Occipitalis minor n.
1st DORSAL VERTEBRA
Intl.(cutan.)brch. of 1st dorsl. spinl. n.
Intl.(cutan.)branch of 12th dorsl. spinl. n.
Intl.(cutan.)branch of 1st lumbr. spinl. n.
12th DORSL. VERTEBRA
Antr. division of 12th dorsl. spinal n.
Branch of ilio-hypogastric n.
Intl.(cutanl.)branch of 5th lumbl. spinl. n.
Intl.(cutanl.)brchs. of sacrl. spinl. ns.
M.Cohn, ad naturam del.

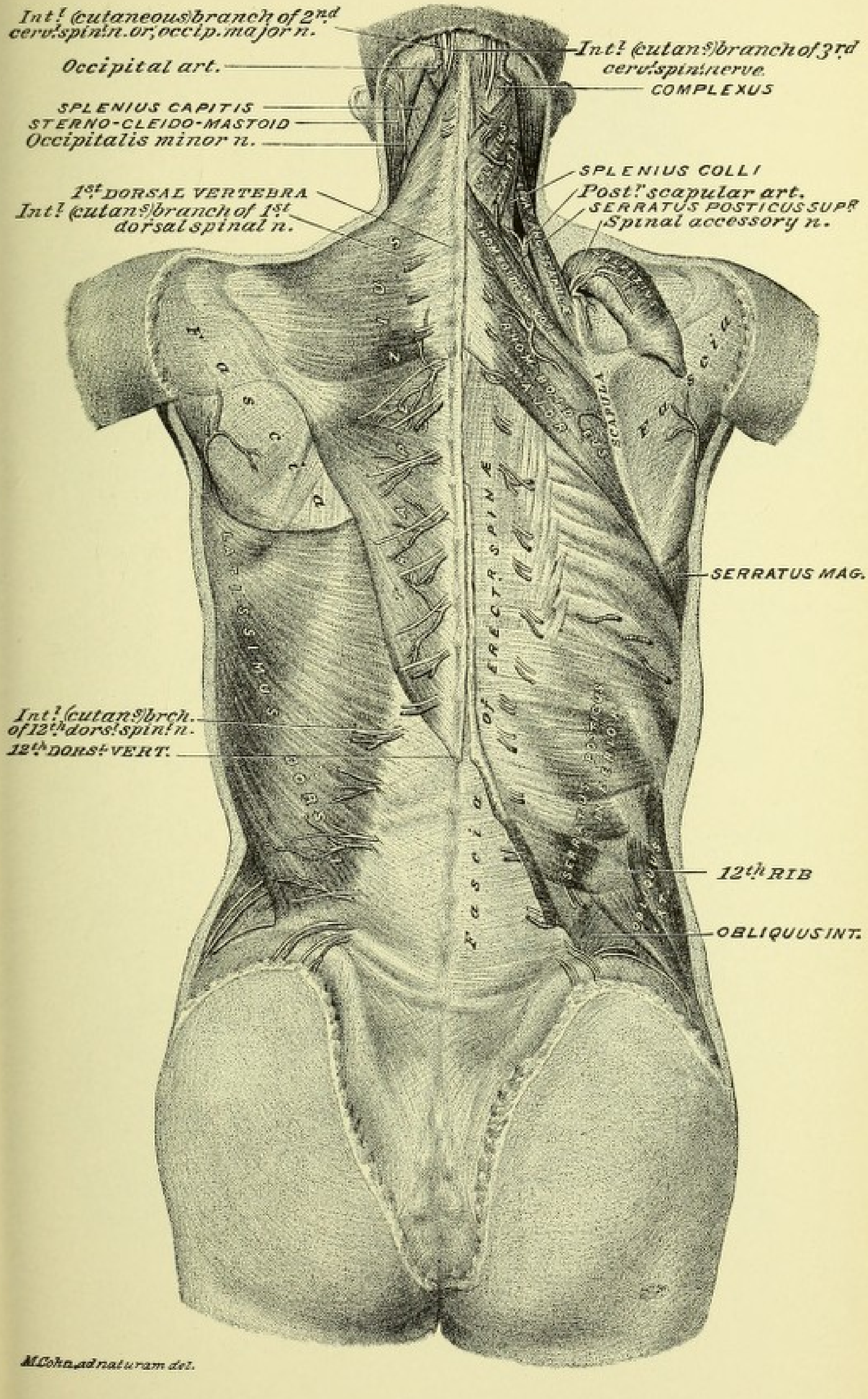
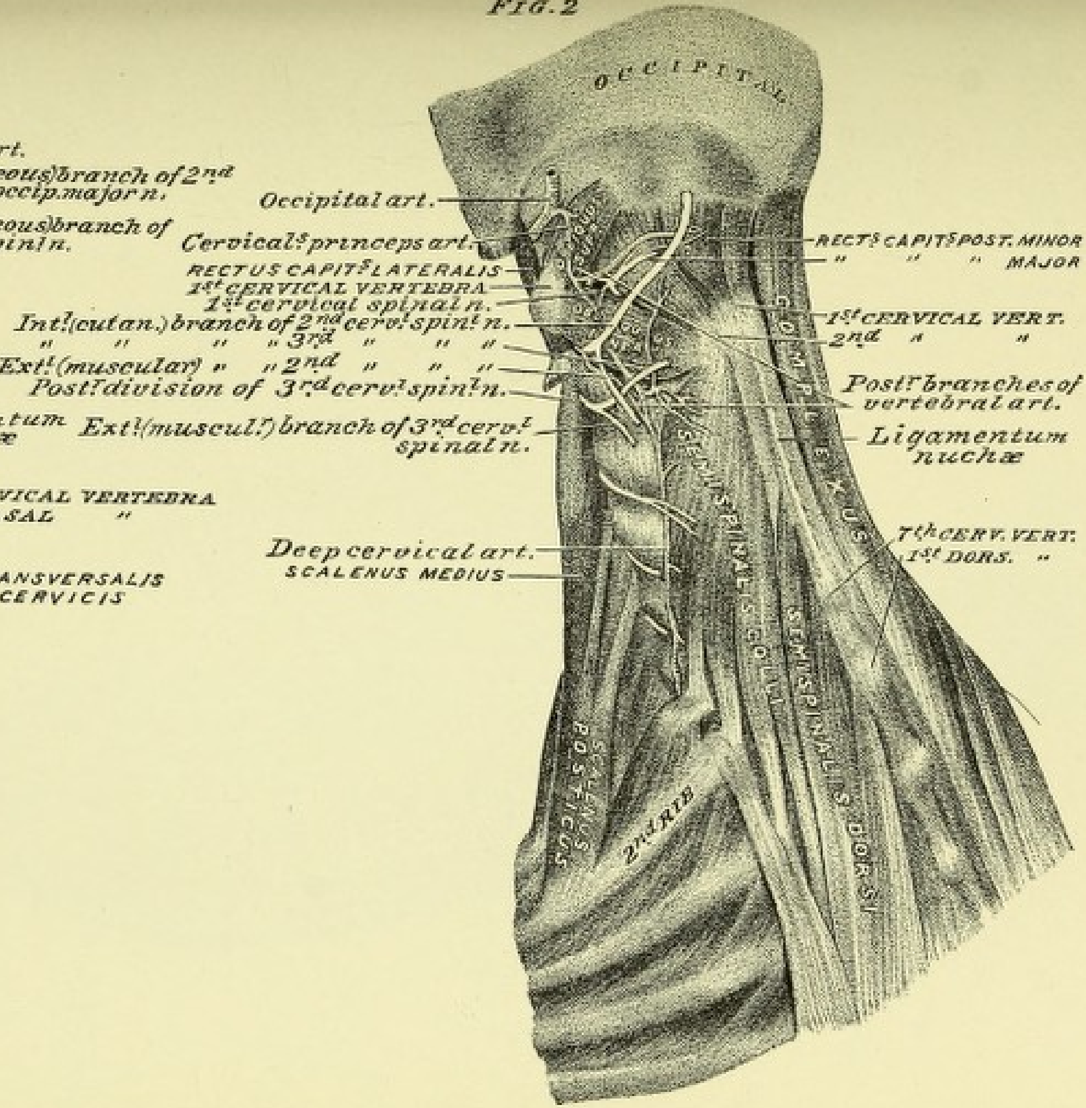

Int! (cutaneous) branch of 2nd cerv! spin! n. or, occip. major n.
Occipital art.
SPLENIUS CAPITIS
STERNO-CLEIDO-MASTOID
Occipitalis minor n.
1st DORSAL VERTEBRA
Int! (cutan!) branch of 1st dorsal spinal n.
Int! (cutan!) branch of 3rd cerv! spin! nerve.
COMPLEXUS
SPLENIUS COLLI
Post! scapular art.
SERRATUS POSTICUS SUP!
Spinal accessory n.
SERRATUS MAG.
Int! (cutan!) brch. of 12th dors! spin! n.
12th DORS! VERT.
12th RIB
OBLIQUUS INT.
SCAPULA
Fascia
LATISSIMUS DORSI
Fascia of ERECTR SPINAE
M.Cohn, ad naturam del.

FIG. 1

FIG. 2



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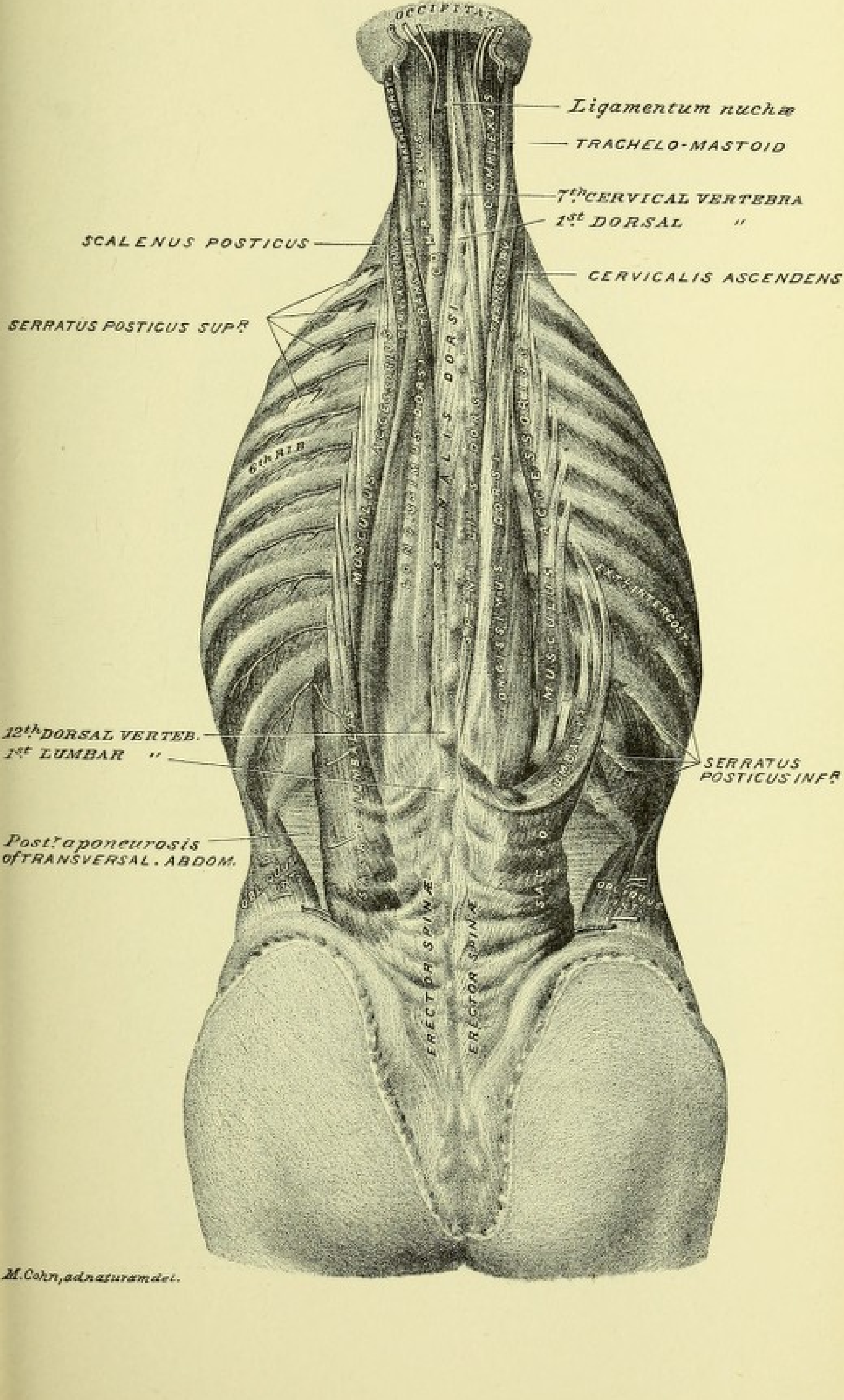

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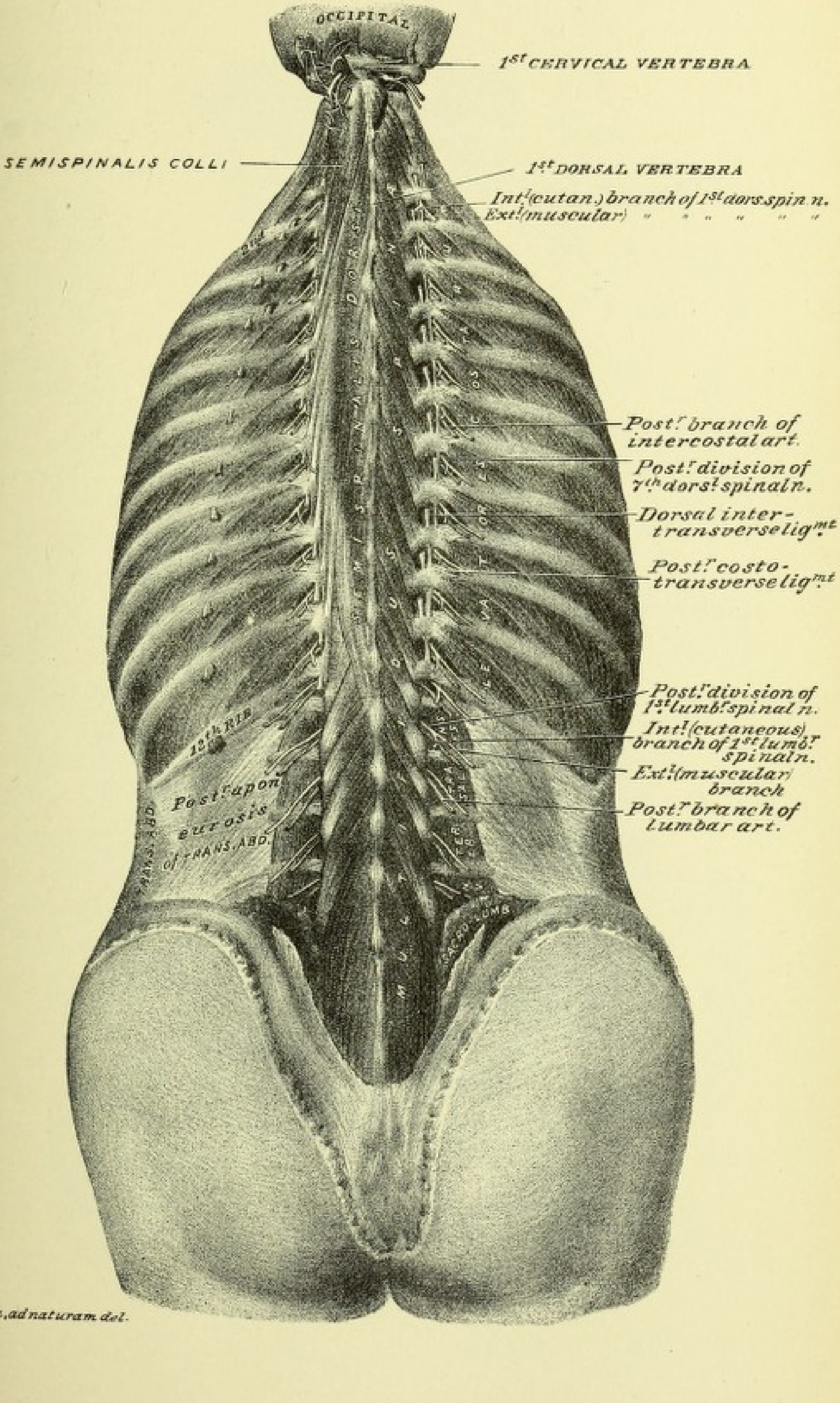
OCCIPITAL
1st CERVICAL VERTEBRA
SEMISPINALIS COLLI
1st DORSAL VERTEBRA
Intl (cutan.) branch of 1st dors. spin. n.
Extl (muscular) " " " " "
Postr branch of intercostal art.
Postr division of 7th dorsl spinal n.
Dorsal inter-transverse ligmt.
Postr costo-transverse ligmt.
Postr division of 1st lumbr spinal n.
Intl (cutaneous) branch of 1st lumbr spinal n.
Extl (muscular) branch
Postr branch of lumbar art.
12th RIB
Postr apon eurosis of TRANS. ABD.
TRANS. ABD.
SACRO-LUMB.
M. Cohn, ad naturam del.

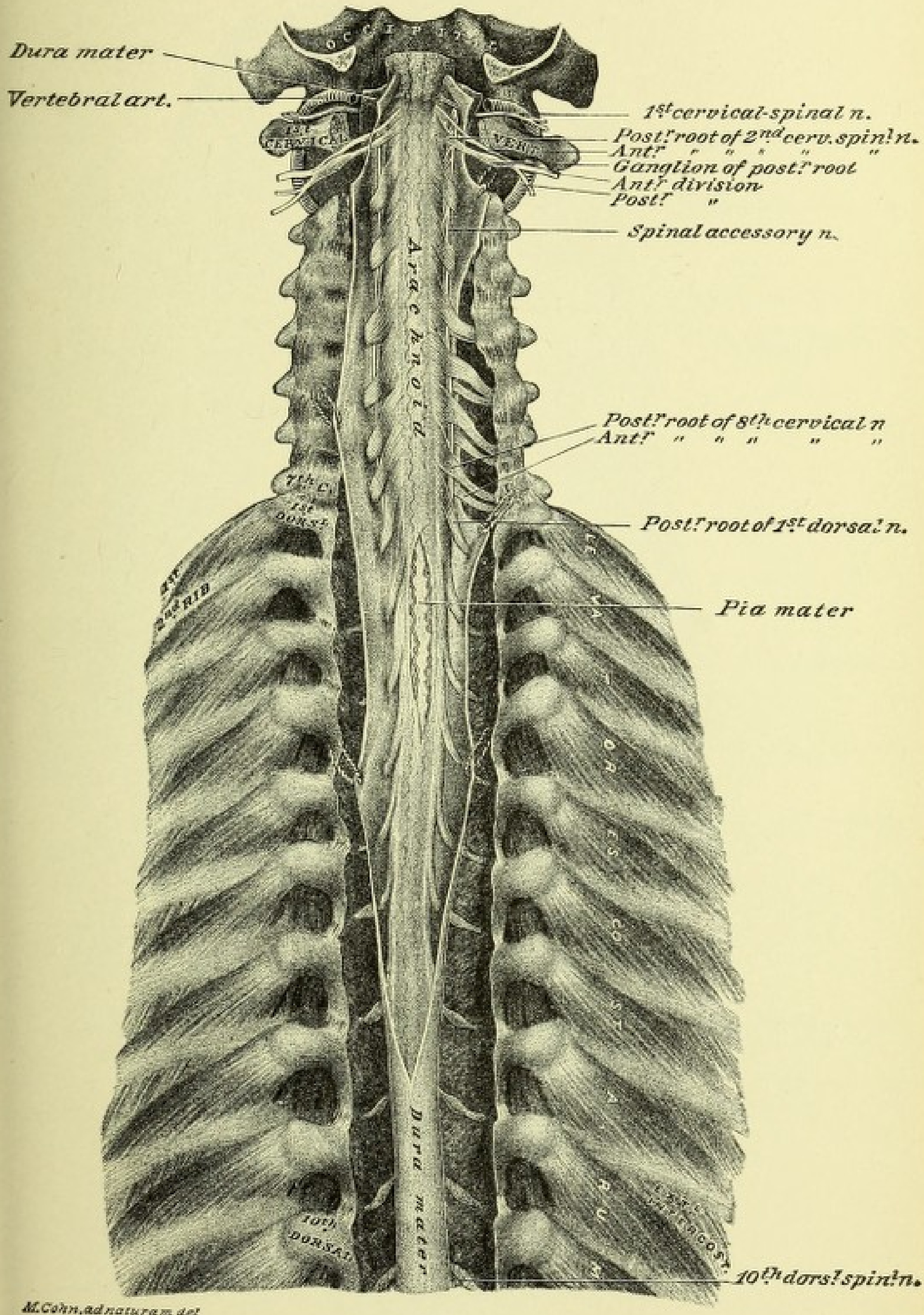

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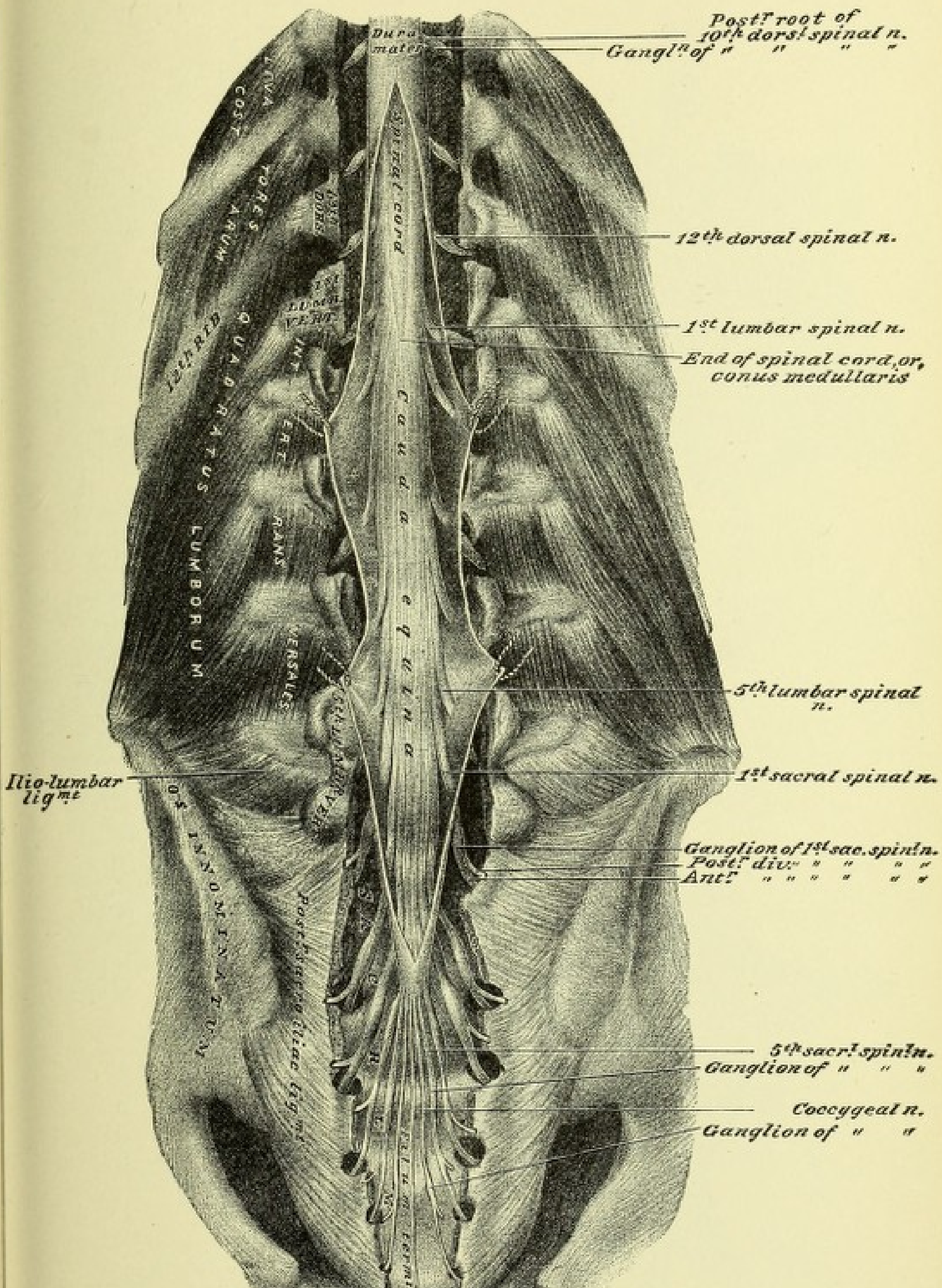
PLATE 154



M. Cohn, ad naturam del.

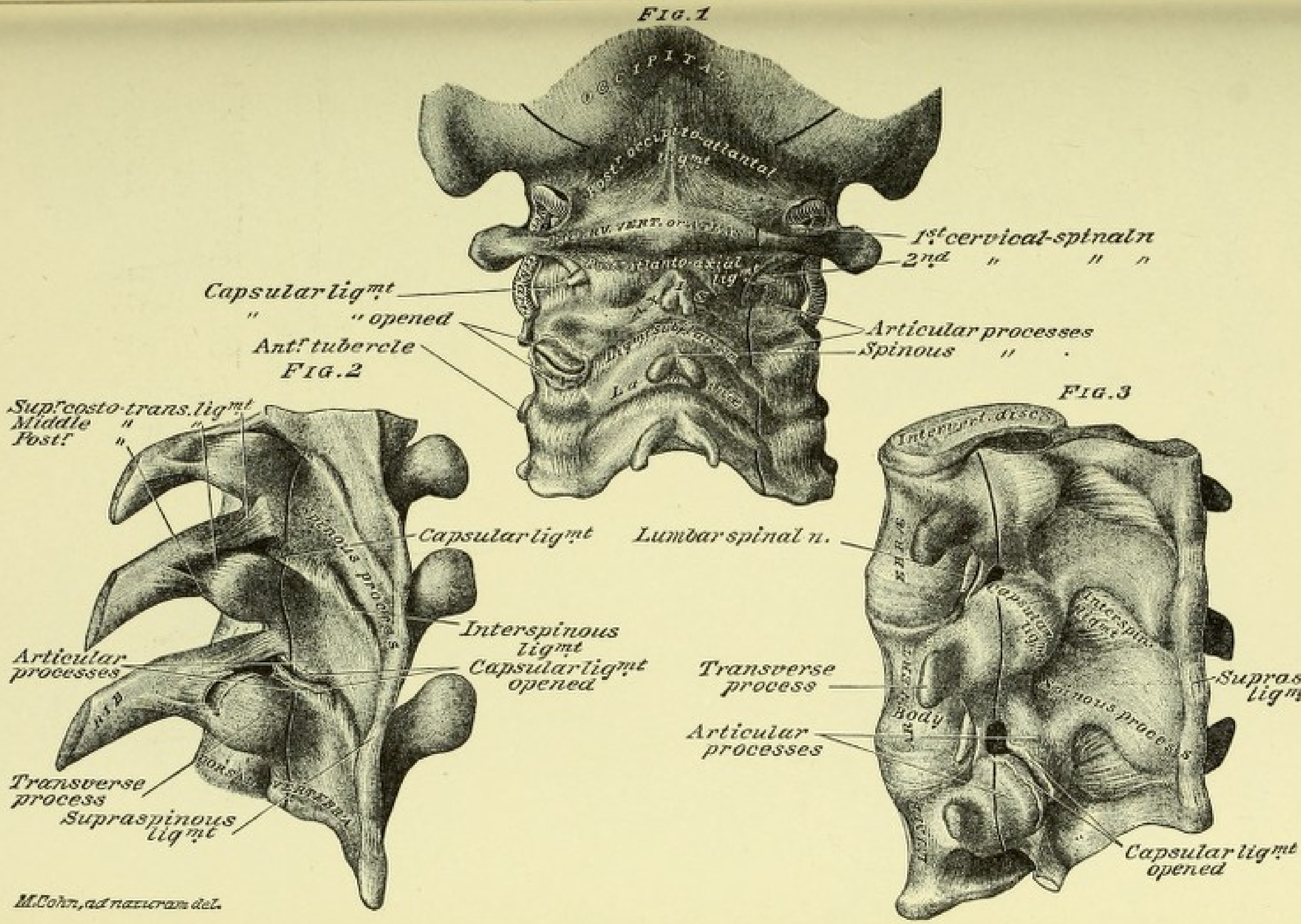


FIG. 1
OCCIPITAL
Post.r occipito-atlantal ligmt
1st cervical-spinal n
2nd " " "
Capsular ligmt
" " opened
Ant.r tubercle
Articular processes
Spinous "
FIG. 2
Supr costo-trans. ligmt
Middle "
Post.r "
Capsular ligmt
Interspinous ligmt
Capsular ligmt opened
Articular processes
Transverse process
Supraspinous ligmt
spinous process
RIB
FIG. 3
Intervert. disc
Lumbar spinal n.
Transverse process
Articular processes
Body
Interspin. ligmt
Capsular ligmt
Spinous process
Supraspin.s ligmt
Capsular ligmt opened
M. Cohn, ad naturam del.

FIG. 1

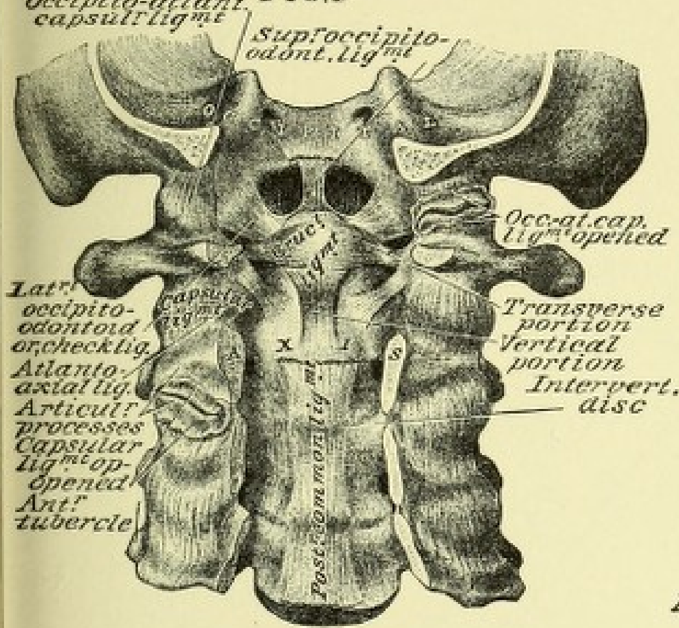


FIG. 2

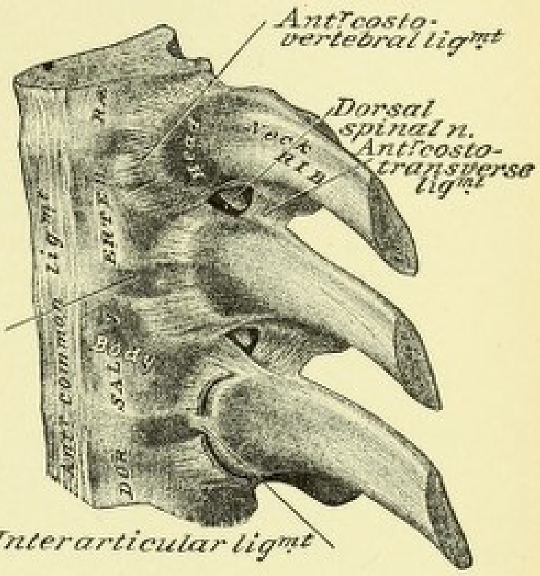


FIG. 4

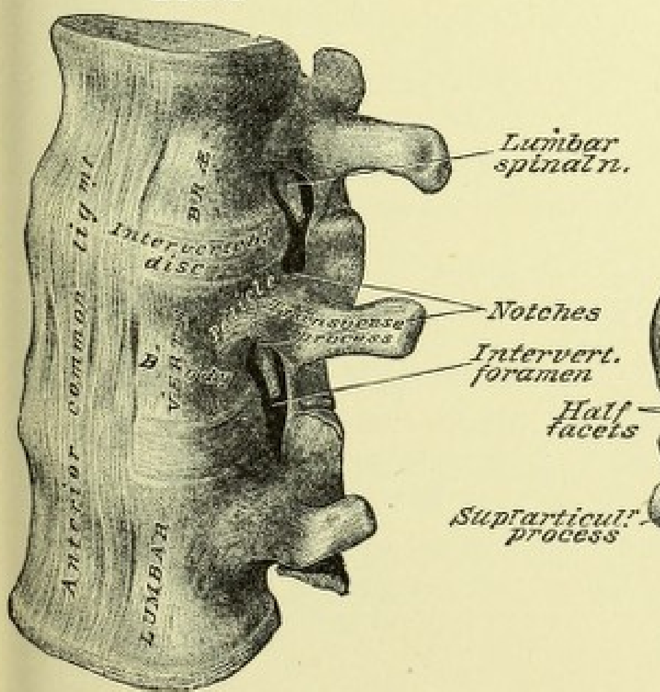
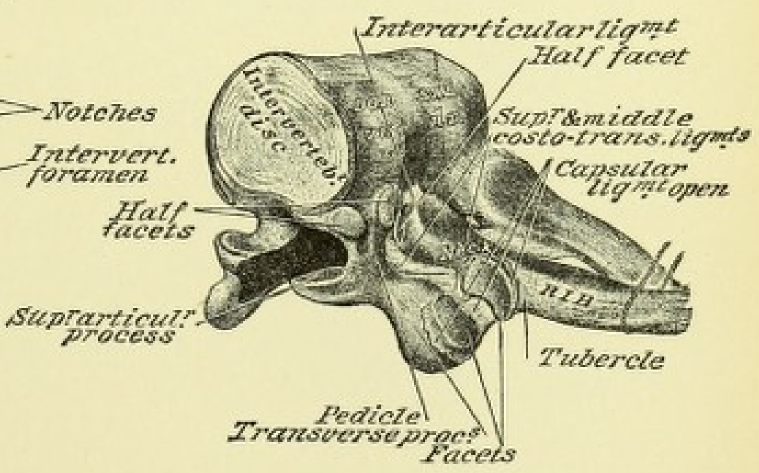


FIG. 3



M. Cohn, ad naturam del.

UPPER EXTREMITY.

TWENTIETH DISSECTION.

ANTERIOR SCAPULAR MUSCLES; POSTERIOR OF SHOULDER AND ARM.

ANTERIOR SCAPULAR MUSCLES.

Dissection.—The subject should be in the same position as for the nineteenth dissection, and the latter dissection should have been completed. Reflect the upper extremity so as to apply its posterior surface to the posterior surface of the thorax.

Terms of Relation.—These are the general terms (page 2), and special terms, applied to the thorax, of *exterior* and *antero-lateral*.

Bones and Bone Areas, Plate 113.—The anterior surface of the scapula, and the exterior surfaces of the antero-lateral area, of the eight or nine superior ribs, form the osseous framework of the region occupied by the anterior scapular muscles.

Dissection.—Expose the exterior surface of the serratus magnus muscle, and the anterior surface of the subscapularis muscle.

1. Serratus Magnus Muscle, Plates 113 and 157.—This muscle is attached: anteriorly, by nine serrations, to the exterior surfaces of the nine superior ribs; posteriorly, to the anterior edge of the posterior border of the body of the scapula. It swathes the antero-lateral area of the thorax, where a portion of it forms the inner wall of the axilla (page 196; Plates 116, 117, 119, and 120).

2. Subscapularis Muscle.—This muscle is lodged in the subscapular fossa; it crosses the anterior surface of the capsular ligament of the shoulder-joint. It is attached: internally, to the ridges on the anterior surface of the scapula; externally, to the inner tuberosity of the humerus.

Dissection.—Section the serratus magnus muscle (Plate 157); the anterior of the thorax, the anterior of the neck, and the region of the back having been dissected, this section of the serratus magnus muscle will sever the upper extremity from the trunk.

POSTERIOR OF THE SHOULDER AND ARM.

Dissection.—Extend the upper extremity—detached from the trunk—with its posterior surface uppermost. Flex the elbow, so as to put the muscles of the posterior of the arm upon the stretch.

Terms of Relation.—The general terms *anterior* and *posterior* (page 2); and the special terms *proximal* and *distal* (toward, and from, the trunk), and *inner* and *outer*, are used to locate parts in this portion of the dissection.

Bones and Bone Areas of Muscle Attachments, Plate 158.—The posterior surfaces of the scapula, the clavicle, the

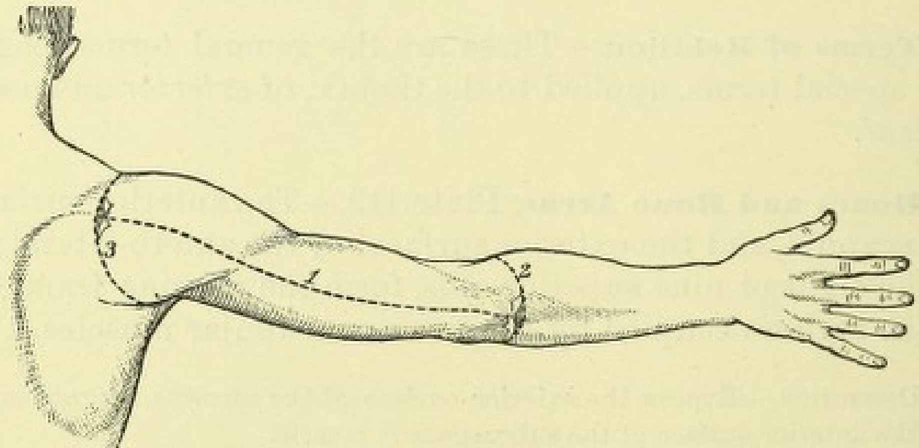


Figure 12.

humerus, and the proximal end of the ulna, form the osseous framework of this portion of the dissection. All of these bone surfaces afford areas for muscle attachments.

Dissection.—When the dissections of the anterior of the arm and of the back have preceded that of this dissection, make skin incisions 1 and 2 of Figure 12, and dissect away the skin from the arm. Where the anterior of the arm and the back have not been dissected make the skin incisions 1, 2, and 3, of Figure 12, and reflect flaps as indicated. Find and trace the nerves in the subcutaneous plane, and clear the surface of the fascia.

3. Cutaneous Branch of Circumflex Nerve, Plate 159.—This nerve appears at the distal half of the posterior border of the deltoid muscle; from the internal surface of the muscle. It distributes to the distal portion of the deltoid region and to the proximal portion of the arm. It is accompanied by a small branch from the posterior circumflex artery.

4. Intercosto-humeral Nerve.—This nerve emerges, posteriorly, from the axilla, along the inner side of the proximal portion of the arm; its branches have a distal course along the inner border of the arm.

5. Superior and Inferior External Cutaneous Branches of the Musculo-spiral Nerve.—These nerves perforate the fascia at the outer side of the distal portion of the arm, and are continued into the forearm.

6. Fascia.—A layer of fascia covers the muscles of the posterior of the arm, which is continued to the anterior of the arm and to the posterior of the forearm.

DISSECTION.—Section the nerves in the subcutaneous plane (Plate 159). Clear the fascia from the subjacent muscles, cutting out the nerves that perforate it.

7. Deltoid Muscle, Plate 113; Fig. 1, Plate 158; and Plate 160.—This triangular, coarse-fibred muscle caps the shoulder. Its base or proximal end conforms to the bony contour of the shoulder by its attachments: anteriorly, to the outer third of the antero-inferior border of the clavicle (Plate 113); externally, to the border of the acromion process of the scapula; and, posteriorly, to the inferior half of the external two-thirds of the posterior face of the spine of the scapula (Fig. 1, Plate 158). Its apex or distal end is attached to a rough, triangular, area at the antero-external face, of about the middle, of the shaft of the humerus (Plate 113).

8. Triceps Muscle, Plate 113; Fig. 1, Plate 158; and Plates 160, 161, and 162.—This muscle, as its name implies, has three heads: a *long head* from the superior portion of the external border of the scapula (Plates 113 and 162); an *outer head*, along the outer side of the long head (Plates 160, 161, and 162), is attached to the outer side of the shaft of the humerus, between its spiral groove and its outer tuberosity (Plate 158); an *inner head*, located to the inner side of the distal portion of the long head, is attached to the inner side of the posterior surface of the shaft of the humerus, distal to its spiral groove (Plate 158). The long and the outer heads are projected, in a distal direction, from the anterior surface of the posterior portion of the deltoid muscle (Plate 160); in the distal half of the arm they are joined by the inner head; the three heads forming a common tendon at the proximal side of the elbow-joint. The distal attachment of the muscle is by an aponeurotic expansion to the olecranon process of the ulna, at its tip and sides; while the outer portion of the aponeurosis fuses with the fascia of the forearm; the latter is attached to the posterior border of the shaft of the ulna. Between the outer and inner head attachments of the muscle to the humerus a spiral groove presents, on the outer side of the middle of the shaft of that bone (Plate 158).

DISSECTION.—Clear the surface of the supraspinatus muscle, tracing it to where its external end disappears inferiorly to the acromion process of the scapula.

9. Supraspinatus Muscle, Plates 158, 160, and 161.—This muscle is lodged in, and has its internal attachment to, the supraspinous fossa of the scapula; it has an external course, inferiorly to the acromio-clavicular articulation, and the acromion process of the scapula. Its external portion crosses the superior face of the capsular ligament of the scapulo-humeral or shoulder-joint, to reach its external attachment to the superior facet of the outer tuberosity of the humerus (Fig. 2, Plate 158).

DISSECTION.—Section the deltoid muscle, as in Plate 162; reflect the posterior portion of the muscle anteriorly. Clear the surfaces of the infraspinatus and teres minor muscles.

10. Infraspinatus Muscle.—This muscle is lodged in, and has its internal and inferior attachment to, the infraspinous fossa of the scapula. Its fibres have an external and superior course, the muscle narrowing to where it crosses the posterior face of the capsular ligament of the shoulder-joint. Its superior and external end is attached to the middle facet upon the outer tuberosity of the humerus (Fig. 2, Plate 158).

11. Teres Minor Muscle.—This muscle has an inferior and internal attachment to the external and superior portions of the infraspinous fossa of the scapula. It lies in a plane posteriorly to the proximal end of the long head of the triceps muscle, and it crosses the posterior face of the capsular ligament of the shoulder-joint, to reach its superior attachment to the inferior facet of the outer tuberosity of the humerus (Fig. 2, Plate 158).

DISSECTION.—Follow the long head of the triceps muscle to its proximal attachment (Plate 113), and display the outer head of the same muscle. Expose the teres major muscle; also the external and superior portion of the latissimus dorsi muscle.

12. Triceps Muscle, Plate 113; Fig. 1, Plate 158; Plates 160, 161, and 162.—The *long head* of this muscle passes between the teres minor muscle, posteriorly, and the teres major muscle, anteriorly, to its proximal attachment to the superior portion of the external border of the scapula (Plate 113). The proximal attachment of the *outer head* extends from the spiral groove of, to the outer tuberosity of, the humerus.

13. Teres Major Muscle.—The inferior and internal attachment of this muscle is to the external portion of the inferior half of the infraspinous fossa of the scapula (Fig. 1, Plate 158); from this point the muscle has a superior, external, and slightly distal course (page 196; Plates 116 to 120, inclusive), anteriorly to the long head of the triceps. Its superior and external attachment is to the posterior lip of the bicipital groove of the humerus (Plate 113).

14. Latissimus Dorsi Muscle, Plates 113, 160, 161, and 162. —The postero-internal and inferior portions of this muscle were before described (page 267) and illustrated (Plates 147 and 149). Its external and superior end winds anteriorly to the teres major muscle in the posterior fold of the axilla (page 196; Plates 116 to 120, inclusive); its flat tendon, about half the breadth of the tendon of the teres major, enters the bicipital groove of the humerus, where it is attached, posteriorly to the tendon of the long head of the biceps muscle (Plate 113).

DISSECTION.—Find the musculo-spiral nerve and its branches, between the long and the outer heads of the triceps muscle, distal to the teres major muscle. Expose the superior profunda branch of the brachial artery. Put a loop of thread through the outer border of the long head of the triceps muscle, and hold off the same to the inner side. Taking the musculo-spiral nerve and the superior profunda artery as guides, cut through the triceps muscle, so as to expose the course of the nerve and artery through the spiral groove of the humerus. Cut away the triceps muscle to enable the tracing of the branches of the musculo-spiral nerve into its heads.

15. Musculo-spiral Nerve, Plate 161.—The proximal portion of this nerve was before described (page 206) and illustrated (Plates 119 and 120), as it presents at the antero-internal face of the proximal portion of the arm. It appears at the posterior of the arm, and, after giving off branches to the heads of the triceps and to the anconeus muscles, it enters the spiral groove of the humerus; in this groove it has a distal, and anterior, course to the outer side of the distal portion of the arm, where it was before described (page 215) and illustrated (Plate 126).

16. Nerves to the Triceps and Anconeus Muscles.—These nerves, branches of the musculo-spiral nerve before its entrance into the spiral groove of the humerus, have a distal course to, and enter the substance of, the three heads of the triceps muscle. One of the branches is continued, through the outer head of the triceps, to the anconeus muscle.

17. Brachial Artery.—The posterior surface of the proximal portion of this artery appears, anteriorly to the musculo-spiral nerve, where it gives off the superior profunda artery.

18. Superior Profunda Artery.—This artery (venæ comites), the first and largest branch of the brachial artery, was before described (page 204) and illustrated (Plates 118 and 119), as it presents at the antero-internal face of the arm. Posteriorly, it accompanies the musculo-spiral nerve, through the spiral groove of the humerus. It supplies the triceps muscle, and terminates at the outer side of the distal portion of the anterior of the arm (page 206; Plate 216).

Dissection.—Find and trace the circumflex nerve and its branch to the teres minor muscle; also the posterior circumflex artery.

19. Circumflex Nerve.—Plates 161 and 162.—The proximal portion of this nerve was described (page 205) and illustrated (Plate 120), where it presents, anteriorly, at the posterior of the axilla. It appears, posteriorly, in the space bounded by the humerus, the teres minor muscle, the long head of the triceps muscle, and the teres major muscle; after winding around the external surface of the proximal end of the shaft of the humerus its terminal branches distribute to the deltoid muscle entering its internal surface. Its cutaneous branch has been described (page 289) and illustrated (Plate 159).

20. Nerve to the Teres Minor Muscle.—This nerve is given off from the last-described nerve, near the point where the latter appears posteriorly. It takes an internal course to the muscle it supplies, running posteriorly to the proximal end of the long head of the triceps muscle. It is accompanied by a branch from the posterior circumflex artery.

21. Posterior Circumflex Artery.—This artery (venæ comites), a branch from the external portion of the axillary artery (page 206; Plate 120), appears, posteriorly, to the distal side of the circumflex nerve. It distributes to contiguous muscles, but mainly to the deltoid.

Dissection.—Section the supraspinatus muscle (Plate 160), and reflect its internal portion, internally, as in Plate 162. Find and trace the suprascapular artery and nerve.

22. Suprascapular Artery, Plate 162.—This artery (venæ comites) presents posteriorly, at the suprascapular notch of the scapula, where it enters the supraspinous fossa. It distributes to the supraspinatus muscle, and is continued into the infraspinous fossa.

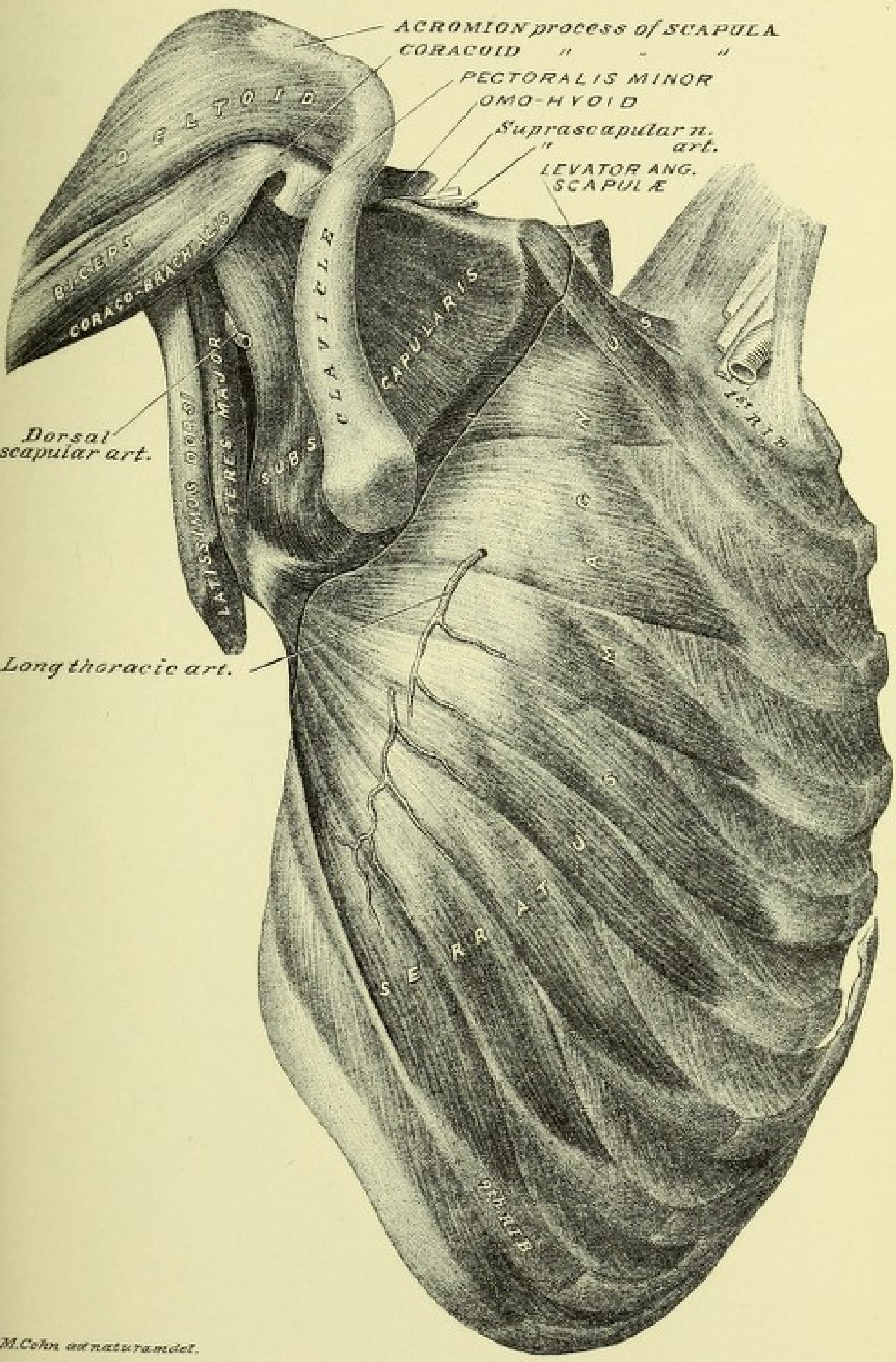
23. Suprascapular Nerve.—This nerve appears, posteriorly, at the suprascapular notch, accompanying the last-described artery. It supplies a branch to the supraspinatus muscle, and a second to the shoulder-joint. It sends a branch into the infraspinous fossa.

Dissection.—Section the infraspinatus and the teres minor muscles (Plate 161). Dissect away their infraspinous fossa portions, and reflect their external and superior portions upon the head of the humerus. Trace the dorsal scapular artery into the infraspinous fossa, also the suprascapular artery, noting their anastomoses. Find and trace the branch of the suprascapular nerve into the infraspinous fossa.

24. Dorsal Scapular Artery, Plates 161 and 162. — This artery (venæ comites), branch of the subscapular artery (page 201; Plates 116, 117, 119, and 120), presents, posteriorly, in the interval between the long head of the triceps muscle, the teres major muscle, and the external border of the body of the scapula. It ramifies in the infraspinous fossa, and along its external border, distributing to the muscles of the fossa, and anastomosing with the infraspinous branch of the suprascapular artery.

25. Suprascapular Artery, Plate 162.—This artery (venæ comites) projects a branch, around the great scapular notch into the infraspinous fossa, which anastomoses with the last-described artery.

26. Nerve to the Infraspinatus Muscle.—This nerve, branch of the suprascapular nerve (page 293), enters the infraspinous fossa with the last-described artery.



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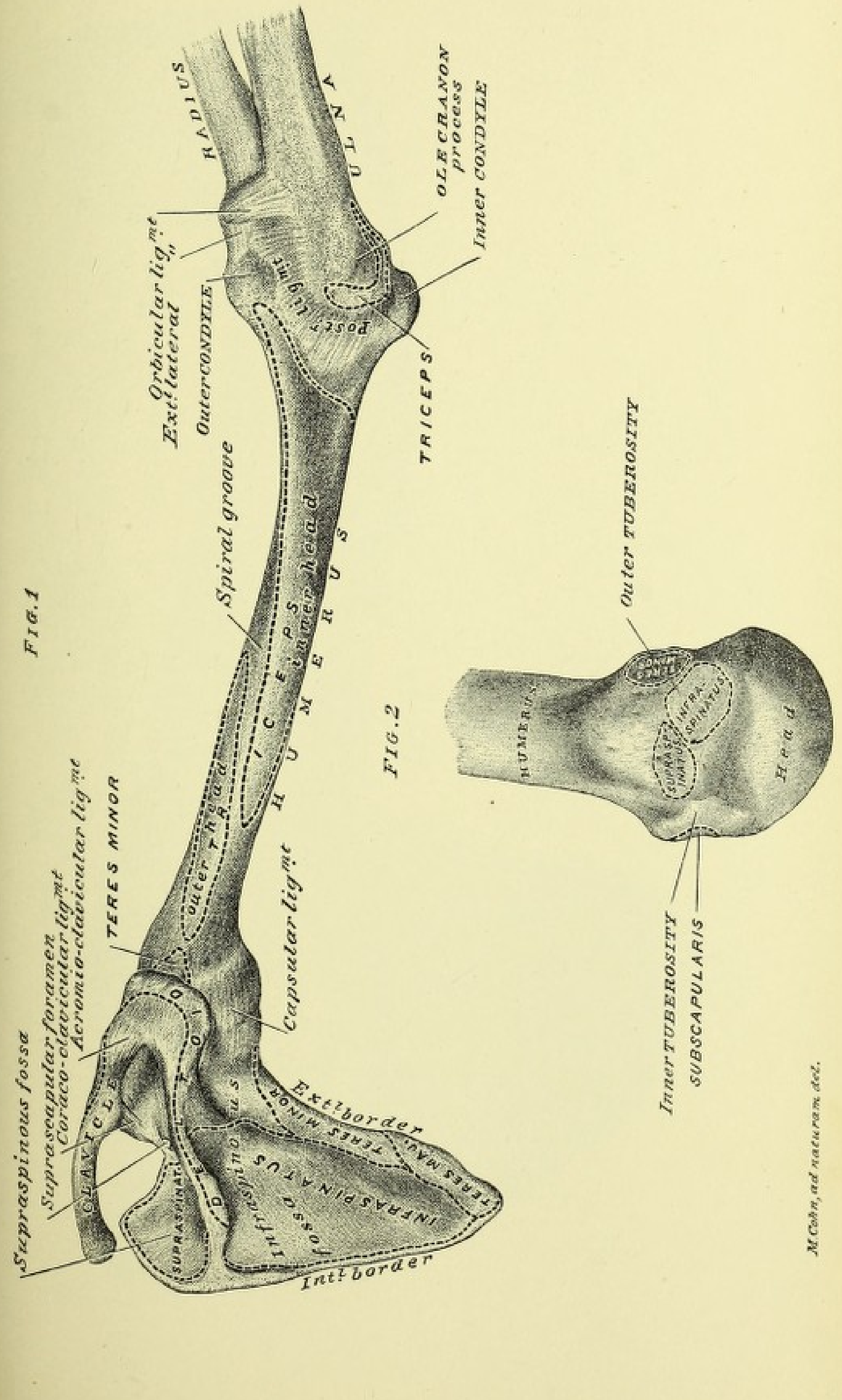

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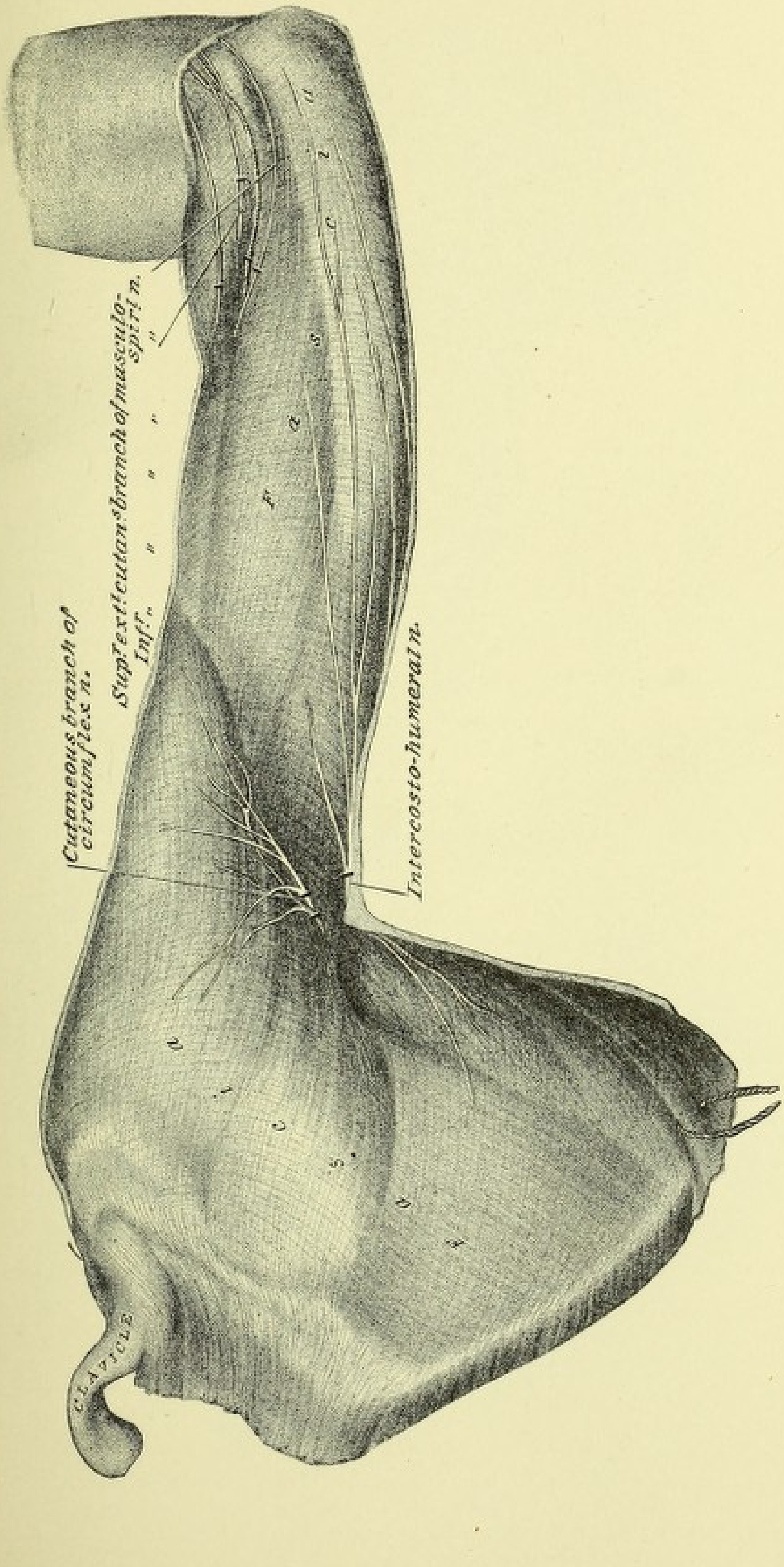

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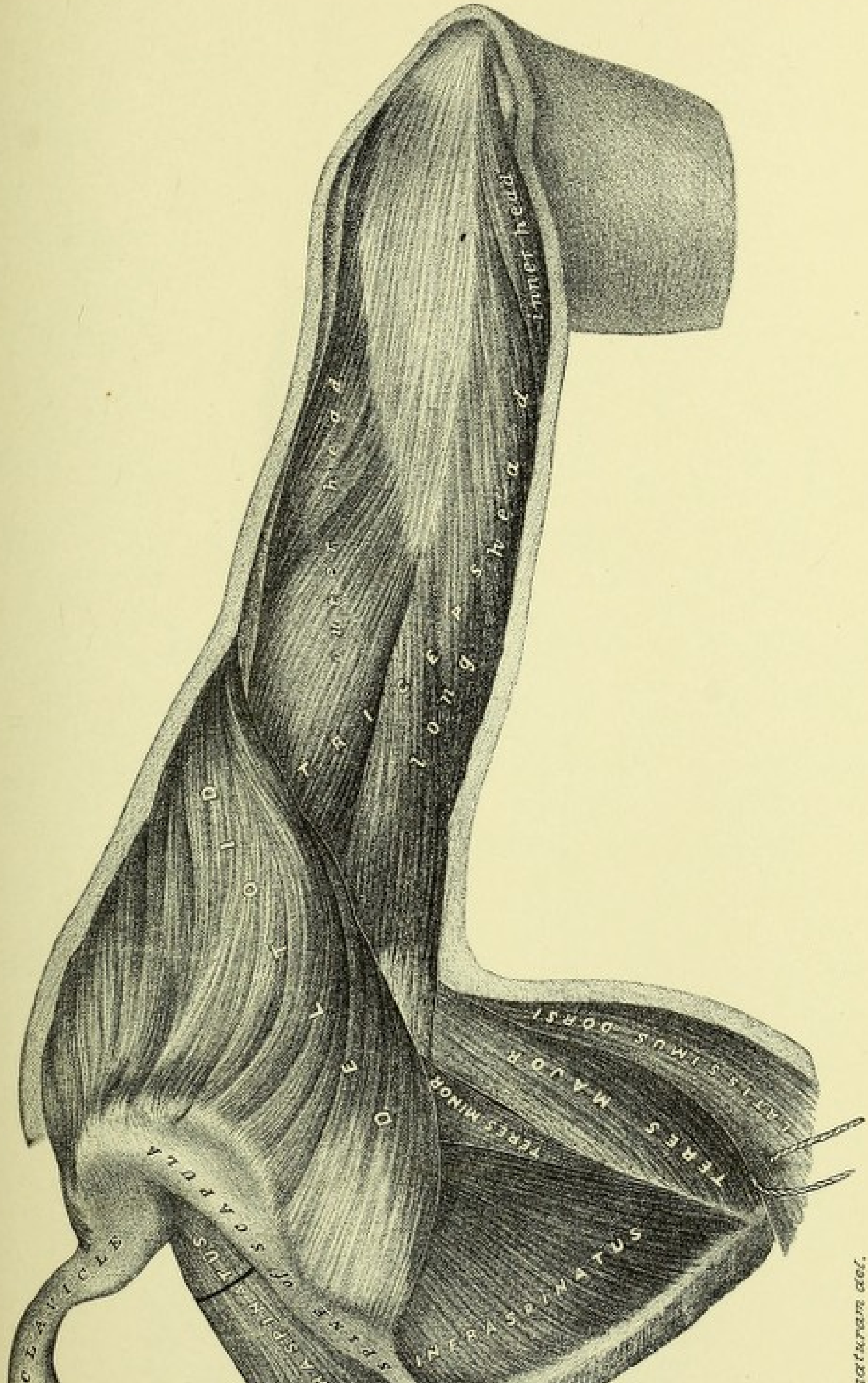

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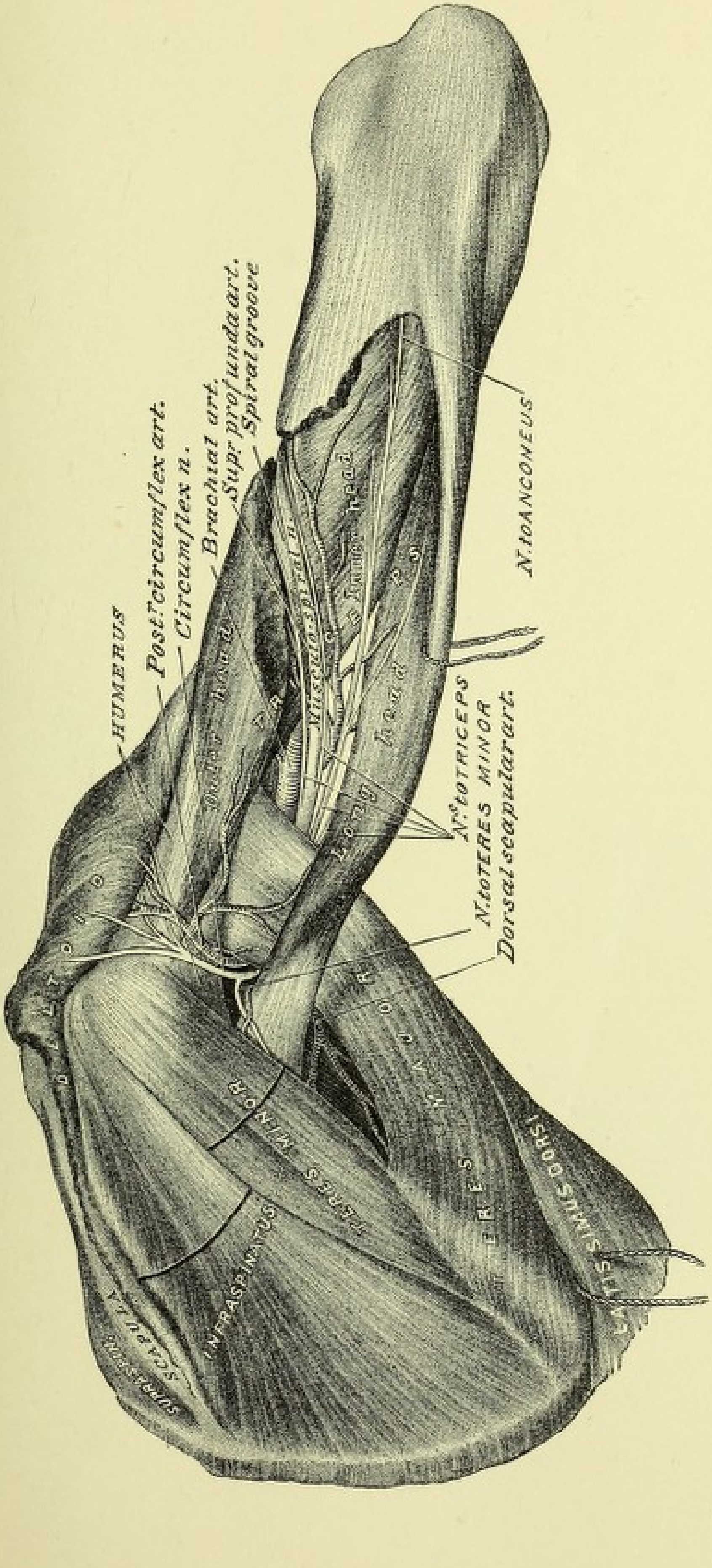

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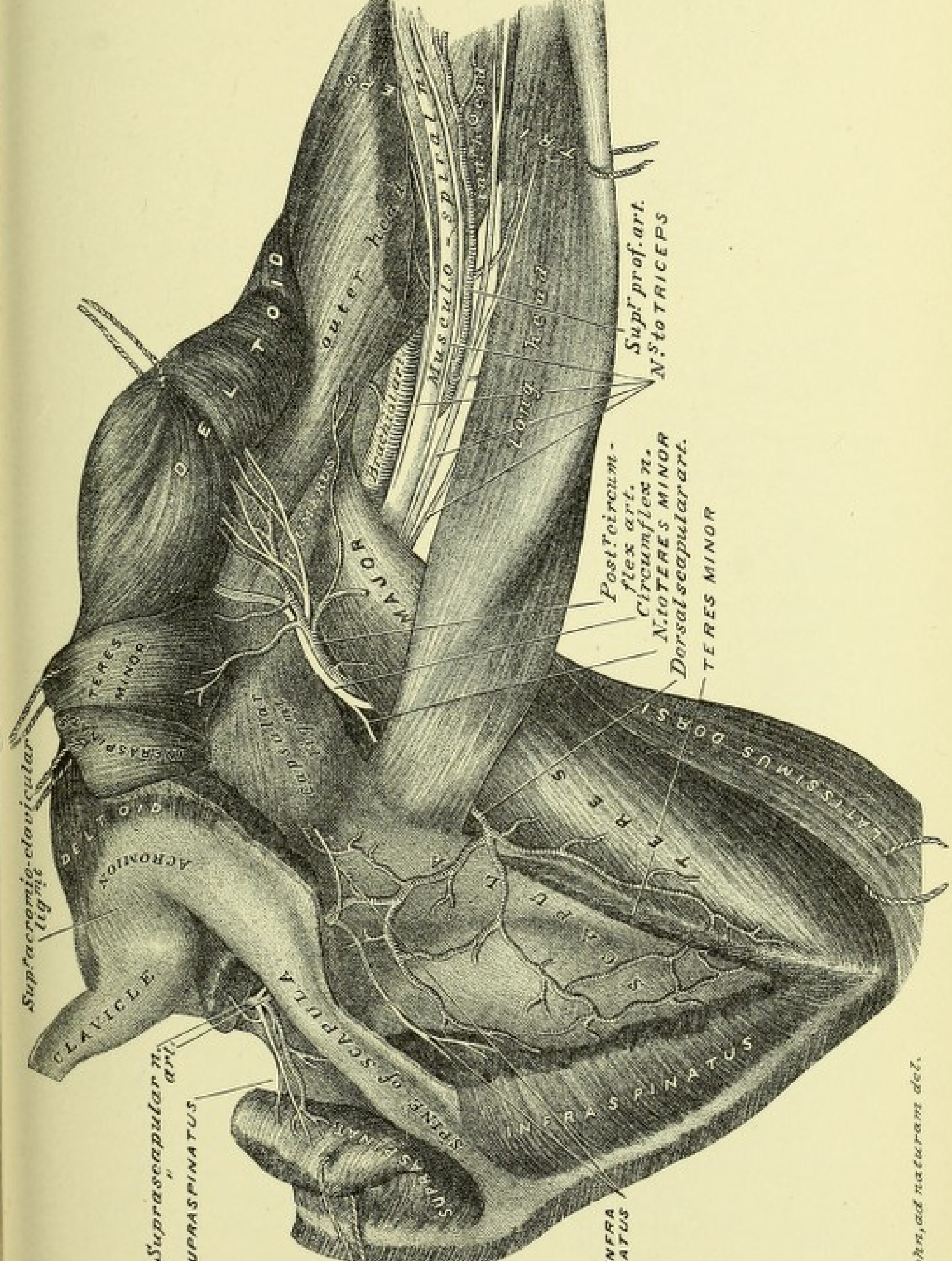

DELTOID
outer head
Musculo-spiral n.
Long head
MAJOR
TERES MINOR
INFRASPINATUS
DELTOID
ACROMION
CLAVICLE
SPINE of SCAPULA
SUPRASPINAT.
INFRASPINATUS
SCAPULA
TERES
LATISSIMUS DORSI
capsular lig.
Supt prof. art.
N.s to TRICEPS
Post.r circum-
flex art.
Circumflex n.
N. to TERES MINOR
Dorsal scapular art.
TERES MINOR
Supraacromio-clavicular
ligmt
Suprascapular n.
art.
N. to SUPRASPINATUS
N.s to INFRA
SPINATUS
M.Cohn, ad naturam del.

TWENTY-FIRST DISSECTION.

POSTERIOR OF ELBOW, FOREARM, HAND, AND DIGITS.

DISSECTION.—Extend the elbow, supinate the forearm, extend the wrist and digits, and place the forearm and hand with their posterior surfaces uppermost.

Terms of Relation.—Those used in describing the elbow and forearm are the general terms (page 2) *anterior* and *posterior;* and the special terms *proximal*, *distal*, *inner*, and *outer*. For the hand and digits the following special terms are used: *proximal*, *distal*, *dorsal*, *inner*, *outer*, and *lateral*.

Bones and Bone Areas for Muscle Attachments, Plate 163.—The posterior surfaces of the distal end of the humerus, of the ulna and radius, and those of the bones of the carpus, metacarpus, and digits (phalanges, phalangines, and phalangettes) form the osseous plane of this dissection. The posterior surfaces of all these bones, except those of the carpus, present areas for muscle attachments.

DISSECTION.—Make skin incisions 1, 2, 3, 4, 5, 6, and 7 of Figure 13 (if the dissection of the posterior of the arm has preceded, this dissection incision 3 will not be required); reflect flaps as indicated. If the anterior of the forearm and hand has been dissected, the skin will have to be removed; otherwise, the skin flaps may hang off from the sides of the limb. Find a bursa upon the olecranon process of the ulna; trace the veins and nerves in the subcutaneous plane of the forearm and hand.

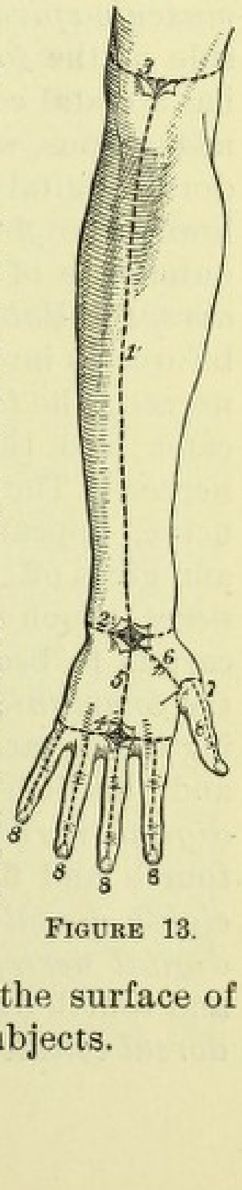


FIGURE 13.

1. Bursa, Plate 164.—A bursa presents at the surface of the olecranon, which varies in size in different subjects.

2. Posterior Ulnar and Radial Veins.—A variable number of subcutaneous veins present upon the dorsal surface of the hand, which receive tributary veins from the digits. The *posterior ulnar vein* has a proximal course from the dorsal veins of the hand through the inner half of the forearm ; its proximal end winds to the anterior surface of the elbow, where it joins the median-basilic vein (page 208 ; Plate 123). The *posterior radial vein* has a proximal course from the dorsal veins of the hand, through the outer half of the forearm ; its proximal end winds to the anterior surface of the elbow, where it joins the median-cephalic vein (page 208 ; Plate 123).

3. Posterior Cutaneous Nerves of the Forearm, Hand, and Digits.—Along the inner side of the forearm posterior branches of the *internal cutaneous* nerve present (page 208 ; Plate 123). In the proximal portion of the outer side of the forearm the *superior* and *inferior external cutaneous branches of the musculo-spiral* nerve ramify. In the distal third of the outer side of the forearm the *radial nerve* appears posteriorly ; it has a distal course over the carpus to the dorsal surface of the metacarpus, where it breaks up into the first, second, and third dorsal digital nerves. The latter nerves are distributed as follows: the *first dorsal digital nerve* is projected along the outer side of the first metacarpal region, to become the *first dorsal collateral digital nerve ;* the *second digital nerve* bifurcates into the *second* and *third dorsal collateral digital nerves ;* the *third digital nerve* is continued to where it bifurcates into the *fourth* and *fifth dorsal collateral digital nerves.* The *posterior carpal nerve*, branch of the ulnar nerve, appears, posteriorly, at the inner side of the carpus and gives off the following branches: the *sixth dorsal digital nerve*, which is continued along the inner border of the metacarpus to become the *tenth dorsal collateral digital nerve ;* the *communicating nerve*, which bifurcates, its branches crossing the metacarpus to anastomose with the third dorsal digital and the fifth dorsal collateral digital nerves ; the *fifth dorsal digital nerve*, which is projected to the cleft between the fourth and fifth digits, where it bifurcates into the *ninth* and *eighth dorsal collateral digital nerves ;* and the *fourth dorsal digital nerve*, which advances to the cleft between the third and fourth digits, where it bifurcates into the *sixth* and *seventh dorsal collateral digital nerves.*

4. Fascia.—The fascia of the posterior of the forearm is continuous with that of the arm and the anterior of the forearm; that of the dorsal surface of the hand and digits is continuous with that of the posterior of the forearm and that of the palmar surfaces of the hand and the digits.

DISSECTION.—Section the subcutaneous veins and nerves (Plate 164) and clear them from the fascia. Incise the fascia, in the line of skin incision 1 of Figure 13 (page 295), and dissect it from the muscles of the forearm and the tendons upon the metacarpus; preserve the posterior annular ligament (Plate 165).

5. Posterior Annular Ligament, Plates 163 to 166, inclusive.—This is a thickened, oblique, portion of the fascia of the forearm, that crosses the distal ends of the radius and ulna, and the carpus. It is attached to the bony prominences at the sides of the wrist, and septa pass from it to the deep fascia of the carpus (Plates 167 and 168), forming compartments for the run of the tendons of the long extensors, that cross from the forearm to the metacarpus.

6. Compound Extensor Attachment, Plates 163, 165, 167, 168, and 169.—This is formed by the fusion of the proximal ends of the extensor communis digitorum, extensor minimi digiti, extensor carpi ulnaris, extensor carpi radialis brevior, and the supinator brevis muscles, to a common attachment to the outer condyle of the humerus.

7. Extensor Communis Digitorum Muscle, Plates 163, 165, and 166.—This muscle has its proximal attachment to the outer condyle of the humerus, by the compound extensor attachment thereto; it has a distal course through the middle of the forearm to the carpus, where it forms two *initial tendons*, which cross the carpus in a special compartment of the posterior annular ligament; distal to the ligament four *terminal tendons* appear, which are projected across the metacarpus to the dorsal surfaces of the second, third, fourth, and fifth digits, respectively; the one to the fifth digit becomes an *accessory tendon* to the extensor minimi digiti tendon. At the distal portion of the metacarpus transverse *communicating slips* pass between the second and third terminal tendons, and between the third terminal and the accessory tendons. The accessory tendon passes to the fifth digit to fuse with the tendon of the extensor minimi digiti muscle. The continuations of the terminal tendons of this muscle to the dorsal surfaces of the digits second to fifth, inclusive, will be described hereafter.

8. Extensor Minimi Digiti Muscle, Plates 163 and 165.—This muscle has the same proximal attachment as the last-described muscle ; its course through the forearm is parallel with, and to the inner side of it. Its tendon diverges to the inner side ; passes through a special compartment of the posterior annular ligament ; crosses the metacarpus to the dorsum of the fifth digit ; and receives the fusion of the accessory tendon from the extensor communis digitorum muscle. The tendon of this muscle, as it presents upon the dorsal surface of the digit, will be described hereafter.

9. Extensor Carpi Ulnaris Muscle, Plates 163, 165, 167, 168 and 169.—This muscle has its proximal attachment to the humerus, by the compound extensor attachment thereto ; it is continued through the forearm, between the last-described muscle to the outer side, and the shaft of the ulna to the inner side ; it crosses the carpus in a special compartment of the posterior annular ligament ; and its distal attachment is to the dorsal surface of the proximal end of the fifth metacarpal bone.

10. Anconeus Muscle.—This triangular muscle has its proximal attachment by a special tendon to the outer condyle of the humerus, at a point internally to the compound extensor attachment ; it expands and passes to its distal attachment at the outer side of the olecranon process of, and the proximal end of the shaft of, the ulna. Its proximal border is parallel with the outer portion of the distal end of the triceps muscle ; its outer border is parallel with the proximal portion of the extensor carpi ulnaris muscle.

Dissection.—Turn the forearm and hand, so that its outer side is uppermost, and let the hand hang semi-pronated. Display the muscles, tendons and artery along the outer side of the forearm, hand and first digit.

11. Supinator Longus Muscle, Plates 163, and 165 to 169, inclusive.—This muscle was described (page 211) and illustrated (Plates 121 and 125) as it appears at the anterior of the forearm. At the outer side of the forearm (Plate 166) it lies anteriorly to, and parallel with, the extensor carpi radialis longior muscle.

12. Extensor Carpi Radialis Longior Muscle, Plates 121, 163 and 165 to 169, inclusive.—This muscle was before referred to (page 211), and illustrated (Plate 125); it has its proximal attachment to the outer condyloid ridge of the humerus (Plates 121 and 163), immediately proximal to the outer condyle of that bone; the belly of the muscle lies to the outer side, and parallel with, the extensor communis digitorum muscle, to about the middle of the forearm, where the latter diverges toward the inner side of the limb. Its tendon passes anteriorly to the tendons of the extensor ossis metacarpi pollicis and extensor primi internodii pollicis muscles; it then crosses the carpus in a compartment of the posterior annular ligament, and passes to its distal attachment, at the dorsal surface of the proximal end of the second metacarpal bone.

13. Extensor Ossis Metacarpi Pollicis and Extensor Primi Internodii Pollicis Muscles, Plates 165 and 166.—Portions of these two muscles cross obliquely the outer side of the distal half of the forearm, emerging from between the extensor communis digitorum and the extensor carpi radialis longior muscles.

14. Radial Artery, Plates 165 to 169, inclusive.—This artery (venæ comites) presents in the outer third of the posterior surface of the carpus. It appears, posteriorly, from the anterior of the tendons of the extensor primi internodii pollicis and the extensor ossis metacarpi pollicis muscles (Plate 166); thence, it is continued to the proximal portion of the first intermetacarpal space, where it passes to the palmar region, between the attachments of the dorsal portion of the first dorsal interosseous muscle. In this portion of its course it gives off branches, which will be described hereafter.

Dissection.—Section (Plates 165 and 166) the supinator longus, extensor carpi radialis longior, extensor communis digitorum, and extensor minimi digiti muscles; reflect the proximal and distal portions of the muscles. In reflecting the proximal portions of the two latter muscles, find and cut the branch to them of the posterior interosseous nerve, which enters their anterior surfaces; in reflecting their distal portions, cut their tendons out of the compartments of the posterior annular ligament. Slit open the compartment in the posterior annular ligament for the tendon of the extensor carpi ulnaris muscle. Find the trunk of the posterior interosseous nerve, and trace the branches of the same to the several muscles they supply. Find the posterior interosseous artery and follow its branches to contiguous muscles. Clear the surface of the extensor carpi radialis brevior muscle, following it to its distal attachment.

15. Posterior Interosseous Nerve, Plate 167.—This nerve emerges, posteriorly, from its perforation of the supinator brevis muscle. It gives off branches to the following muscles: to the extensor carpi ulnaris; to the extensor communis digitorum and extensor minimi digiti, which was found and cut in the reflection of the proximal portions of the muscles; to the extensor ossis metacarpi pollicis; to the extensor indicis; to the extensor primi internodii pollicis; and to the extensor secundi internodii pollicis. The trunk of the nerve has a distal course, successively, upon the supinator brevis, the extensor ossis metacarpi pollicis, and the extensor primi internodii pollicis muscles; it then disappears anteriorly to the extensor secundi internodii pollicis muscle.

16. Posterior Interosseous Artery, Plates 167 and 168.—This artery (venæ comites) appears, posteriorly, from between the supinator brevis and the extensor ossis metacarpi pollicis muscles. It gives off branches to contiguous muscles.

17. Extensor Carpi Radialis Brevior Muscle, Plates 163, and 165 to 169, inclusive.—This muscle lies parallel with, and anteriorly to, the extensor carpi radialis longior muscle (page 299; Plate 167); its proximal attachment is, to the humerus, by the compound extensor attachment (page 297); it runs through the forearm upon the outer and posterior surfaces of the shaft of the radius; in the distal half of the forearm its tendon appears at the inner side of, and in a plane anteriorly to, that of the extensor carpi radialis longior; it crosses the posterior surface of the carpus, with the latter tendon, in a compartment of the posterior annular ligament; its distal attachment is to the dorsal surface of the proximal end of the third metacarpal bone.

Dissection.—Section (Plate 167) and cut away the several branches of the posterior interosseous nerve, also, the distal branches of the posterior interosseous artery. Clear the surfaces of the extensor indicis and the extensor secundi internodii pollicis muscles ; cut open the posterior annular ligament compartment of the latter.

18. Extensor Indicis Muscle, Plates 163, 165, 167, and 168. —This muscle has its proximal attachment to the outer side of the distal third of the shaft of the ulna ; it is projected across the carpus in the same compartment of the posterior annular ligament as the tendons of the extensor communis digitorum muscle, anteriorly to the latter ; it crosses the metacarpus obliquely, to reach the second or index digit, passing along the inner side of the terminal tendon, to that digit, of the extensor communis digitorum muscle. Its course upon the dorsum of the second digit will be described hereafter.

19. Extensor Secundi Internodii Pollicis Muscle, Plates 163, and 165 to 169, inclusive.—This muscle is attached, at its proximal end, to the outer side of the distal portion of the middle third of the shaft of the ulna, proximal to the attachment of the last-described muscle. It has a distal and oblique course to the outer third of the posterior surface of the carpus, where it runs through a compartment of the posterior annular ligament, common to it and the tendons of the extensor carpi radialis longior and brevior muscles ; it lies posteriorly to the latter muscles. Its tendon passes upon the dorsal surface of the first metacarpal bone and phalanx of the first digit, to reach the distal attachment of the muscle, at the dorsal surface of the base of the phalangette of the first digit.

Dissection.—Section (Plate 167) the extensor carpi radialis brevior, the extensor carpi ulnaris, the extensor indicis and the extensor secundi internodii pollicis muscles ; reflect the proximal and distal portions of the same. Follow the trunk of the posterior interosseous nerve, to where it passes anteriorly to the deep fascia upon the posterior surface of the carpus. Find and trace the perforating branches of the anterior interosseous artery. Clear the surfaces of the extensor primi internodii pollicis, the ossis metacarpi pollicis (slit open the compartment of the posterior annular ligament lodging the tendons of these two muscles), and the supinator brevis muscles. Clear the deep fascia upon the dorsum of the carpus and metacarpus.

20. Posterior Interosseous Nerve, Plate 168.—The proximal portion of this nerve was before described (page 300). From the point where it passed anteriorly to the extensor secundi internodii pollicis muscle it has a distal course, to where it passes anteriorly to the deep fascia upon the posterior surface of the carpus.

21. Perforating Branches of the Anterior Interosseous Artery, Plates 168 and 169.—The anterior portion of this artery was described (page 235) and illustrated (Plate 130 and Fig. 1, Plate 134). It projects three perforating branches through the radio-ulnar interosseous ligament, which appear, posteriorly, between the ligament and the deep muscles of the posterior of the forearm, supplying the latter. The distal and largest branch has a distal course, accompanying the posterior interosseous nerve, to where it passes anteriorly to the deep fascia upon the posterior of the carpus.

22. Extensor Primi Internodii Pollicis Muscle, Plates 163, and 165 to 169, inclusive.—This muscle is attached, at its proximal end, to the outer side of the proximal portion of the distal third of the shaft of the radius; it has an oblique course posteriorly to the tendons of the extensor carpi radialis longior and brevior muscles. Its tendon runs in a compartment of the posterior annular ligament, with the tendon of the extensor ossis metacarpi pollicis muscle; and is continued, upon the dorsal surface of the first metacarpal bone, to reach the distal attachment of the muscle, at the dorsal surface of the base of the phalanx of the first digit.

23. Extensor Ossis Metacarpi Pollicis Muscle, Plates 121, 163, and 165 to 169, inclusive.—The distal and anterior portion of this muscle was described (page 212) and illustrated (Plates 125, 127, and 129 to 133, inclusive). Its proximal attachments are: to the outer side of the posterior surface of the middle third of the shaft of the ulna, proximal to that of the last-described muscle; to the inner side of the posterior surface of the middle third of the shaft of the radius; and to the posterior surface of the intervening portion of the radio-ulnar interosseous ligament. The muscle has a distal and oblique course to the outer side of, and posteriorly to, the tendons of the extensor carpi radialis brevior and longior muscles. Its tendon passes through a compartment of the posterior annular ligament, it then winds to the outer side of the anterior surface of the carpus, and is attached to the anterior and outer surfaces of the proximal end of the first metacarpal bone (Plate 121).

24. Supinator Brevis Muscle, Plates 121, 163, 167, 168, and 169.—The anterior portion of this muscle was described (page 236), and illustrated (Plates 126, 128, 129, 130, and Fig. 1, Plate 134). The muscle, posteriorly, covers the proximal portion of the shaft and neck of the radius, bridging therefrom to the outer condyle of the humerus and the outer side of the proximal end of the shaft of the ulna. It is attached as follows: anteriorly (Plate 121), to the outer side of the coronoid process and proximal end of the shaft of the ulna, and to the outer side of the neck and the proximal end of the shaft of the radius; posteriorly (Plate 163), to the outer condyle of the humerus by the compound extensor attachment, to the outer side of the proximal end of the shaft of the ulna, and to the posterior surface and outer side of the neck and the proximal end of the shaft of the radius.

25. Deep Fascia of the Posterior Surface of the Wrist and Metacarpus, Plates 165, 167, and 168.—A layer of deep fascia invests the posterior surfaces of the distal radio-ulnar articulation, the carpus, and the metacarpus. The partitions of the compartments of the posterior annular ligament bridge between the latter ligament and this deep fascia.

Dissection.—Section (Plate 168) the posterior interosseous nerve and remove the portion between the cuts. Cut the middle perforating branch of the anterior interosseous artery. Section (Plate 167) the distal ends of the extensor primi internodii pollicis, and the extensor ossis metacarpi pollicis muscles; reflect their proximal portions and cut them from their attachments, as in Plate 169. Dissect away the ulnar attachments of the extensor secundi internodii pollicis and the extensor indicis muscles. Cut the tendons of the extensor carpi radialis longior, extensor carpi radialis brevior, and extensor carpi ulnaris at their distal ends (Plate 168). Clear the radial attachment of the pronator radii teres muscle. Cut away the ulnar portion of the supinator brevis muscle and trace, in a proximal direction, the posterior interosseous recurrent branch of the posterior interosseous artery. Clear away the deep fascia from the distal ends of the radius and ulna, and from the carpus and metacarpus. Display the distal end of the posterior interosseous nerve and its terminal ganglion; the distal end of the third perforating branch of the anterior interosseous artery, following it to its anastomosis; the posterior carpal branches of the ulnar and radial arteries; the dorsal digital arteries; the perforating arteries; the dorsal collateral digital arteries; and the dorsal interosseous muscles.

26. Pronator Radii Teres Muscle, Plates 163, 168 and 169. —The anterior portion of this muscle was before described (pages 212 and 224), and illustrated (Plates 121, 125, 126, 128, 129, 130, and Fig. 1, Plate 134). Its distal attachment presents at the outer side and posterior surface, of the shaft of the radius, distal to the attachment of the supinator brevis muscle, and to the outer side of the radial attachment of the extensor ossis metacarpi pollicis muscle.

27. Posterior Interosseous Recurrent Artery, Plate 169.— This artery (venæ comites) has a proximal course from its giving off from the posterior interosseous artery, along the outer side of the ulna, and anteriorly to the posterior portion of the supinator brevis muscle. It distributes to the outer side of the elbow, contributing to its peri-articular plexus.

28. Posterior Interosseous Nerve.—The distal end of this nerve may be traced between the deep fascia and the posterior surface of the wrist, to its termination in a ganglion-like enlargement, from which branches are given off to the wrist-joint.

29. Third Perforating Branch of Anterior Interosseous Artery, Plates 168 and 169.—This artery (venæ comites) may be traced, between the deep fascia and the posterior surface of the wrist, to where it anastomoses with the posterior carpal branch of the ulnar artery.

30. Posterior Carpal Branch of Ulnar Artery, Plate 169. —This branch appears, posteriorly, at the inner side of the carpus; it gives off two carpal branches and the sixth dorsal digital artery.

31. Posterior Carpal Branches of the Radial and Ulnar Arteries, and the Posterior Carpal Arches.—There are two (sometimes only one) posterior carpal arterial arches (venæ comites), a proximal and a distal, across the posterior of the carpus; they are formed by the anastomoses of the posterior carpal branches of the radial and the ulnar arteries. The proximal arch receives anastomosing branches from the third perforating branch of the anterior interosseous artery. The distal arch gives off recurrent branches to the carpus; its distal branches are the third, fourth, and fifth dorsal digital arteries.

32. Dorsal Digital Arteries.—These arteries (venæ comites) are six in number: the first and second, from the radial artery; the third, fourth, and fifth from the distal posterior carpal arch; the sixth is the continuation of the posterior carpal branch of the ulnar artery. The first has a distal course along the outer side of the first metacarpal bone; the second to the fifth, inclusive, have a distal course upon the posterior surfaces of the dorsal interosseous muscles; the sixth has a distal course along the inner side of the fifth metacarpal bone.

33. Perforating Arteries.—These arteries (venæ comites) are three in number; they are branches of the deep palmar arch (page 233; Plates 132 and 133), which emerge, posteriorly, between the proximal portions of the metacarpal attachments of the second, third, and fourth dorsal interosseous muscles; they anastomose with the third, fourth, and fifth dorsal digital arteries.

DISSECTION.—Make the skin incisions 8, 8, 8, 8, 8 of Fig. 12 (page 295), and reflect the flaps of skin from the dorsal surfaces of the digits. Display the distributions of the dorsal collateral digital arteries and nerves, also those of the dorsal branches of the palmar collateral digital arteries and nerves.

34. Dorsal Collateral Digital Arteries, Plate 169; Fig. 1, Plate 170.—These arteries (venæ comites) are ten in number, two to each digit; they distribute, respectively, to the dorsal halves of the lateral surfaces of the phalangeal segments of the digits. The *first*, at the outer side of the first digit, is the continuation of the first dorsal digital artery; the *second* to *ninth*, inclusive, result from the bifurcation of the dorsal digital arteries, second to fifth, inclusive; the *tenth* is the continuation of the sixth digital artery.

35. Dorsal Collateral Digital Nerves, Plate 164; Fig. 1, Plate 170.—These nerves, described (page 296), distribute to the digits as do the last-described arteries.

36. Dorsal Branches of the Palmar Collateral Digital Arteries, Fig. 1, Plate 170.—These arteries, of a digit, appear posteriorly at the sides of the phalangine segment; they have a distal course along the dorsal halves of the lateral surfaces of the phalangine and phalangette segments, and distribute to the dorsal surface of the digit and to the matrix of the nail.

37. Dorsal Branches of the Palmar Collateral Digital Nerves.—These nerves, of a digit, appear posteriorly with, and distribute to the same areas as, the last-described arteries.

DISSECTION.—Clear the surfaces of the digital portions of the tendons of the extensor communis digitorum, the extensor minimi digiti, and the extensor indicis muscles. Follow to their distal attachments the lumbricales, the palmar interosseous, and the dorsal interosseous muscles. Demonstrate the compound digital extensor aponeuroses of the digits, second to fifth, inclusive.

38. Extensor Communis Digitorum Muscle, Plates 163 and 170.—The terminal tendons of this muscle pass to the dorsal surfaces of the second, third, fourth, and fifth digits. A given tendon is projected upon the dorsal surface of a metacarpo-phalangeal articulation, where it has lateral expansions upon the sides of the joint, which blend with the palmar ligament of the joint ; it advances upon the phalanx of the digit, where it contributes to the compound digital extensor aponeurosis.

39. Extensor Indicis Muscle, Plates 165, 167, and Fig. 2, Plate 170.—The tendon of this muscle is projected to the dorsal surface of the second or index digit, where it contributes to its compound digital extensor aponeurosis.

40. Extensor Minimi Digiti Muscle, Plate 165.—The tendon of this muscle and the accessory terminal tendon of the extensor communis digitorum muscle are projected to the dorsal surface of the fifth or minim digit, where they contribute to the compound digital extensor aponeurosis of the digit.

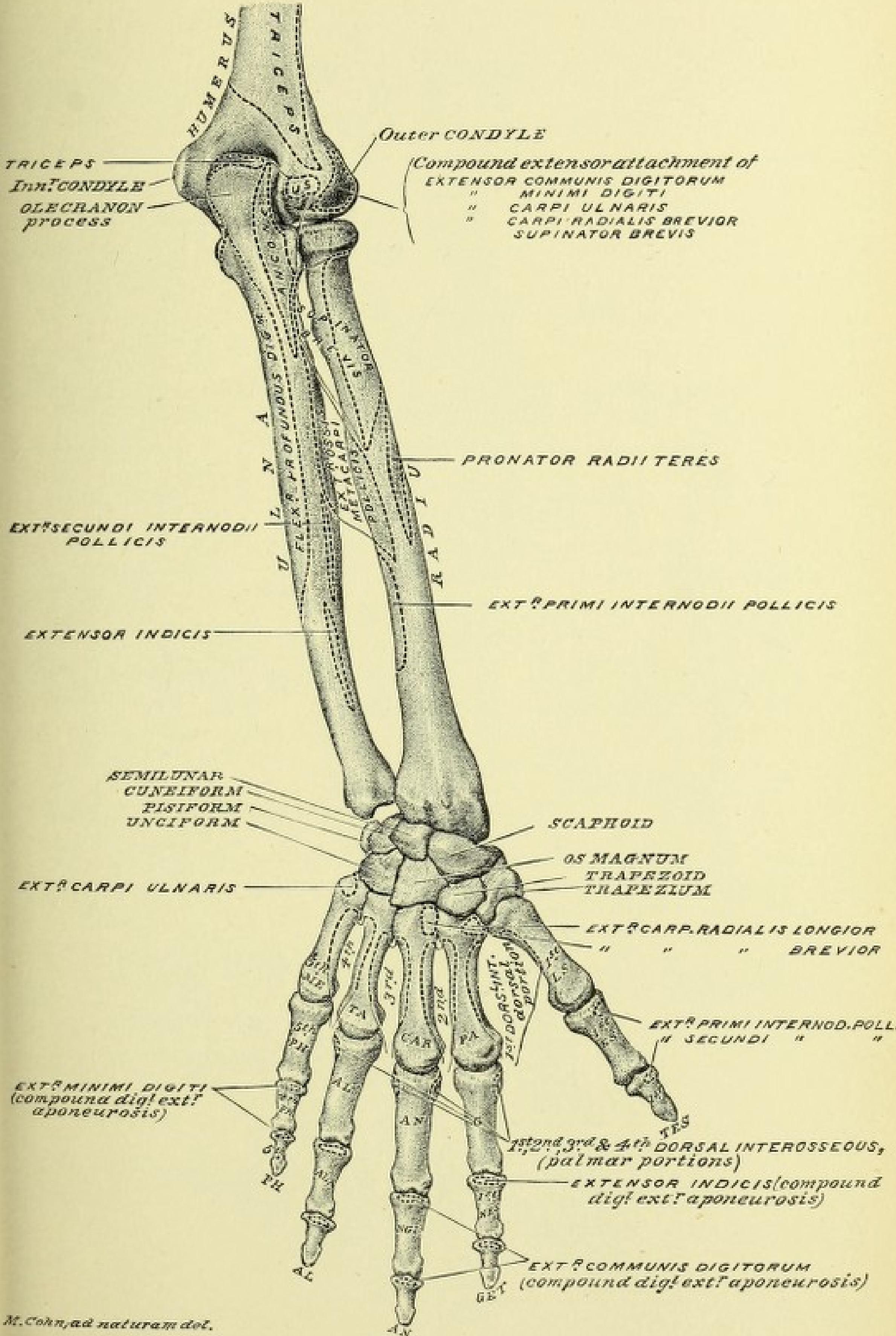
41. Lumbricales Muscles, Figs. 1, 2, and 3, Plate 170.—The anterior or palmar portions of these four muscles have been described (pages 221, 222, 223, and 230) and illustrated (Plates 127, 129, 131, 132, and 133). Their distal ends wind over the outer sides of the metacarpo-phalangeal articulations and bases of the phalanges of the digits, second to fifth, inclusive, to where they end in a fibrous expansion (Fig. 3, Plate 170), which contributes to the compound digital extensor aponeurosis of the digits, second to fifth, inclusive.

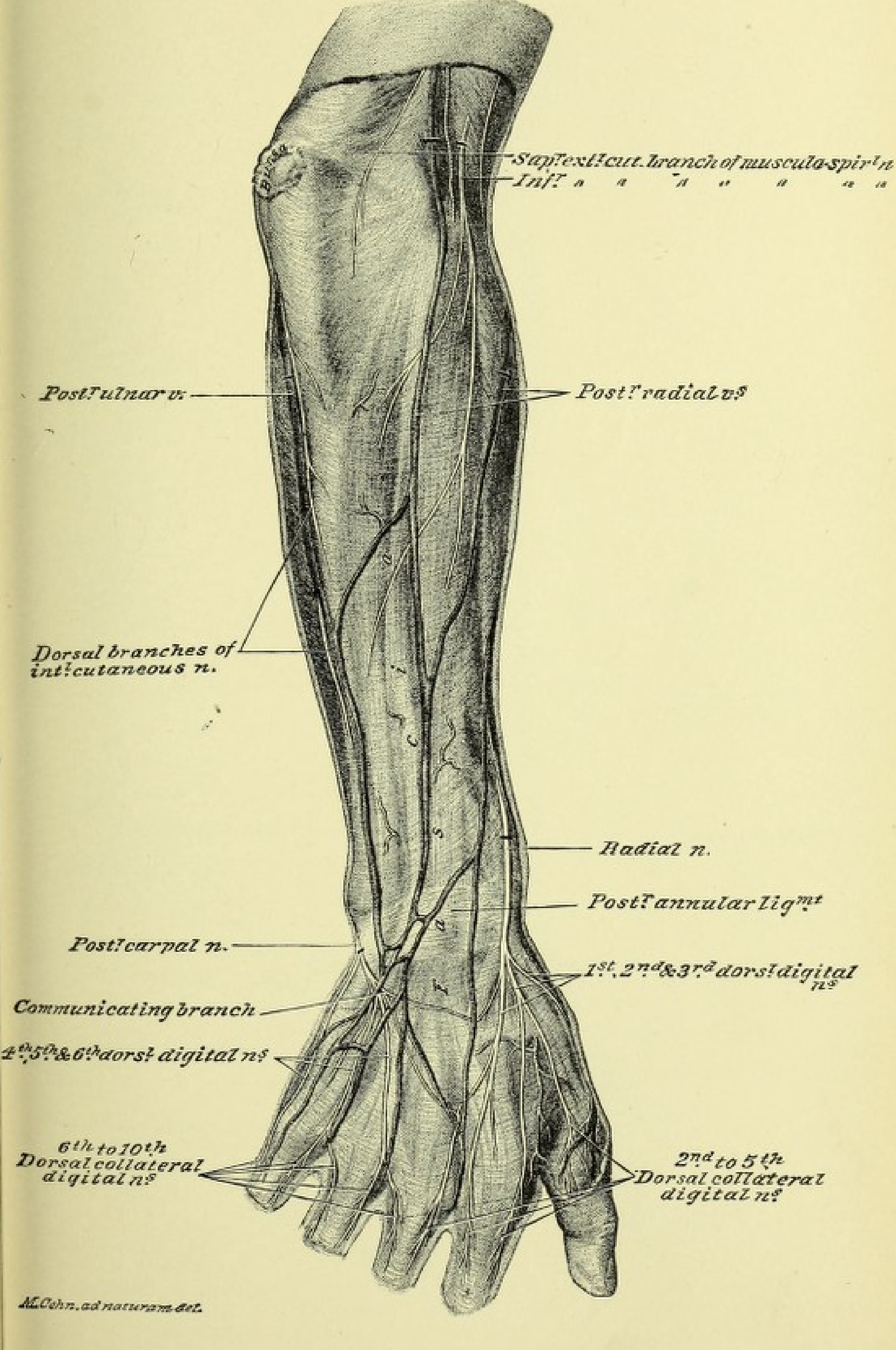
42. Palmar Interosseous Muscles, Figs. 1 and 4, Plate 170.—The anterior or palmar surfaces of these three muscles have been described (page 234) and illustrated (Plates 122, 132, and

133). Their distal ends are projected along the inner side of the second, and the outer sides of the fourth and fifth metacarpo-phalangeal articulations, respectively, to where they end in fibrous expansions, which fuse with, and contribute to, the compound digital extensor aponeuroses of the second, fourth, and fifth digits, respectively. As a tendon of one of these muscles passes a metacarpo-phalangeal joint, it sends a slip to the palmar ligament of the joint (Fig. 4, Plate 170).

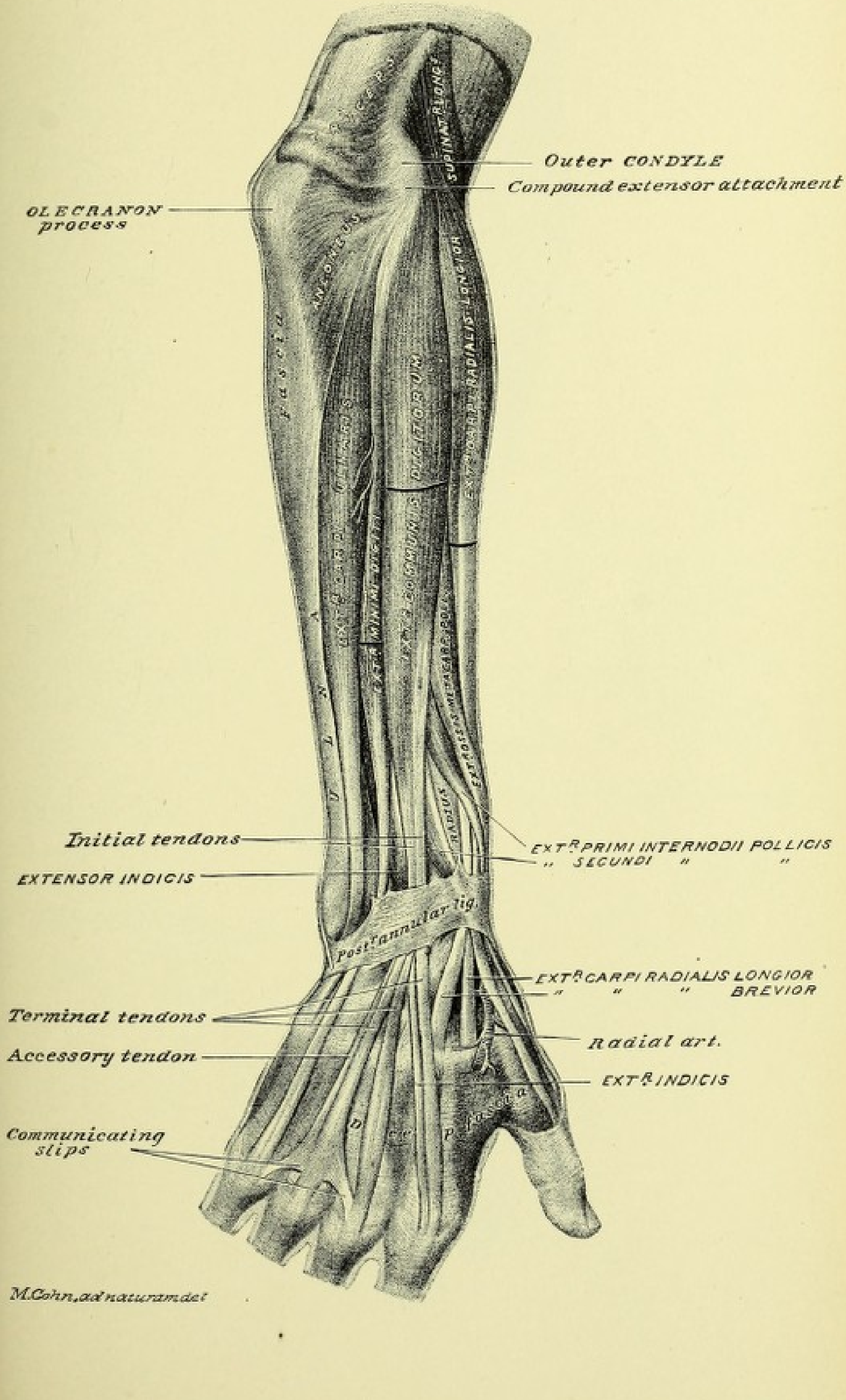
43. Dorsal Interosseous Muscles, Plates 122, 163, and 169; Figs. 1, 2, and 3, Plate 170.—The palmar surfaces of these four muscles have been described (page 234) and illustrated (Plates 122, 132, and 133). In demonstrating their distal ends (Fig. 3, Plate 170), each muscle will be found to have a palmar and a dorsal portion. The *palmar portion* has its proximal attachment to the palmar half of the lateral surface of a metacarpal bone (Plate 122), and its distal attachment to the same side of the base of the phalanx of the corresponding digit (Fig. 3, Plate 170). The *dorsal portion* has proximal attachments to the dorsal halves of the lateral surfaces of the two metacarpal bones bounding the intermetacarpal space in which the muscle is lodged (Plate 163); the two proximal attachments blend into a plane of muscle, which bridges the intermetacarpal space (Plate 169); the portion narrows to a tendon, which crosses the side of the metacarpo-phalangeal articulation of the digit, then expands and fuses into the compound digital extensor aponeurosis of the digit.

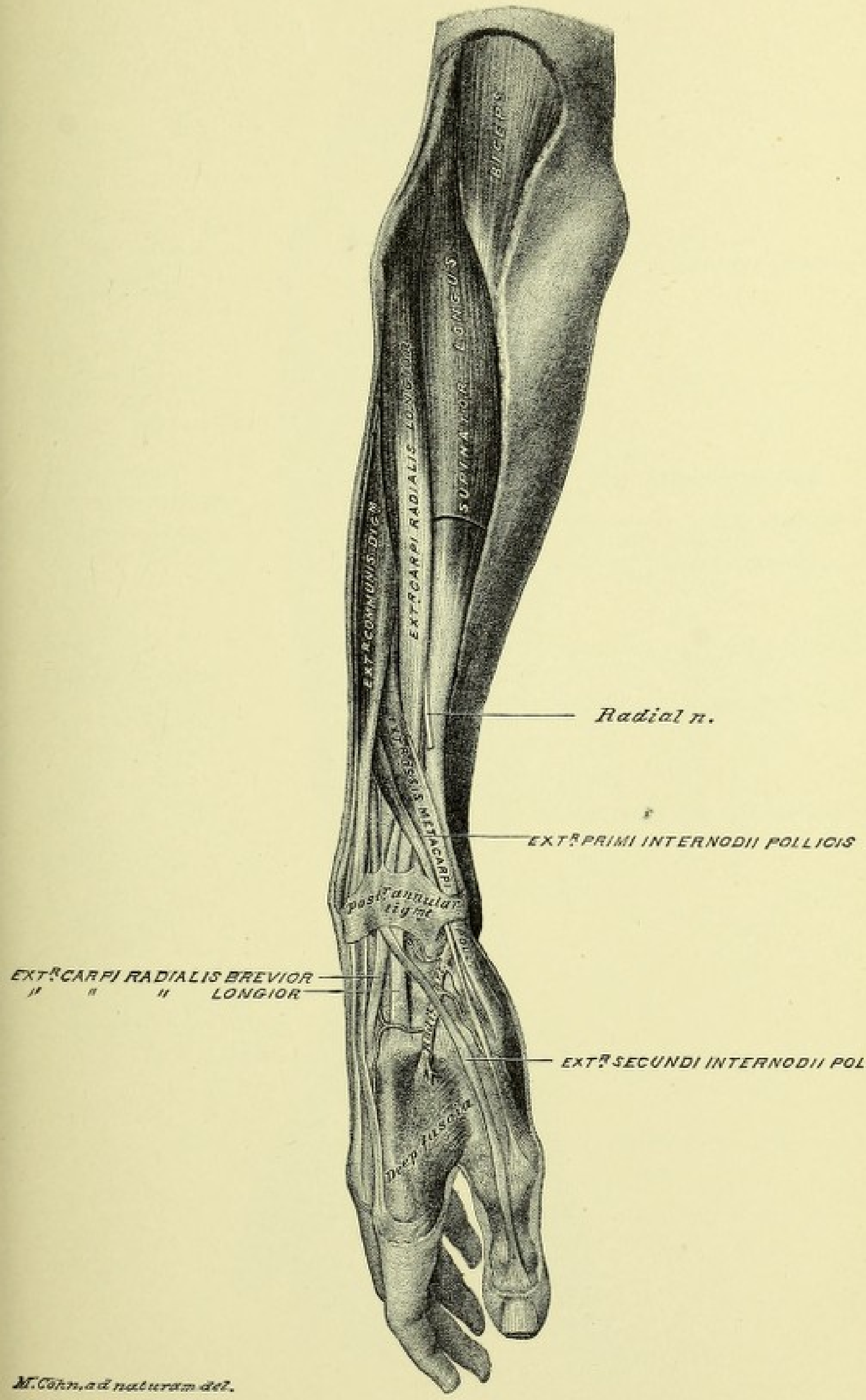
44. Compound Digital Extensor Aponeuroses, Plates 163 and 170.—Upon the dorsum of each digit, second to fifth, inclusive, is an aponeurotic expansion, formed by the fusion of the tendons of the digital extensors, the lumbricales, the palmar interosseous, and the dorsal interosseous muscles. The tendons of the three latter muscles are, respectively, received at the lateral borders of the extensor tendons, in the phalanx segments of the digits. That of the *second digit* is formed by (Fig. 2, Plate 170): a terminal tendon of the extensor communis digitorum muscle; the tendon of the extensor indicis muscle; the tendon of the dorsal portion of the first dorsal interosseous muscle and that of the first lumbricalis muscle, at the outer side; the tendon of the first palmar interosseous muscle, at the inner side. The aponeurosis of the *third digit* results from the fusion of: a terminal tendon of the extensor communis digitorum muscle; the tendon of the dorsal portion of the second dorsal interosseous muscle, and that of the second lumbricalis muscle, at the outer side; the tendon of the dorsal portion of the dorsal interosseous muscle—at the inner side. That of the *fourth digit* is contributed to (Fig. 1, Plate 170) by: a terminal tendon of the extensor communis digitorum muscle; the tendon of the second palmar interosseous muscle, and that of the third lumbricalis muscle, at the outer side; the tendon of the dorsal portion of the fourth dorsal interosseous muscle, at the inner side. The aponeurosis of the *fifth digit* is formed by: the tendon of the extensor minimi digiti muscle with the accessory tendon of the extensor communis digitorum muscle; the tendon of the third palmar interosseous muscle, and that of the fourth lumbricalis muscle, at the outer side. The aponeurosis of a digit is broadest in its phalanx portion, and opposite the distal portion of that bone it trifurcates; the *middle slip* of the trifurcation is attached to the base of the phalangine; the *lateral slips* are projected upon the phalangine of the digit, where they blend into one slip, which is continued to its attachment to the base of the phalangette of the digit. As the aponeuroses cross the digital joints they lie upon the posterior ligaments of the latter.


HUMERUS
TRICEPS
Outer CONDYLE
TRICEPS
Innr. CONDYLE
OLECRANON process
Compound extensor attachment of
EXTENSOR COMMUNIS DIGITORUM
" MINIMI DIGITI
" CARPI ULNARIS
" CARPI RADIALIS BREVIOR
SUPINATOR BREVIS
ULNA
RADIUS
PRONATOR RADII TERES
EXTR. SECUNDI INTERNODII POLLICIS
EXTR. PRIMI INTERNODII POLLICIS
EXTENSOR INDICIS
SEMILUNAR
CUNEIFORM
PISIFORM
UNCIFORM
SCAPHOID
OS MAGNUM
TRAPEZOID
TRAPEZIUM
EXTR. CARPI ULNARIS
EXTR. CARP. RADIALIS LONGIOR
" " " BREVIOR
EXTR. PRIMI INTERNOD. POLL.
" SECUNDI " "
EXTR. MINIMI DIGITI (compound dig! ext! aponeurosis)
1st, 2nd, 3rd & 4th DORSAL INTEROSSEOUS, (palmar portions)
EXTENSOR INDICIS (compound dig! ext! aponeurosis)
EXTR. COMMUNIS DIGITORUM (compound dig! ext! aponeurosis)
M. Cohn, ad naturam del.

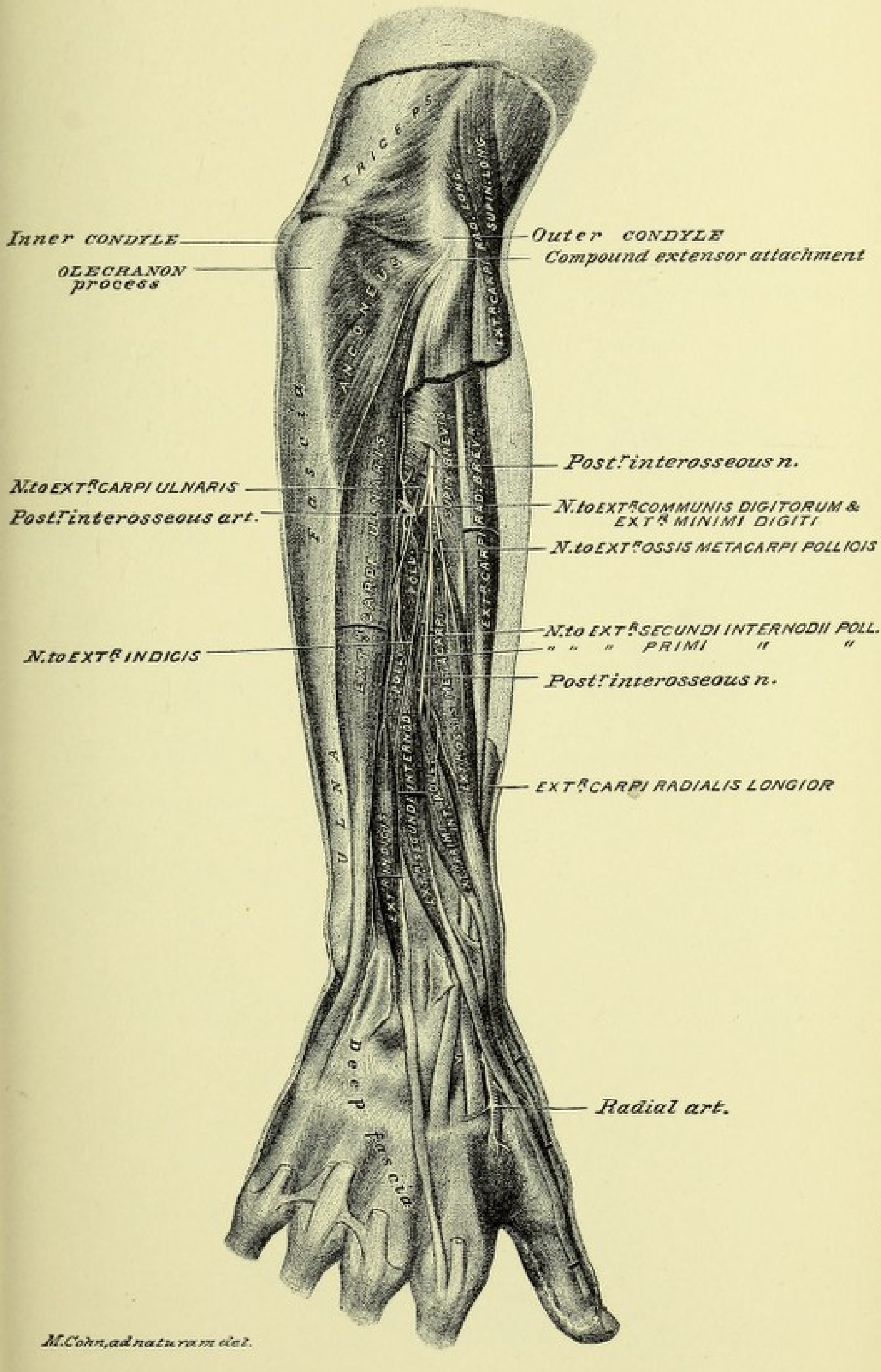


M. Cohn. ad naturam del.


Outer CONDYLE
Compound extensor attachment
OLECRANON process
Initial tendons
EXTENSOR INDICIS
EXTR PRIMI INTERNODII POLLICIS
" SECUNDI " "
Post. annular lig.
EXTR CARPI RADIALIS LONGIOR
" " " BREVIOR
Terminal tendons
Accessory tendon
Radial art.
EXTR INDICIS
Communicating slips
M.Cohn, ad naturam del.



M. Cohn, ad naturam del.



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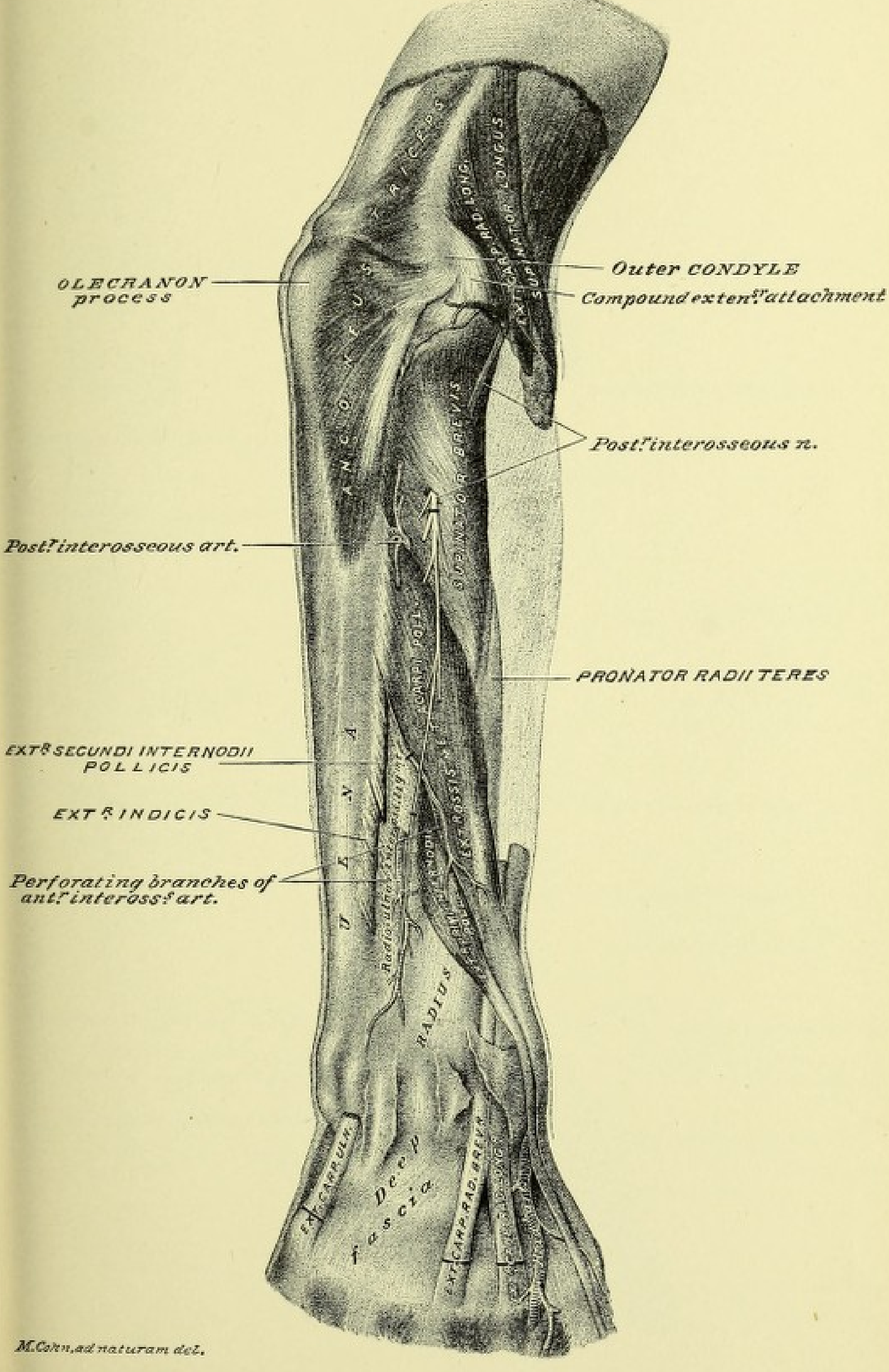

M. Cohn, ad naturam del.

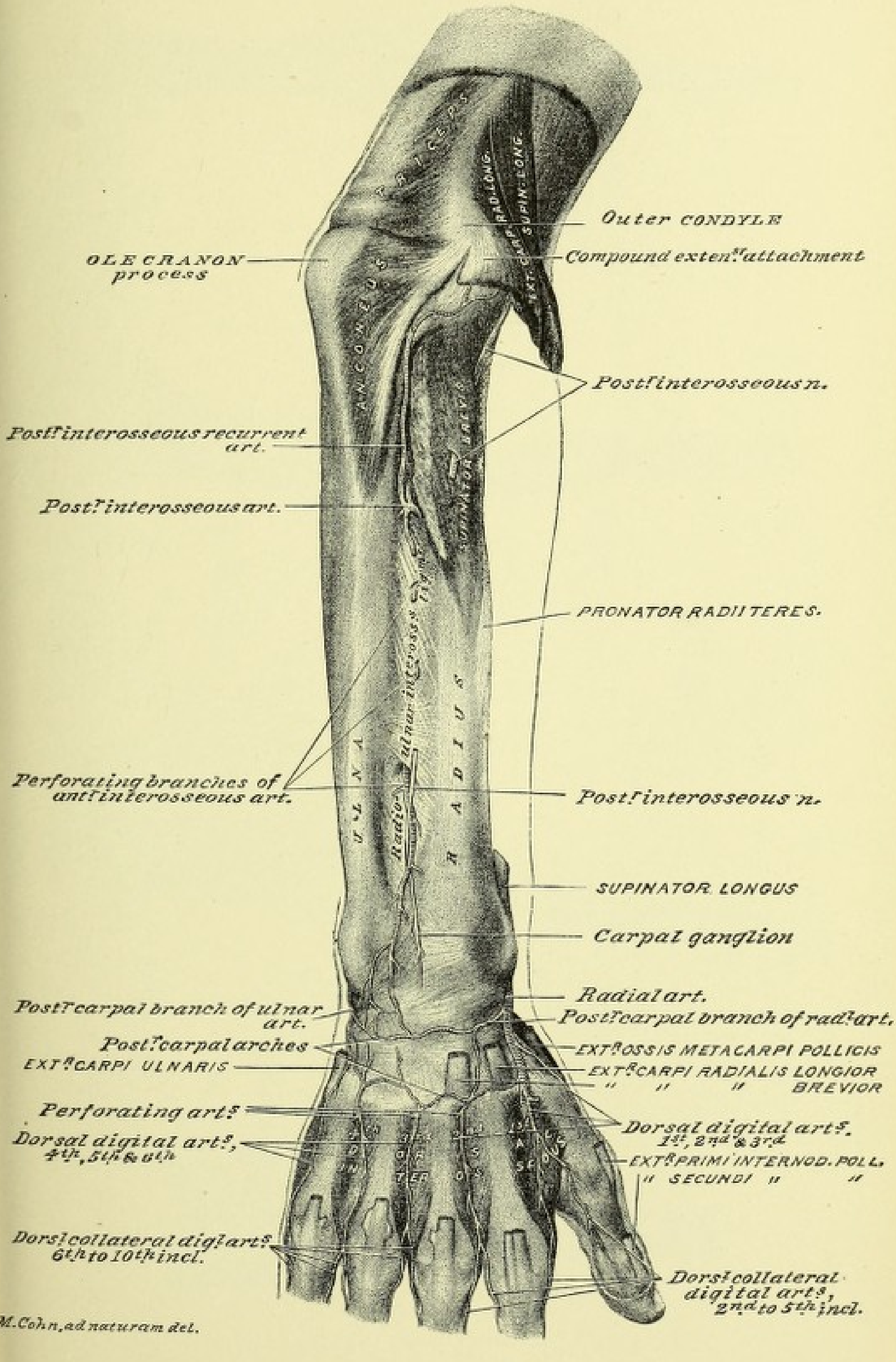

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FIG. 1

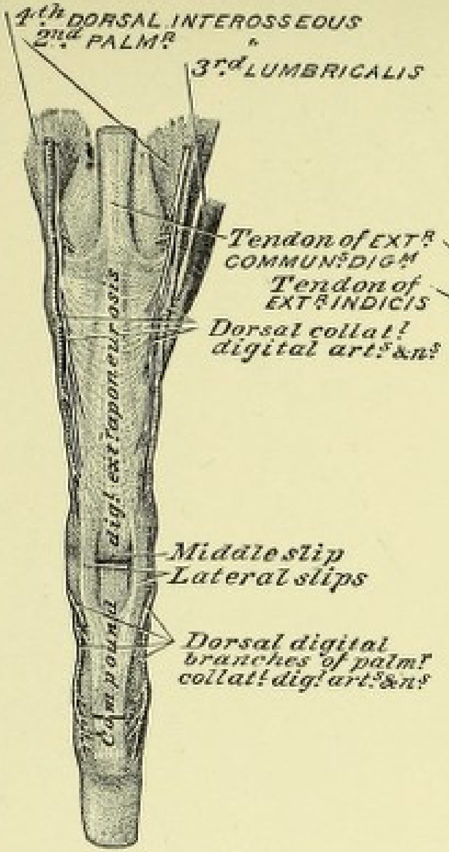


FIG. 2

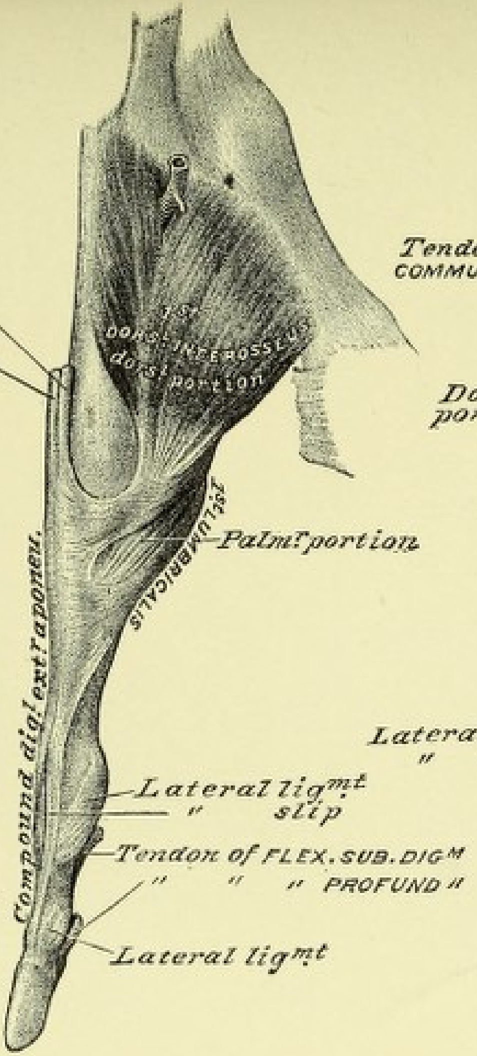


FIG. 3

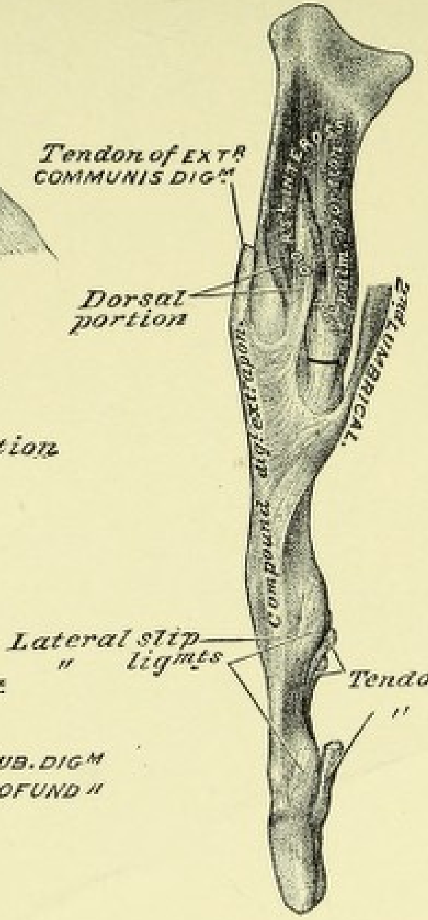
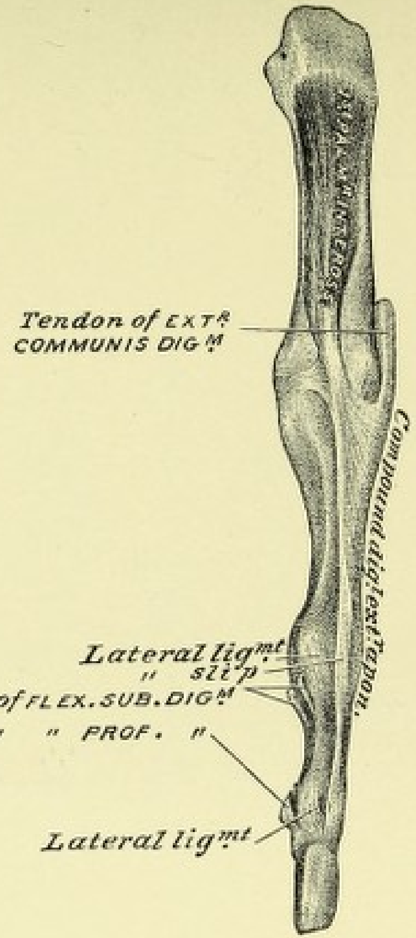


FIG. 4



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TWENTY-SECOND DISSECTION.

ARTICULATIONS OF THE HAND, ELBOW, FORE-ARM, AND SHOULDER.

ARTICULATIONS OF THE HAND.

DISSECTION.—Dissect away the compound digital extensor aponeuroses from the digital region (Fig. 1, Plate 170); also the muscles from the metacarpal region (Plates 133 and 169).

Terms of Relation.—The following special terms are used in describing the articulations of the hand, viz.: *proximal* and *distal; palmar* and *dorsal; inner* and *outer.* The regions of the hand are: the *digital*, the *metacarpal* and the *carpal.*

Bones of the Hand, Plates 122 and 163.—Twenty-seven bones form the framework of the hand: in the digital region are the *five phalangettes*, the *four phalangines*, and the *five phalanges* (page 123); in the metacarpal region are the *five metacarpals;* in the carpal region—from the outer to the inner side—the *trapezium*, the *trapezoid*, the *os magnum*, and the *unciform* construct the distal row, while—in the same direction—the *scaphoid*, the *semilunar*, the *cuneiform*, and the *pisiform* make up the distal row. All of these bones afford attachments to ligaments.

DISSECTION.—Expose the ligaments of the palmar, the inner, the outer, and the dorsal surfaces of the digital articulations. Open one or more of the digital-joints so as to demonstrate the several ligaments (Fig. 2, Plate 173).

1. Articulations of the Digits, Plates 171, 172, and Fig. 2, Plate 173.—The fourteen bones of the digits form nine articulations. Each articulation has four ligaments: two lateral, a palmar, and a dorsal. The *lateral ligaments* pass between the contiguous ends of the digital bones, in the dorsal halves of the inner and outer sides of the joint area (Fig. 2, Plate 173). A *palmar ligament* fills the space between the palmar borders of the lateral ligaments, bridging between points of the palmar surfaces of the digital bones contiguous to the joint; it contains a fibrous plate, whose palmar surface is covered by the sheath of the flexor tendons of the digit. A *dorsal ligament* bridges between the dorsal borders of the lateral ligaments.

DISSECTION.—Clear the surfaces of the metacarpo-phalangeal articulations, displaying the ligaments of the same. Open the joints of the middle and pollex digits, at their dorsal surfaces (Figs. 3 and 4, Plate 173); also that of the fourth digit, at its palmar surface (Fig. 5, Plate 173).

2. Metacarpo-phalangeal Articulations, Plates 171 and 172; Figs. 3, 4, and 5, Plate 173.—These articulations, five in number, are formed by the proximal ends (bases) of the phalanges and the distal ends (heads) of the metacarpal bones. They have the same ligaments as the digital articulations. The fibrous plates of the palmar ligaments of the digits, second to fifth, inclusive, are thicker than those of the digits, while that of the pollex articulation includes two sesamoid bones (Fig. 4, Plate 173).

DISSECTION.—Expose the palmar and dorsal intermetacarpal ligaments, the surfaces of the trapezio-metacarpal, the carpo-metacarpal, and the intercarpal articulations.

3. Intermetacarpal Ligaments, Plates 171 and 172.—These six ligaments—three palmar and three dorsal—bridge, at the respective surfaces, between the proximal ends (bases) of the metacarpal bones, second to fifth, inclusive.

4. Trapezio-metacarpal Articulation.—This articulation is formed by the proximal end (base) of the first metacarpal bone and the trapezium of the carpus. It has a capsular ligament, which passes from the circumference of one articular surface to that of the other.

5. Carpo-metacarpal Articulation.—This articulation is formed by the apposition of the proximal ends (bases) of the metacarpal bones, second to fifth, inclusive, and the distal surfaces of the trapezoid, os magnum, and unciform bones of the carpus. Ligaments pass, upon the respective palmar and dorsal surfaces, between these two lines of bones.

6. Intercarpal Articulations.—These are formed by the apposition of the distal row of carpal bones, of the proximal row of carpal bones, and of the two articulated rows with each other—medio-carpal articulation. The *distal row*—trapezium, trapezoid, os magnum, and unciform—are bound to each other by three palmar and three dorsal transverse ligaments. The *proximal row*—scaphoid, semilunar, and cuneiform—are held in apposition by two palmar and two dorsal transverse ligaments. The *medio-carpal* articulation has palmar and dorsal ligaments passing between the distal and proximal rows of bones.

DISSECTION.—Clear the surfaces of the articulation of the carpus with the distal ends of the radius and ulna. Section the inner lateral, the inner portions of the anterior and posterior radio-carpal ligaments (being careful to leave the interarticular fibro-cartilage of the joint *in situ*), and abduct the hand.

7. Articulation of the Carpus with the Radius and Ulna, Plates 121, 122, 163, 171, 172, and Fig. 1, Plate 173.—The elements of this articulation are: bones, ligaments, an interarticular fibro-cartilage, and synovial membrane. The *bones* are: the scaphoid and semilunar, opposed to the radius—radio-carpal articulation; the cuneiform opposite to, but separated by the interarticular fibro-cartilage from, the ulna (Fig. 1, Plate 173). The radius projects, in a distal direction, further than the ulna; this projection, with the separation of the ulna from the carpus by the interarticular fibro-cartilage, render the motions of the hand independent of the ulna.

The *ligaments* are four in number. The *anterior radio-carpal* (Plate 171), which has its proximal attachment to the anterior surface of the styloid process, and the anterior border of the distal end, of the radius; its fibres run obliquely, toward the inner side, to their distal attachments, to the anterior surfaces of the semilunar, the cuneiform, and the os magnum bones of the carpus. The *outer lateral* (Plates 171, 172, and Fig. 1, Plate 173) passes from the styloid process of the radius to the scaphoid bone of the carpus. The *inner lateral* (Plates 171 and 172) bridges from the styloid process of the ulna to the cuneiform and pisiform bones of the carpus; its distal end has an anterior, a posterior, and a middle slip, which are attached, respectively, to the anterior and posterior surfaces of the cuneiform and pisiform bones. The *posterior radio-carpal* (Plate 172) has its proximal attachment to the styloid process, and the posterior border of the distal end, of the radius; its fibres cross obliquely to the inner side, to their distal attachments at the posterior surfaces of the scaphoid, the semilunar, and the cuneiform bones of the carpus.

The *interarticular fibro-cartilage* (Fig. 1, Plate 173) is attached to the inner border of the carpal articular surface of the distal end of the radius, and to the styloid process of the ulna. It is thus lodged between the cuneiform bone of the carpus and the distal end of the ulna. Its distal surface with that of the radius forms the proximal articular surface, which is opposed to the proximal row of the carpal bones.

DISSECTION.—Cut the remaining ligaments of the outer half of the radio-carpal articulation, thus severing the hand from the bones of the forearm. Section the dorsal intermetacarpal, the dorsal carpo-metacarpal, and the dorsal carpal ligaments; separate the bases of the metacarpal bones, also the carpal bones from each other, and demonstrate the interosseous ligaments between them.

8. Interosseous Ligaments of the Metacarpal and Carpal Regions.—Interosseous ligaments will be found between: the opposed surfaces of the bases of the metacarpal bones, second to fifth, inclusive; the base of the second metacarpal and the trapezium; the fourth metacarpal and the unciform; the os magnum and the unciform; the scaphoid and the semilunar; the semilunar and the cuneiform.

ARTICULATION OF ELBOW.

DISSECTION.—Clear the surfaces of the elbow-joint so as to display the ligaments of the same.

Terms of Relation.—The same general and special terms used in describing the wrist-joint (page 309), will apply to the description of these joints.

Bones of the Elbow-joint, Plates 121 and 163.—The bones of this joint are: the *ulna*—its olecranon process, coronoid process, great sigmoid notch, and small sigmoid notch; the *radius*—its button-shaped head; and the *humerus*—its trochlea, capitellum, olecranon fossa, and coronoid fossa.

1. Outer Lateral Ligament, Plate 174; Fig. 2, Plate 175. —This ligament is attached as follows: at its proximal end, to the outer surface of the outer condyle of the humerus; at its distal end, to the orbicular ligament of the proximal radio-ulnar articulation.

2. Inner Lateral Ligament, Plate 174; Fig. 1, Plate 175. —This ligament is attached: at its proximal end, to the inner condyle of the humerus; at its distal end, to the inner surfaces of the proximal end of the shaft, and the coronoid process, of the ulna.

3. Anterior Ligament, Fig. 1, Plate 174; Fig. 1, Plate 175.—This ligament closes in the anterior of the elbow-joint, between the borders of the lateral ligaments. It is attached: at its proximal end, to the borders of the coronoid fossa and the radial depression of the humerus; at its distal end, to the border of the coronoid process of the ulna, and to the orbicular ligament of the proximal radio-ulnar articulation.

4. Posterior Ligament, Fig. 2, Plate 174; Fig. 2, Plate 175. —This ligament extends from the borders of the olecranon fossa of the humerus to the borders of the olecranon process, and the great sigmoid notch, of the ulna. Some of its outer fibres fuse with the posterior portion of the orbicular ligament of the proximal radio-ulnar articulation.

ARTICULATIONS OF RADIUS AND ULNA.

Dissection.—This articulation is included in, and forms a part of, the elbow-joint. Open the elbow-joint by cutting transversely its anterior and posterior ligaments, and preserving its outer and inner lateral ligaments, and the orbicular ligament of the proximal radio-ulnar articulation (Figs. 1 and 2, Plate 175).

1. Orbicular Ligament, Plate 174; Figs. 1 and 2, Plate 175.—This ligament consists of circular fibres, which wind around the head of radius; its attachments are to the anterior and posterior borders of the small sigmoid cavity of ulna, and to the anterior, outer, and posterior surfaces of the neck of the radius. The proximal border of the ligament receives the fusion of fibres of the anterior, the outer lateral, and the posterior ligaments of the elbow-joint.

DISSECTION.—Section the outer and the inner lateral ligaments of the elbow-joint (Figs. 1 and 2, Plate 175). Clear the surfaces of the radio-ulnar interosseous and the oblique ligaments of the middle radio-ulnar articulation.

2. Radio-ulnar Interosseous Ligament, Plates 134 and 169. —This ligament bridges the distal three-quarters of the interosseous space between the ulna and the radius, from the inner border of the shaft of the radius to the outer border of the shaft of the ulna. The fibres of the ligament have a distal and oblique course, from the radius to the ulna.

3. Oblique Ligament, Fig. 1, Plate 174; Fig. 1, Plate 175. —This ligament bridges from the ulna to the radius at the proximal limit of the last-described ligament. It passes obliquely from the outer side of the coronoid process of the ulna to the inner side of the radius, distal to its tubercle.

4. Distal Radio-ulnar Articulation, Plates 171 and 172; Fig. 1, Plate 173.—The distal ends of the radius and ulna are bound to each other by a posterior and an anterior ligament, which allow and limit the partial rotation of the radius about the immovable ulna. When the radius rolls to the anterior of the ulna it is called *pronation;* when it returns to the outer side of, and parallel with, the ulna, it is called *supination.* These motions are participated in by the hand, because of the independence of the radio-carpal articulation of the ulna.

The *bones* of this articulation present as follows: the radius, a groove upon the inner surface of its distal end; the ulna, a rounded border at the outer and anterior surfaces of its distal end.

The *posterior radio-ulnar ligament* (Plate 172) which limits pronation, is attached: at its outer end, to the posterior border of the articulating groove of the radius; at its inner end, to the posterior surfaces of the distal end, and the styloid process, of the ulna. It is also attached to the posterior border of the interarticular fibro-cartilage of the wrist-joint (page 312). The *anterior radio-ulnar ligament* (Plate 171, and Fig. 1, Plate 173), which limits supination, is attached: at its outer end, to the anterior border of the articulating groove of the radius; at its inner end, to the anterior surface of the inner portion of the distal end of the ulna, and to the anterior border of the interarticular fibro-cartilage of the wrist-joint.

ARTICULATION OF SHOULDER.

DISSECTION.—Clear the proximal end of the humerus, cutting the muscles short, that are attached thereto. Display the surfaces of the capsular and coraco-clavicular ligaments of the joint.

Terms of Relation.—The general terms *anterior* and *posterior*, *external* and *internal*, *superior* and *inferior*, will be used.

Bones, Plates 113 and 158; Fig. 3, Plate 175.—The humerus —its head and anatomical neck—and the scapula—its glenoid cavity, neck, and coracoid process—contribute to the construction of the shoulder-joint or scapulo-humeral joint.

1. Muscles Crossing the Exterior of the Capsular Ligament, Plate 176.—Anteriorly, the *subscapularis*, from the subscapular fossa of the scapula to the small tuberosity of the humerus; superiorly, the *supraspinatus*, from the supraspinatus fossa of the scapula to the superior facet of the great tuberosity of the humerus; posteriorly, the *infraspinatus* and the *teres minor*, from the infraspinatus fossa of the scapula to the middle and inferior facets respectively of the great tuberosity of the humerus.

2. Capsular Ligament, Plate 176.—This loose, circumferential ligament extends from the anatomical neck of the humerus and the circumference of that bone inferiorly thereto, to the circumference of the neck of the scapula.

3. Coraco-humeral Ligament, Plate 113; Fig. 1, Plate 176. —This ligament extends from the superior portion of the proximal end of the humerus, between its great tuberosity and the anatomical neck, to the external border of the root of the coracoid process of the scapula. It serves to strengthen the superior portion of the capsular ligament.

DISSECTION.—Section the anterior, inferior, and posterior portions of the capsular ligament; raise the humerus, superiorly, so as to expose the interior of the shoulder-joint.

4. Glenoid Ligament, Fig. 3, Plate 175.—This is circumferential fibro-cartilage, that rims the glenoid cavity of the scapula, for the purpose of deepening the same.

5. Tendon of Biceps within the Shoulder-joint.—The tendon of the long head of the biceps enters, by the bicipital groove of the humerus, the interior surface of the superior portion of the capsular ligament of the shoulder-joint ; it passes to be attached to the superior part of the glenoid ligament.

SCAPULO-CLAVICULAR ARTICULATION AND SCAPULAR LIGAMENTS.

DISSECTION.—Clear the acromio-clavicular, the coraco-clavicular, coraco-acromial, and suprascapular ligaments.

Terms of Relation.—The same as for the description of the shoulder-joint.

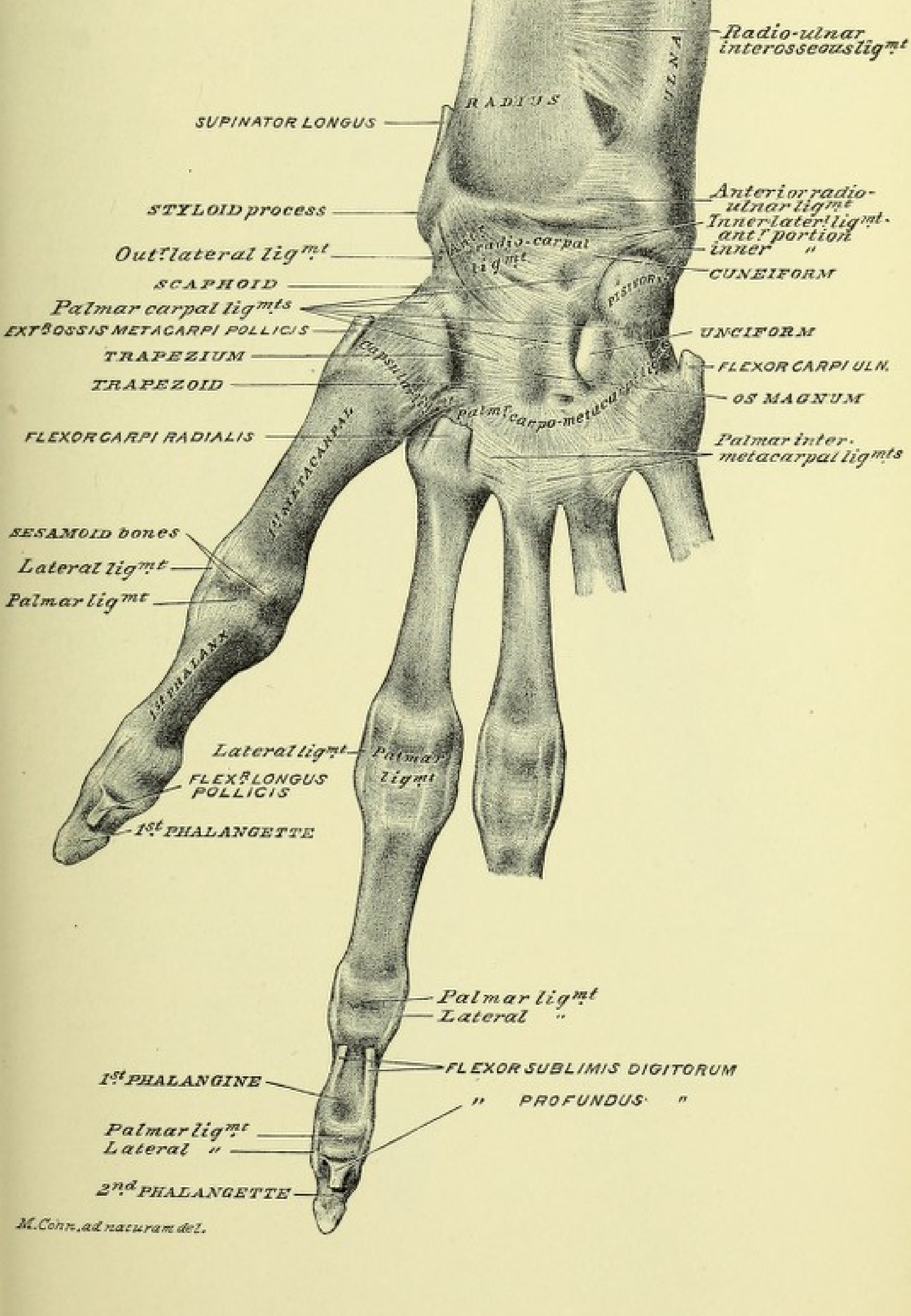
Bones, Plates 113, 158, and 176.—These are the clavicle—its external half ; and the scapula—its acromion and coracoid processes, and its superior border.

1. Acromio-clavicular Articulation.—The external end of the clavicle is received at a facet on the internal border of the acromion process of the scapula, where it is held by the *superior acromio-clavicular* and the *inferior acromio-clavicular* ligaments.

2. Coraco-clavicular Ligament.—This extends from the inferior surface of the external half of the clavicle to the superior surface and posterior border of the angle of the coracoid process of the scapula. It is sometimes described as the cono-trapezoid ligament, having two portions : anteriorly and externally, the *trapezoid* portion ; posteriorly and internally, the *conoid* portion.

3. Coraco-acromial Ligament, Plate 113, and Fig. 1, Plate 176.—This is a stretch of fibrous tissue from the anterior border of the acromion process of the scapula to the superior border of the external portion of its coracoid process.

4. Suprascapular Ligament, Fig. 2, Plate 176.—This is a band of fibrous tissue, that bridges the suprascapular notch, converting the same into a foramen.


Radio-ulnar interosseous ligmt
RADIUS
ULNA
SUPINATOR LONGUS
Anterior radio-ulnar ligmt
STYLOID process
Inner laterl ligmt. antr portion
inner "
Outr lateral ligmt
Ant. radio-carpal ligmt
CUNEIFORM
SCAPHOID
PISIFORM
Palmar carpal ligmts
EXTR OSSIS METACARPI POLLICIS
UNCIFORM
TRAPEZIUM
FLEXOR CARPI ULN.
TRAPEZOID
OS MAGNUM
palmr carpo-metacarpal
FLEXOR CARPI RADIALIS
Palmar inter-metacarpal ligmts
1st METACARPAL
SESAMOID bones
Lateral ligmt
Palmar ligmt
1st PHALANX
Lateral ligmt
Palmar ligmt
FLEXR LONGUS POLLICIS
1st PHALANGETTE
Palmar ligmt
Lateral "
FLEXOR SUBLIMIS DIGITORUM
1st PHALANGINE
" PROFUNDUS "
Palmar ligmt
Lateral "
2nd PHALANGETTE
M. Cohn, ad naturam del.

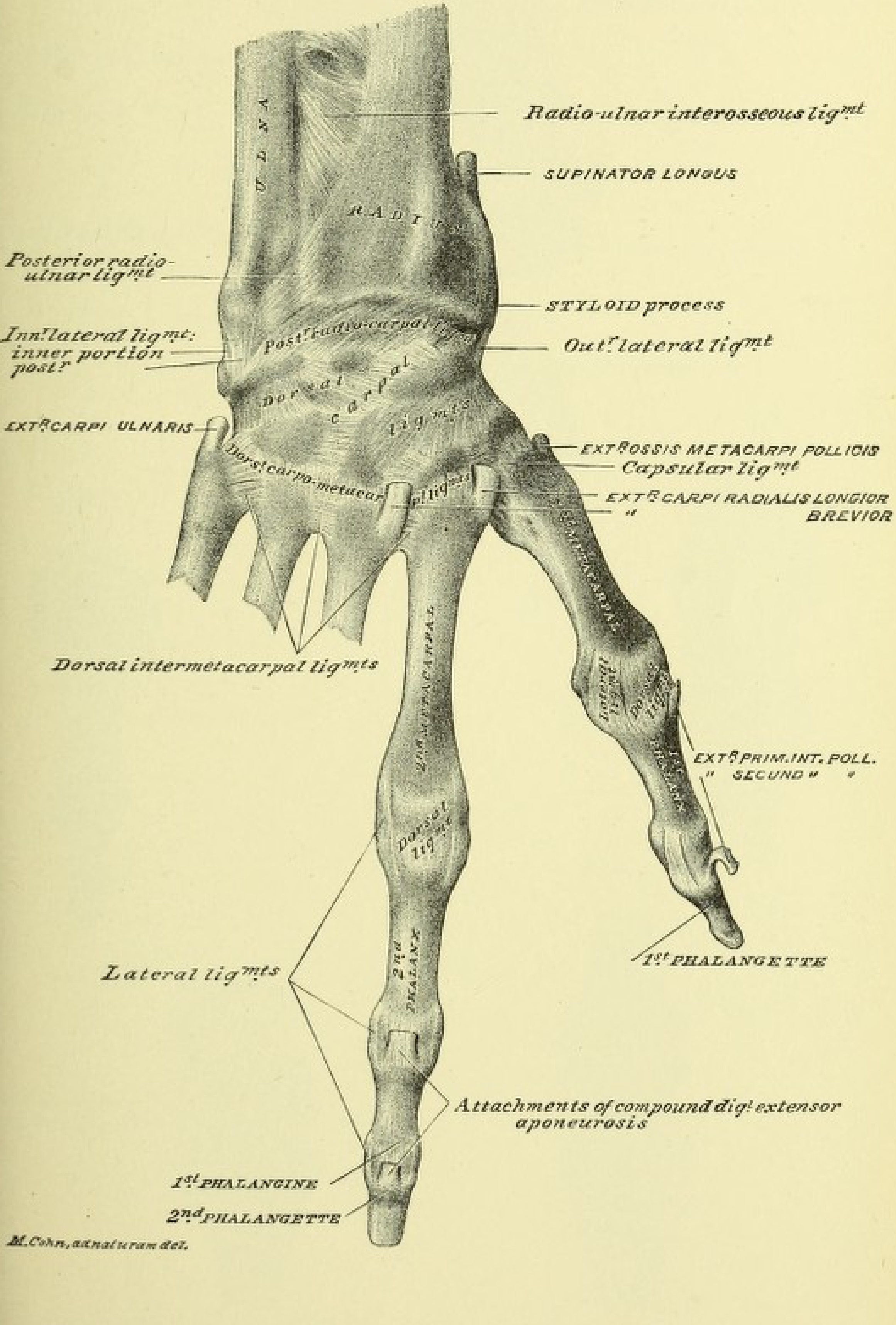

Radio-ulnar interosseous ligmt
SUPINATOR LONGUS
ULNA
RADIUS
Posterior radio-ulnar ligmt
STYLOID process
Innr lateral ligmt: inner portion postr
Postr radio-carpal ligmt
Outr lateral ligmt
Dorsal carpal ligmts
EXTR CARPI ULNARIS
EXTR OSSIS METACARPI POLLICIS
Capsular ligmt
Dorsl carpo-metacarpl ligmts
EXTR CARPI RADIALIS LONGIOR
" BREVIOR
Dorsal intermetacarpal ligmts
2nd METACARPAL
EXTR PRIM. INT. POLL.
" SECUND " "
Dorsal ligmt
Lateral ligmts
2nd PHALANX
1st PHALANGETTE
Attachments of compound digl extensor aponeurosis
1st PHALANGINE
2nd PHALANGETTE
M. Cohn, ad naturam del.

FIG. 1

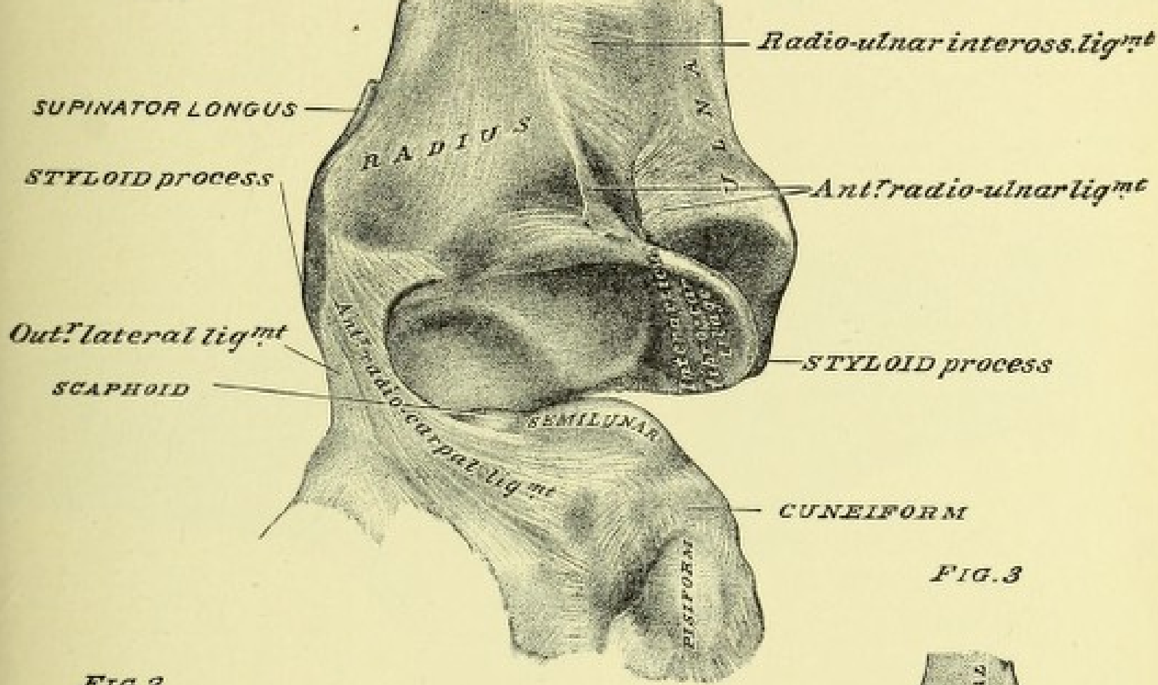


FIG. 3

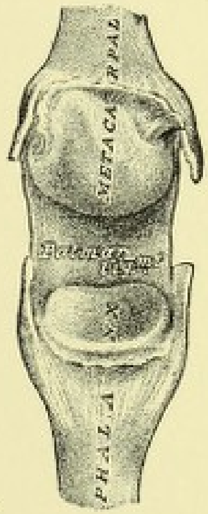


FIG. 2

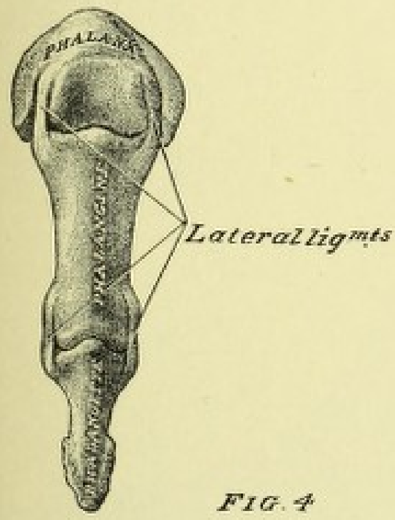


FIG. 5

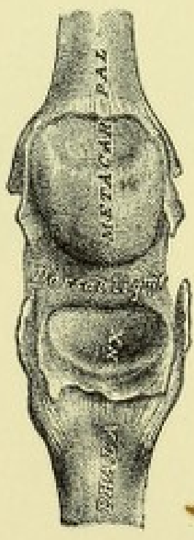
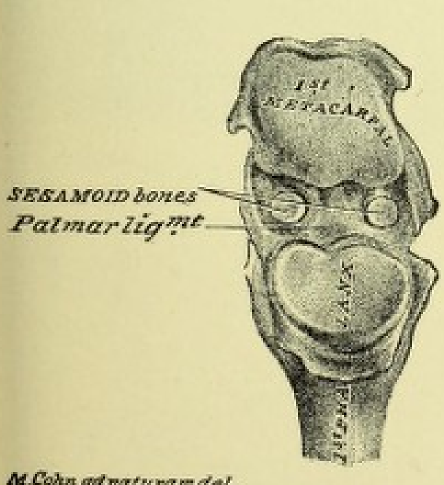


FIG. 4



M. Cohn, ad naturam del.

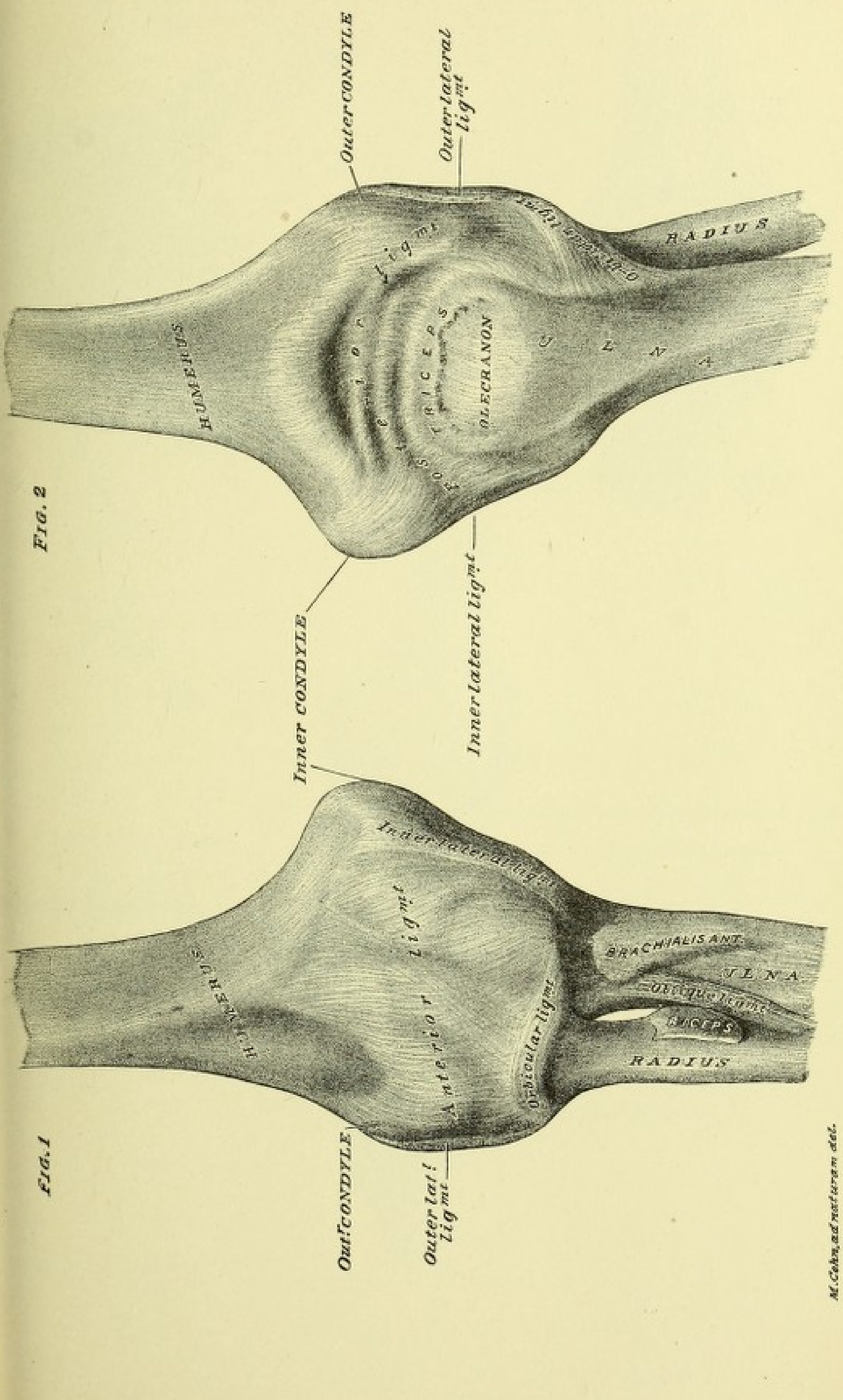

Outer CONDYLE
Outer lateral ligmt
Inner CONDYLE
Inner lateral ligmt
HUMERUS
Posterior Ligmt
TRICEPS
OLECRANON
ULNA
RADIUS
Orbicular ligmt
Inner lateral ligmt
Anterior ligmt
BRACHIALIS ANT.
BICEPS
Outl CONDYLE
Outer latl ligmt
M. Cohn, ad naturam del.

Fig. 2

Fig. 1

FIG. 2

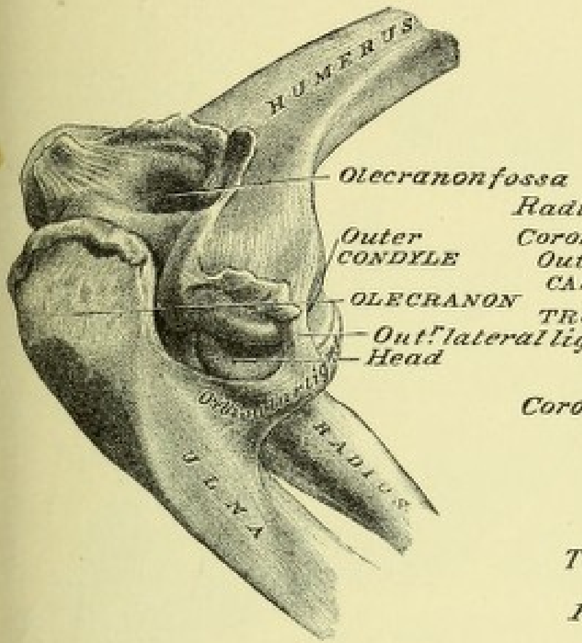


FIG. 1

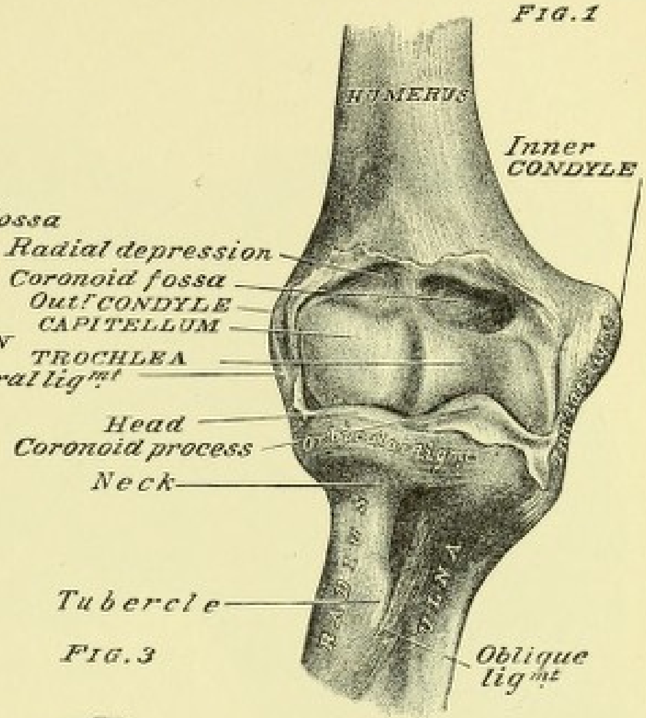
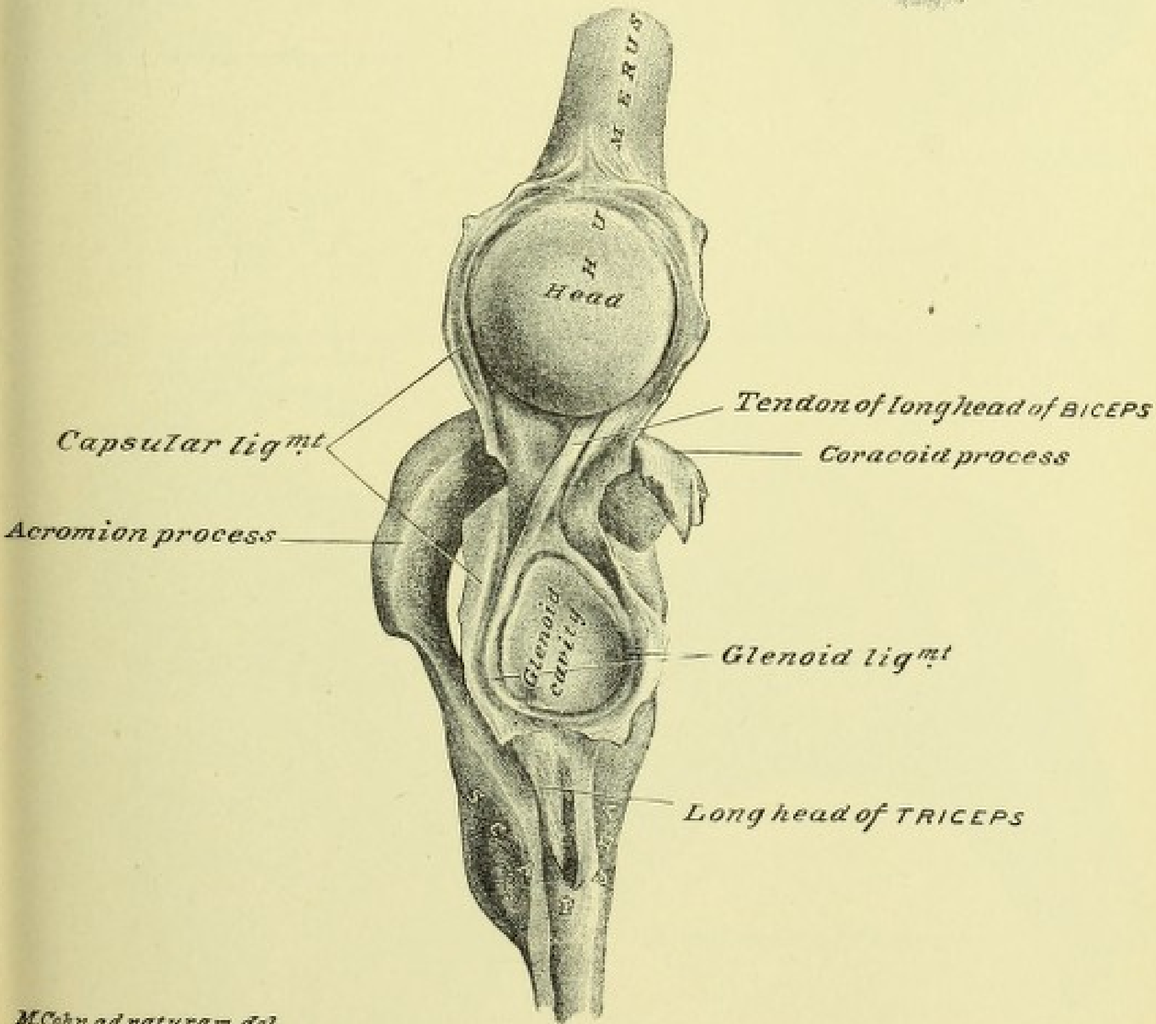


FIG. 3



M.Cohn, ad naturam del.

FIG. 1

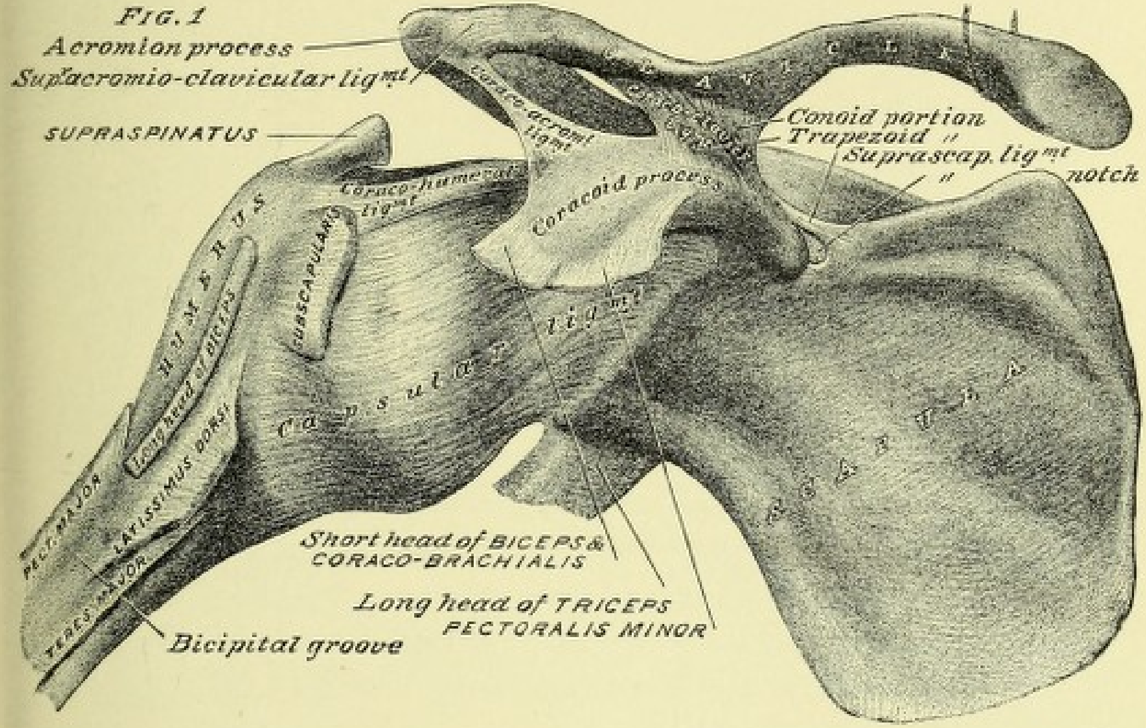
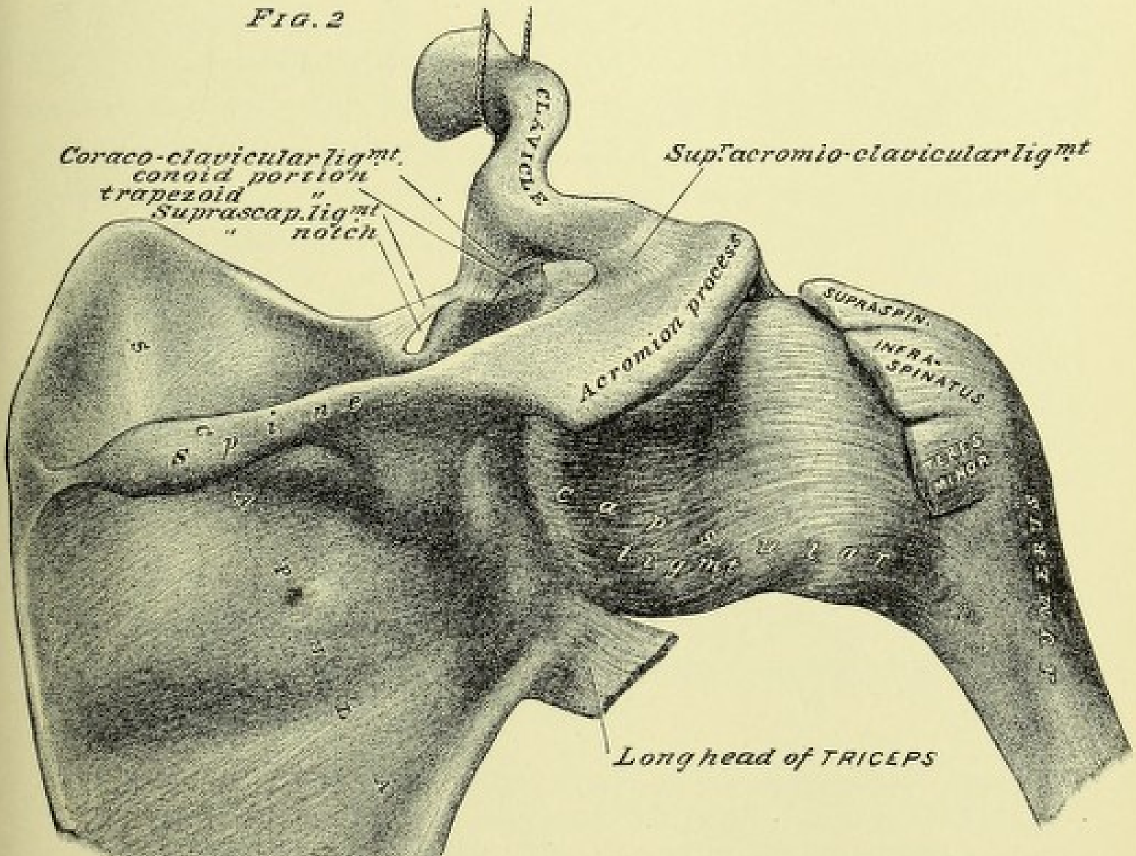


FIG. 2



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TWENTY-THIRD DISSECTION.

SCALP; VERTEX PORTION OF THE MEMBRANES OF THE BRAIN; INTERIOR OF THE BASE OF THE CRANIUM.

DISSECTION.—The subject is placed as for dissection of the thorax, and upper extremities (page 193); the head is so steadied upon a block as to present one of its lateral surfaces uppermost (Plate 177).

Terms of Relation.—These are: the general terms (page 2); and the special terms *frontal*, *lateral*, *occipital*, and *vertex surfaces* or *areas* applied to the exterior of the cranium; *exterior* and *interior*, used relatively to the cranial cavity.

Bones, and Bone Areas of Muscle Attachments, Plates 181 and 189.—Parts of the frontal, parietal, sphenoid, temporal, and occipital bones form the vault of the cranium. At the lateral and occipital surfaces of the cranium the bones present areas for the attachments of muscles. Parts of the frontal, ethmoid, sphenoid, temporal, and occipital bones contribute to form the base of the cranium.

SCALP.

DISSECTION.—Make the skin incisions 1 and 2, of Figure 14 (page 318), and reflect a flap as indicated. Care must be taken to reflect the skin only, that the vessels and nerves of the subcutaneous plane may be left *in situ*. As a guide for the hairy portion of the scalp, the roots of the hairs should be exposed projecting from the interior of the flap.

1. Subcutaneous Tissue.—This plane of the scalp differs from the same tissue of other regions: in being very dense; and in its intimate blending with the skin, exteriorly, and the musculo-aponeurotic layer, interiorly.

DISSECTION.—Trace through the frontal area of the subcutaneous tissue the frontal artery, the supratrochlear nerve, and the anterior branch of the superficial temporal artery. Expose the surface of the frontal portion of the occipito-frontalis muscle.

2. Frontal Artery, Plate 177.—This artery presents superiorly to the internal portion of the supra-orbital region, where it has a superior course exteriorly to the occipito-frontalis muscle.

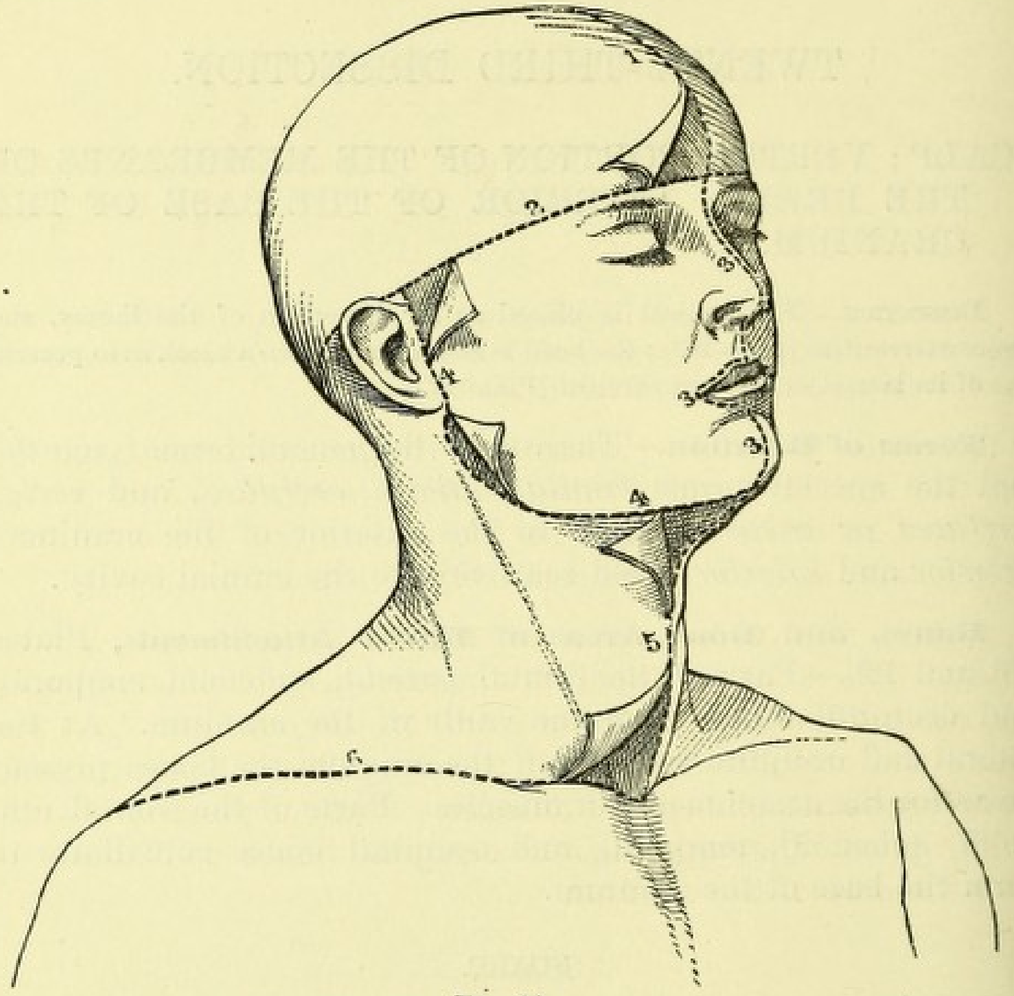


Fig. 14.

3. Supratrochlear Nerve.—This small nerve appears internally to, and parallel with, the last-described artery; it perforates the muscle to the same plane as the artery.

4. Superficial Temporal Artery.—The anterior branch of this artery (vena comes) is projected into the superior portion of the frontal area of the scalp.

Dissection.—Cut out the supra-orbital artery and nerve from the interior of the frontal portion of the occipito-frontalis muscle (Plate 177). Trace the nerve branches to where they perforate the muscle to reach the subcutaneous-tissue plane, and follow them, superiorly and posteriorly, into the anterior portion of the vertex area of the scalp.

5. Supra-orbital Artery.—This small artery emerges from the orbital cavity, at the supra-orbital notch or foramen, into the plane interiorly to the occipito-frontalis muscle; its branches perforate the muscle, to anastomose with the frontal and the anterior branch of the superficial temporal artery.

6. Supra-orbital Nerve.—This nerve leaves the orbit with, and lies in the same plane as, the last-described artery. Its branches (usually two) perforate the muscle exteriorly to them, and continue into the subcutaneous plane of the scalp.

DISSECTION.—Trace the superficial temporal artery and vein in the subcutaneous plane of the lateral area of the scalp, exteriorly to the superficial temporal fascia.

7. Superficial Temporal Artery.—This artery is projected as a single trunk, superiorly, from a point anteriorly to the ear into the subcutaneous plane of the lateral area of the scalp. The trunk bifurcates, at a variable point, into an anterior and a posterior branch; the *anterior* is projected to the frontal region (page 318); the *posterior*, the larger of the two, has a superior and posterior course in the posterior half of the lateral area of the scalp—its branches anastomose with the posterior auricular and occipital arteries.

8. Superficial Temporal Vein.—The anterior and posterior temporal veins (one for each artery) converge to the anterior of the ear, where they form the superficial temporal vein, which passes into the neck.

DISSECTION.—Cut out, from the interior of the superficial temporal fascia, the temporal branches of the facial nerve. Find the auriculo-temporal nerve and trace it superiorly, to the ramification of its terminal branch in the subcutaneous plane of the scalp.

9. Temporal Branches of the Facial Nerve.—These nerves run, superiorly, interiorly to the superficial temporal fascia. They supply: by the posterior branch, the attrahens and attollens aurem muscles; by the anterior branch, the frontal portion of the occipito-frontalis muscle, the superior part of the orbicularis palpebrarum muscle, and the corrugator supercilii muscle.

10. Auriculo-temporal Nerve.—This nerve is projected, superiorly, between the superficial temporal vessels and the pinna of the ear. Its terminal branch, the *superficial temporal* nerve, ramifies in the subcutaneous plane of the temporal region.

DISSECTION.—Clear the occipital area of the scalp, exposing the occipital and posterior auricular arteries; also the occipitalis major, the occipitalis minor, and a branch of the third cervical-spinal nerve. Display the occipito-frontalis muscle, also the auricular muscles.

11. Occipital Artery.—This artery (venæ comites) passes superiorly, from the region of the neck (page 266; Plates 148, 149, and 150), into the subcutaneous plane of the scalp.

12. Posterior Auricular Artery.—Terminal branches of this vessel have a superior course posteriorly to the ear.

13. Occipitalis Major Nerve.—This nerve, the internal (cutaneous) branch of the posterior division of the second cervical-spinal nerve, runs, superiorly, from the region of the neck (page 266; Plates 148, 149, and 150), into the subcutaneous plane of the scalp.

14. Occipitalis Minor Nerve.—This nerve has a superior course, from the neck into the subcutaneous plane of the scalp (page 266; Plates 148, 149, and 150), running parallel with, and externally to, the last-described nerve.

15. Branch of the Third Cervical-Spinal Nerve.—The internal (cutaneous) branch of the posterior division of the third cervical-spinal nerve is projected, from the neck, into the subcutaneous plane of the scalp. It runs superiorly, parallel with and internally to the occipitalis major nerve (page 266; Plates 148, 149, and 150).

16. Occipito-frontalis Muscle.—This musculo-aponeurotic plane forms the third and interior layer of the scalp, and has three portions. The posterior or *occipital* (muscle) portion is attached: inferiorly, to the superior oblique line upon the exterior of the occipital bone and to the exterior of the mastoid portion of the temporal bone; superiorly, to the exterior of the aponeurosis. The anterior or *frontal* (muscle) portion is attached: superiorly, to the exterior of the aponeurosis; inferiorly, it blends with the superior part of the orbicularis palpebrarum, the pyramidalis nasi, and the corrugator supercilii muscles. The middle or *aponeurotic* (fibrous) portion is attached: posteriorly, to the superior curved line of the occipital bone, and to the exterior of the mastoid portion of the temporal bone; it spreads anteriorly over the vertex area of the head to the frontal portion of the muscle.

17. Superficial Temporal Fascia.—This is a layer of fascia located interiorly to the subcutaneous plane of the lateral area of the scalp and the attollens and attrahens aurem muscles. It is continued, inferiorly, from the aponeurosis of the occipito-frontalis muscle to the superior border of the zygomatic arch (zygoma of the temporal bone and the malar bone).

18. Auricular Muscles.—These muscles—three in number—lie exteriorly to the superficial temporal fascia. The superior or *attollens aurem* is attached: superiorly, to the aponeurosis of the occipito-frontalis muscle; inferiorly, to the internal face of the superior portion of the pinna of the ear. The anterior or *attrahens aurem* passes from the superficial temporal fascia, anteriorly to the ear, to the anterior of the helix of the ear. The posterior or *retrahens aurem* bridges from the mastoid portion of the temporal bone to the internal face of the pinna of the ear.

DISSECTION.—Section the vessels and nerves of the scalp (Plate 177). Cut the occipito-frontalis, anteriorly and posteriorly, as in Figs. 1 and 2, Plate 178, and dissect away the muscle. Reflect, inferiorly, the superficial temporal fascia with the auricular muscles (attollens and attrahens), and cut them away. Display the deep temporal fascia, and then cut its inferior portion away, as in Fig. 1, Plate 178. Note the splitting of its inferior portion, superiorly to its zygomatic-arch attachment. Expose the temporal muscle.

19. Deep Temporal Fascia, Fig. 1, Plate 178.—This thick layer of fascia is attached, circumferentially, to the temporal ridge—on the frontal, parietal, and occipital bones—and to the superior border of the zygomatic arch. Its inferior portion splits into two layers, between which adipose tissue is lodged.

20. Temporal Muscle.—This muscle is attached to the lateral area of the cranium, within the boundaries of the temporal ridge and the superior border of the zygomatic arch; converging to a tendinous portion, it passes internally to the zygomatic arch, to its inferior attachment, to the coronoid process of the inferior maxillary bone (Fig. 2, Plate 184). Note the adipose tissue between the muscle and the zygomatic arch.

DISSECTION.—Cut away the temporal muscle, as in Fig. 2, Plate 178, and display the deep temporal vessels and nerves.

21. Anterior and Posterior Deep Temporal Arteries, Fig. 2, Plate 178.—These arteries (venæ comites), branches of the internal maxillary artery (Plate 187), are projected, superiorly, between the temporal muscle and the squamous portion of the temporal bone, to supply the temporal muscle.

22. Anterior and Posterior Deep Temporal Nerves.—These two (sometimes three, a middle one) nerves, branches from the trifacial nerve (Plate 187), have a superior course, to supply the temporal muscle.

VERTEX PORTION OF THE MEMBRANES OF THE BRAIN.

DISSECTION.—Saw the cranial bones at both sides of the skull, as indicated by the antero-posterior section-line across Fig. 2, Plate 178. In sawing be careful not to perforate and injure the contents of the cranium (nothing is gained by pressure of the saw, but the work is expedited by the lightness with which the saw is drawn along its track). The thickest points are at the antero-lateral and postero-lateral angles of the cranium; complete the bone section with the chisel and mallet; and remove the calvarium by dragging upon it, antero-posteriorly, with the hook. Recognize the dura mater; the meningeal arteries exteriorly to it; and the prominences of the Pacchionian bodies.

23. Dura Mater, Plates 179 and 180.—Lining the interior of the cranium is this the exterior of three membranes of investment of the brain. It is the thickest of the three; during fœtal and infantile life it is an interior periosteum (from which the bones derive nourishment) of the cranial bones; its reduplications—the falx cerebri, the tentorium cerebelli, and the falx cerebelli—determine intracranial compartments for the lodgement of the several parts of the brain; its splittings form the intracranial sinuses or blood-canals.

24. Meningeal Arteries.—Exteriorly to the dura mater, between it and the lateral portion of the cranial bones, these arteries are projected, superiorly, toward the vertex.

25. Pacchionian Bodies, Plate 179.—These are villi from the exterior of the arachnoid or middle membrane of the brain; they are located antero-posteriorly, at either side of the median line, where they project the dura mater, and produce by their development erosions of the interior of the calvarium. They vary in number and development in different subjects.

DISSECTION.—Incise, from a posterior point anteriorly, the median line of the dura mater, where its two halves will be found united by transverse strands of fibrous tissue. This will bring into view an antero-posterior canal.

26. Superior Longitudinal Sinus.—This is one of the fifteen intracranial venous canals formed by the dura mater. This sinus is formed by the dipping, inferiorly, of the dura mater, between the hemispheres of the cerebrum—forming the falx cerebri. The apposed surfaces of the membrane adhere to form the floor of the sinus, while the edges of the reduplications are bridged by transverse strands of fibrous tissue, which form its roof. It is a triangular canal, which is lined by the continuation of the internal coat of veins emptying into it; it is small anteriorly, and increases in size antero-posteriorly; laterally, it presents the orifices of veins.

DISSECTION.—Cut away one-half of the vertex portion of the dura mater (Plate 179), so as to display the subdural space and the arachnoid membrane. Dissect away, in turn, the posterior half of the exposed arachnoid membrane (Plate 179), thereby discovering the subarachnoidean space and the pia mater. Remove a part of the pia mater from the posterior portion of the cerebrum (Plate 179).

27. Subdural Space, Plate 179.—This is a space between the dura mater and the arachnoid membranes of the brain.

28. Arachnoid Membrane.—This is the middle one of the three membranes of the brain. It bridges the sulci of the exterior surface of the cerebrum, and also the prominences of the brain at its base.

29. Subarachnoidean Space.—This is a space between the arachnoid and the pia mater membranes of the brain, within which ramify the supplying arterial trunks to the brain. The space communicates with the ventricular cavities of the brain, to be referred to hereafter. It contains, in life, a liquid, the *cerebro-spinal fluid.*

30. Pia Mater.—This, the interior of the three membranes of the brain, forms an intimate investiture of the organ; it dips into and lines all the sulci and inequalities of the brain, and even, as will be shown hereafter, is projected into its ventricular cavities. It is extremely vascular, as follows: it receives all the arteries destined to supply the brain, which break up in its texture into minute vessels; the venous blood of the brain is collected into small veins in its substance, which empty into the sinuses of the dura mater.

INTERIOR OF THE BASE OF THE CRANIUM.

DISSECTION.—Remove the brain from the cranium *with the curved scissors*, as follows: cut the dura mater, circumferentially, at the level of the cranial section; raise the anterior lobes of the cerebrum and cut the falx cerebri from the crista galli of the ethmoid; raise the posterior lobes of the cerebrum and cut the tentorium cerebelli, circumferentially (be careful not to open the lateral sinuses or injure the cerebellum inferiorly to the membrane). Let the head hang from the shoulders, by taking out the block. Raise the two anterior lobes of the cerebrum, antero-posteriorly, from the anterior fossæ of the cranium; find the bulbs of the olfactory nerves, upon the interior of the cribriform plate of the ethmoid bone, lift one of them so that it may come away with the brain, and cut the other so as to leave it *in situ;* expose and cut the optic nerves, posteriorly to the commissure of the same; also the internal carotid arteries, the right and the left. Open the coronary sinus around the pituitary body, which is lodged in the sella turcica, at the superior surface of the body of the sphenoid bone; turn out the pituitary body from its bed. Continue to lift the brain out of the cranium, in an antero-posterior direction; find and cut the following parts, to the right and left, alternately: the oculomotor, the trochlear, the trifacial and the abducent nerves; the facial and auditory nerves, and the auditory arteries; the vertebral arteries; the glossopharyngeal, pneumogastric, and hypoglossal nerves; the spinal cord at its superior end. The brain thus freed, pass the palm of the left hand to its base with two fingers into the posterior fossa of the cranium, and the palm of the right hand to the vertex surface, then withdraw the organ, in an anterior direction, from the cranium. Follow the spinal accessory nerve from its entrance into the cranium, by the foramen magnum, to its exit therefrom, by the posterior lacerated foramen. Recognize the superior end of the spinal cord.

31. Interior of the Base of the Cranium, Plate 180.—After the removal of the brain from the cranium, the interior of its base presents the right and left *anterior*, *middle*, and *posterior fossæ*, which are lined by the dura mater.

32. Exits of Cranial Nerves at the Base of the Cranium. —The twelve pairs of cranial nerves leave the interior of the dura mater by foramina in the base of the cranium—olfactory, optic, auditory, facial, glossopharyngeal, pneumogastric, spinal accessory, and hypoglossal; or by openings in the dura mater —oculomotor, trochlear, trifacial and abducent. The nerves of a side pass out, in order antero-posteriorly, as follows:

the *first* or *olfactory*, by filaments from its bulb, through the openings in the cribriform plate of the ethmoid bone; the *second* or *optic* by the optic foramen, at the apex or internal end of the posterior border of the anterior fossa of the cranium; the *third* or *oculomotor*, by an opening in the dura mater, externally to the anterior end of the basilar process of the occipital bone; the *fourth* or *trochlear*, by an opening in the dura mater, at a point a little posteriorly and inferiorly to the transit of the third; the *fifth* or *trifacial* (a large sensory and a small motor root), by an opening in the dura mater, posteriorly to the transit of the fourth, and inferiorly to the attachment of the tentorium cerebelli to the temporal bone; the *sixth* or *abducent*, by an opening in the dura mater, internally and inferiorly to the transit of the fifth; the *seventh* or *facial* and the *eighth* or *auditory* pass out by the meatus auditorius internus, at the posterior surface of the petrous portion of the temporal bone; the *ninth* or *glossopharyngeal*, the *tenth* or *pneumogastric*, and the *eleventh* or *spinal accessory* by the anterior portion of the foramen lacerum posterius—a deficiency in the occipito-temporal articulation; the *twelfth* or *hypoglossal* by the anterior condyloid foramen.

33. Spinal Accessory Nerve.—This nerve, having its origin from the lateral surface of the cervical portion of the spinal cord (page 281, Plate 153), enters the cranium by the foramen magnum and leaves the same as described above.

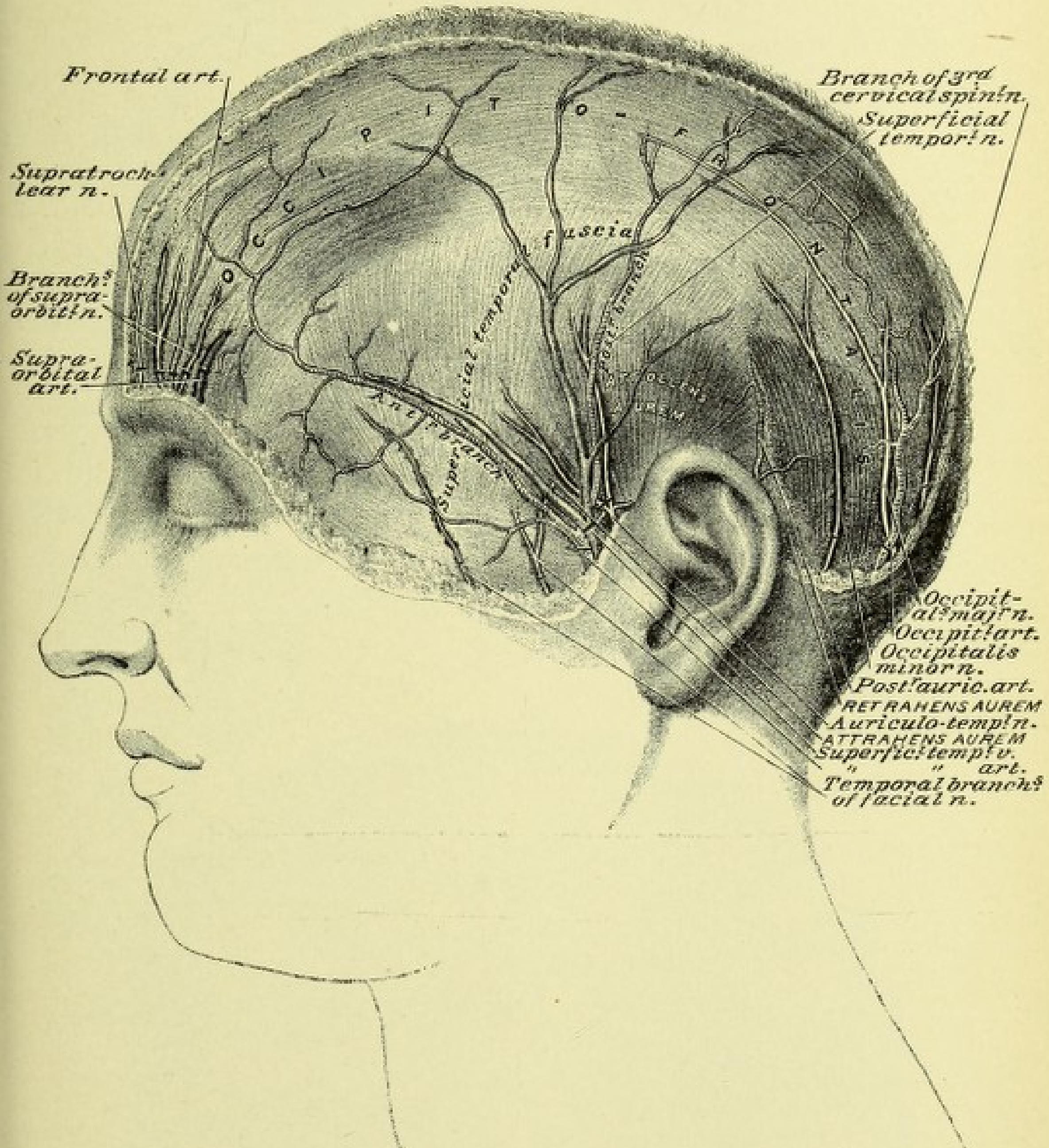
34. Spinal Cord.—The superior end of the spinal cord is seen, through the foramen magnum.

35. Arteries of the Base of the Cranium.—The *internal carotid arteries* are projected, superiorly, at either side of the body of the sphenoid bone. At the foramen magnum the *vertebral arteries* enter the cranial cavity. The *auditory arteries*, leave the cranium by the meatus auditorius internus, right and left, with the auditory and facial nerves.

DISSECTION.—With the curved scissors slit open the posterior and inferior portion of the superior longitudinal; also the lateral, the occipital, the superior petrosal, the cavernous, the transverse, the coronary, and the inferior petrosal sinuses, of one side, of the interior of the base of the cranium. Loop aside one of the stumps of an optic nerve and find the ophthalmic branch of the internal carotid artery.

36. Venous Sinuses of the Cranium.—Antero-posteriorly, the following sinuses, of a side, present: the *coronary* (one half of it), at the superior surface of the body of the sphenoid bone, where it is located at one side of the pituitary body; the *cavernous*, at the side of the body of the sphenoid bone—it receives the ophthalmic vein from the orbit by the sphenoidal fissure; the *transverse* (one-half of it), crossing one-half of the line of articulation of the basilar process of the occipital bone with the sphenoid bone; the *superior petrosal*, in the attachment of the tentorium cerebelli along the superior border of the petrous portion of the temporal bone, unites the cavernous with the lateral; the *inferior petrosal*, lodged in the anterior portion of the temporo-occipital articulation, unites the transverse with the lateral; the *lateral*, posteriorly, along the line of occipital attachment of the tentorium cerebelli and, anteriorly and inferiorly, at the interior of the mastoid portion of the temporal bone; the *occipital* unites the torcular Herophili with the terminus of the lateral. The *superior longitudinal*, a part of which was recognized at its median-line position (page 319, Plate 179) in the convexity of the falx cerebri, empties, posteriorly, into the torcular Herophili; the *inferior longitudinal* has an antero-posterior course, and a median-line position in the edge of the concavity of the falx cerebri, ending at the anterior border of the tentorium cerebelli; the *straight* runs antero-posteriorly, in a median-line position, in the junction of the base of the falx cerebri with the superior surface of the tentorium cerebelli—it unites the posterior end of the inferior longitudinal sinus with the torcular Herophili. The *torcular Herophili* is the meeting of the superior longitudinal, the right and left lateral, the right and left occipital (and the straight) sinuses, at the median-line junction of the falx cerebri and tentorium cerebelli, at the interior of the occipital bone. The *internal jugular vein*, attached to the circumference of the exterior of the posterior portion of the foramen lacerum posterius, presents its orifice to receive the blood collected by the intracranial sinuses of a side of the cranium.

37. Ophthalmic Artery.—This artery is given off from the intracranial portion of the internal carotid artery; it runs inferiorly to, and into the orbit by the optic foramen with, the optic nerve (page 325).



M. Cohn, ad naturam del.

FIG. 1

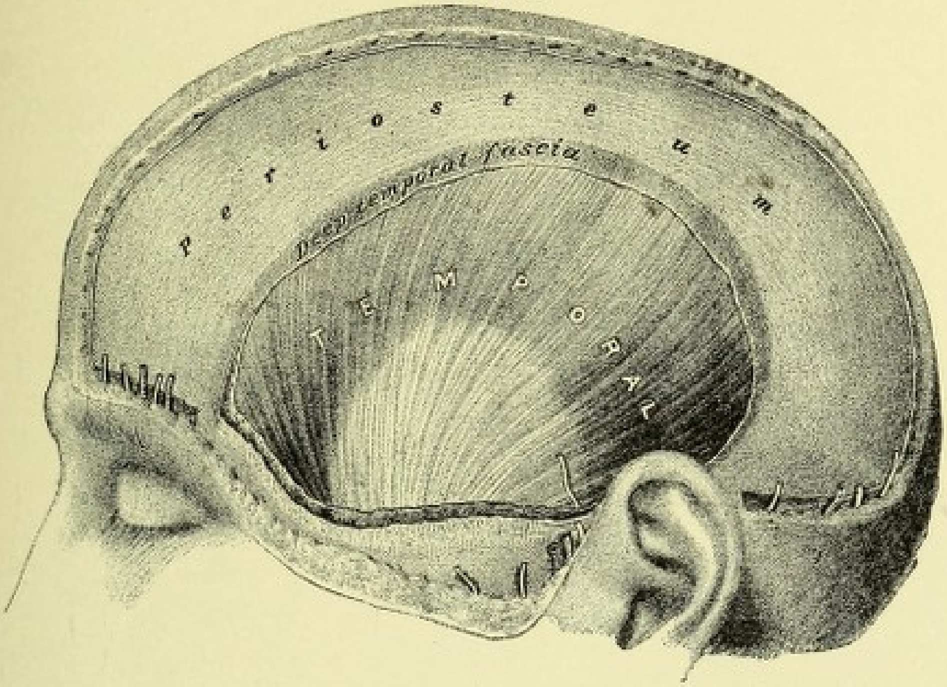
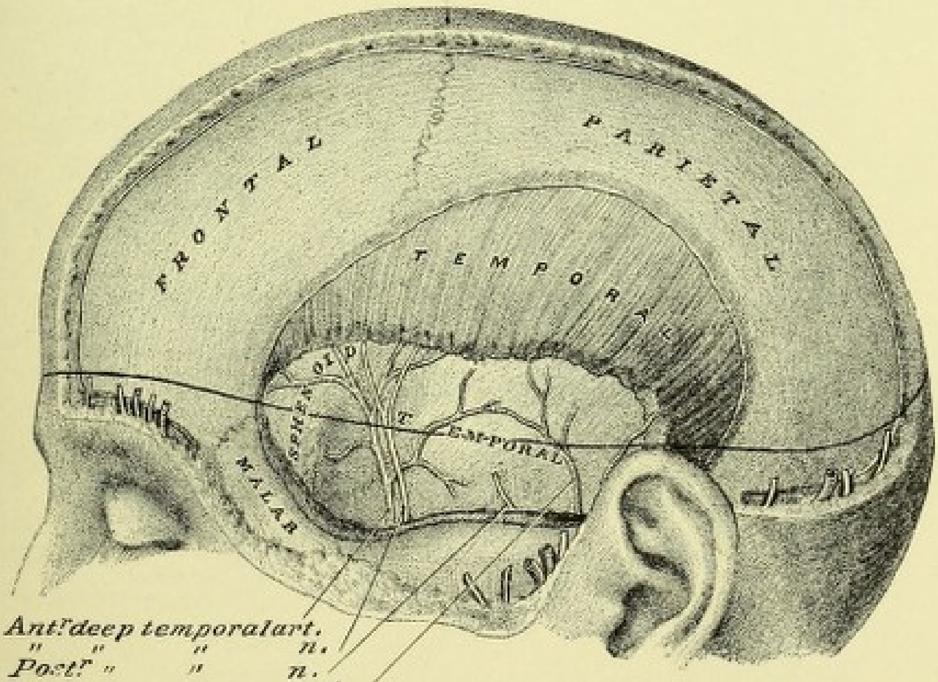


FIG. 2



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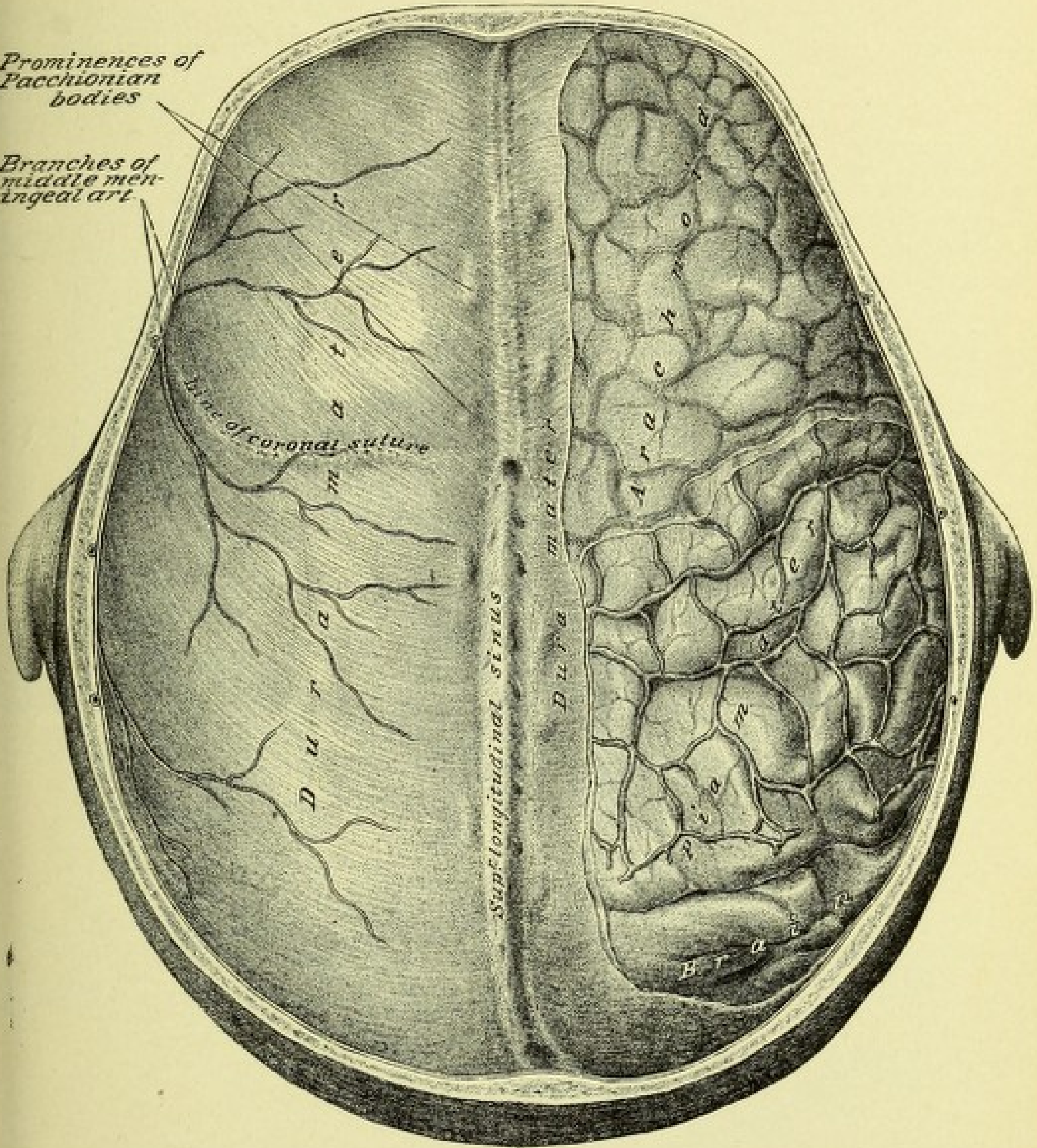

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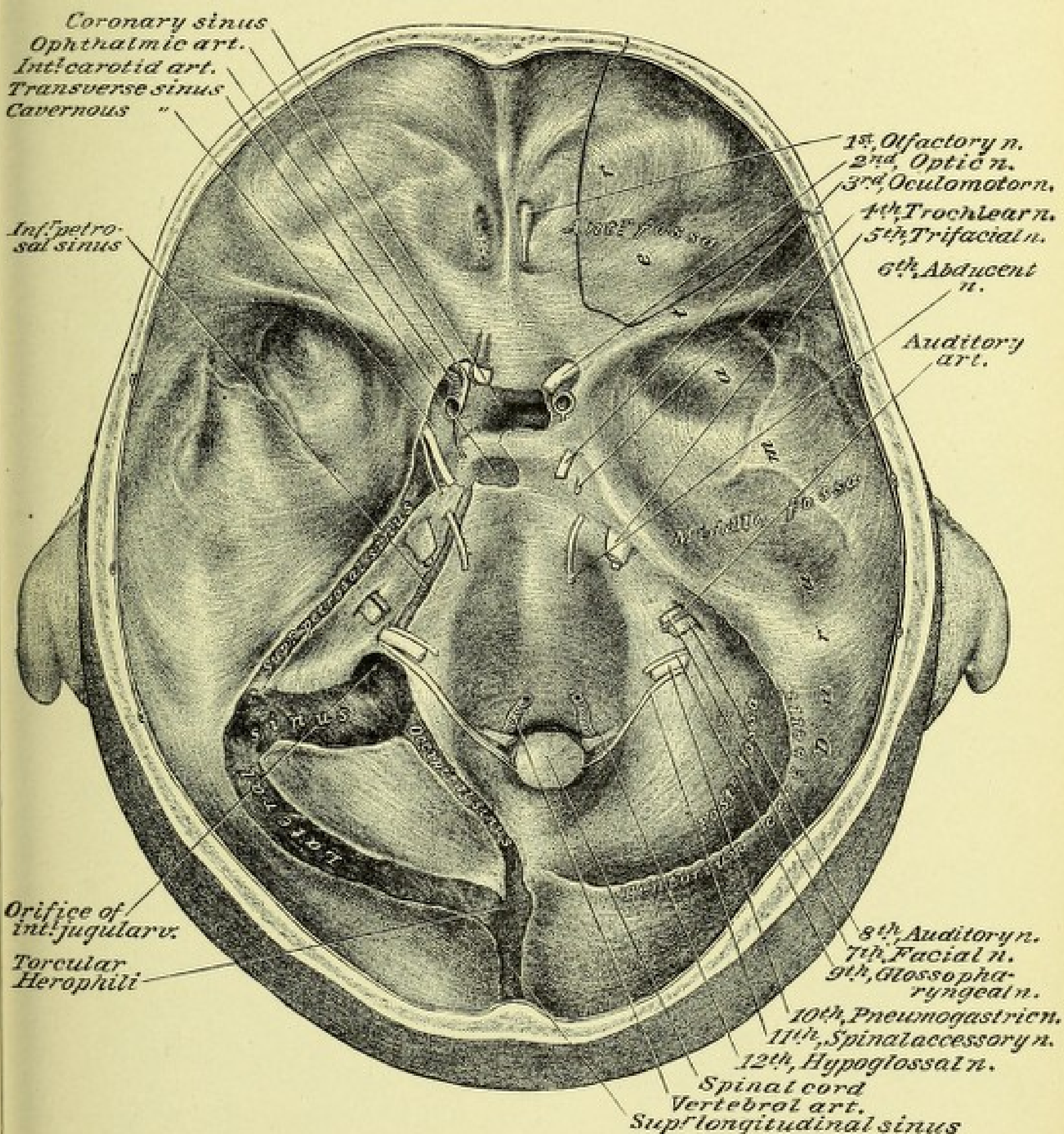


M. Cohn, ad naturam del.

TWENTY-FOURTH DISSECTION.

SUPERFICIAL REGION OF THE FACE; ORBITAL CAVITY; MIDDLE FOSSA OF THE CRANIUM; DEEP REGION OF THE FACE.

SUPERFICIAL REGION OF THE FACE.

DISSECTION.—Prepare the face for dissection as follows: remove all hair from the skin; distend the nostrils with oakum; introduce oakum under the eyelids and suture their edges together; close the teeth, insert oakum between them and the cheeks and lips, then suture the lips together. With the subject in position for dissection of the thorax and upper extremities (page 193), place the lateral surface of the head upon a block, and steady it in the position shown in Fig. 2, Plate 182.

Terms of Relation.—These are the general terms (page 2); and the special terms *antero-lateral*—applied to the face—*exterior* and *interior*—relatively to the mouth and nostrils.

Bones, and Bone Attachments of Muscles, Plate 181.—The osseous framework of the antero-lateral area of the face includes the following bones: for the cranial region, the *frontal;* for the upper jaw region, the *nasal*, *superior maxillary*, and *malar;* for the lower jaw region, the *inferior maxillary*. The facial surfaces of all of these bones, except the nasal, afford attachments to muscles.

DISSECTION.—Make the skin incisions 2, 3, 3, 3, and 4, 4, of Figure 14, (page 318); reflect a flap as indicated. Where the dissection of the scalp has preceded that of the face, skin incision 2 will have been made. Expose a layer of subcutaneous tissue.

1. Subcutaneous Tissue.—A layer of subcutaneous tissue containing a variable quantity of fat, spreads over the antero-lateral area of the face.

DISSECTION.—Remove the subcutaneous tissue, *with the curved scissors*, so as to display the facial portion of the platysma myoides muscle and the risorius muscle.

2. Platysma Myoides Muscle, Fig. 1, Plate 182.—The facial portion of this plane of muscle is projected, from the neck, over the border of the inferior maxillary bone—from the median line to a point posteriorly to the angle of the bone. Anteriorly and inferiorly to the symphysis of the bone, its internal fibres blend with those of its fellow of the opposite side, and some even cross the median line. Along the body of the bone some of its middle fibres are attached, while others with its external fibres continue, superiorly and internally, to the depressor anguli oris and orbicularis oris muscles, the fascia of the parotid region, and the zygomatic arch.

3. Risorius Muscle.—This muscle consists of stray muscle fibres, which have a transverse course, from the surface of the facial portion of the platysma myoides muscle to their fusion with the orbicularis oris muscle, opposite the angle of the lips.

DISSECTION.—Section the platysma myoides muscle, as in Fig. 2, Plate 182; reflect it and the risorius muscle, superiorly and internally, thereby exposing a thin fascia anteriorly to the facial muscles, etc. Clear off the fascia covering the surfaces of the orbicularis oris (one half), depressor anguli oris, depressor labii inferioris (submental artery and vein), zygomaticus major, zygomaticus minor, levator labii superioris alæque nasi, and orbicularis palpebrarum muscles. Find the nasal and frontal arteries, also the supratrochlear nerve.

4. Orbicularis Oris Muscle, Fig. 2, Plate 182; and Plates 183, and 184.—This is a median-line, sphincter, muscle of the lips—its superior and inferior portions are continuous across the median line, and at the angles of the lips with each other. It is located between the subcutaneous and submucous tissue planes of the lips. Certain facial muscles centre to, and blend with, it.

5. Depressor Anguli Oris Muscle, Plate 181; Fig. 2, Plate 182; and Plate 183.—This muscle is attached: inferiorly, to the anterior surface of the body of the inferior maxillary bone, near its inferior border, and within the area of the first molar and the bicuspid teeth (Plate 181); superiorly, it blends with the inferior portion of the orbicularis oris muscle, at the angle of the lips (Fig. 2, Plate 182).

6. Depressor Labii Inferioris Muscle.—This muscle is attached: inferiorly, to the anterior surface of the body of the inferior maxillary bone—superiorly to the attachment of the last-described muscle, and inferiorly to the mental foramen within the area of the bicuspid teeth (Plate 181); superiorly, it fuses with the orbicularis oris muscle (Fig. 2, Plate 182). The terminal portion of the *submental artery* is projected, from the neck, to its anterior surface (Fig. 2, Plate 182; and Plate 183) or into its substance.

7. Zygomaticus Major Muscle, Plate 181; Fig. 2, Plate 182.—This muscle is attached: superiorly and externally, to the external surface of the malar bone (Plate 181); inferiorly and internally, it fuses with the superior portion of the orbicularis oris muscle, nearly opposite the angle of the lips (Fig. 2, Plate 182).

8. Zygomaticus Minor Muscle.—This muscle passes from the external surface of the malar bone, at a point internally to the attachment of the last-described muscle (Plate 181); it runs parallel with, and internally to, the latter muscle, and blends with the superior portion of the orbicularis oris muscle (Fig. 2, Plate 182).

9. Levator Labii Superioris Alæque Nasi Muscle.—This muscle is attached: superiorly, to the external surface of the nasal process of the superior maxillary bone (Plate 181); inferiorly, it divides into an external part, which fuses with the superior portion of the orbicularis oris muscle, and an internal part, which is attached to the ala of the nose (Fig. 2, Plate 182).

10. Orbicularis Palpebrarum Muscle, Plate 181; Fig. 2, Plate 182; and Plate 183.—This muscle has its bone attachment, at the internal border of the rim of the orbital fossa, to the nasal process of the superior maxillary bone and the internal angular process of the frontal bone (Plate 181). Its fibres pass in concentric loops around the palpebral slit: the central ones, very thin, anteriorly to the tarsi of the eyelids; the circumferential ones, thicker, encroaching, upon the cheek, inferiorly, the malar region, externally, and the superciliary ridge, superiorly.

Dissection.—Through the fascia, externally to the masseter muscle, see the branches of the facial nerve—infra-orbital, buccal, and supramaxillary. Cut them out (Fig. 2, Plate 182) from the fascia, and follow them: externally, to the point where they disappear internally to, and at the border of, the parotid gland; and internally, to their distribution to or passage posteriorly to the depressor anguli oris, orbicularis oris, and zygomaticus major muscles. Dissect out and follow (Fig. 2, Plate 182), superiorly and internally, the facial artery and vein (in tracing these vessels do not cut the branches of the facial nerve, which lie anteriorly to them). Clear the surfaces (Fig. 2, Plate 182) of portions of the pyramidalis nasi, compressor naris, levator labii superioris proprius, levator anguli oris, buccinator, and masseter muscles. Find and trace (Fig. 2, Plate 182) the superficial temporal artery, the auriculo-temporal nerve, the temporal (two) and malar (one) branches of the facial nerve, and the transverse facial artery, to the border of the parotid gland, internally to which they all pass. Dissect the fascia from the external surface of the parotid gland and follow (Fig. 2, Plate 182) its duct (Stenson's), internally, to the point where it perforates the buccinator muscle.

11. Parotid Gland, Fig. 2, Plate 182; Plate 183 and Fig. 2, Plate 184.—The anterior portion of this gland is located externally to the masseter muscle, parallel with, and inferiorly to, the zygomatic arch (zygoma of the temporal bone and the malar bone); its posterior portion is lodged, between the ramus of the inferior maxillary bone and the sterno-cleido-mastoid muscle, and turns over the posterior border of, to the internal surface of, the ramus of the inferior maxillary bone. The posterior portion of the gland is in close relation with: the facial nerve; the external carotid, superficial temporal, transverse facial, internal maxillary, and internal carotid arteries; the external jugular vein and its submaxillary anastomosing branch; and the internal jugular vein. Its duct (Stenson's), is projected, internally, across the internal third of the masseter muscle, from which it is continued to its perforation of the buccinator muscle and buccal mucous membrane; it opens into the mouth, opposite the second molar tooth of the superior dental arch.

Dissection.—Section (Fig. 2, Plate 182) Stenson's duct; reflect the parotid gland externally, and cut the gland so as to leave its posterior portion *in situ*. Trace (Plate 183) the branches of the facial nerve to the trunk of the nerve and to their distribution. Follow (Plate 183) the transverse facial artery to the superficial temporal, and that, in turn, to the bifurcation of the external caortid artery. (In exposing the trunk of the facial nerve and the bifurcation of the external carotid artery reflect the posterior and deep portions of the parotid gland, left *in situ*, and dissect the parts out of it.)

12. Facial Nerve, Plate 183.—This nerve emerges into the superficial region of the face, from between the parotid gland and the neck of the condyloid process of the inferior maxillary bone, where it winds anteriorly, externally to the superficial temporal artery—to reach this point the nerve, having left the cranium by the stylo-mastoid foramen (Plate 199), makes its way between or through portions of the parotid gland. As it appears on the face it divides into a cervico-facial and a temporo-facial division. The *cervico-facial division* distributes: to the neck (page 358) by the *inframaxillary branch*—to the platysma myoides muscle, etc.; to the face by the *supramaxillary branch*—to the depressor anguli oris, depressor labii inferioris, and levator menti muscles—and *buccal branch*—to the orbicularis oris and buccinator muscles. The *temporo-facial division* supplies *temporal branches* (two) before described (page 319) and illustrated (Plate 177); a *malar branch*—to the orbicularis palpebrarum muscle; and *infraorbital branches* (three) — the superior, supplies the zygomaticus major and zygomaticus minor muscles, the middle, longer, distributes to the levator anguli oris muscle, the inferior, the longest, supplies the levator labii superioris proprius, levator labii superioris alæque nasi, pyramidalis nasi, compressor naris, the dilatator naris posterior, dilatator naris anterior, and depressor alæ nasi muscles.

13. Transverse Facial and Superficial Temporal Arteries, Fig. 2, Plate 182; and Plate 183.—The *transverse facial artery* (venæ comites), branch of the superficial temporal, runs parallel with, and inferiorly to, the zygomatic arch, between the parotid gland and the masseter muscle; it projects internally to the gland (Fig. 2, Plate 182), parallel with, and superiorly to, Stenson's duct. The *superficial temporal artery* (vena comes) has a superior course, from the internal surface of the parotid gland (Fig. 2, Plate 182). It passes (Plate 183) internally to the facial nerve, and posteriorly to the neck of the condyloid process of the inferior maxillary bone, to its origin from the bifurcation of the external carotid artery. The transverse facial artery is given off from it, superiorly to the point where it is crossed by the facial nerve.

14. External Carotid and Internal Maxillary Arteries, Plate 183; Fig. 2, Plate 184.—The *external carotid* presents at the level of, and posteriorly to, the neck of the condyloid process of the inferior maxillary bone, where it bifurcates into the *superficial temporal* and *internal maxillary arteries.* The latter disappears, to the deep region of the face (page 348), posteriorly to the neck of the condyloid process.

15. Auriculo-temporal Nerve: Fig. 2, Plate 182; Plate 183; Fig. 2, Plate 184.—This nerve has a superior course, to the scalp (page 320; Plate 177), between the superficial temporal artery and the auricle. It emerges from the deep region of the face, posteriorly to the temporo-maxillary articulation.

Dissection.—Clear (Plate 183) the surfaces of the masseter and levator labii superioris proprius muscles. Expose (Plate 183) the facial portion of the facial vein; also the same of the facial artery with its branches—inferior labial, inferior coronary, superior coronary, lateral nasal artery, and angular—which may be cut, where required, from out of their muscle beddings depressor anguli oris (orbicularis oris and levator labii superioris alæque nasi muscles). Clear (Fig. 2, Plate 183), completely, the surfaces of the compressor naris and pyramidalis nasi muscles.

16. Masseter Muscle, Plate 181; Fig. 2, Plate 182; and Plate 183.—This muscle is attached superiorly (Plates 181 and 183), by two portions: an *anterior*, to the inferior border of the anterior part of the zygomatic arch; and a *posterior* to the inferior border of the posterior part, and the internal surface of, the zygomatic arch. Inferiorly (Plates 181 and 183), the portions are attached as follows: the *anterior* passes, inferiorly and posteriorly, to the inferior part of the external surface of the ramus of the inferior maxillary bone; the *posterior* bridges, inferiorly to the superior part of the external surface of the ramus, and the inferior portion of the external surface of the coronoid process of, the same bone.

17. Levator Labii Superioris Proprius Muscle.—This muscle is attached: superiorly, inferiorly to the inferior rim of the orbital fossa (Plate 181); inferiorly, it blends with the middle (of the half) of the superior portion of the orbicularis oris muscle (Plate 183), posteriorly to the zygomaticus minor muscle (Fig. 2, Plate 182).

18. Facial Vein, Fig. 2, Plate 182, and Plate 183.—This vessel emerges from the posterior of the inferior portion of the orbicularis palpebrarum muscle, and has an indirectly-oblique course, posteriorly to the zygomaticus major and minor muscles (Fig. 2, Plate 182), to the point where it passes anteriorly to the body of the inferior maxillary bone into the subfascial plane of the neck (Plate 192).

19. Facial Artery.—This artery is projected, from the neck (Plate 192), anteriorly to the body of the inferior maxillary bone, and internally to the facial vein. It has a superior and internal, tortuous, course to a point externally to the angle of the lips; then, it is continued, superiorly to the superior lip, posteriorly to the zygomaticus major, zygomaticus minor, levator labii superioris proprius, and levator labii superioris alæque nasi muscles (Fig. 2, Plate 182); finally, it runs, superiorly, upon the exterior of the lateral wall of the nose.

20. Branches of the Facial Portion of the Facial Artery.—These branches present, in order, as follows: an anastomosing branch passes, superiorly and posteriorly, to the transverse facial artery; the *inferior labial* has an internal course to the inferior lip, posteriorly to the depressor anguli oris muscle; the *inferior coronary* is projected internally, in the submucous plane of the lip, and has a median-line anastomosis with its fellow of the opposite side; the *superior coronary* passes, internally, in the same plane of the lip, and anastomoses, as does the inferior—it gives off the *artery of the septum* to the septum of the nostrils; the *lateral nasal artery* runs, internally, exteriorly to the fleshy portion of the nostril, to its median line anastomosis with its fellow of the opposite side; the *angular artery*, the terminal branch of the facial, is located at the exterior of the superior portion of the nose, where it anastomoses with the nasal branch of the ophthalmic artery (Plate 183).

21. Pyramidalis Nasi Muscle.—This muscle is lodged exteriorly to the nasal bone; superiorly, it ends in the skin of the inferior portion of the frontal region; inferiorly, it blends with the superior border of the compressor naris muscle.

22. Compressor Naris Muscle, Plate 181; Fig. 2, Plate 182; Plate 183; Fig. 2, Plate 184; and Plates 187 and 188.—This muscle is attached: externally, to the anterior surface of the superior maxillary bone, externally to the osseous anterior naris, and superiorly to the eminence formed by the root of the lateral incisor tooth (Plate 181); its fibres pass over the fleshy portion of the nose and meet those of its fellow of the opposite side at a median-line, fibrous, raphe.

Dissection.—Section (Plate 183) the temporo-facial division of, and the buccal branch of the cervico-facial division of, the facial nerve, also the masseter muscle; dissect away the branches of the nerve, and the superior portion of the muscle—in removing the latter find (Plate 184) the nerve and artery to the masseter muscle. Expose the external lateral ligament of the right temporo-maxillary articulation.

23. Nerve and Artery of the Masseter Muscle, Fig. 2, Plate 184.—This nerve and artery—branches, respectively, of the motor root of the fifth cranial nerve, and the internal maxillary artery—emerge from the deep region of the face, through the sigmoid notch of the inferior maxillary bone, to enter the internal surface of the muscle.

Dissection.—Dissect away (Plate 183) the stumps of the zygomaticus major, zygomaticus minor, levator labii superioris alæque nasi muscles, and the levator labii superioris proprius muscle. Section (Plate 183) the facial vein, also the facial artery and its branches; dissect away the superior portions of the two vessels. Display (Fig. 2, Plate 184), the infra-orbital nerve and artery and find the buccal branch of the inferior maxillary division of the sensory root of the trifacial nerve externally to the buccinator muscle; clear the surfaces of the buccinator and levator anguli oris muscles.

24. Buccinator Muscle, Plate 181; Fig. 2, Plate 182; Plate 183; Fig. 2, Plate 184.—This muscle of the intermaxillary region, forms the muscle plane of the cheek. It is attached, posteriorly and externally, to the superior and inferior maxillary bones, respectively, within the area of the molar teeth (Plate 181); also to a fibrous raphe, the pterygo-maxillary ligament (Plate 201), between it and the superior constrictor muscle of the pharynx. Its fibres converge anteriorly and internally to fuse with the orbicularis oris muscle—opposite, superiorly to, and inferiorly to the angle of the lips (Fig. 2, Plate 184). It is perforated, as before described (page 330), by Stenson's duct of the parotid gland.

25. Levator Anguli Oris Muscle, Plates 181, 182, and 183; Fig. 2, Plate 184.—This muscle is attached: superiorly, to the superior maxillary bone, externally to the infra-orbital foramen (Plate 181); inferiorly, it fuses with the superior portion of the orbicularis oris muscle, superiorly to the angle of the lips (Fig. 2, Plate 184).

26. Infra-orbital Nerve, Fig. 2, Plate 184.—This nerve—the terminal branch of the superior maxillary division of the sensory root of the trifacial nerve—emerges to the superficial region of the face, at the infra-orbital foramen; it presents a leash of nerves, which pass between the muscles of the superior maxillary region, to distribute to the skin of the cheek, superior lip, and nose.

27. Infra-orbital Artery. — This artery (venæ comites), branch of the internal maxillary artery in the deep region of the face, appears in the superficial region of the face, by the infra-orbital foramen; it distributes to the contiguous muscles, etc., and anastomoses with the facial and nasal arteries.

DISSECTION.—Section (Plate 183), and clear away, the superior portions of the depressor anguli oris and depressor labii inferioris muscles; expose the mental nerve and artery, and the levator menti muscle.

28. Mental Nerve.—This nerve, branch of the inferior dental nerve within the dental canal of the inferior maxillary bone, is projected from the mental foramen (Plate 181), to distribute to the skin of the chin and inferior lip.

29. Mental Artery.—This artery (venæ comites), branch of the inferior dental artery within the dental canal, appears at the mental foramen, with the last-described nerve.

30. Levator Menti Muscle, Plates 181, and Fig. 2, 184.—This small muscle is attached: superiorly, to the anterior surface of the body of the inferior maxillary bone inferiorly to the alveolus of the lateral incisor tooth (Plate 181); inferiorly, it fuses with the skin of the chin at the side of the median line (Fig. 2, Plate 184).

DISSECTION.—Dissect away (Fig. 1, Plate 184), the orbicularis palpebrarum muscle, and display: the corrugator supercilii muscle; the palpebral ligament; the tarsi of the eyelids; and the internal and external tarsal ligaments. Cut out the sutures from the borders of the eyelids and remove the oakum posteriorly to them. Demonstrate the conjunctival sacs—superior and inferior; and the puncta lachrymalia—superior and inferior. Slit open the latter and expose the lachrymal canals—superior and inferior—and the lachrymal sac; pass a probe into the nasal duct.

31. Corrugator Supercilii Muscle.—This muscle is attached: internally, to the external surface of the internal angular process of the frontal bone; externally, to the skin of the internal half of the eyebrow.

32.—Palpebral Ligament and the Tarsi of the Eyelids, Plate 184.—The *palpebral ligament* is a fibrous membrane, which is attached to the osseous rim of the orbital aperture, and the tarsi of the eyelids; it closes in the orbital cavity. The *tarsi* (formerly described as tarsal cartilages) are dense fibrous tissue plates (a superior and an inferior), which continue the palpebral ligament into the eyelids. They give the lids shape and form their framework—the superior one is the larger of the two. From the internal and external angles of the palpebral slit, special fibres of the palpebral ligament form the, so-called, *internal* and *external tarsal ligaments.*

33. Conjunctiva and its Sacs, Fig. 1, Plate 184.—This is a layer of mucous membrane, continuous with the skin at the border of the eyelids, which lines the posterior surfaces of the tarsi of the latter and is reflected, circumferentially, from the tarsi to the anterior face of the globe of the eye. This reflection forms a superior and an inferior conjunctival sac. At the external part of the superior sac the orifices of the ducts from the lachrymal gland open.

34. Lachrymal Puncta, Lachrymal Canals, Lachrymal Sac, and Nasal Duct.—Near the internal angle of the palpebral aperture, an opening presents at the border of either eyelid—*lachrymal puncta;* these open into small canals, *lachrymal canals*, which continue, internally, to the *lachrymal sac;* the latter is lodged in the lachrymal groove at the orbital face of the lachrymal bone. From it a canal, the *nasal duct,* passes, inferiorly and a little posteriorly, to open into the inferior meatus of the nostril.

Dissection.—Open the superior portion of the palpebral ligament and expose (Fig. 2, Plate 184): the supra-orbital artery and nerve; the frontal artery; the supratrochlear nerve; the anterior portions of the levator palpebrae superioris and obliquus superior muscles; and the lachrymal gland. Dissect away the inferior portion of the palpebral ligament and display: the internal portion and anterior surface of the obliquus inferior muscle. Find and trace the nasal artery; and the infratrochlear nerve.

35. Supra-orbital Nerve and Artery, Fig. 2, Plate 182; Plates 183 and 184.—This nerve and artery pass out of the orbital cavity, by the supra-orbital notch or foramen (Plate 181), to reach the frontal area of the scalp (page 319; Plate 177).

36. Frontal and Nasal Arteries. — These arteries (venæ comites) are the branches of bifurcation of the ophthalmic artery at the internal side of the anterior of the orbit, inferiorly to the trochlea of the obliquus superior muscle. The *frontal artery* has a superior course to supply the frontal area of the scalp (page 318; Plate 177). The *nasal artery* runs, inferiorly and internally, to distribute to the exterior of the nose, and anastomose with branches of the facial and infra-orbital arteries, and with its fellow of the opposite side.

37. Supratrochlear Nerve.—This nerve emerges from the orbit superiorly to the trochlea of the obliquus superior muscle; has a superior course to the frontal area of the scalp (page 318; Plate 177); in its latter distribution it runs parallel with, and internally to, the frontal artery.

38. Infratrochlear Nerve.—This nerve appears from the orbit, inferiorly to the trochlea of the obliquus superior muscle. It distributes to the internal portion of the inferior eyelid and the nose.

ORBITAL CAVITY.

DISSECTION.—*The anatomical elements in one orbit may be dissected consecutively, without carrying forward the dissection of the two; but for the illustration of the parts contained in one orbit it is convenient to make counter-references to the dissected contents of both orbital cavities.*

Terms of Relation.—The general terms (Page 2) are used in the description of the dissection of the contents of this cavity.

Bones, and Bone Areas of Muscle Attachments, Plate 181.—The bones which form the walls of the orbital cavity are: the frontal (its horizontal portion); the ethmoid (its os-planum); the sphenoid (parts of its great and small wings); the malar; the superior maxillary; the palate (its orbital process); and the lachrymal. Of these the frontal, sphenoid, and superior maxillary afford attachments to muscles. The superior wall of the orbit, the horizontal portion of the frontal bone and the small wing of the sphenoid bone—together with the cribriform plate (one-half) of the ethmoid bone, form an anterior fossa (one side) of the interior of base of the cranium (page 324, Plate 180).

DISSECTION.—Detach the periosteum of the superior border of the orbital cavity; introduce the handle of a scalpel between the periosteum and the bone of the superior wall of the orbit, and peel the former from the latter. Saw along the section lines (Fig. 2, Plate 184), through the supra-orbital portion of the frontal bone; then make, with the chisel and mallet a V-shaped cut through the roof of the orbit (Plate 180), and remove it with the supra-orbital portion of the frontal bone. Introduce the end of a blowpipe into the eyeball and inflate it. Cut open, the superior periosteal lining of the orbit, and expose by removing the adipose tissue surrounding them, portions of the following parts (Plate 185, right orbit): the frontal nerve and its branches; the trochlear nerve; the supra-orbital artery; the lachrymal artery and nerve; the lachrymal gland; the levator palpebræ superioris, obliquus superior and a portion of the rectus superior muscles.

1. Frontal Nerve, Plate 185 (right orbit).—This nerve has an anterior course through the orbit, at first superiorly to, and then internally to, the levator palpebræ superioris muscle. It bifurcates into the *supra-orbital* and *supratrochlear* nerves, which continue, anteriorly, into the superficial region of the face to reach the frontal area of the scalp, as described (page 337) and illustrated (Plate 184).

2. Trochlear Nerve.—This nerve perforates the dura mater (page 325; Plate 180), runs externally to the cavernous sinus, and enters the orbit by the sphenoidal fissure. Its orbital portion has an anterior and internal course, internally to the posterior part of the frontal nerve, to the point where it enters the posterior half of the postero-anterior portion of the obliquus superior muscle.

3. Supra-orbital Artery.— This artery (vena comes), a branch of the ophthalmic, has an anterior course, parallel with, and internally to, the frontal and supra-orbital nerves, to leave the orbit with the latter nerve (page 337; Fig. 2, Plate 184).

4. Lachrymal Artery and Nerve.—The anterior portions of this artery (vena comes) and nerve have an anterior course, through the superior and external portion of the orbit, to supply the lachrymal gland.

5. Lachrymal Gland, Fig. 2, Plate 184; Plate 185.—This small glandular body is located at the anterior, and superior-external portion, of the orbital cavity. It is lodged between: the globe of the eye and its external rectus muscle, inferiorly; the frontal bone, superiorly; and the conjunctiva, anteriorly.

6. Levator Palpebræ Superioris Muscle, Plate 181; Fig. 2, 184; and Plate 185.—This muscle is attached: posteriorly, to the orbital surface of the small wing of the sphenoid bone, superiorly to the optic foramen; anteriorly, to the superior border of the tarsus of the superior eyelid. It widens as it advances anteriorly.

7. Obliquus Superior Muscle.—This muscle has four portions: the postero-anterior, the transverse, the mid-tendon, and the trochlea. The *postero-anterior portion* is attached: posteriorly, to the orbital surface of the small wing of the sphenoid bone, internally and superiorly to the optic foramen; anteriorly, it ends in the mid-tendon. The *transverse portion* extends, almost at a right angle to the postero-anterior portion, from the mid-tendon to the anterior, antero-posterior, attachment of the muscle to the sclerotic coat of the eyeball, inferiorly to the rectus superior muscle. The *mid-tendon* is round and is common to the two muscle portions. The *trochlea* is a loop of fibrous tissue, which is attached to the orbital surface of the frontal bone—at the trochlear fossa; within it the mid-tendon plays.

Dissection.—Chisel away (according to the section lines on the right side of Plate 185) the internal portion of the left small wing of the sphenoid bone (pick out, with the forceps, the pieces of bone). Expose, with the sharp pointed curved scissors (Plate 185, left side), the transit into the orbit of the optic nerve, ophthalmic artery, trochlear nerve, oculo-motor nerve, and the ophthalmic division of the sensory root of the trifacial nerve. Cut (as in Plate 185, right side) the frontal nerve and supra-orbital artery, and dissect away their anterior portions. Section (as in Plate 185, right side) the lachrymal artery and nerve ; remove their anterior portions, carrying away the lachrymal gland. Cut (Plate 185, left orbit) the levator palpebræ superioris muscle ; dissect away its anterior portion, together with the tarsus of the superior eyelid. Expose (Plate 185, left side) the trochlear nerve, from its intracranial portion to the obliquus superior muscle. Demonstrate (Plate 185, left side) the intra-orbital fibrous ring, which surrounds the posterior ends of the intra-orbital muscles, vessels, and nerves. Clear the superior surfaces of the rectus superior muscle and the globe of the eye. Removing more fat from the orbit, display anterior portions of : the ophthalmic vein and artery, and the nasal nerve.

8. Intra-orbital Fibrous Ring, Plate 185 (left side).—At the circumference of the intra-orbital face of the sphenoidal fissure and optic foramen, a ring of fibrous tissue presents, from which the intra-orbital muscles diverge, and through which vessels and nerves pass.

9. Ophthalmic Division of the Sensory Root of the Trifacial Nerve, Plates 185 and 186.—This division of the trifacial nerve is projected, anteriorly and a little superiorly, from the Gasserian ganglion of the sensory root of the nerve, to the point where it passes from the cranium into the orbit, by the sphenoidal fissure. As it enters the fissure it bifurcates into a superior—the *frontal* nerve—and an inferior—the *nasal* nerve—branch. The *frontal nerve* (page 338) gives off the *lachrymal nerve* (page 339) ; the two pass into the orbit superiorly to the intra-orbital fibrous ring. The *nasal nerve* (page 342) enters the orbit through the ring.

10. Rectus Superior Muscle, Plates 181 and 185.—This muscle runs postero-anteriorly, and is located inferiorly to the levator palpebræ superioris muscle. It is attached : posteriorly, to the orbital surface of the small wing of the sphenoid bone, between the optic foramen and the posterior attachment of the levator palpebræ superioris muscle ; anteriorly, to the superior area of the sclerotic coat of the eyeball, near the circumference of the cornea.

11. Ophthalmic Vein, Plate 185.—This commences at the internal part of the anterior of the orbital cavity, by the confluence of the comites veins of the frontal and nasal arteries. It runs obliquely, posteriorly to the eyeball, to the external side of the posterior third of the rectus superior muscle; then it is projected posteriorly, between the posterior attachments of the rectus externus muscle, and through the inferior portion of the sphenoidal fissure, to empty into the cavernous sinus (Plate 180). In its intra-orbital course it receives the comites veins of all the branches of the ophthalmic artery.

DISSECTION.—Section (Plate 185, left side) the ophthalmic division of the sensory root of the trifacial nerve and its nasal branch, also, the rectus superior and obliquus superior muscles. Dissect away the portions of the nerve and muscles included between the sections of them. Section (Plate 185, left orbit) the intra-orbital fibrous ring: reflect the internal portion of the ring with the posterior attachments of the levator palpebræ superioris and obliquus superior muscles; dissect away the external portion, carrying, externally, the superior attachment of the rectus externus muscle (Plate 186, left orbit). Remove the ophthalmic vein, antero-posteriorly. Trace the abducent nerve from its intracranial stump to its point of entrance into the rectus externus muscle (Plate 186, left side). Find the ophthalmic ganglion—by cutting away a portion of the branch of the ophthalmic artery to the rectus externus muscle—bedded in fat, between the rectus externus muscle and the optic nerve (Plate 186, left orbit); trace its motor root (to the oculomotor nerve), its sensory root (to the nasal nerve), and its anterior branches. Follow (Plate 186, left orbit) the oculomotor nerve from the cranium into the orbit; find and trace its superior branch; also its inferior branch, to the point where it disappears. Track (Plate 186, left orbit) the nasal nerve and its branches, also the ophthalmic artery and its branches. Display the optic nerve from the cranium to its entrance into the eyeball (Plate 186, left side). Clear (Plate 186, left orbit), partially, the superior surfaces of the rectus externus and rectus internus muscles.

12. Abducent Nerve, Plates 185 and 186.—This nerve, the sixth cranial, perforates the dura mater (page 325; Plate 180), to run inferiorly to the cavernous sinus, and the ophthalmic division of the sensory root of the trifacial nerve (Plate 185, left side); it finally passes from the cranium into the orbit, by the sphenoidal fissure. Its intra-orbital course is, between the posterior attachments of the rectus externus muscle, directly to the internal surface of that muscle.

13. Ophthalmic Ganglion, Plate 186 (left orbit).—This ganglion is bedded in adipose tissue, internally to the posterior portion of the rectus externus muscle. It presents as a bead-like, shining, reddish body. From it a short branch can be traced to the inferior branch of the oculomotor nerve (motor root), and a second, longer one, to the nasal nerve (sensory root). Anteriorly, from it, a variable number of branches (very delicate) are given off—the *short ciliary nerves*—which pass to enter the posterior surface of the eyeball (Plate 186, left orbit, shows two of the larger of these nerves).

14. Oculomotor Nerve, Plates 185 and 186.—This nerve, the third cranial, leaves the interior of the dura mater (page 325); it is continued, anteriorly, externally to the cavernous sinus, and is projected from the cranium into the orbit by the sphenoidal fissure. Its intra-orbital portion passes between the posterior attachments of the rectus externus muscle. A superior branch supplies the rectus superior and the levator palpebræ superioris muscles. Its inferior branch gives off the motor root of the ophthalmic ganglion, and continues to its disappearance inferiorly to the optic nerve (Plate 186, left orbit).

15. Nasal Nerve and its Branches, Plates 185 and 186 (left orbits).—This nerve, a branch of the ophthalmic division of the sensory root of the trifacial nerve (Plate 185, left orbit), is projected, anteriorly into the orbit, through the sphenoidal fissure. Its intra-orbital portion passes between the posterior attachments of the rectus externus muscle; and crosses, internally, between the ophthalmic artery and the optic nerve. Its branches are: the sensory root of the ophthalmic ganglion, which runs, anteriorly, to the ganglion, externally to the optic nerve. As it crosses between the optic nerve and the ophthalmic artery, it gives off the *long ciliary nerves*, which run parallel with, and superiorly to, the optic nerve, to enter the posterior of the eyeball. At the internal side of the orbit it gives off the *infratrochlear branch*, which is projected, anteriorly, to its emergence, in the superficial region of the face (page 337; Plate 184), inferiorly to the trochlea of the obliquus superior muscle. The nasal nerve leaves the orbit by the anterior ethmoidal foramen, by which it enters the cranium; its intra-cranial portion runs, anteriorly, upon the superior surface of the cribriform plate of the ethmoid bone (Plate 186), to the point where it passes out of the cranium, at the side of the crista galli of the ethmoid bone, into a nasal cavity.

16. Ophthalmic Artery and its Branches, Plates 180, 185, and 186.—This artery, a branch of the internal carotid (page 326; Plate 180) passes, with the optic nerve, from the cranial cavity to the orbit, by the optic foramen. The posterior of its intra-orbital portion curves internally, to cross superiorly to the optic nerve; it then advances, obliquely, to the internal side of the anterior portion of the orbit, where it terminates by bifurcation, inferiorly to the trochlea of the obliquus superior muscle. Its branches are: the *superior* and *inferior muscular* to the intra-orbital muscles; the *supra-orbital* before described (page 338) and illustrated (Plate 185, right orbit); the *ciliary*, which run anteriorly, superiorly to the optic nerve, to enter the posterior of the eyeball; the *posterior* and the *anterior ethmoidal*, which leave the orbital cavity, at its internal wall, by the posterior and the anterior ethmoidal foramen, respectively; at its terminus it bifurcates into the *frontal* and *nasal arteries* (page 337; Plate 184).

17. Optic Nerve, Plate 186 (left side).—This, the second cranial nerve, leaves the cranial cavity, with the ophthalmic artery, by the optic foramen, and enters the posterior or apex of the orbit. Its intra-orbital portion advances anteriorly, and a little externally, to its entrance into the eyeball, at its posterior surface. As lodged it is surrounded by fat, in which arteries and nerves run parallel with it—the ciliary (pages 341 and 342).

18. Rectus Externus Muscle, Plates 181 and 185.—This muscle is attached: posteriorly, to the orbital surface of the small wing of the sphenoid bone, externally to the optic foramen (superior head), and at the inferior border of the sphenoidal fissure (inferior head); anteriorly, at the external area and to the sclerotic coat, of the eyeball, near the cornea.

Dissection.—Cut the following parts (Plate 186, left orbit): the ophthalmic artery; the motor root of the ophthalmic ganglion; the nasal nerve; also the ciliary arteries and nerves as they enter the eyeball (as in Plate 186, right side). Dissect away the ophthalmic ganglion, nasal nerve, and ophthalmic artery. In removing the artery find the arteria centralis retinæ, and cut it near its entrance into the optic nerve (Plate 186, right orbit). Cut the optic nerve (Plate 186, right orbit), and remove the included portion. Section the rectus externus muscle (Plate 186, right orbit) and dissect away its anterior portion. Tilt the eyeball (by a loop of thread), anteriorly and inferiorly; trace the inferior branch of the oculomotor nerve; clear the surfaces of the rectus internus, rectus inferior, and obliquus inferior muscles.

19. Arteria Centralis Retinæ, Plate 186 (right orbit).—This small artery, a branch of the ophthalmic—opposite the anterior portion of the optic nerve—enters the nerve a short distance from the posterior of the eyeball.

20. Oculomotor Nerve.—This nerve was partly described (page 342); its inferior branch is now seen distributing branches to the rectus internus, rectus inferior, and obliquus inferior muscles.

21. Rectus Internus Muscle, Plates 181 and 186.—This muscle, at the internal wall of the orbit, is attached: posteriorly, to the orbital face of the small wing of the sphenoid bone, internally to the optic foramen; anteriorly, at the internal area, and to the sclerotic coat, of the eyeball, near the cornea.

22. Rectus Inferior Muscle.—This muscle, at the inferior wall of the orbit, is attached: posteriorly, to the orbital face of the small wing of the sphenoid bone, inferiorly to the optic foramen; anteriorly, at the inferior area, and to the sclerotic coat, of the eyeball, near the cornea.

23, Obliquus Inferior Muscle, Plate 181; Fig. 2, Plate 184; Plates 185 to 188, inclusive.—This muscle is located at the inferior of the anterior portion of the orbit (Fig. 2, Plate 184), its internal attachment is to the internal and anterior portion of the orbital surface of the superior maxillary bone (Plates 181, 187, and 188). It winds around the eyeball, inferiorly to the anterior end of the rectus inferior muscle, and between the anterior part of the rectus externus muscle and the eyeball. Externally it has an antero-posterior attachment to the sclerotic coat of the eyeball, at the external surface of its mid-portion.

MIDDLE FOSSA OF THE CRANIUM.

DISSECTION.—*Either the right or left middle fossa of the interior of the cranium may be dissected consecutively, but for purposes of illustration both fossæ are dissected and utilized for counter-references.*

Terms of Relation.—The general terms (page 2) will suffice to locate the parts in this dissection.

Bones of a Middle Fossa of the Cranium, Plates 180, 181, 185, 186, and 199.—Portions of the following bones contribute to a middle fossa of the base of the cranium (page 324; Plate

180): the sphenoid (superior and lateral surfaces of its body, a great wing, and a small wing); the temporal (anterior surface and apex of its petrous portion). It communicates with: the orbit, by the sphenoidal fissure and optic foramen (Plate 181); the deep region of the face (Plate 199) by the foramen rotundum, foramen ovale, and foramen spinosum; with the aqueductus Fallopii, by the hiatus Fallopii.

DISSECTION.—Peel the dura mater from the interior of a middle fossa of the cranium, and expose (Plate 185, left side) the following parts: the stumps of the motor and sensory roots of the trifacial nerve; the Gasserian ganglion, with the ophthalmic, superior maxillary, and inferior maxillary divisions of the sensory root of the same nerve; the middle meningeal artery; the large superficial petrosal and external superficial petrosal nerves.

1. Trifacial Nerve: its Gasserian Ganglion; Divisions of its Sensory Root; and its Motor Root, Plates 185 and 186.—The motor and sensory roots of the trifacial nerve pass, anteriorly, superiorly to the superior border of the internal end of the petrous portion of the temporal bone. The Gasserian ganglion, of the *sensory root* of the trifacial nerve, is located on a depression at the anterior surface of the apex of the petrous portion of the temporal bone. From the anterior of the ganglion the three divisions of the sensory root of the nerve are given off: the ophthalmic, the superior maxillary, and the inferior maxillary. The *ophthalmic division* has been described (page 340) and illustrated (Plates 185 and 186, left sides); the *superior maxillary division* is projected, anteriorly, to its emergence from the cranium, to the spheno-palatine fossa of the deep region of the face, by the foramen rotundum in the great wing of the sphenoid bone; the *inferior maxillary division* passes, inferiorly, out of the cranium, to the deep region of the face (Plate 188), by the foramen ovale in the great wing of the sphenoid bone.

The *motor root* of the trifacial nerve runs, inferiorly to the Gasserian ganglion, to the foramen ovale, where it leaves the interior of the cranium to enter the deep region of the face (Plate 188) with the inferior maxillary division of the sensory root of the nerve.

2. Middle Meningeal Artery. — This artery enters the cranium, from the deep region of the face (Plate 188), by the foramen spinosum in the great wing of the sphenoid bone. Its intracranial portion has a superior course toward the vertex area of the head (Plate 179), between the dura mater and the lateral osseous wall of the cranium.

3. External Superficial Petrosal Nerve. — This nerve, branch of the geniculate ganglion of the facial nerve, enters the interior of the cranium by a small foramen in the anterior wall of the petrous portion of the temporal bone. It has a short intracranial course, between the dura mater and bone, to the middle meningeal artery, where it communicates with the sympathetic nerve plexus upon that artery.

Dissection.—Section (as on right side of Plate 186) the right superior maxillary and inferior maxillary divisions of the sensory root of the trifacial nerve; dissect away the ganglion and portion of the motor root of the nerve. Expose the intracranial portions of the internal carotid artery, and the large superficial petrosal nerve (Plate 186, right side).

4. Internal Carotid Artery.—The intracranial portion of this artery emerges into the interior of the cranium (Plate 186, right side) from the internal orifice of the carotid canal, at the apex of the petrous portion of the temporal bone; thence it is projected, superiorly, at the lateral surface of the body of the sphenoid bone. It gives off the ophthalmic and posterior communicating arteries, and then bifurcates into the middle and anterior cerebral arteries. (In the removal of the brain, etc., from the interior of the cranium (page 324), the internal carotid arteries, the right and the left, are cut between the giving off of their ophthalmic and posterior communicating branches; therefore, the latter branches and the bifurcations of these arteries are removed with, and are described with, the brain.)

5. Large Superficial Petrosal Nerve.—This nerve, branch of the geniculate ganglion of the facial nerve—lodged in the aqueductus Fallopii of the petrous portion of the temporal bone—emerges into the interior of the cranium by the hiatus Fallopii, at the anterior surface of the petrous portion of the temporal bone. Its intracranial portion runs, internally and anteriorly, between the dura mater and the bony floor of the middle fossa of the cranium. It passes inferiorly to the Gasserian ganglion of the trifacial nerve, and the internal carotid artery to reach the foramen lacerum medium—a triangular deficiency in the base of the cranium, which is bounded by the apex of the petrous portion of the temporal bone, externally, the basilar process of the occipital bone, posteriorly and internally, and the root of the pterygoid process of the sphenoid bone, anteriorly. At this point it is joined by the *large deep petrosal nerve* from the sympathetic nerve upon the internal carotid artery; the two form the Vidian nerve, which passes, anteriorly, by the Vidian canal, to the spheno-palatine fossa of the deep region of the face.

DEEP REGION OF THE FACE.

DISSECTION.—*The deep region of the right side of the face may be dissected consecutively to its superficial region, but in order to illustrate, undisturbed, the pharynx with its contiguous vessels and nerves, the right side is reserved for the same, and the deep region of the face is illustrated on the left side.*

Terms of Relation.—The general terms (page 2), are used in locating the parts in this dissection.

Bones, and Bone Areas of Muscle Attachments, Plates 190 and 199.—The bones forming the walls of this region are: internally, the *superior maxillary* (the postero-external surface of the body), and the *sphenoid* (the plates of one its pterygoid processes); superiorly, the *sphenoid* (one of its great wings), and the *temporal* (inferior face of its petrous portion); externally, the *inferior maxillary* (one of its rami), the *temporal* (its zygoma), and the *malar;* posteriorly, the *three superior cervical vertebræ* (the anterior of their transverse processes). All of these bones, except the cervical vertebræ, afford attachments to muscles of the region. Internally, the region is walled by the superior portion of the pharynx, and the pillars and tonsil of the soft palate.

DISSECTION.—The dissection of the superficial region of the left antero-lateral area of the face should be made, according to the steps detailed (pages 327 to 337, inclusive), and the illustrations (Plates 181 to 184, inclusive), given for the right. Saw the left zygomatic arch along lines similar to those shown in Fig. 2, Plate 184—through the malar bone and the zygoma of the temporal bone—and remove the included portion of bone. Clear the external surface of the inferior portion of the left temporal muscle, and follow the same to its inferior attachment.

1. Temporal Muscle, Plate 181; Fig. 2, Plate 184.—The superior portion of this muscle was before described (page 321) and illustrated (Plate 178). Its inferior portion is lodged internally to the zygomatic arch, and is attached to the coronoid process of the inferior maxillary bone (Fig. 2, Plate 184).

Dissection.—Preserving (Fig. 2, Plate 184), the stumps of the deep temporal arteries and nerves, of the masseteric artery and nerve, and of the buccal nerve, cut away the inferior portion of the temporal muscle from the coronoid process of the inferior maxillary bone. Saw the inferior maxillary bone along lines similar to those shown in Fig. 2, Plate 184—at the neck of the condyloid process, and through the ramus inferiorly to the level of Stenson's duct. (Saw partly through the bone with a small saw, and complete the section with bone forceps). Dissect away the included piece of bone; also, the posterior part of the parotid gland. Cut away the skin posteriorly to the ramus of the inferior maxillary bone (Plate 187), and display: portions of the digastric (posterior belly) and stylo-hyoid muscles; and the superior part of the external carotid artery. Trace (Plate 187) the internal maxillary artery from its origin, internally; find its several branches. Follow (Plate 187) the temporal nerves inferiorly, and buccal and masseteric nerves superiorly, to the points where they perforate or pass posteriorly to the external pterygoid muscle. Expose (Plate 187) the following parts: the external surface of the temporo-maxillary articulation; the anterior surface of the external pterygoid muscle; portions of the gustatory, inferior dental, and mylohyoid nerves; and part of the external surface of the internal pterygoid muscle.

2. Internal Maxillary Artery, Plates 187 and 188.—This artery (venæ comites), one of the branches of bifurcation of the external carotid artery, passes between the condyloid process of the inferior maxillary bone, anteriorly, and the internal lateral ligament, posteriorly, to enter the deep region of the face. It has an anterior and internal course, externally to the external pterygoid muscle, to the point where it enters the spheno-palatine fossa (Plate 188).

3. Branches of the Internal Maxillary Artery, — The branches of this artery present in order, from its origin internally, as follows: the *deep auricular*, the *tympanic*, the *middle meningeal*, and the *small meningeal* have a superior course—the first to the external ear, the second to the middle ear, the third and fourth to the interior of the cranium; the *inferior dental* is projected inferiorly, to enter the inferior dental foramen of the inferior maxillary bone; the *anterior deep temporal* and the *posterior deep temporal* (page 322; Fig. 2,

Plate 178, and Fig. 2, Plate 184), the masseteric (Fig. 2, Plate 184), and the *pterygoid* (two or more), distribute superiorly and inferiorly to the corresponding muscles; the *buccal* has an inferior course to the cheek; the *alveolar* runs anteriorly, giving off the (two) *posterior dental* arteries—which enter canals in the external wall of the superior maxillary bone, to distribute to the molar and bicuspid teeth, of one side, of the superior dental arch—and continues to the alveolar process and gums of the superior dental arch; the *infraorbital* is projected anteriorly, and a little superiorly, to enter the posterior end of the infraorbital canal (Plate 181) in the floor of the orbit, where it gives off the *anterior dental*, before emerging to the superficial region of the face by the infra-orbital foramen—the anterior dental nerve passes through a canal in the anterior wall of the superior maxillary bone, to supply the canine and incisor teeth, of one side, of the superior dental arch.

4. Buccal Nerve, Plate 187.—This nerve, branch of the inferior maxillary division of the sensory root of the trifacial nerve, emerges from between the superior and inferior portions of the external pterygoid muscle; it has an inferior course to distribute to the cheek.

Dissection.—Section (Plate 187) the internal maxillary artery and its alveolar branch; remove the portion of the vessel included between the cuts. Expose the external pterygoid muscle. Dissect away the left condyloid process of the inferior maxillary bone, demonstrating thereby the following parts: the external lateral and capsular ligaments (Plate 187), and the interarticular fibro-cartilage (Fig. 2, Plate 188) of the temporo-maxillary articulation; also the posterior attachments of the external pterygoid muscle. Cut away the interarticular fibro-cartilage, and expose, completely, the internal lateral ligament of the temporo-maxillary articulation (Fig. 1, Plate 188).

5. Temporo-maxillary Articulation, Fig. 2, Plate 184; Plates 187, 188, and 190.—The anatomical elements of this articulation are: bones, ligaments, interarticular fibro-cartilage, articular cartilage and synovial membrane.

The bones are: the *temporal*, by the glenoid cavity (Fig. 1, Plate 188) of its squamous portion; and the *inferior maxillary*, by its condyloid process.

The ligaments are: the *external lateral* (Fig. 2, Plate 184; and Plate 187), from the anterior portion of the external surface of the neck of the condyloid process of the inferior maxillary bone to the zygoma of the squamous portion of the temporal bone; the *capsular* (Plates 187 and 190), from the border of the articular surface of the condyloid process to the circumference of the glenoid cavity, and, intermediately, to the circumference of the interarticular fibro-cartilage (Fig. 2, Plate 188); the *internal lateral* (Plate 187; Fig. 1, Plate 188; Plate 190), which passes from the internal border of the inferior dental foramen (at the internal surface of the ramus) to the spine of the sphenoid bone (Plate 199)—it is located internally to: the posterior end of the external pterygoid muscle, the auriculo-temporal nerve, the internal maxillary, middle meningeal, and inferior dental arteries, and the inferior dental nerve; the *stylo-maxillary* (Plate 190), from the posterior border of the inferior portion of the ramus of the inferior maxillary bone to the styloid process of the petrous portion of the temporal bone.

The *interarticular fibro-cartilage* (Fig. 2, Plate 188), is lodged between the articular surfaces of the articulation and determines a superior and an inferior cavity to the joint.

The *articular cartilage* and *synovial membrane* are disposed as with movable joints in general (page 11).

6. External Pterygoid Muscle, Plate 187; Fig. 2, Plate 188; Plates 190 and 199.—This muscle, having a superior and an inferior portion, has an antero-posterior course. Its *superior portion* is attached: anteriorly, to the exterior surface of the great wing of the sphenoid bone (Plate 190); posteriorly, to the internal border of the interarticular fibro-cartilage of the temporo-maxillary articulation (Fig. 2, Plate 188). Its *inferior portion* is attached: anteriorly, to the external surface of the external plate of the pterygoid process of the sphenoid bone; posteriorly, to the internal surface of the neck of the condyloid process of the inferior maxillary bone (Plate 199).

Dissection.—Dissect away the external pterygoid muscle from its anterior attachments; find and preserve its nerve. Remove a portion of adipose tissue from the external surface of, and superiorly to, the internal pterygoid muscle. Trace (Fig. 1, Plate 188) the deep temporal (anterior and posterior), buccal, masseteric, external pterygoid, auriculo-temporal, inferior dental, and gustatory nerves to their origin from the inferior maxillary division of the sensory root and the motor root of the trifacial nerve, in the deep region of the face. Find (Fig. 1, Plate 188) the nerve to the internal pterygoid muscle from the trifacial nerve ; also, the chorda tympani nerve (Fig. 1, Plate 188) at its junction with the gustatory nerve ; follow the latter, superiorly and externally, to the Glasserian fissure of the glenoid cavity of the inferior maxillary bone. Expose the middle and small meningeal arteries (Fig. 1, Plate 188) from their origins to their entrances into the cranium.

7. Inferior Maxillary Division of the Sensory Root, and the Motor Root, of the Trifacial Nerve, Plate 188.—The intra-cranial portions of this division of the sensory root, and the motor root, of this cranial nerve were before described (page 345) and illustrated (Plates 180, 185, and 186). They emerge from the cranium into the deep region of the face, by the foramen ovale in the great wing of the sphenoid bone ; they lie externally to the superior portion of the tensor palati muscle.

8. Buccal, Temporal, Masseteric, External Pterygoid and Internal Pterygoid Nerves, Plates 184, 187, and Fig. 1, Plate 188.—These are all motor nerves (except the buccal), and are given off from the motor portion of the trifacial nerve, to supply the muscles their names imply. The buccal nerve has been described (page 349) and illustrated (Plate 187).

9. Auriculo-temporal Nerve, Plates 182 and 183 ; Fig. 2, Plate 184 ; Plate 187 ; Fig. 1, Plate 188.—This nerve may be traced from its external portion anteriorly to the auricle (Fig. 2, Plate 184), to the point where it winds posteriorly to the glenoid cavity of the temporal bone, into the deep region of the face. It passes internally, externally to the internal lateral ligament of the temporo-maxillary articulation, to the point where it divides to include the middle meningeal artery ; it then unites again, forming a single trunk, which may be traced to the inferior maxillary division of the sensory root of the trifacial nerve.

10. Inferior Dental Nerve, Plates 187 and 188.—This nerve is a branch of the inferior maxillary division of the sensory root of the trifacial nerve, after the same has entered the deep region of the face (page 345 ; Plate 188). It is projected, inferiorly, externally to the tensor palati and internal pterygoid muscles, to the internal surface of the ramus of the inferior maxillary bone, where it enters, the inferior dental canal, by the inferior dental foramen. Before entering the foramen it gives off the *mylo-hyoid branch* (a motor nerve, that receives its filaments from the motor root of the trifacial through the inferior dental nerve), which passes, inferiorly, in the mylo-hyoid groove, at the internal surface of the ramus and body of the inferior maxillary bone, to supply the mylo-hyoid and digastric (anterior belly) muscles ; it is accompanied by the mylo-hyoid branch of the inferior dental artery. The inferior dental nerve is accompanied, in the inferior dental canal, by the inferior dental artery, branch of the internal maxillary artery (page 348, Plate 187) ; while in the canal, the nerve and artery supply the teeth (of one half) of the inferior dental arch ; opposite the mental foramen (Plate 181), the artery and nerve give off, respectively, the mental artery and nerve, which emerge to the superficial region of the face, by the mental foramen (page 335 ; Fig. 2, Plate 184 ; Plate 187 ; and Fig. 1, Plate 188).

11. Gustatory Nerve.—This nerve, the largest branch of the inferior maxillary division of the sensory root of the trifacial nerve, has an inferior course parallel with, and anteriorly to, the inferior dental nerve ; it runs externally to the tensor palati and internal pterygoid muscles, to the point where it passes internally to the anterior portion of the inferior part of the ramus of the inferior maxillary bone.

12. Chorda Tympani Nerve, Fig. 1, Plate 188.—This nerve, branch of the facial nerve (from its portion in the aqueductus Fallopii), enters the deep region of the face, from the tympanic wall of the middle ear, by the Glasserian fissure of the glenoid cavity of the temporal bone. It has an anterior and internal course, internally to the internal lateral ligament of the temporo-maxillary articulation, to the point where it communicates with the gustatory nerve, at the external surface of the internal pterygoid muscle.

13. Middle and Small Meningeal Arteries, Plate 187 and Fig. 1, Plate 188.—The *middle meningeal artery* (venæ comites), branch of the internal maxillary artery, has a superior course, to enter the cranium by the foramen spinosum (Plate 199), in the great wing of the sphenoid bone. As before referred to (page 351), it is included in a ring of nerve, formed by the division and reunion of the auriculo-temporal nerve (Fig. 1, Plate 188). Its intracranial portion was before described (pages 322 and 345) and illustrated (Plates 179, 185, and 186). The *small meningeal artery*, usually a branch of the middle meningeal, has a superior and internal course to enter the cranium, by the foramen ovale (Plate 199) in the great wing of the sphenoid bone.

DISSECTION.—Loop (Fig. 1, Plate 188) the inferior maxillary division of the sensory root, and the motor root, of the trifacial nerve internally, and display the otic ganglion.

14. Otic Ganglion, Fig. 1, Plate 188.—This ganglion, one of the cephalic ganglia of the sympathetic nerve, presents as a small (bead-like), reddish, and shining body, at the external surface of the superior portion of the tensor palati muscle; from it very minute filaments radiate.

DISSECTION.—Section (as in Fig. 2, Plate 188) the external carotid and middle meningeal arteries; and the auriculo-temporal and chorda tympani nerves. Dissect away the stumps of the superficial temporal, internal maxillary and middle meningeal arteries; the auriculo-temporal nerve with the otic ganglion, the chorda tympani nerve, and the internal lateral ligament of the temporo-maxillary articulation. Expose (Fig. 2, Plate 188) the surfaces of parts of the tensor palati, levator palati, and superior constrictor (of pharynx) muscles, and the internal carotid artery. Posteriorly, and externally, to the latter artery, find portions of: the styloid process of the temporal bone; the stylo-glossus and stylo-pharyngeus muscles; the glosso-pharyngeal nerve; and the spinal accessory nerve.

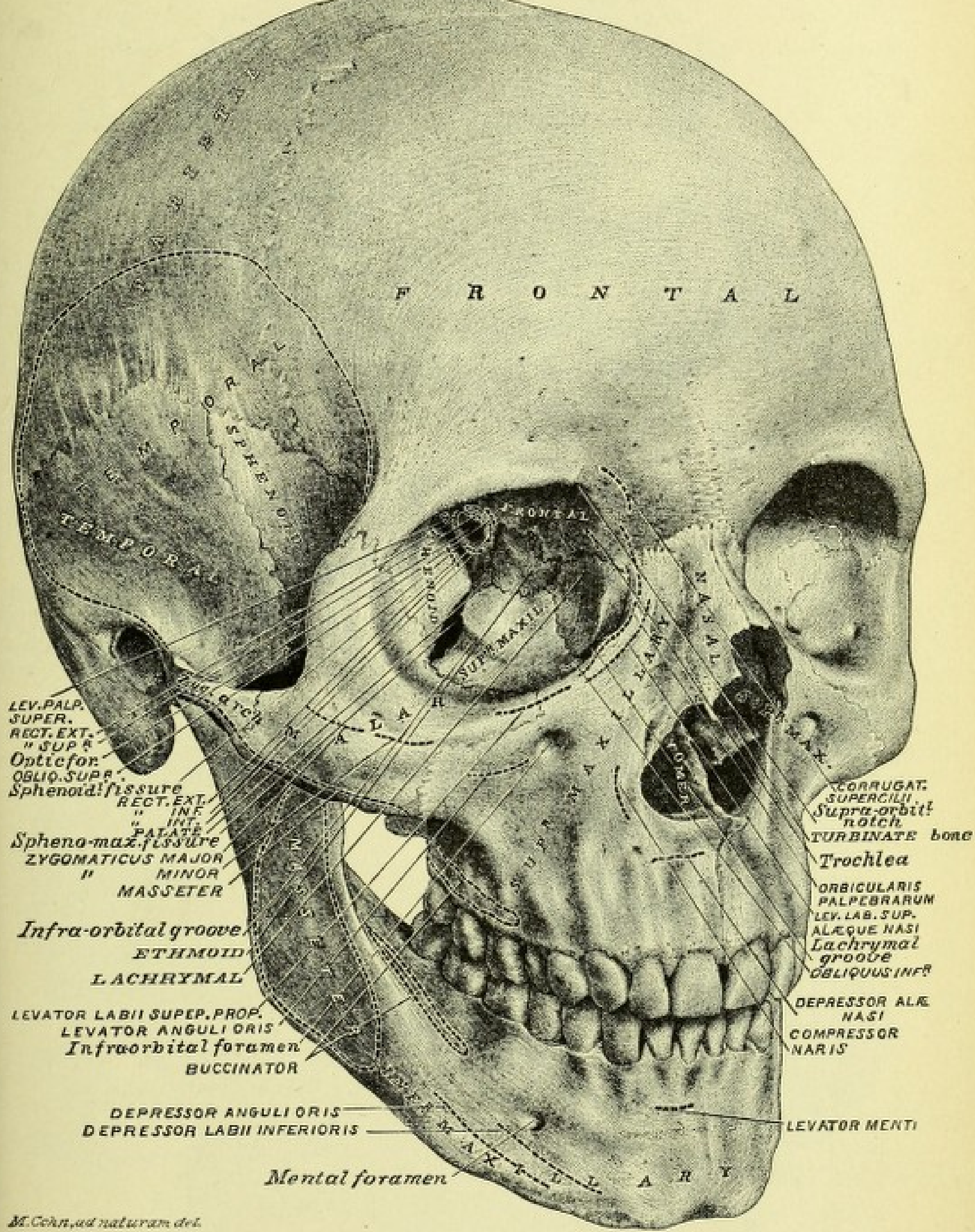
15. Internal Carotid Artery, Fig. 2, Plate 188.—The superior end of the extracranial portion of this artery presents externally to the superior constrictor muscle of the pharynx, on its way to the orifice of the carotid canal (Plate 199), at the inferior face of the petrous portion of the temporal bone.

16. Tensor Palati and Levator Palati Muscles; Superior Constrictor Muscle and Fibrous Coat of the Pharynx.—The external surfaces of the superior portions of these muscles present in the triangular space bounded by: the internal pterygoid muscle, anteriorly; the internal carotid artery, posteriorly; and the cranium, superiorly. A portion of the fibrous coat of the pharynx appears between the superior constrictor and the levator palati muscles.

17. Styloid Process of Temporal Bone; Stylo-hyoid, Stylo-glossus, and Stylo-pharyngeus Muscles, Fig. 2, Plate 188, and Plate 190.—The styloid process, of the petrous portion of the temporal bone, has a variable length, and from it the stylo-hyoid ligament is continued to the small cornu of the hyoid bone (Plate 190). It affords attachments to the superior ends of the three *stylo* muscles, which pass, as their names imply, to the hyoid bone, tongue, and pharynx.

18. Glosso-pharyngeal and Spinal Accessory Nerves, Fig. 2, Plate 188.—The superior ends of the extracranial portions of these nerves present as follows: the glosso-pharyngeal nerve, posteriorly to, and between, the internal carotid artery and the styloid process; the spinal accessory nerve, posteriorly to, and between, the styloid process and the posterior auricular artery, to the point where it passes internally to the posterior belly of the digastric muscle.

19. Posterior Auricular Artery, Plates 187 and 188.—This artery (venæ comites) is given off from the external carotid artery, where the latter is located internally to the inferior end of the posterior portion of the parotid gland. It passes, superiorly and posteriorly, under cover of the gland, supplying it, the auricle of the ear, and the scalp (page 320; Plate 177).



M. Cohn, ad naturam del.

FIG. 1

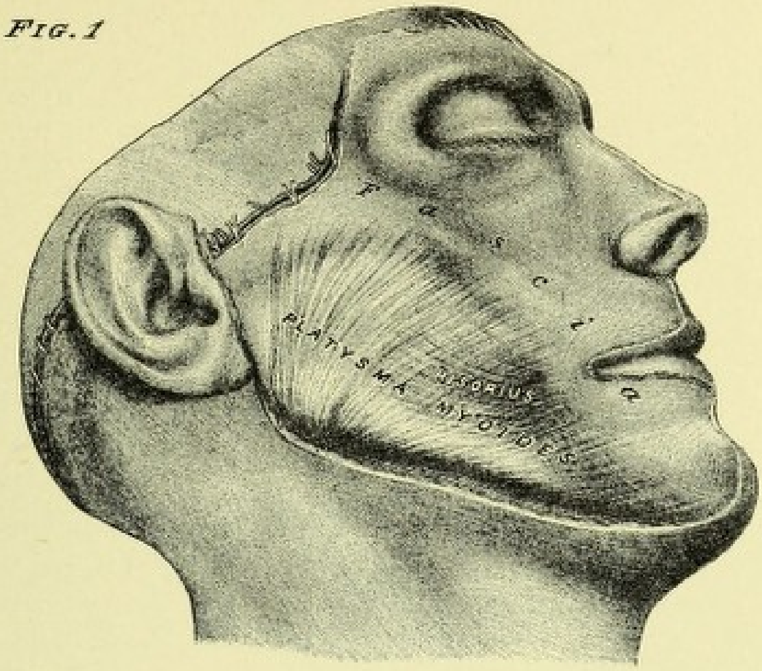
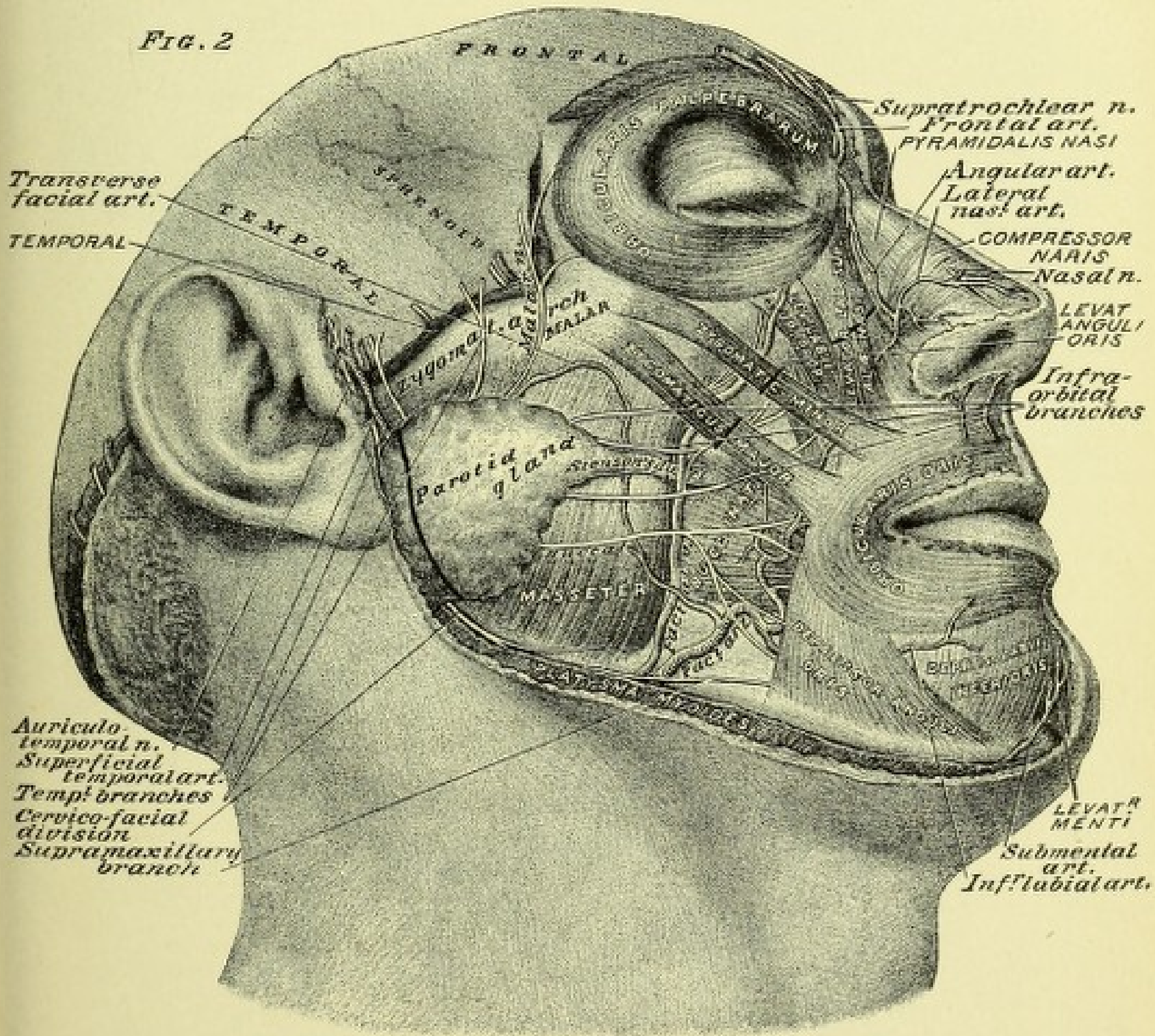
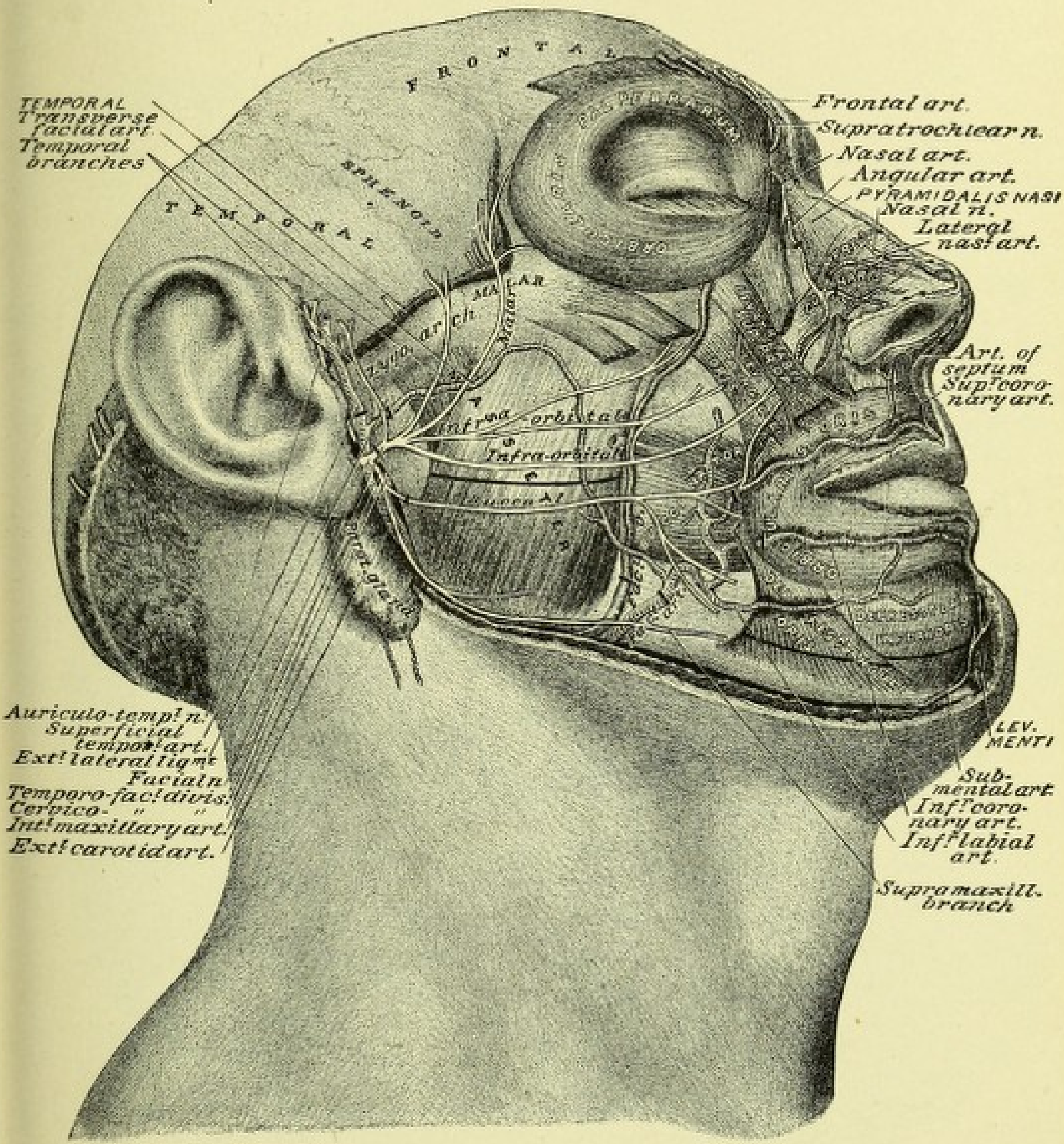


FIG. 2



M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

FIG. 1

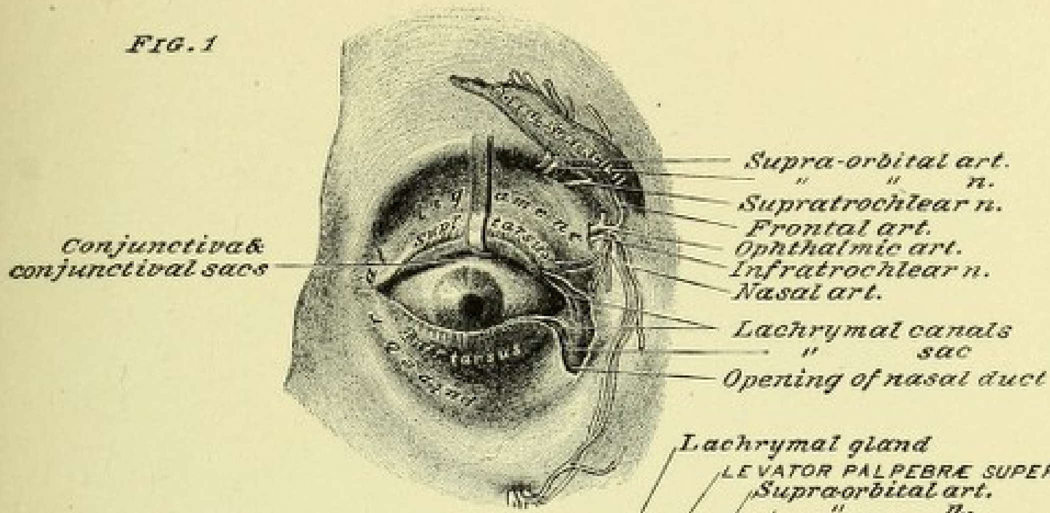
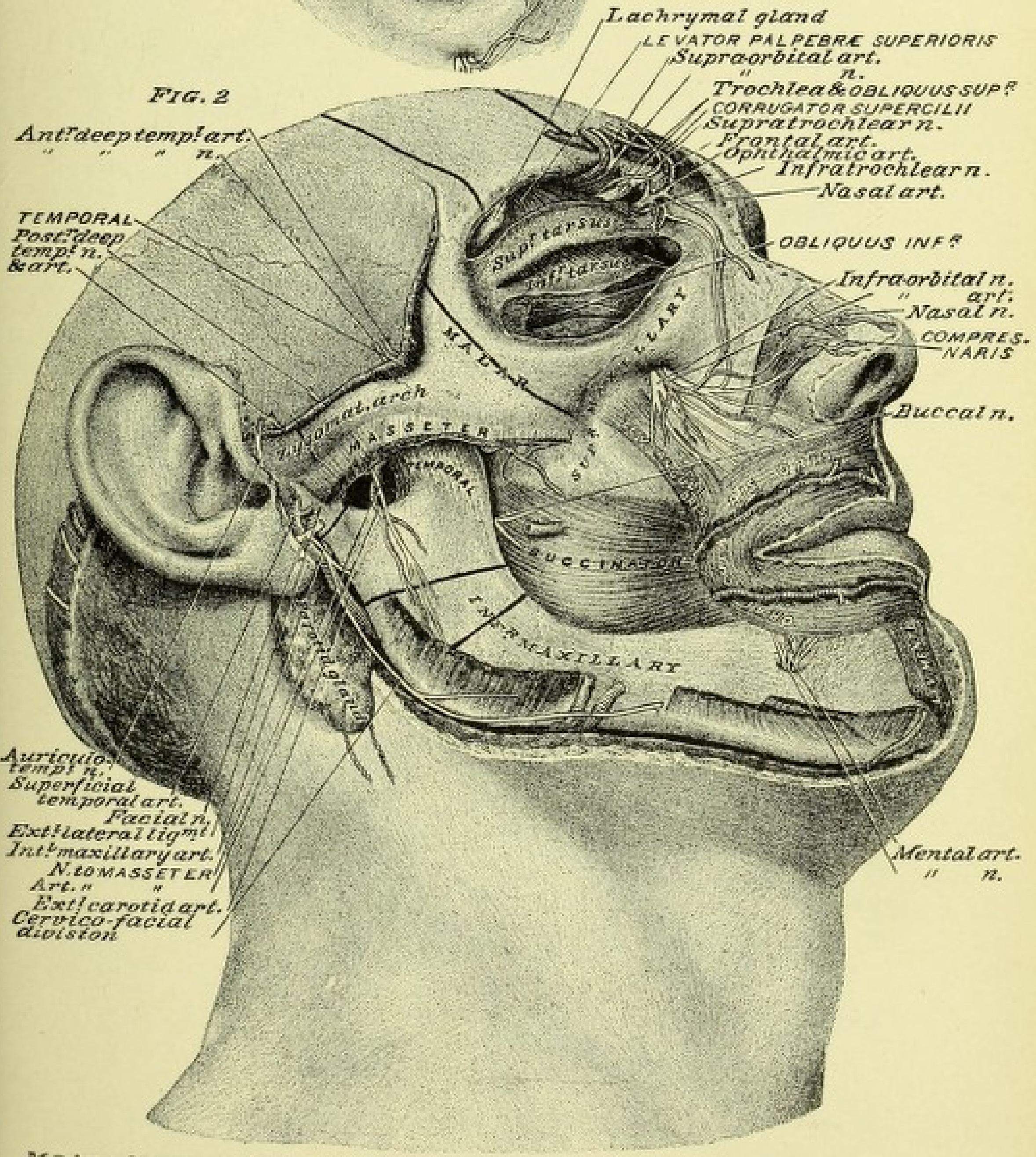
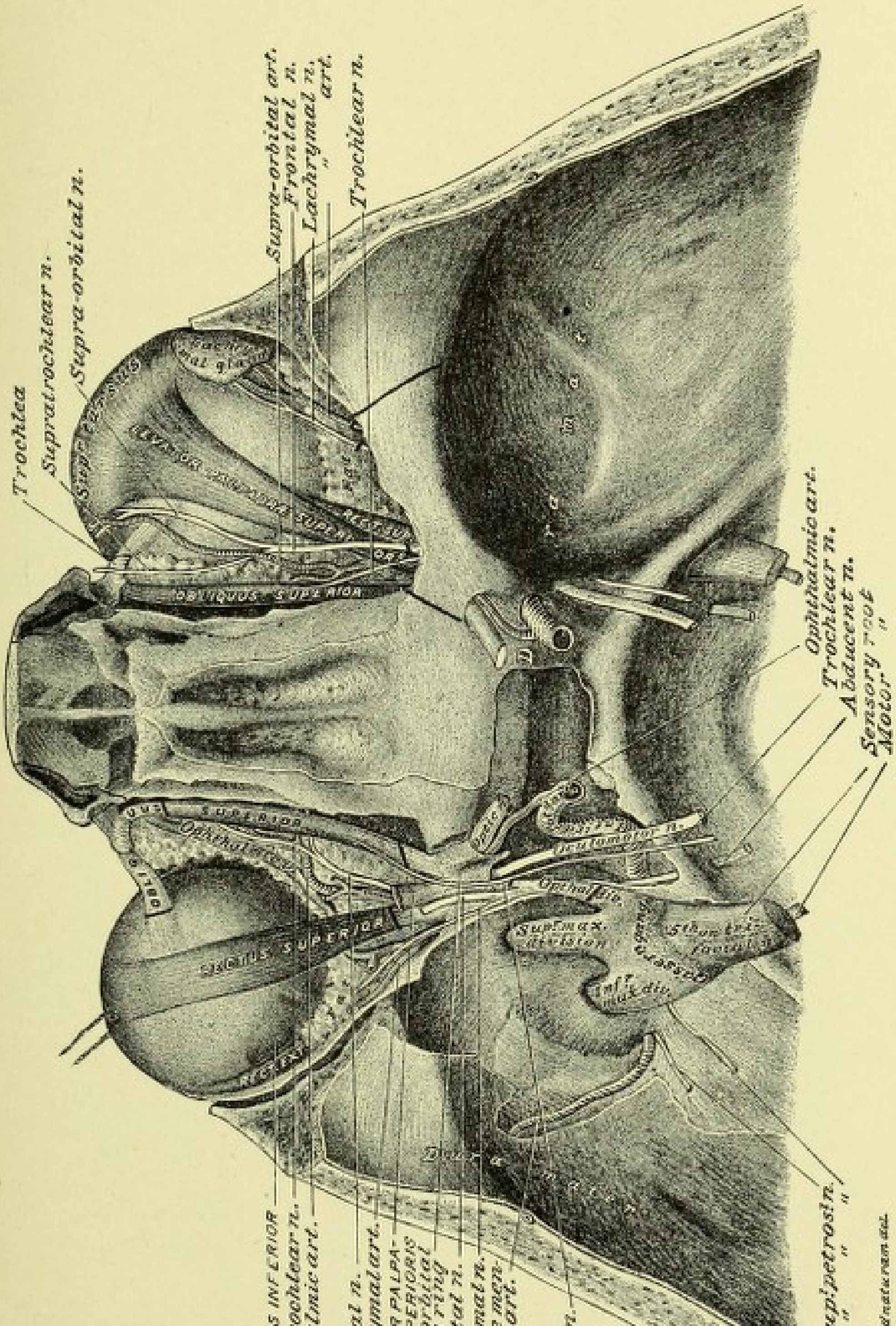
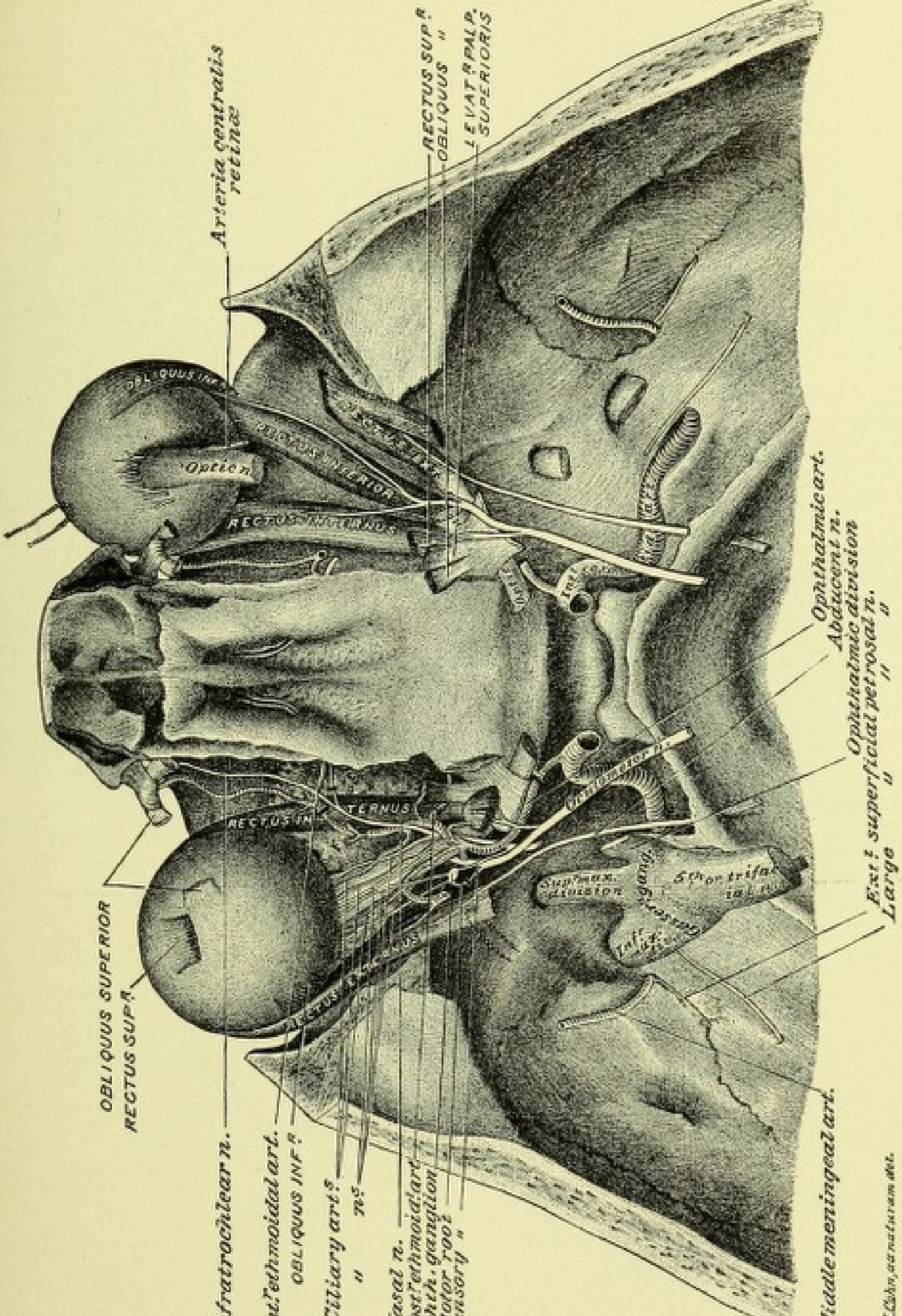


FIG. 2

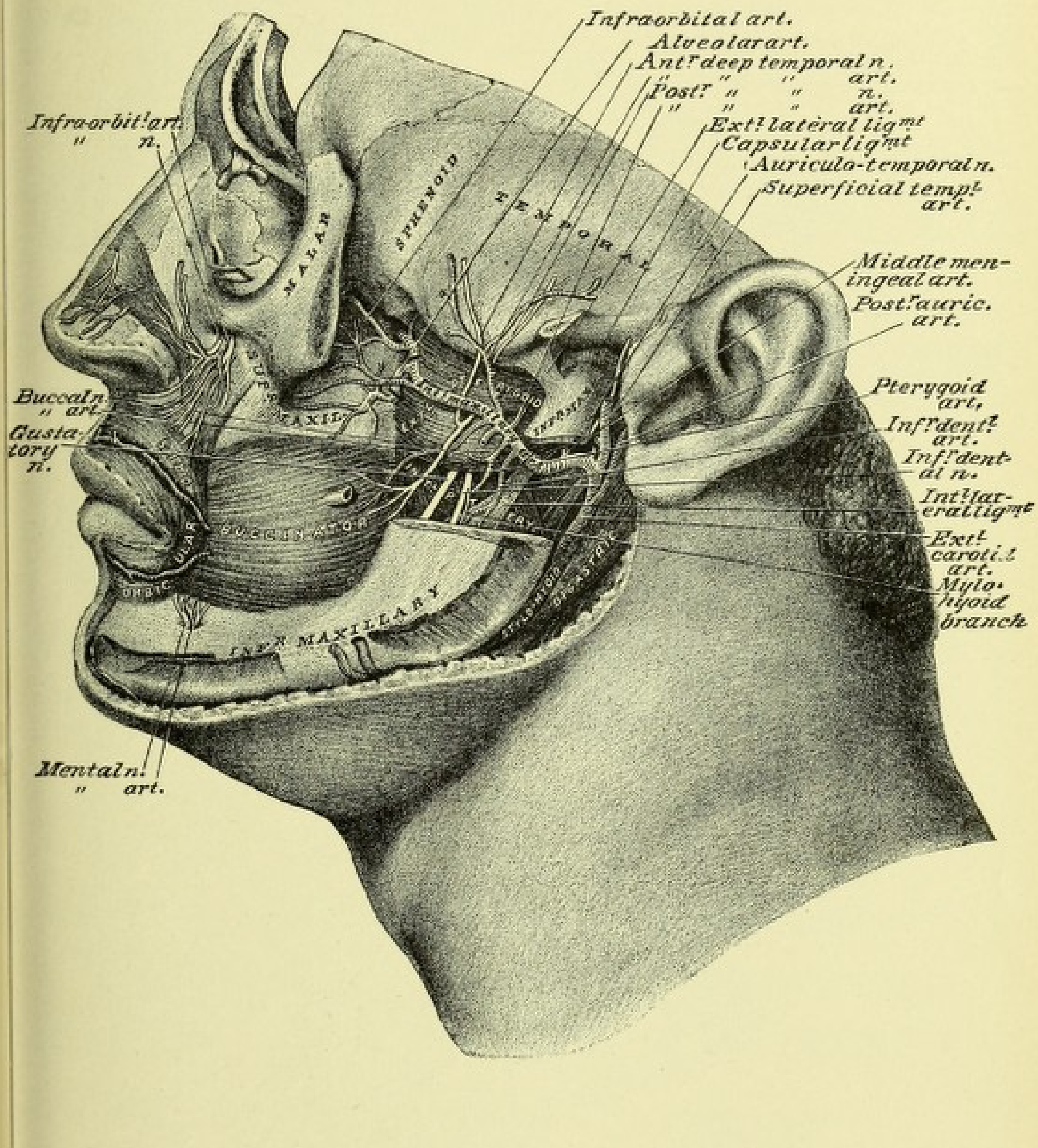


M. Cohn, ad naturam del.


Trochlea
Supratrochlear n.
Supra-orbital n.
Supra-orbital art.
Frontal n.
Lachrymal n.
" art.
Trochlear n.
Ophthalmic art.
Trochlear n.
Abducent n.
Sensory root
Motor "
OBLIQUUS INFERIOR
Infratrochlear n.
Ophthalmic art.
Nasal n.
Lachrymal art.
LEVATOR PALPEBRÆ SUPERIORIS
Extra-orbital fibrous ring
Frontal n.
Lachrymal n.
Middle meningeal art.
Nasal n.
Ext'l sup'l petros'l n.
Large " "
OBLIQUUS SUPERIOR
RECTUS SUPERIOR
Oculomotor n.
Sup. max. division
Inf. max. div.
Dura mater
M. Cohn, ad natur. del.



Arteria centralis retinæ
RECTUS SUP.R
OBLIQUUS "
LEVAT.R PALP. SUPERIORIS
Ophthalmic art.
Abducent n.
Ophthalmic division
Ext.l superficial petrosal n.
Large " " "
Middle meningeal art.
OBLIQUUS SUPERIOR
RECTUS SUP.R
Infratrochlear n.
Ant.r ethmoidal art.
OBLIQUUS INF.R
Ciliary art.s
" n.s
Nasal n.
Post.r ethmoidal art.
Ophth. ganglion
Motor root
Sensory "
OBLIQUUS INF.
Optic n.
RECTUS INTERNUS
RECTUS INFERIOR
Sup.r max. division
5th or trifacial n.
M. Lühn, ad naturam del.



M. Cohn, ad naturam del.

FIG. 1

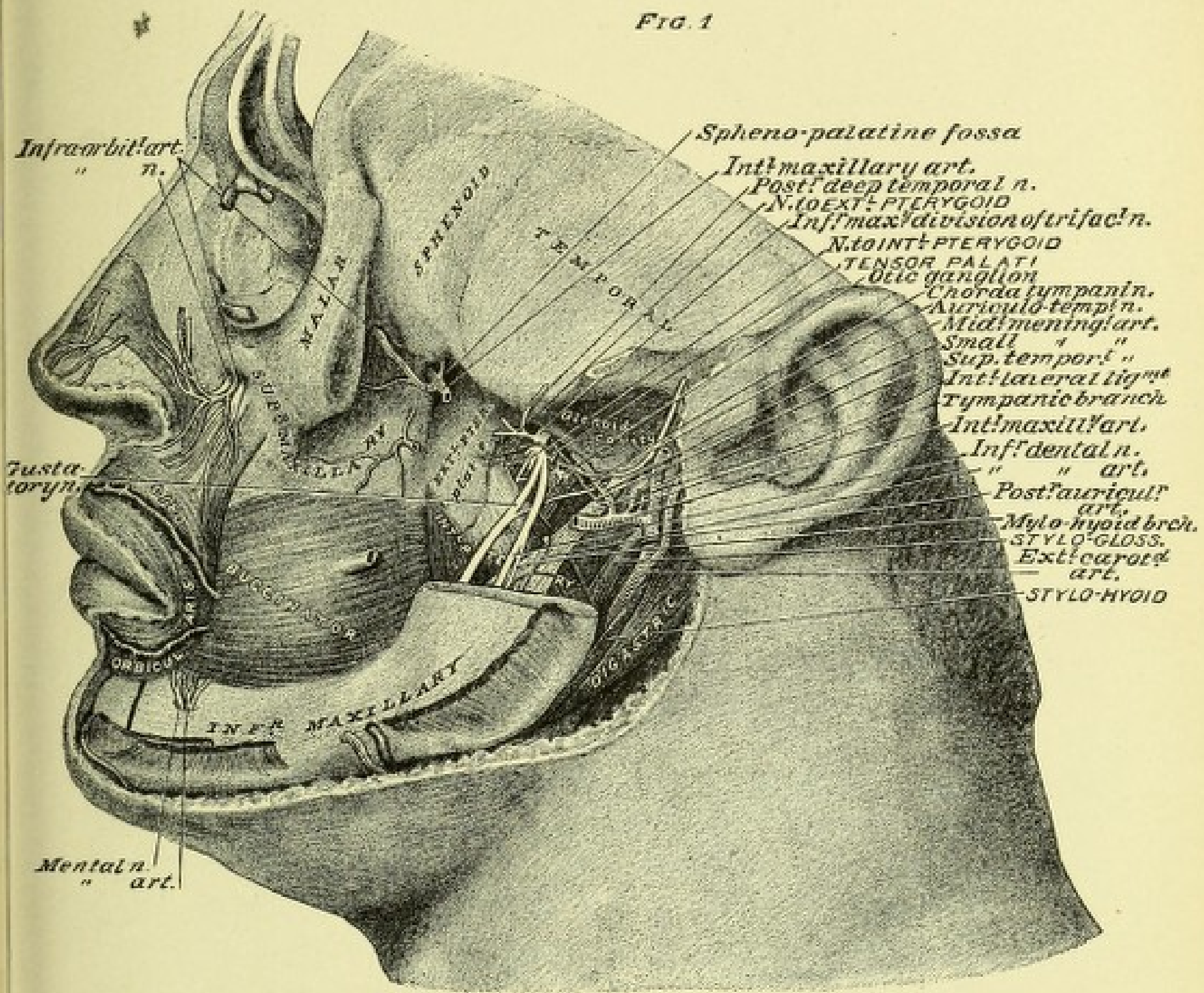
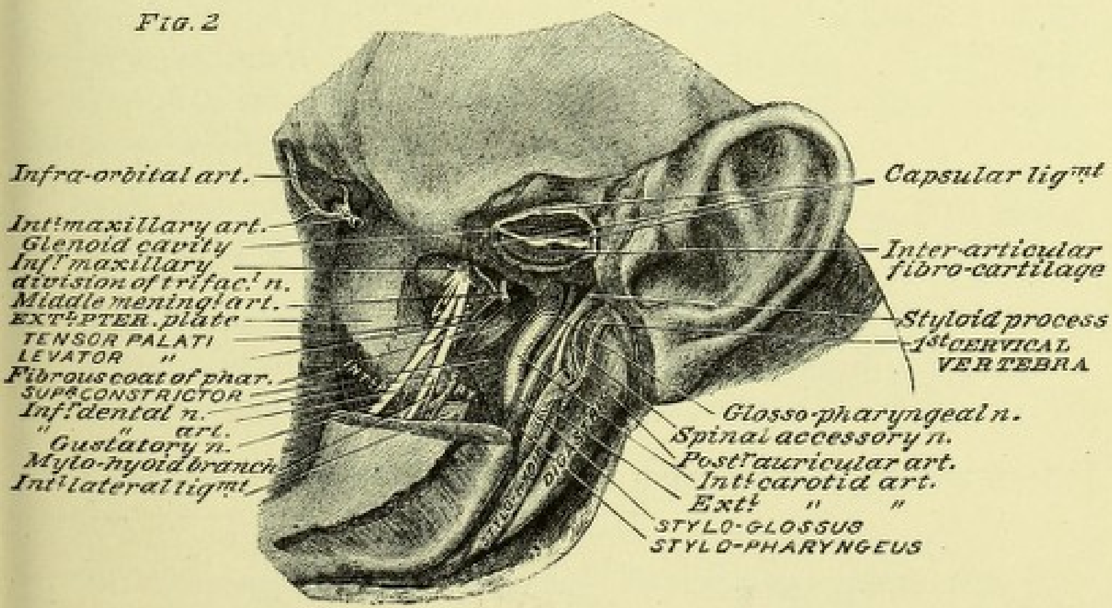


FIG. 2



M. Cohn, ad naturam del.

TWENTY-FIFTH DISSECTION.

ANTERO-LATERAL AREA OF THE NECK.

DISSECTION.—With the subject placed as for dissection of the upper extremities (page 193), rest the left lateral surface of the head upon a block, and steady the same in the position shown in Plate 191.

Terms of Relation.—The general terms (page 2) are used; and the special terms *antero-lateral* and *lateral*—to the neck—*interior* and *exterior*—to the mouth, thorax, and larynx.

Bones; Bone and Cartilage Areas for Muscle Attachments, Plates 189 and 190.—The bones, forming the framework of this dissection, are: *posteriorly*, the seven cervical vertebræ and the two superior dorsal vertebræ (their anterior surfaces); *inferiorly*, the sternum (its superior end), the clavicle (its superior border), the two superior ribs (their exterior surfaces); *superiorly*, the occipital (its inferior surface), the hyoid and inferior maxillary bones (their inferior borders). All of these bones, with the thyroid cartilage of the larynx, afford attachments to muscles in this dissection.

DISSECTION.—Make the skin incisions 3, 4, 4, and 5, of Figure 14 (page 318), and reflect a flap as commenced.

1. Subcutaneous Tissue, Plate 191.—This presents as a thin layer anteriorly to the platysma myoides muscle, and a thick one externally and internally therefrom.

DISSECTION.—Dissect the subcutaneous tissue from the platysma myoides muscle.

2. Platysma Myoides Muscle.—The cervical portion of this oblong muscle occupies the antero-lateral area of the neck. It is attached, inferiorly, to the fascia of the thorax, parallel with, and inferiorly to, the clavicle. Its internal fibres meet those of its fellow of the opposite side at a median-line raphe, inferiorly to the inferior maxillary bone; it passes superiorly, anteriorly to the inferior maxillary bone, to the lateral area of the face (page 328; Fig. 1, Plate 182).

DISSECTION.—Reverse the head and neck on the block, and dissect the left side of the neck to the stage of the dissection in Plate 191; restore the head to its position in Plate 191. Section (Plate 191) the right platysma myoides muscle, and reflect it inferiorly. Be careful not to cut away the external jugular vein and its branches. Remove the anterior layer of the sheath (formed by the splitting of the deep cervical fascia) of the sterno-cleido-mastoid muscle; take care to dissect out, and leave *in situ* (Plate 192), the portions of the internal jugular vein, the occipitalis minor, auricularis magnus, superficial cervical, and sternal branches of the cervical plexus of nerves, anteriorly to the muscle.

3. **Sterno-cleido-mastoid Muscle,** Plates 189, 192, and 193. —This muscle is located in the antero-lateral area of the neck. It is attached: superiorly, to the mastoid portion of the temporal bone (Plate 189); inferiorly, by a *sternal*, tendinous, portion, to the exterior surface of the superior part of the sternum, and by a *cleido*, muscular, portion to the superior border of part of the internal third or half of the clavicle.

DISSECTION.—Trace (Plate 192) the external jugular vein to its superior and inferior ends. Find (Plate 192), running inferiorly and externally, the following branches of the cervical plexus: the nerve to the trapezius muscle, the clavicular, and the acromial nerves. Dissect out (Plate 192) the external and inferior portion of the spinal accessory nerve.

4. **External Jugular Vein,** Plates 192 and 193.—This vein extends, from the internal surface of the parotid gland, inferiorly and externally, across the antero-lateral area of the neck —anteriorly to the sterno-cleido-mastoid muscle—to its point of emptying into the subclavian vein, posteriorly to the middle third of the clavicle. It has a *submaxillary*, and an *inferior, anastomosing branch:* the former with the facial vein; the latter with the anterior jugular vein.

5. **Branches of the Cervical Plexus of Nerves.**—From the posterior border, and internal surface, of the sterno-cleido-mastoid muscle, superiorly to the external jugular vein, these nerves emerge, in the following order: the *sternal* winds, inferiorly and internally, anteriorly to the external jugular vein

and sterno-cleido-mastoid muscle, to the subcutaneous tissue of the superior portion of the sternal region of the thorax; the *clavicular* is projected, inferiorly, anteriorly to the external jugular vein and clavicle, to the subcutaneous tissue of the subclavicular region of the thorax; the *acromial* runs, externally and inferiorly, to the subcutaneous tissue of the acromial region of the shoulder; the *superficial cervical* passes internally, between the external jugular vein and sterno-cleido-mastoid muscle, to the subcutaneous tissue of the anterior area of the neck; the *auricularis magnus* takes an internal and superior course, anteriorly to the sterno-cleido-mastoid muscle, to the internal surface of the pinna of the ear and the subcutaneous tissue of the parotid region of the face; the *nerve to the trapezius muscle* has an external and inferior course, to its passage posteriorly to the antero-external border of the trapezius muscle (it accompanies the spinal accessory nerve); the *occipitalis minor* lies externally to, and parallel with, the superior portion of the posterior border of the sterno-cleido-mastoid muscle, as it advances, superiorly, to its distribution to the scalp (page 320; Plate 177).

DISSECTION.—Dissect out (Plate 192) the antero-external border of the trapezius muscle; anteriorly and externally to its superior end, expose the occipitalis major nerve, a branch of the third cervical spinal nerve, and the occipital artery.

6. Trapezius Muscle, Plates 189, and 192 to 198, inclusive. —This muscle was before described (page 267) and illustrated (Plate 149). Its external and anterior border—external for the superior half, and anterior for the inferior half—forms the external boundary of the antero-lateral area of the neck. The border extends from the occipital to the clavicular attachments of the muscle (Plates 189 and 192).

7. Occipitalis Major Nerve and a Branch of the Third Cervical-Spinal Nerve, Plates 192, 194, and 196.—These nerves, the internal (cutaneous) branches of the posterior divisions of the second and third cervical-spinal nerves, emerge from the anterior surface of the superior end of the trapezius muscle, on their way to the scalp (page 320; Plate 177).

8. Occipital Artery.—This artery presents between the superior ends of the trapezius and sterno-cleido-mastoid muscles; it emerges from the anterior surface, and at the superior border of the splenius capitis muscle ; it has a superior course to the scalp (page 320 ; Plate 177).

DISSECTION.—Commencing superiorly, clear the surfaces of the portions of muscles between the borders of the trapezius and sterno-cleido-mastoid muscles (Plate 192) ; do not cut away the nerves and vessels, that lie upon the exposed portions of the muscles.

9. Complexus, Splenius Capitis, Levator Anguli Scapulæ, Scalenus Posticus, Scalenus Medius, and Omo-hyoid (posterior belly) Muscles, Plate 192.—Commencing superiorly, portions of these muscles present, in order, between the trapezius and sterno-cleido-mastoid muscles. Posteriorly to the complexus are the occipitalis major nerve, the branch of the third cervical-spinal nerve, and the occipital artery ; externally to the levator anguli scapulæ are the nerve to the trapezius muscle, and the inferior and external portion of the spinal accessory nerve ; anteriorly to the scalenus medius is the acromial nerve ; anteriorly to the scalenus medius and omo-hyoid (posterior belly) muscles are the clavicular nerve and the external jugular vein.

DISSECTION.—Display (Plate 192), in a plane posteriorly to the omo-hyoid (posterior belly), portions of the superficial cervical, suprascapular, subclavian, and posterior scapular arteries ; also portions of the brachial plexus of nerves, scalenus anticus muscle, and subclavian vein. Clear (Plate 192) the inferior portion of the parotid gland ; find the cervico-facial division of the facial nerve, and follow its inframaxillary branch to the neck. Display (Plate 192), in the subfascial plane of the submaxillary region, the submaxillary anastomosing branch of the external jugular vein, and the facial vein with its tributary branches ; also the confluence of the facial and internal jugular veins.

10. Parotid Gland, Plates 192 to 197, inclusive.—The posterior portion of this gland (page 330 ; Fig. 2, Plate 182) is lodged between the ramus of the inferior maxillary bone and the sterno-cleido-mastoid muscle.

11. Cervico-facial Division of the Facial Nerve.—This nerve emerges from between the parotid gland and the ramus of the inferior maxillary bone ; it projects its inframaxillary branch to the neck (platysma myoides muscle).

12. Submaxillary Anastomosing Branch of the External Jugular Vein, Plates 192 and 193.—This vein (of variable size) runs posteriorly to, and parallel with, the ramus of the inferior maxillary bone, from the external jugular to the facial vein.

13. Facial Vein and its Tributary Branches.—This vein appears from the face (page 332), over the inferior border of the outer third of the inferior maxillary bone. It has an inferior and external course, to its emptying into the internal jugular vein. In its course it receives tributary veins: the *submental*, the *submaxillary anastomosing branch of the external jugular*, the *lingual*, and the *superior thyroid*.

Dissection.—Expose (Plate 192) portions of the following parts: digastric (posterior belly), stylo-hyoid, and hyo-glossus muscles; hyoid bone; submaxillary gland; internal jugular vein; common, internal, and external carotid arteries; superior thyroid, lingual, facial, and occipital branches of the external carotid artery; hypoglossal, descendens noni, and superior laryngeal nerves. Find and trace (Plate 192), inferiorly, the anterior jugular vein from its anastomosis with the submental vein. Clear (Plate 192), commencing superiorly, portions of the mylo-hyoid, digastric (anterior belly), thyro-hyoid, omo-hyoid (anterior belly), and sterno-hyoid muscles.

14. Anterior Jugular Vein, Plate 192.—This vein runs, inferiorly, from the submental vein, anteriorly to the digastric (anterior belly), mylo-hyoid, and sterno-hyoid muscles, to the point where it receives the inferior anastomosing branch of the external jugular vein; it then disappears posteriorly to the sternal portion of the sterno-cleido-mastoid muscle.

Dissection.—Reverse the position of the head and neck on the block, so as to present its left side uppermost; dissect the left antero-lateral area of the neck to the same stage of the dissection, as the right side in Plate 192, following the text, from the close of paragraph 2 to the close of paragraph 14. Then remove the block from under the head and neck, and steady the head in the position shown in Plate 193. Clear additional, portions of the, right and left, internal jugular vein, descendens noni nerve, and common carotid artery (Plate 193). Section (Plate 192) the right and left anterior jugular veins; the cervico-facial division of the facial nerve, and the sternal, clavicular, and acromial nerves. Dissect away the veins and the inferior portions of the nerves. Clear (Plate 193) the surfaces of the, right and left, sterno-hyoid muscles and the uniting median-line portion of intermuscular fascia between them.

15. Sterno-hyoid Muscle, Plates 190, 192 and 193.—This muscle extends, parallel with the median line, from the hyoid bone (Plate 190), superiorly, to the point where it disappears inferiorly, posteriorly to the sternal portion of the sterno-cleido-mastoid muscle.

16. Median-line Intermuscular Fascia, Plate 193.—This is a stretch of fascia—varying in width with age and sex—between the internal borders of the right and left sterno-hyoid muscles. In infants and children it is a mere raphe, while in adults, more especially men, the development, and consequent projection, of the larynx and trachea widens it.

DISSECTION.—Restore the head and neck to the position shown in Plate 192. Section (Plate 192) the external jugular and facial veins, the superficial cervical, auricularis magnus, and occipitalis minor nerves, also the nerve to the trapezius muscle ; dissect away the nerves, and reflect the veins inferiorly. Section (Plate 192) the sterno-cleido-mastoid muscle and reflect it superiorly. In reflecting the latter muscle, trace the inferior and external portion of the spinal accessory nerve into the sterno-cleido-mastoid muscle ; cut out the nerve from, and find the branch of the nerve to, the muscle (Plate 194). Dissect away the internal layer of the sheath (from the splitting of the deep cervical fascia) of the sterno-cleido-mastoid muscle, and expose (Plate 194) portions of the following parts : the mid-tendon and fascial slip of the omo-hyoid muscle ; the sterno-hyoid muscle ; the common carotid artery ; the internal jugular vein ; the descendens and communicans noni nerves, with the branches of the same ; the anterior divisions of the third and fourth cervical-spinal nerves and their branches ; the phrenic nerve ; portions of the ascending cervical, superficial cervical, and suprascapular arteries. Clear (Plate 194) the surfaces of portions of the scalenus anticus, rectus capitis anticus major, and sterno-thyroid muscles ; also the superior, and internal, portions of the splenius capitis, levator anguli scapulæ, scalenus posticus, and scalenus medius muscles.

17. Spinal Accessory Nerve, Plates 194 to 197, inclusive.—This nerve appears in the neck from the internal surface, and inferior border, of the posterior belly of the digastric muscle. Inferiorly to the muscle, it gives off a branch to the sterno-cleido-mastoid muscle ; it then perforates the latter muscle, obliquely, to be continued, inferiorly and externally, to its passage anteriorly to the inferior portion of the trapezius muscle, which it supplies.

18. Omo-hyoid Muscle, Fig. 1, Plate 135 ; Plates 157, 190, 192, 193, 194 and 195.—This muscle has four portions (Plates 194 and 195) : an *anterior belly*, which has an oblique course, from the hyoid bone (Plate 190) to the mid-tendon ; a *posterior belly*, which passes from the mid-tendon to the point where it runs posteriorly to the external third of the clavicle, to reach the inferior attachment of the muscle (Plate 157) ; a *mid-tendon*, which determines the anterior and posterior belly to the muscle ; from the mid-tendon a *fascial slip* passes, inferiorly, posteriorly to the inferior end of the sterno-hyoid muscle, to be attached to the cartilage of the first rib (page 238 ; Fig. 1, Plate 135).

19. Sterno-hyoid Muscle, Fig. 2, Plate 135 and Plates 190, 192, 193, and 194.—This muscle was before referred to (pages 238 and 359). It is attached: superiorly, to the hyoid bone (Plate 190); inferiorly, to the interior surface of the superior portion of the sternum, and to the posterior surface of the internal end of the clavicle (Fig. 2, Plate 135). It should therefore be named *sterno-cleido-hyoid* muscle.

20. Internal Jugular Vein, Plates 192 to 195, inclusive.—This large venous trunk appears in the neck, from the internal surface, and inferior border, of the posterior belly of the digastric muscle. It passes inferiorly, anteriorly to the rectus capitis anticus major muscle, to its confluence with the subclavian vein, posteriorly to the internal third of the clavicle. In the superior third of its cervical course it receives the facial vein (page 359).

21. Descendens and Communicans Noni Nerves.—The *descendens noni* nerve, branch of the hypoglossal nerve (page 365), passes inferiorly, parallel with, and anteriorly and internally to, the last-described vein; it gives off a *nerve to the omo-hyoid* (anterior belly). The *communicans noni* nerve (Plates 194 and 195), branch of the anterior division of the third cervical-spinal nerve, has an inferior course, anteriorly to the rectus capitis anticus major muscle and the internal jugular vein. It runs posteriorly to the omo-hyoid muscle (anterior belly), to its communication with the descendens noni nerve, thereby forming the *noni loop*. A branch from the loop supplies the omo-hyoid (posterior belly), sterno- (cleido-) hyoid, and sterno-thyroid muscles (Plates 194 and 195).

22. Anterior Division of the Third Cervical-spinal Nerve, Plates 194, 196, and 197.—This nerve appears from between the rectus capitis anticus major and the scalenus medius muscles. It receives a *communicating branch* from the second cervical-spinal nerve (Plate 196). It gives off the above-described communicans noni nerve; the occipitalis minor, auricularis magnus, and superficial cervical nerves, and the nerve to the trapezius muscle (page 357); also, the *nerve to the levator anguli scapulæ muscle* (Plates 194 and 196), which crosses the scalenus medius muscle.

23. Anterior Division of the Fourth Cervical-spinal Nerve.—This division of the fourth cervical-spinal nerve appears in the neck, inferiorly to, and in the same manner as, the anterior division of the third. The stumps of the acromial, clavicular, and sternal nerves (page 356 and 357), may be traced to it. It also gives off the nerve to the *scalenus medius muscle.*

24. Phrenic Nerve, Plates 194 to 198, inclusive.—This nerve is a branch of the anterior division of the fourth cervical-spinal nerve (sometimes it is contributed to by the anterior divisions of the third and fifth (Plate 198) cervical-spinal nerves, one or both). Its cervical portion is projected, inferiorly, upon the anterior surface of the scalenus anticus muscle, to its disappearance between that muscle, posteriorly, and the subclavian vein, anteriorly. Anteriorly, it is crossed by the posterior belly of the omo-hyoid muscle, and the ascending cervical, superficial cervical, and suprascapular arteries.

DISSECTION.—Clear (Plate 194) the surface of the submaxillary gland. Raise (Plate 194) the submaxillary and parotid glands (by loops of thread) and display the mylo-hyoid and digastric muscles; also portions of the stylo-hyoid and stylo-glossus muscles. Trace (Plate 194) the internal and external laryngeal arteries.

25. Submaxillary Gland, Plates 192 to 197, inclusive.—This gland is lodged (Plate 192) between: the external half of the body of the inferior maxillary bone, superiorly; the facial vein, externally; the facial artery, the mylo-hyoid muscle, and the inferior ends of the digastric (posterior belly) and stylo-hyoid muscles, internally (Plate 194). It is about the size of an English walnut.

26. Mylo-hyoid Muscle, Plates 190 and 192 to 197, inclusive. This muscle bridges from the posterior of the superior border of the body of the hyoid bone to the mylo-hyoid ridge at the posterior surface of the body of the inferior maxillary bone (Plate 190). It is located in the floor of the buccal cavity, in a plane interiorly to the anterior belly of the digastric muscle. Its fibres pass, superiorly and externally, from the hyoid bone and a median-line, fibrous, raphe (from the hyoid bone to the inferior maxillary bone) between the right and left muscles.

27. Digastric Muscle, Plates 189, 190, and 192 to 195, inclusive.—This muscle has four portions—a posterior belly, an anterior belly, a mid-tendon, and a fascial loop. The *posterior* *belly* is attached, superiorly and posteriorly, in the digastric groove of the mastoid portion of the temporal bone (Plate 189); it is projected, inferiorly and anteriorly, to its ending in the mid-tendon—in its course it perforates the inferior half of the stylo-hyoid muscle. The *anterior belly* is attached, superiorly and anteriorly, at the posterior of the inferior border of the body of the inferior maxillary bone, near to the median line; it is directed, inferiorly and posteriorly, to its ending in the mid-tendon. The *mid-tendon* determines the two bellies of the muscle. The *fascial loop* passes around the mid-tendon of the muscle, and is attached to the superior surface of the body and the great cornu of the hyoid bone (Plate 190).

28. Stylo-hyoid Muscle, Plates 190, and 192 to 195, inclusive.—This muscle runs parallel with, and internally and superiorly to, the posterior belly of the digastric muscle. It is attached, superiorly and posteriorly, to the external surface of the styloid process of the temporal bone (Plate 190); its inferior half presents an opening for the transit of the posterior belly of the digastric muscle; inferiorly to the digastric opening, the muscle passes to its inferior and anterior attachment to the superior surface of the great cornu of the hyoid bone (Plate 190).

DISSECTION.—Reverse the position of the head on the block, so as to present the left antero-lateral area of the neck uppermost. Dissect the left side of the neck from the stage of the dissection in Plate 192, to that in Plate 194, following the steps given for the latter from the close of paragraph 14 to the close of paragraph 28. Section the sterno-hyoid muscles, right and left (Plate 194) and reflect them inferiorly. Withdraw the block from under the head and neck, and steady the head in the position shown in Plate 195. Clear the surfaces of the sterno-thyroid muscles, right and left; expose the tracheal fascia, anteriorly to the trachea; display portions of the thyroid body, the larynx, the cricoid artery, the thyro-hyoid membrane, and the hyoid bone.

29. Sterno-thyroid Muscle: Fig. 2, Plate 135; and Plates 190, 194, and 195.—This muscle, located posteriorly to the sterno-hyoid muscle, is attached: superiorly, to the exterior of the thyroid cartilage of the larynx (Plate 190); inferiorly, to the interior surfaces of the superior portion of the sternum, and the first costal cartilage (page 238; Fig. 2, Plate 135).

30. Tracheal Fascia, Plates 194 and 195.—This is the middle layer of the anterior portion of the deep cervical fascia.

It is located in a plane posteriorly to the last-described muscle. It is attached, superiorly, to the cricoid cartilage of the larynx and passes anteriorly to the thyroid body, trachea, and large vessels at the inferior of the mid-region of the neck; thence, it is continued posteriorly to the superior portion of the sternum, into the interior of the thorax.

Dissection.—Dissect away (Plate 195) the fascial slip of the left omo-hyoid muscle, and expose, posteriorly to it, portions of: the internal jugular vein; the cervical portion of the thoracic or left lymphatic duct; the pneumogastric nerve; and the first portion of the subclavian artery. Section (Plate 193), and reflect inferiorly, the anterior belly of the left digastric muscle; section (Plate 193) the fascial loop of the left digastric muscle and the left stylo-hyoid muscle from their hyoid attachments; reflect the latter muscle and the posterior belly of the digastric muscle, posteriorly, and cut them away, as shown on the left side of Plate 195. Section the left mylo-hyoid muscle (Plate 193) close to the median-line raphe and from the hyoid bone; reflect it superiorly and cut it away inferiorly to, and parallel with, the body of the inferior maxillary bone (Plate 195). Cut away (Plate 195) a portion of the left submaxillary gland; trace the duct of the gland, internally and anteriorly. Find portions of the gustatory nerve and stylo-glossus muscle parallel with, and superiorly to, the duct. Follow the left hypoglossal nerve, internally and anteriorly. Clear the surfaces of the left genio-hyoid and hyo-glossus muscles.

31. Duct of the Submaxillary Gland, Plates 195 and 197.—This duct (Wharton's) runs internally between the mylo-hyoid muscle, exteriorly, and the hyo-glossus muscle interiorly. It disappears into the floor of the buccal cavity, at the internal border of the anterior portion of the hyo-glossus muscle.

32. Gustatory Nerve and Stylo-glossus Muscle.—Portions of this nerve and muscle present anteriorly to, and parallel with, the last-described duct.

33. Hypoglossal Nerve, Plates 192 to 196, inclusive.—This nerve emerges, superiorly, at the inferior border, and from the internal surface, of the posterior belly of the digastric muscle (Plates 192 to 195, inclusive); thence it runs inferiorly, internally to the internal jugular vein, posteriorly to the external jugular vein (Plate 192), and anteriorly to the internal carotid artery (Plates 192, 194, and 196); it makes an abrupt curve internally, inferiorly to the origin of the occipital artery from the external carotid artery (Plates 192 to 196, inclusive). Continuing internally, it crosses the external carotid artery, to the external surface of the posterior-inferior angle of the hyo-glossus muscle; thence it passes internally to the hyoid ends of the posterior belly of the digastric and the stylo-hyoid muscles, to reach the interior surface of the mylo-hyoid muscle (Plates 192 to 197, inclusive). Its branches are: the *descendens noni* (page 361), from its curve upon the anterior surface of the internal carotid artery (Plates 192 to 195, inclusive); and the *nerve to the thyro-hyoid muscle*, given off as the nerve passes superiorly to the hyoid bone (Plates 192 to 196, inclusive). The anterior and internal portion of the hypoglossal nerve runs between the mylo-hyoid and hyo-glossus muscles (Plates 195 and 197), to its disappearance, anteriorly, between the hyo-glossus and genio-hyoid muscles.

34. Genio-hyoid Muscle, Plates 190, 195, 196, and 197.—This muscle, located in the floor of the buccal cavity, interiorly to the mylo-hyoid muscle, runs at the side of, and parallel with, the median-line. It is attached: posteriorly, to the hyoid bone (Plate 190); anteriorly, to the inferior genial tubercle, at the posterior surface of the body of the inferior maxillary bone (Plate 190), near the median line.

35. Hyo-glossus Muscle, Plates 190, 192, and 194 to 197, inclusive.—This occupies a plane interiorly to the mylo-hyoid muscle. It is attached: posteriorly, to the hyoid bone (Plate 190); anteriorly and superiorly, its fibres pass into the substance of the lateral border of the tongue.

Dissection.—Section (Plate 195) the right omo-hyoid and thyro-hyoid muscles. Restore the head and neck to its position on the block in Plate 194; section (Plate 194) the descendens and communicans noni nerves, also the external laryngeal artery; reflect the omo-hyoid and thyro-hyoid muscles with the noni loop of nerves. Section (Plate 194) the right internal jugular vein and reflect it inferiorly; then expose the right pneumogastric nerve and its branches.

36. Right Pneumogastric Nerve and its Branches, Plate 196.—The cervical portion of this nerve, lodged within the carotid sheath, has an inferior course: anteriorly to the rectus capitis anticus major muscle; posteriorly to the internal jugular vein; parallel with, and externally to, the internal and common carotid arteries. The *superior laryngeal nerve* (Plates 192 to 197, inclusive) is given off from it, where it is in relation with the internal carotid artery (Plate 197); it curves internally, posteriorly to the internal and external carotid arteries, appears internally to the latter, and passes anteriorly to the thyro-hyoid membrane, where it disappears, in company with the internal laryngeal artery (page 367; Plate 194), between the thyro-hyoid membrane and muscle. Inferiorly, the right pneumogastric nerve gives off the following branches: a *cervical cardiac*, which has an inferior and internal course, anteriorly to the first portion of the subclavian artery, to its disappearance into the interior of the thorax; a *recurrent laryngeal* (Plates 196 and 197), which is given off inferiorly to the first portion of the subclavian artery (page 242; Plate 138), and is continued, superiorly and internally, posteriorly to the subclavian and common carotid arteries.

Dissection.—Clear (Plate 196) the anterior surfaces of the innominate artery, and the trachea, preserving the right inferior thyroid vein, recurrent laryngeal nerve, and branches of the inferior thyroid artery. Expose (Plate 196): the right common carotid artery to its bifurcation; the first portion of the right subclavian artery and portions of its branches—vertebral, thyroid axis (with its branches), and internal mammary arteries.

37. Innominate Artery, Plates 196, 197, and 198.—The cervical portion of this artery is projected into the neck, superiorly and to the right, posteriorly to the right sterno-clavicular articulation. It bifurcates into the right common carotid and the right subclavian arteries.

38. Right Common Carotid Artery, Plates 192 to 196, inclusive.—This artery extends, superiorly, from the bifurcation of the innominate artery, parallel with, and internally to, the internal jugular vein (Plates 192 to 195, inclusive) and pneumogastric nerve (Plate 196). On a line with or a little superiorly to the superior border of the thyroid cartilage of the larynx, it bifurcates into the internal and external carotid arteries.

Dissection.—Section (Plate 194) the right digastric and stylo-hyoid muscles; reflect the anterior belly of the digastric muscle, anteriorly and superiorly, the posterior belly of the digastric muscle and the stylo-hyoid muscle, posteriorly. Clear (Plate 196) the superior end of the hypoglossal nerve, the inferior portion of the internal carotid artery, and the inferior part of the external carotid artery with its branches—superior thyroid, lingual, facial, occipital, and posterior auricular. Expose (Plate 196) portions of: the middle constrictor (of the pharynx), superior constrictor (of the pharynx), and stylo-glossus muscles; the ascending palatine branch of the facial artery; and the glosso-pharyngeal nerve.

39. Internal Carotid Artery, Plates 192 to 196, inclusive.—This artery passes, superiorly, from its origin to its disappearance posteriorly to the hypoglossal nerve and occipital artery.

40. External Carotid Artery.—This artery is projected, superiorly, from its origin to the point where it disappears internally to the parotid gland.

41. Superior Thyroid Artery.—This artery (venæ comites), the first internal branch of the external carotid, is given off close to the origin of the latter; it curves inferiorly, to run internally to, and parallel with, the common carotid artery. Its branches are: the *internal laryngeal* (Plate 194), which joins the superior laryngeal nerve (page 366), anteriorly to thyro-hyoid membrane and disappears, with the nerve, between the membrane and the thyro-hyoid muscle; the *external laryngeal* (Plate 194), which distributes to the muscles exteriorly to the larynx; the *cricoid* (Plates 195, 196, and 197), which crosses, internally, anteriorly to the crico-thyroid muscle, and the superior portion of the crico-thyroid membrane, to its anastomosis with its fellow of the opposite side. The superior thyroid artery terminates by branches, most of which enter the superior of the thyroid body, while others anastomose with branches of the inferior thyroid artery (Plates 196 and 197).

42. Inferior Constrictor Muscle, Plates 190, 196 and 197.—The inferior portion of this constrictor muscle of the pharynx presents externally to the superior thyroid body, on its way to its attachment to the thyroid cartilage of the larynx (Plate 190). The superior thyroid artery lies externally to it.

43. Lingual Artery, Plates 192 to 197, inclusive.—This artery, the second internal branch of the external carotid, passes, superiorly and externally, from its origin to its disappearance internally to the posterior border of the hyo-glossus muscle, where it runs parallel with, and superiorly to, the hyoid bone.

44. Facial Artery.—This artery, the third internal branch of the external carotid, runs from its origin, internally and superiorly, to pass internally to the submaxillary gland; it reappears between the gland and the body of the inferior maxillary bone, and winds to the anterior surface of the external third of the latter, on its way to the antero-lateral area of the face (Fig. 2, Plate 182; Plate 183). A short distance from its origin it gives off the *ascending palatine artery* (Plate 196), which has a superior course, to the point where it disappears internally to the stylo-glossus muscle.

45. Occipital Artery.—This artery (venæ comites), the first external branch of the external carotid, has a superior course, anteriorly to the internal carotid artery, internal jugular vein, and hypoglossal nerve; it disappears internally to the posterior belly of the digastric muscle, and reappears as before described (page 357) and illustrated (Plates 192, 194 and 196).

46. Posterior Auricular Artery, Plate 196.—This artery (venæ comites), the second external branch of the external carotid, is given off internally to the parotid gland; it has a superior and posterior course, and sends branches to the parotid gland, the auricle of the ear, the scalp, and, by the stylomastoid foramen, to the internal ear.

47. Stylo-glossus, Superior Constrictor, and Middle Constrictor Muscles, Plates 194 and 196.—Portions of these three muscles present in the space bounded: posteriorly, by the external carotid artery; anteriorly, by the hyo-glossus muscle and submaxillary gland; and superiorly, by the inferior maxillary bone.

48. Glosso-pharyngeal Nerve, Plate 196. — A portion of this nerve runs externally to the superior constrictor muscle, between the stylo-glossus and middle constrictor muscles, to the point where it passes internally to the posterior border of the hyo-glossus muscle.

DISSECTION.—Place the block under the right lateral surface of the head, and dissect the left antero-lateral area of the neck, from the stage of the dissection presented in Plate 194 to that in Plate 196, following the steps given from the close of paragraph 28 to the close of paragraph 48.

49. Left Common Carotid Artery, Plates 197 and 198.—This artery differs from the right in being projected into the neck from the interior of the thorax, at a point posteriorly to the internal portion of the left half of the superior end of the sternum. Its origin from the arch of the aorta (page 244; Plate 138) determines this difference.

DISSECTION.—Withdraw the block from beneath the head and neck and steady the head as in Plate 197. Section (Plate 196) the right common carotid artery and pneumogastric nerve; reflect them superiorly as in Plate 197. Clear away the posterior layer of the anterior portion of the deep cervical fascia, and expose the cervical portion of the right sympathetic nerve (Plate 197).

50. Cervical Portion of the Right Sympathetic Nerve, Plate 197.—This nerve cord lies upon the anterior surface of the rectus capitis anticus major muscle, posteriorly to the carotid sheath and the deep layer of the anterior portion of the deep cervical fascia. It consists of three ganglia—inferior, middle, and superior—united by commissural nerve trunks. The *inferior ganglion* lies internally and posteriorly to the vertebral artery; the *middle ganglion* is usually located anteriorly to the inferior thyroid artery; the *superior ganglion* is lodged posteriorly to the internal carotid artery. (Special dissections will demonstrate communicating branches from the anterior branches of the cervical-spinal nerves to the ganglia, and distributing branches from the ganglia—superior, middle, and inferior cardiac nerves—which pass, inferiorly, into the interior of the thorax.)

51. Superior Laryngeal Nerve (right), Plates 192 to 197, inclusive.—This nerve has been described at page 365; it may now be traced to its origin from the superior part of the cervical portion of the pneumogastric nerve.

DISSECTION.—Clear (Plate 197) the first and third portions of the right subclavian artery, and the cervical portion of their branches; the subclavian vein, and the brachial plexus.

52. First and Third Portions of the Right Subclavian Artery, Plates 192, 194, 196, 197, and 198.—The first and a part of the third portion of this artery present as follows: the *first portion*, from the bifurcation of the innominate artery to the internal border of the inferior end of the scalenus anticus muscle, where it passes, to become the *second portion* of the artery, posteriorly to the muscle; the *third portion* (its superior end) is projected, externally and inferiorly, from the posterior surface, and at the external border, of the scalenus anticus muscle.

53. Thyroid Axis and its Branches, Plates 192 to 198, inclusive.—The *thyroid axis* (Plates 197 and 198), branch of the first portion of the subclavian, trifurcates into the inferior thyroid, superficial cervical, and suprascapular branches. The *inferior thyroid* (Plates 196, 197, and 198) extends, superiorly, along the anterior surface of the internal third of the scalenus anticus muscle, as far as the rectus capitis anticus major muscle; it then curves internally and is continued to the lateral lobe of the thyroid body. It is located in a plane posteriorly to the internal jugular vein, pneumogastric nerve, common carotid artery, and sympathetic nerve. Its vertical portion gives off the *ascending cervical artery*, which runs superiorly, anteriorly to the scalenus anticus muscle. The *superficial cervical* (Plates 192 to 198, inclusive) has a transverse course to the point where it passes, by several branches, to the anterior surface of the inferior portion of the trapezius muscle. The *suprascapular* (Plate 192; Plates 194 to 198, inclusive) makes an abrupt curve, inferiorly and externally, to the posterior of the clavicle.

54. Posterior Scapular Artery, Plates 192, 194, and 197.—This artery (venæ comites), branch of the third portion of the subclavian, is projected, posteriorly, internally to the scalenus medius, scalenus posticus, and levator anguli scapulæ muscles, to reach its posterior distribution (page 269; Plate 149).

55. Subclavian Vein, Plates 192, 194, 196, 197, and 198.—This vessel lies posteriorly, and a little inferiorly, to the clavicle; it runs parallel with the second and third portions of the subclavian artery, and is separated from the second portion of the artery by the scalenus anticus muscle.

56. Brachial Plexus, Plates 192 to 198, inclusive.—The superior trunks of this plexus—the anterior divisions of the fifth, sixth, and seventh cervical spinal nerves—are projected, externally and inferiorly; they emerge from between (sometimes perforate) the scalenus anticus and scalenus medius muscles;

they run parallel with, and superiorly to, the third portion of the subclavian artery, and enter the axilla (Plate 120).

DISSECTION.—Dissect away, on the left side, the common carotid, the inferior portion of the external carotid with its branches, and the inferior portion of the internal carotid, by the following steps: section as in Plate 197 the left common carotid artery and reflect it superiorly; continue its reflection, so as to raise the external carotid, cutting (Plate 195), in order, the superior thyroid, lingual, facial, ascending pharyngeal, and occipital arteries; and, as in Plate 197, the external, and internal carotid arteries. Section (Plate 197) the left pneumogastric nerve, superiorly and inferiorly, and dissect away the included part. Display the cervical portion of the left sympathetic nerve; section the nerve, inferiorly and superiorly (Plate 197), and dissect away the portion between the cuts. Expose (Plate 197) completely, the thyro-hyoid muscle; also the antero-lateral surfaces of the hyoid bone, the larynx, the thyro-hyoid membrane, the thyroid body, and the inferior thyroid veins.

57. Thyro-hyoid Muscle, Plates 190 and 192 to 197, inclusive.—This muscle extends, inferiorly, from the inferior border of the hyoid bone to the exterior of the thyroid cartilage of the larynx.

58. Hyoid Bone.—This movable, *u*-shaped, bone is located at the anterior and superior of the neck. It is held in position by the antagonism of the muscles attached to it: inferiorly, the sterno-hyoid, omo-hyoid (anterior belly), and thyro-hyoid; superiorly, the digastric (anterior belly), mylo-hyoid, genio-hyoid and genio-hyo-glossus; posteriorly, the digastric (posterior belly), stylo-hyoid, and middle constrictor (of the pharynx).

59. Larynx, Plates 190, 195, 196, and 197.—Of this organ portions present of the exterior of its thyroid cartilage, cricoid cartilage, crico-thyroid muscles and crico-thyroid membrane ligament.

60. Thyro-hyoid Membrane or Ligament, Plates 190, and 194 to 197, inclusive.—This is a stretch of fibrous tissue between the hyoid bone and the thyroid cartilage of the larynx. It lies in a plane posteriorly to the superior ends of the sterno-hyoid, omo-hyoid (anterior belly), and thyro-hyoid muscles.

61. Thyroid Body, Plates 195, 196, and 197.—This organ (weight in adult about one ounce and a half) is, comparatively, larger in infantile than later life, and in women than in men.

It has a median-line isthmus and two lateral lobes: the *isthmus*, having a variable vertical breadth, and antero-posterior thickness (about half by three-quarters of an inch), crosses the anterior of the superior portion of the trachea; the *lateral lobes*, a right and a left, mould themselves to the lateral surfaces of the continuous trachea and larynx (a lobe measures vertically one inch and three-quarters, transversely one inch, and antero-posteriorly half an inch).

62. Inferior Thyroid Veins, Plates 196 and 197.—These veins emerge, inferiorly, from the lateral lobes of the thyroid body; they lie between the tracheal fascia, anteriorly, and the trachea, posteriorly; the right passes anteriorly to the innominate artery, to the right innominate vein; the left runs anteriorly to the left common carotid subclavian arteries, to the left innominate vein.

DISSECTION.—Clear (Plate 197) the left side of the trachea and expose: the left recurrent laryngeal nerve; the thoracic duct; the first part of left subclavian artery and its branches—vertebral, thyroid axis and its branches, and internal mammary; also portions of the œsophagus, the left longus colli muscle, and the cervical portion of the left brachial plexus.

63. Trachea, Plates 196, 197, and 198.—The cervical portion of this fibro-cartilaginous air-passage extends, inferiorly, from the larynx (cricoid cartilage) to its disappearance into the interior of the thorax, posteriorly to the innominate and left common carotid arteries. It has an antero-posterior direction, its inferior end being further from the skin than its superior.

64. Recurrent Laryngeal Nerves, Plates 196 and 197.—These nerves, as their names imply, take a recurrent course to the larynx. The right, a branch of the right pneumogastric nerve (page 366), runs superiorly, parallel with, and applied to the surface of, the right side of the trachea, to the point where it disappears posteriorly to the right lateral lobe of the thyroid body. The left differs from the right, as follows: because of its origin from the left pneumogastric within the interior of the thorax (page 242; Plate 138), it is projected into the neck from the thorax, posteriorly to the left common carotid artery; its cervical portion lies in the cleft between the left side of the trachea and the œsophagus.

65. Thoracic (or Left Lymphatic) Duct, Fig. 2, Plate 140; Plates 195, 197, and 198.—The cervical portion of this duct, before described (page 249), is projected from the interior of the thorax into the neck, between the œsophagus and the first part of the left subclavian artery, and anteriorly to the left longus colli muscle. It follows the curve of, and runs superiorly to, the artery, crossing anteriorly to the vertebral and inferior thyroid arteries; opposite the internal third of the left scalenus anticus muscle, it curves inferiorly, anteriorly to the left superficial cervical and suprascapular arteries, to pass to its emptying into the left subclavian vein, externally to the confluence of the latter with the left internal jugular vein.

66. First Portion of the Left Subclavian Artery, Plates 138, 195, 197, and 198.—This portion of the left artery differs from that of the right artery (page 369): first, it arises from the left of the transverse portion of the arch of the aorta (page 244; Plate 138); second, it is longer, and is projected, superiorly, into the neck, from the interior of the thorax.

67. Œsophagus, Plates 197 and 198.—The cervical portion of this muscular canal, located posteriorly to the trachea, presents its left-lateral border externally to it and the left recurrent laryngeal nerve (page 244; Plate 138).

DISSECTION.—Reflect (Plate 197), inferiorly, the stump of the left submaxillary gland with its duct; expose the left submaxillary ganglion of the sympathetic, with its branches from the left gustatory nerve.

68. Left Submaxillary Ganglion, Plate 197.—This cephalic sympathetic ganglion is lodged at the external surface of the superior and posterior portion of the hyo-glossus muscle. It receives branches from the left gustatory nerve.

DISSECTION.—Section (Plate 197) the inferior thyroid veins and arteries, the trachea, the right and left recurrent laryngeal nerves, and the œsophagus. Raise the trachea and œsophagus, anteriorly and superiorly, dissecting them from the anterior surfaces of the bodies of the cervical vertebræ, and the longus colli muscles; continue the reflection superiorly, by dissecting the pharynx from the bodies of the cervical vertebræ, and the rectus capitis anticus major muscles, as far as the base of the cranium. Reflect, superiorly, the right and left internal carotid arteries, internal jugular veins, pneumogastric, sympathetic, hypoglossal, glossopharyngeal and spinal accessory nerves, by dissecting them from the right and left rectus capitis anticus major muscles as far as the base of the cranium. Saw, along the section line in Plate 189, the right and left lateral walls of the cranium. Drag the mass of reflected parts (trachea and larynx, œsophagus and pharynx, right and left arteries, veins and nerves), superiorly, over the inferior maxillary bone; then pass the saw blade in between these parts, anteriorly, and the vertebral column and right and left rectus capitis anticus major and minor muscles, posteriorly (the saw should lodge posteriorly to the styloid processes of the right and left temporal bones). Saw, superiorly, through the base of the cranium, so as to enter the previous saw cuts of its lateral walls (Plate 189). Remove the anterior portion of the head with the appended parts of the neck, and keep the same moist for subsequent dissection. The saw cut through the base of the cranium will have cut the superior ends of the rectus capitis anticus major and minor muscles, carrying away their superior attachments upon the anterior portion, while it will section the basilar process of the occipital bone parallel with the anterior surface of the first cervical (atlas) vertebra. Clear the inferior portions of the right and left rectus capitis anticus major muscles.

69. Rectus Capitis Anticus Major Muscle, Plates 189, 194, 196, 197, and 199.—This muscle (its superior portion was cut away by the vertical section of the cranium) is located anteriorly to the transverse processes and pedicles, of the five superior cervical vertebræ, and the longus colli muscle. It is attached: inferiorly, to the anterior tubercles of the transverse processes of the six superior cervical vertebræ; superiorly, to the exterior of the basilar process of the occipital bone (Plate 189).

Dissection.—Remove (Plate 198) the inferior portions of the right and left rectus capitis anticus major muscles and clear the anterior surfaces of the right longus colli muscle, the inferior portion of the left rectus capitis anticus minor muscle, and part of the left rectus capitis lateralis muscle. Dissect away (Plate 198) the inferior portion of the right rectus capitis anticus minor muscle and expose the right rectus capitis lateralis muscle.

70. Rectus Capitis Anticus Minor Muscle, Plates 189, 198, and 199.—This muscle (its superior end was cut away by the vertical section of the base of the cranium) is attached: inferiorly, to the superior surface of the anterior portion of the lateral mass of the first cervical vertebra (atlas); superiorly, to the exterior surface of the basilar process of the occipital bone.

71. Rectus Capitis Lateralis.—This muscle is attached: inferiorly, to the superior surface of the transverse process of the first cervical vertebra (atlas); superiorly, to the exterior surface of the jugular process of the occipital bone.

72. Longus Colli Muscle, Plates 189, 197, and 198.—This muscle has three portions—superior oblique, middle vertical, and inferior oblique. The *superior oblique portion* passes from the anterior of the two superior cervical vertebræ, to the anterior tubercles of the transverse processes of the third, fourth, fifth, and sixth cervical vertebræ. The *middle vertical portion* bridges from the third and fourth cervical vertebræ, to the first dorsal vertebra—the anterior of their bodies. The *inferior oblique portion* stretches from the anterior of the bodies of the first and second dorsal vertebræ, to the anterior tubercle of the transverse process of the sixth cervical vertebra.

Dissection.—Dissect away (Plate 198) the left longus colli muscle and display: the cervical portion of the left vertebral artery; the anterior divisions of the superior cervical-spinal nerves, superiorly to their respective transverse processes; and the anterior surfaces of the scalenus anticus, medius, and posticus muscles.

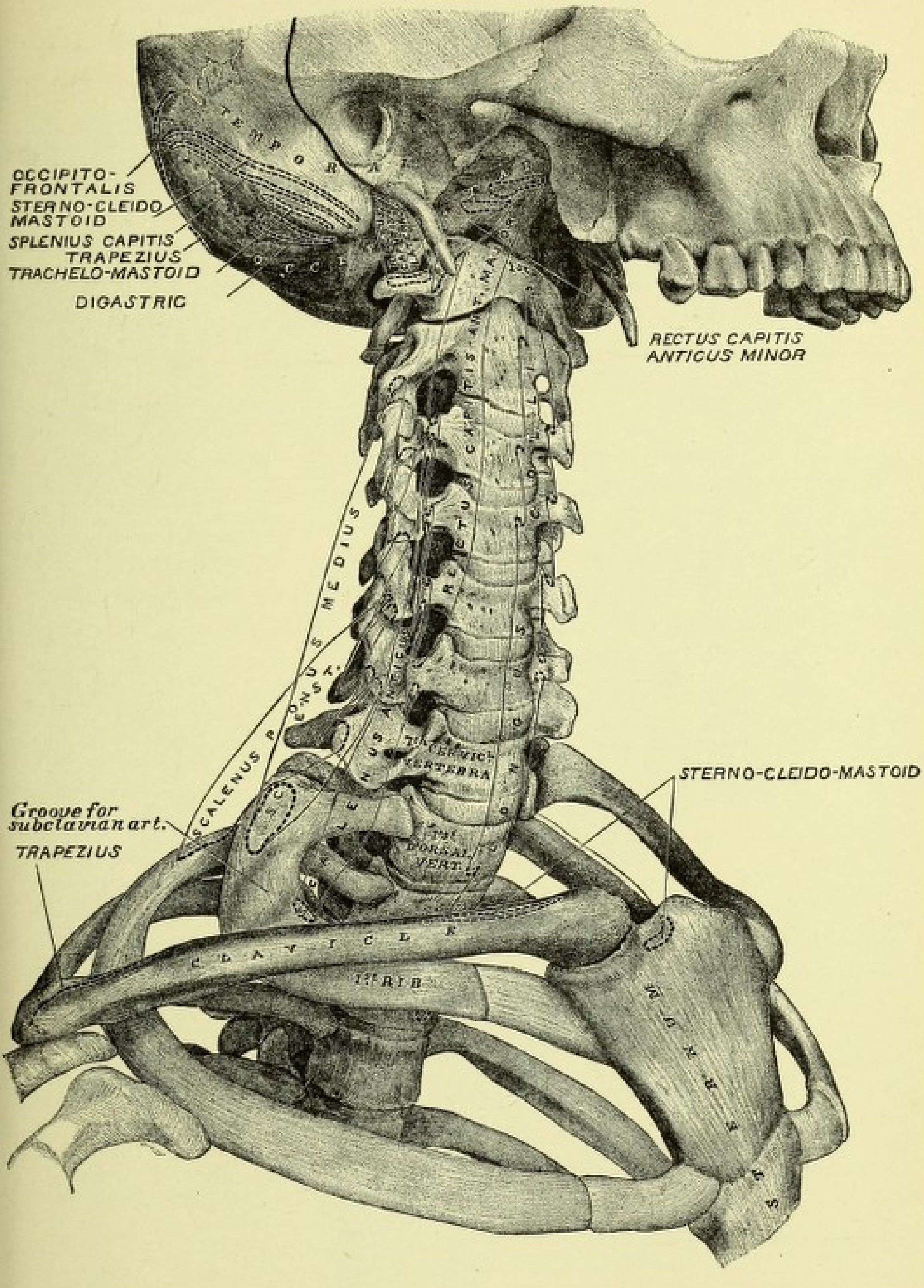
73. Vertebral Artery, Plates 196, 197, and 198.—This artery (vena comes), branch of the first part of the subclavian artery, is projected, superiorly, anteriorly to the transverse process of the seventh cervical vertebra, to its entrance into the foramen between the roots of the transverse process of the sixth cervical vertebra; thence, it passes through similar foramina of the transverse processes of the five superior cervical vertebræ. It gives off external branches, to contiguous muscles; internal, spinal, branches, which enter the vertebral canal, by the cervical intervertebral foramina; and posterior branches of anastomosis and of muscle distribution (page 276; Plate 150).

74. Anterior Divisions of Cervical-spinal Nerves, Plate 198.—These nerves are projected laterally, superiorly to the transverse processes of the cervical vertebræ, and posteriorly to the vertebral artery.

75. Scalenus Anticus Muscle, Plates 189, 192, and 194 to 198, inclusive.—This muscle is attached; superiorly (Plates 189 and 198), to the anterior tubercles of the transverse processes of the cervical vertebræ, third to sixth, inclusive; inferiorly (Plate 189), to the tubercle between the subclavian grooves (the internal for the subclavian vein, the external for the subclavian artery) on the exterior surface of the first rib.

76. Scalenus Medius Muscle, Plates 189, and 192 to 198, inclusive.—This muscle is attached (Plates 189 and 198): superiorly, to the posterior tubercles of the transverse processes of the cervical vertebræ, second to seventh, inclusive; inferiorly, to the exterior surface of the first rib, posteriorly to the subclavian-artery groove, and externally to the first levator costa muscle.

77. Scalenus Posticus Muscle: Fig. 2, Plate 150; Plates 189, and 192 to 197, inclusive.—This muscle is attached: superiorly, to the posterior tubercles of the fifth, sixth, and seventh cervical vertebræ; inferiorly (Fig. 2, Plate 150; Plate 189), to the exterior surface of the second rib, externally to the second levator costa muscle. It is located in a plane posteriorly to the last-described muscle.



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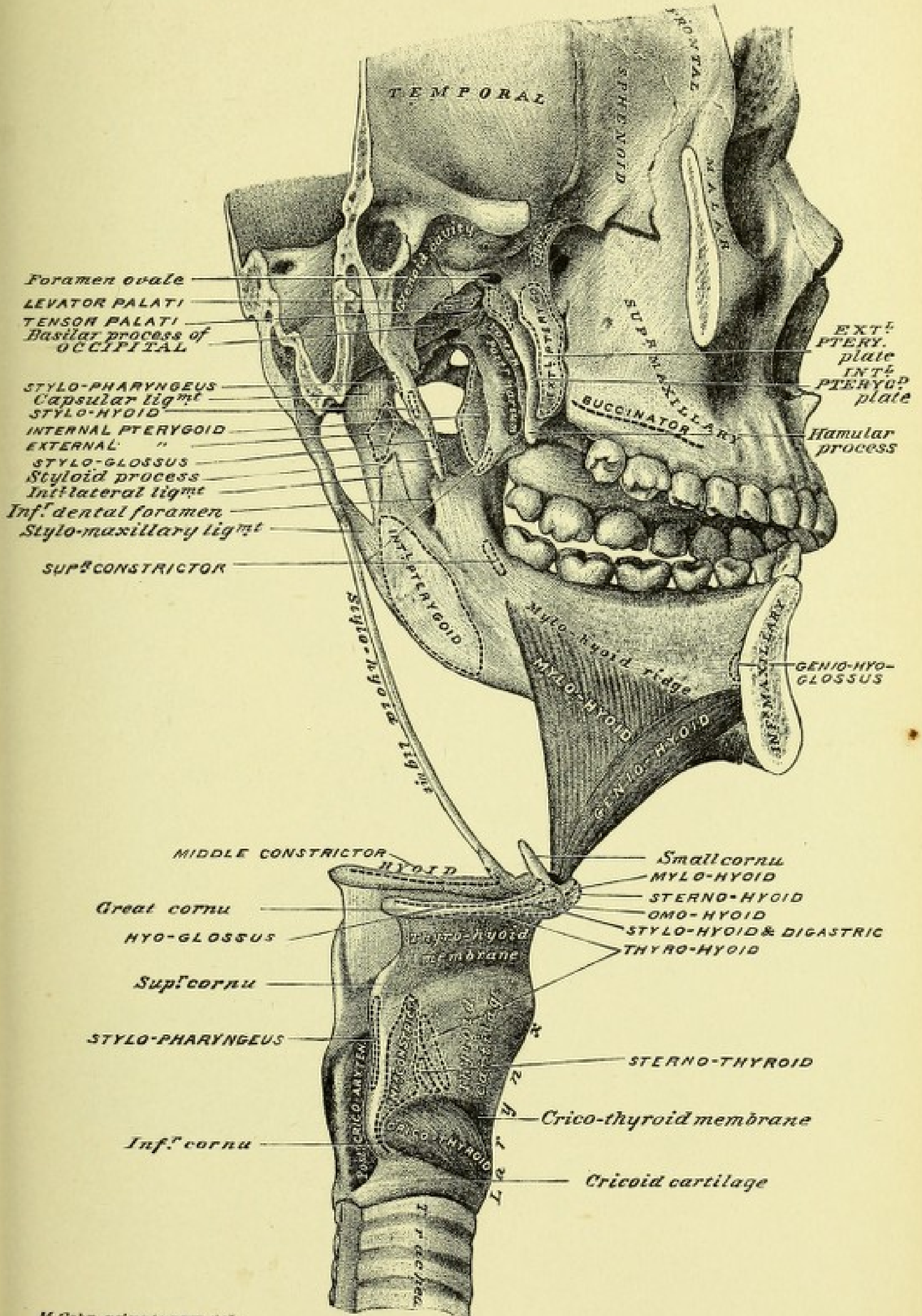

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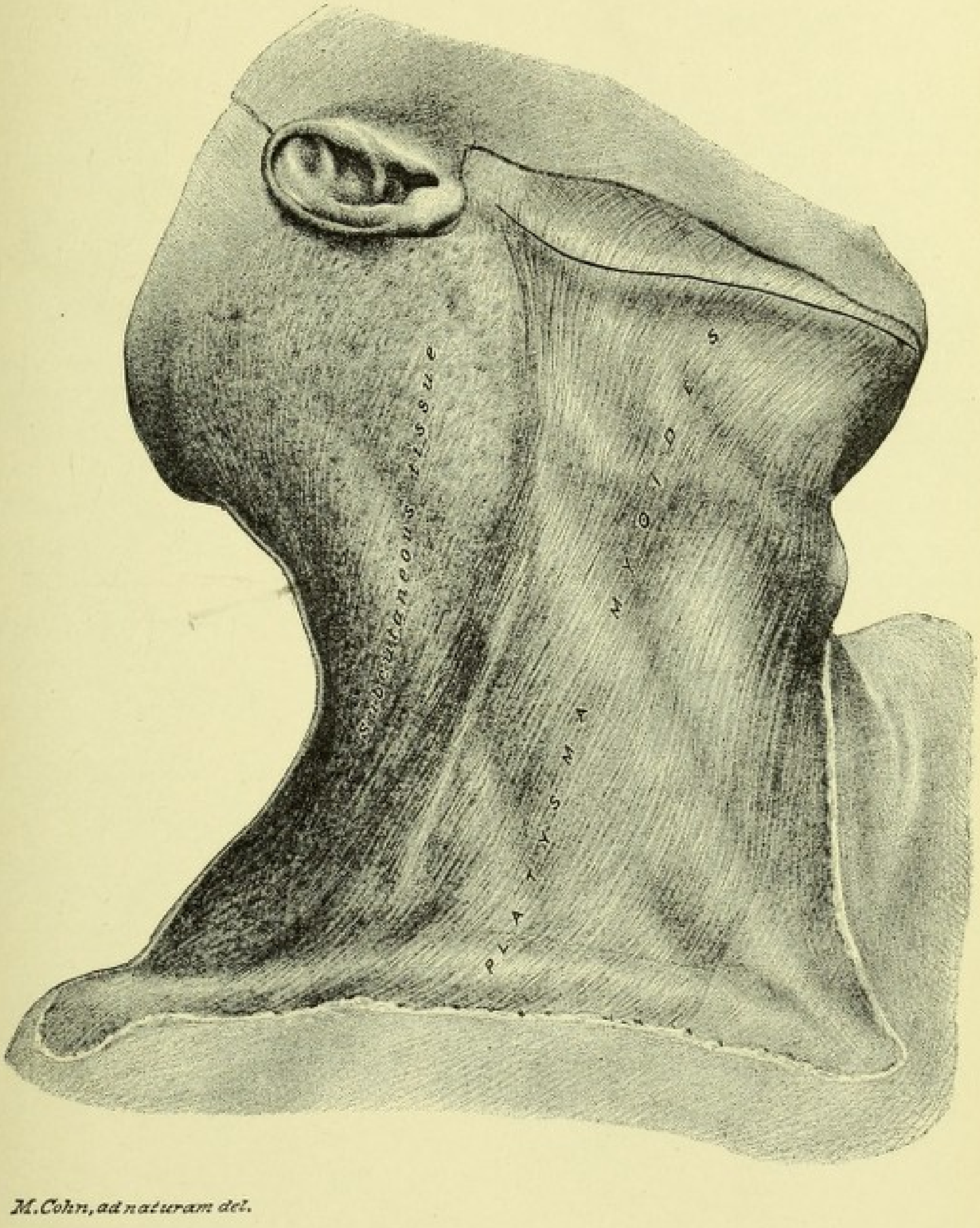

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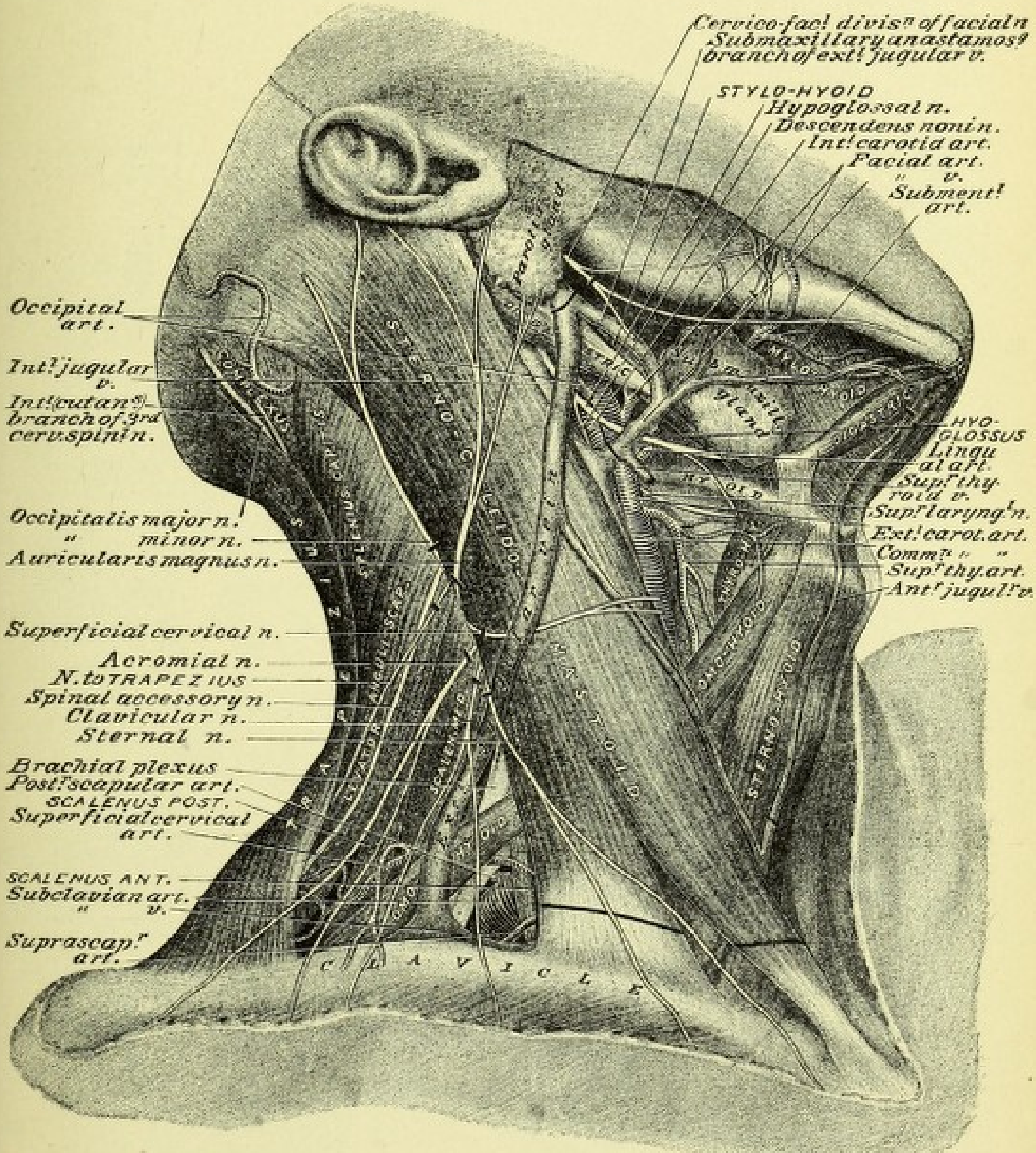

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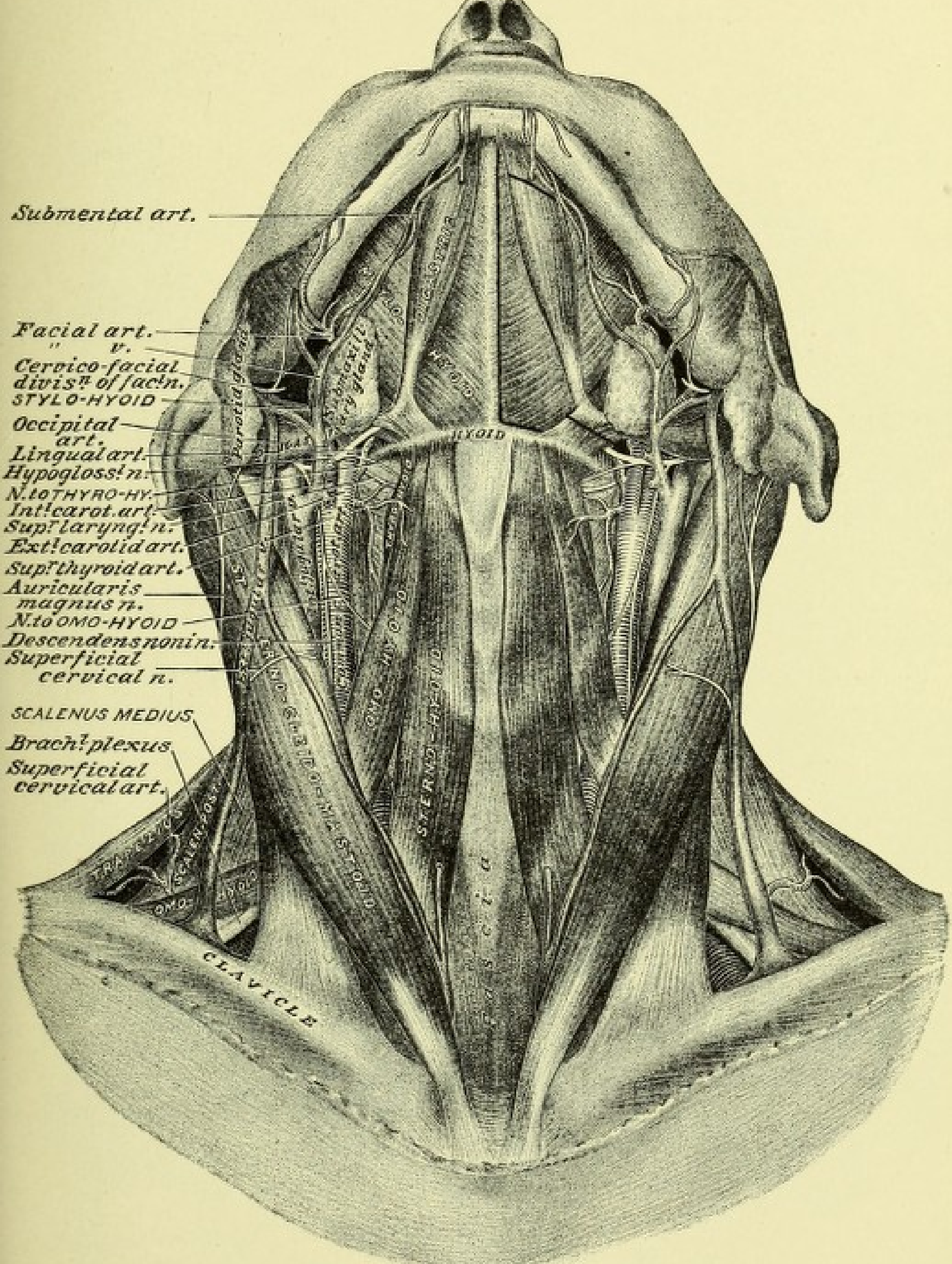

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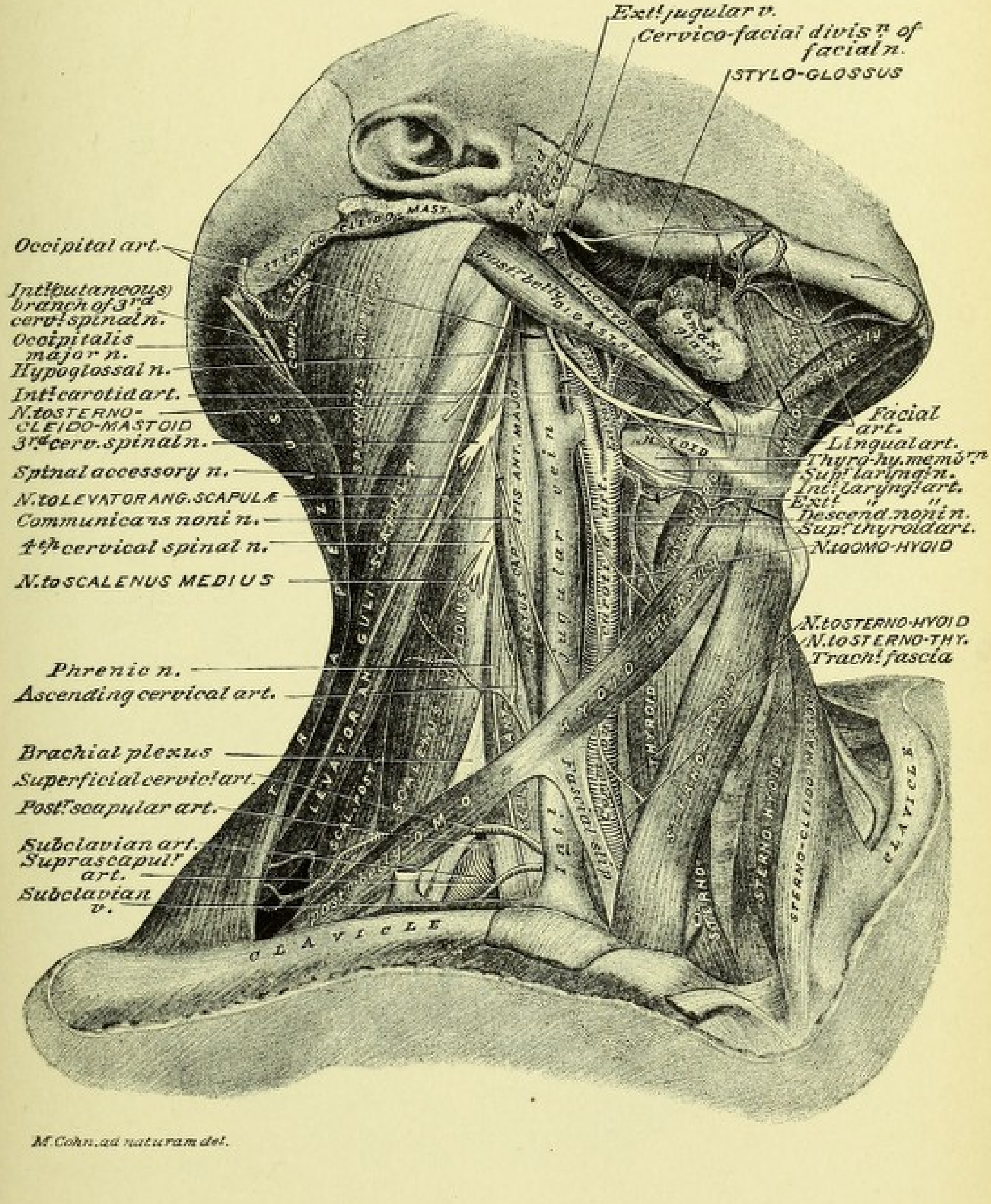

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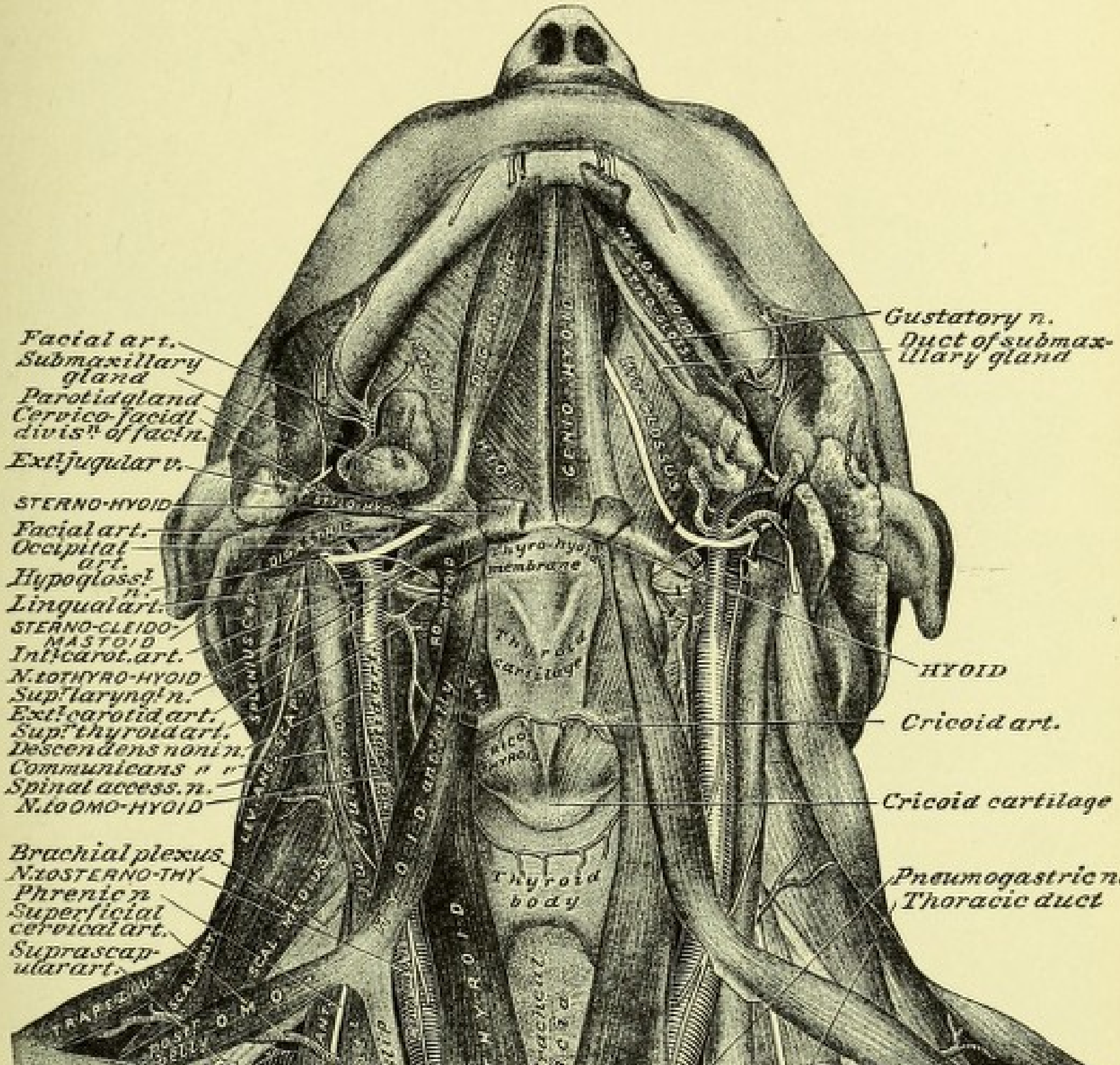

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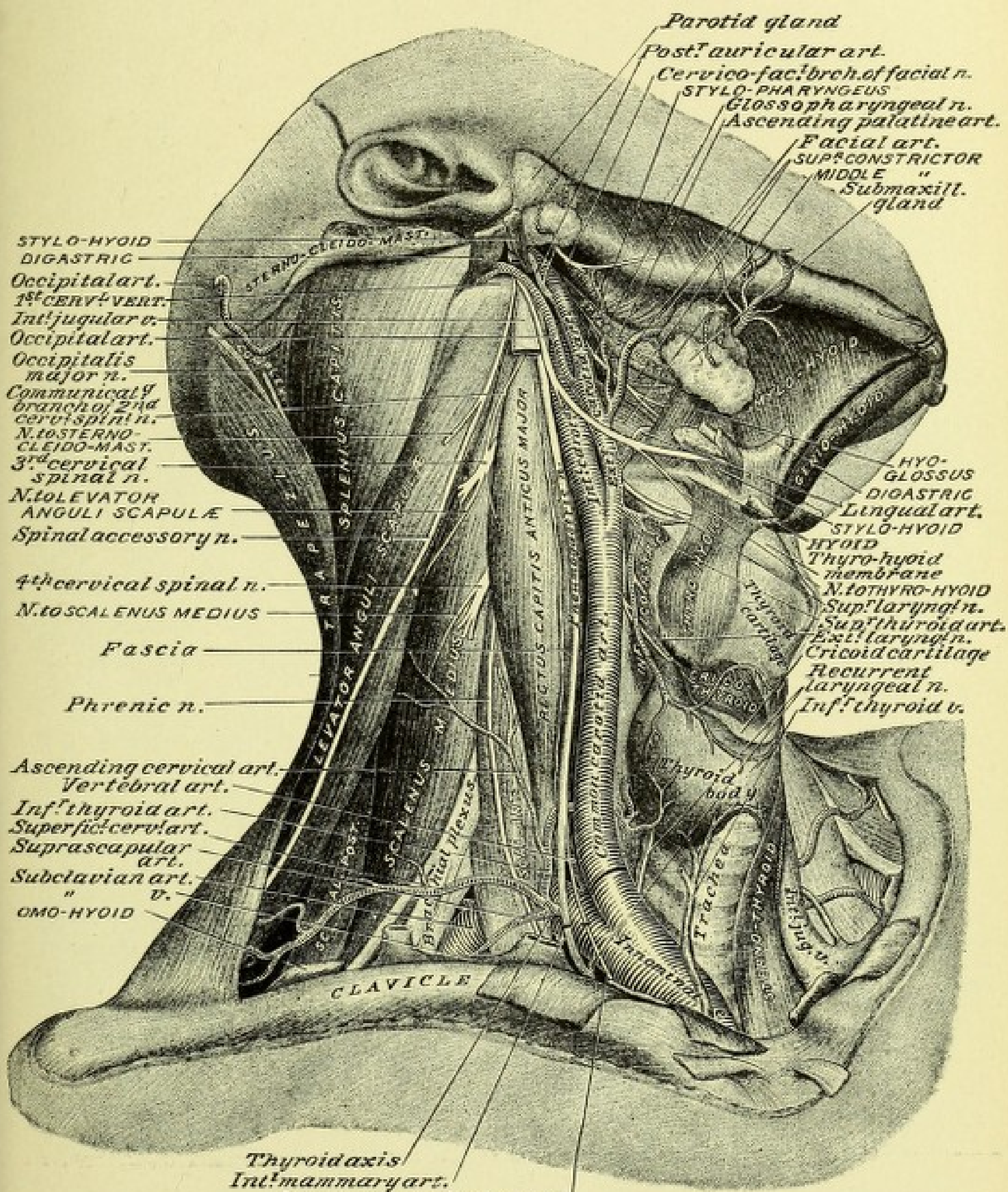

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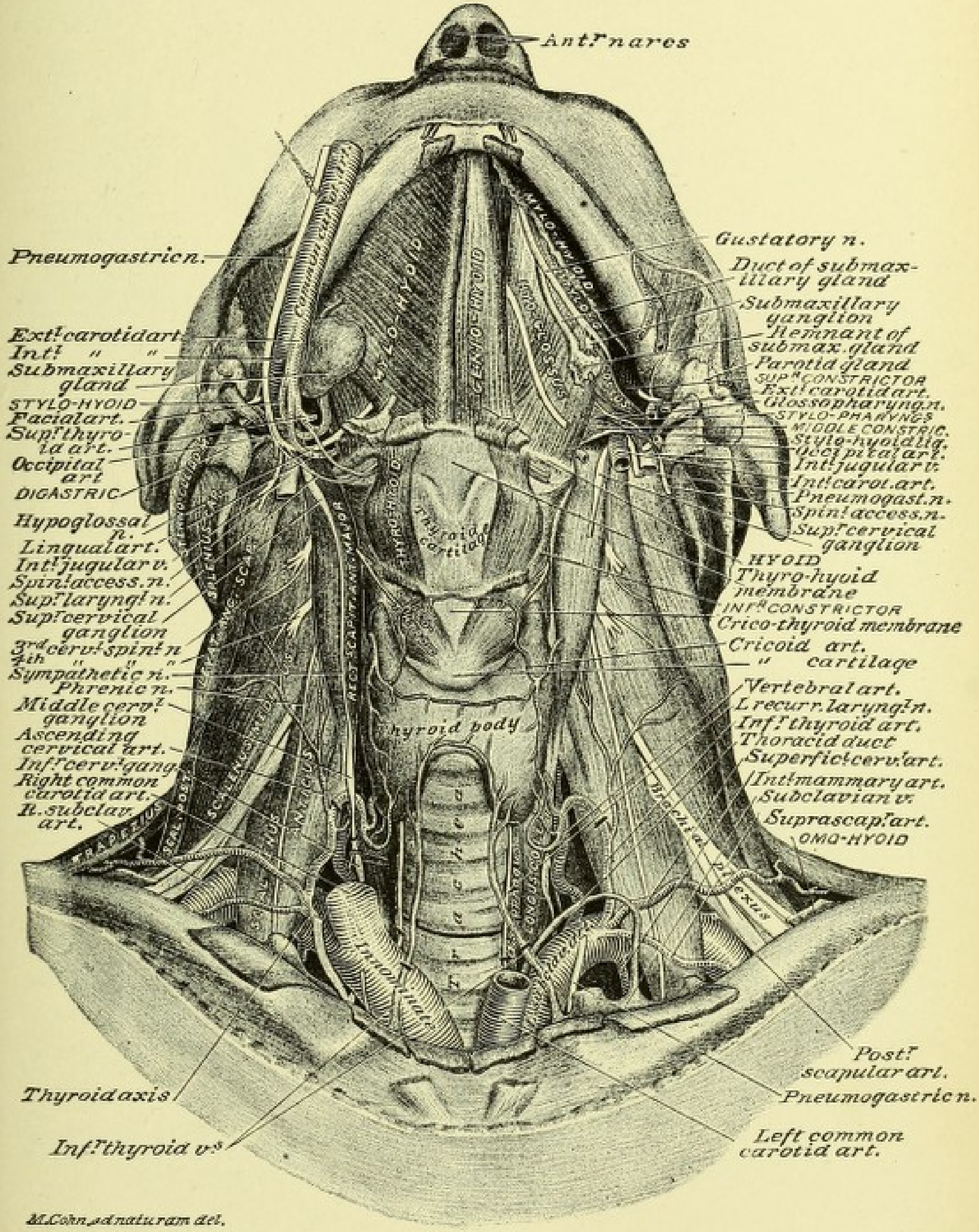

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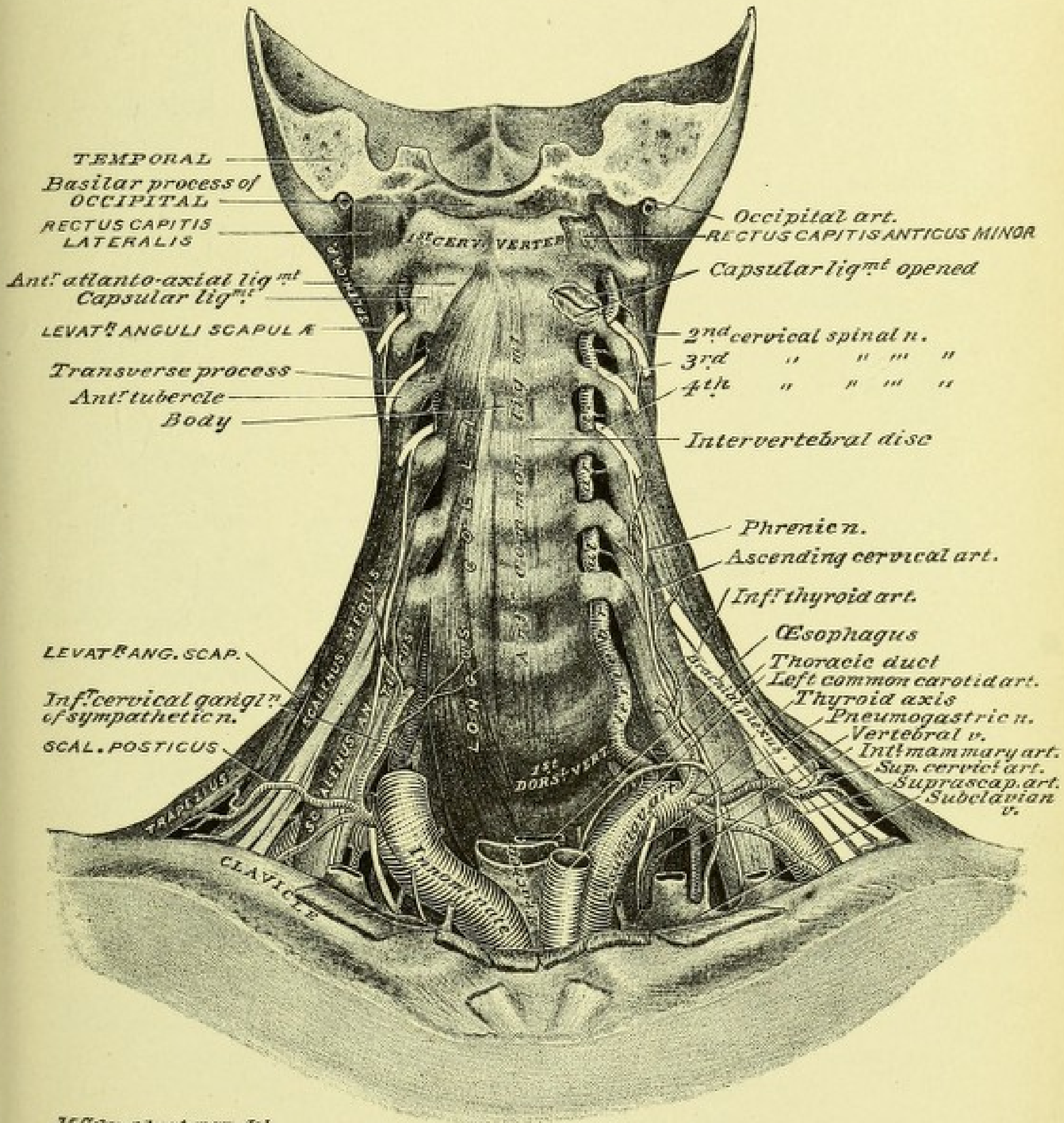

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TWENTY-SIXTH DISSECTION.

ARTERIES AND NERVES CONTIGUOUS TO THE PHARYNX; PHARYNX; SOFT AND HARD PALATE; TONGUE AND CONTIGUOUS PARTS; LARYNX; NASAL CAVITIES AND CONTIGUOUS PARTS.

ARTERIES AND NERVES CONTIGUOUS TO THE PHARYNX.

DISSECTION.—The anterior of the head and appended parts, as sawn from the posterior portion of the head (page 374), are prepared for dissection as follows: saw the right and left ramus of the inferior maxillary bone, according to inferior section line on the same in Fig. 1, Plate 184; stuff the pharynx with oakum, through the mouth and œsophagus; suspend the anterior half of the head and appended parts in the pharyngeal frame (Figure 15, page 378), by strings extending, superiorly, from gimlet holes in the skull—near its superior sawn edge—and, inferiorly, from the trachea; the strings are tied, taut, into the holes of the frame.

Terms of Relation.—The general terms (page 2) are used to locate these arteries and nerves.

DISSECTION.—The vertical section of the cranium (page 374) will have severed the superior end of the right hypoglossal nerve, and have disturbed the superior ends of the pneumogastric, spinal accessory, and glosso-pharyngeal nerves at their cranial exit by the foramen lacerum posterius (page 325, Plate 180). As these nerves are bound to each other, and to the internal carotid artery, by connective tissue, they will be found to maintain their normal relations. Cut away (Plate 200) the left internal carotid artery inferiorly to its entrance into the carotid canal in the petrous portion of the temporal bone (Plate 199); the superior portions of the left external carotid artery; the left hypoglossal, pneumogastric (and its branches), spinal accessory, and glosso-pharyngeal (and its branches) nerves; the left lobe of the thyroid body; the left recurrent laryngeal nerve; and the inferior laryngeal artery. Remove the superior end of the right external carotid artery, from a point inferiorly to the giving off of the occipital artery (Plate 196); also, the right facial artery, leaving the superior portion of its branch, the ascending palatine artery (Plate 201). Display (Plate 200) the superior portions of the following parts: the right hypoglossal and spinal accessory nerves; the right pneumogastric nerve and its superior branches; the right glossopharyngeal nerve and its pharyngeal branch; the ascending pharyngeal artery; and the internal carotid artery.

1. Hypoglossal and Spinal Accessory Nerves, Plate 200.—The posterior face of the superior ends, of the extracranial portions, of these nerves present contiguously to the superior ends of the internal carotid artery and pneumogastric nerve.

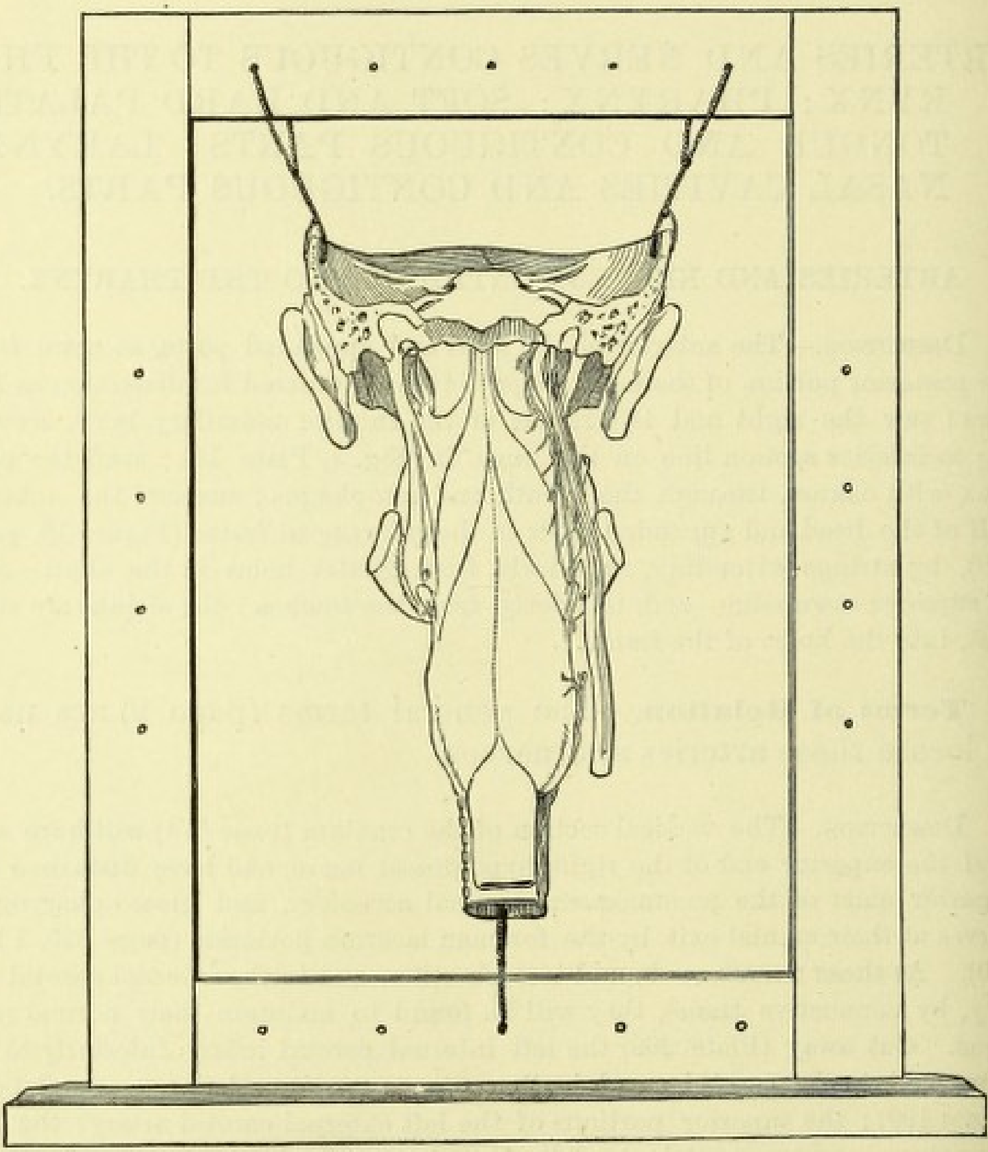


FIGURE 15.

2. Pneumogastric Nerve and its Superior Branches.—The inferior of the cervical part of this nerve has been described (page 366) and illustrated (Plate 196). The superior end of its extracranial portion lies posteriorly to the internal carotid artery and gives off the following branches: the *pharyngeal nerve*, which contributes to the pharyngeal plexus; the *supe-*

rior laryngeal nerve, before described (page 365) and illustrated (Plates 192 to 197, inclusive) at its inferior end, and where it gives off the external laryngeal nerve (page 369 ; Plate 197).

3. Glossopharyngeal Nerve and its Pharyngeal Branch. —The superior end of the extracranial portion of this nerve appears between the internal carotid artery and pneumogastric nerve. Its *pharyngeal branch* winds internally to the artery, passing, inferiorly, to the pharyngeal plexus.

4. Pharyngeal Plexus.—This is a plexus of nerves located at the exterior surface of the middle constrictor muscle ; it is formed by the pharyngeal branches of the pneumogastric and glossopharyngeal nerves, respectively, and branches from the superior cervical ganglion of the sympathetic (Plate 197).

5. Ascending Pharyngeal Artery.—This small artery (venæ comites) arises from the posterior of the external carotid artery, at the level of the origin of the lingual artery from the same trunk. It has a superior course, posteriorly to the internal carotid artery. Its branches supply the pharynx, soft palate, prevertebral muscles, and the membranes of the brain (the latter branches enter the base of the cranium, at the foramen lacerum posterius, and the anterior condylar foramen of the occipital bone).

6. Internal Carotid Artery: Fig. 2, Plate 188 ; Plate 200.— The inferior portion of this artery has been partly described (page 367) and illustrated (Plates 192 to 196, inclusive). The superior part of its extracranial portion is projected, externally to the superior constrictor muscle, to the orifice of the carotid canal, at the inferior surface of the petrous portion of the temporal bone (Plate 199). It is in immediate relation to the following nerves and vessels : the pneumogastric nerve (Plates 196 and 200) and ascending pharyngeal artery (Plate 200), posteriorly ; the hypoglossal nerve (Plates 196 and 200) and the internal jugular vein (Plates 194 and 196), externally ; the glossopharyngeal nerve and the pharyngeal plexus (Plate 200), internally.

PHARYNX.

DISSECTION.—Section the superior laryngeal branch of the pneumogastric nerve, and the hypoglossal nerve (as in Plate 201). Cut away (as in Plate 201), from their superior ends: the right internal carotid artery; the right ascending pharyngeal artery; the portions of the external and common carotid arteries (Plate 200); the right pneumogastric, hypoglossal, and spinal accessory nerves. Clear away the pharyngeal plexus from the exterior of the middle constrictor muscle.

Terms of Relation.—The general terms (page 2); and the special terms *exterior* and *interior*—relatively to the cavities of the pharynx and larynx—*lateral* and *postero-lateral*—applied to the pharynx—will be used in this dissection.

Bone and Cartilage Areas for the Attachment of Muscles, Plates 190 and 199.—The pharynx is suspended, from the cranium and face, by the attachments of its muscles, etc., to the following bones: the *occipital*, at the inferior surface of its basilar process; the right and left *temporal*, at the inferior surfaces of their petrous portions and at their styloid processes; the *sphenoid*, at its hamular processes and internal pterygoid plates; the *inferior maxillary*, at the internal surfaces of the external portions of the two halves of its body; the *hyoid*, at its great cornua; the *thyroid cartilage* of the larynx, at its exterior surface and posterior borders.

DISSECTION.—Clear (Plate 200) the posterior surfaces of the following parts: the superior ends of the œsophagus, trachea, recurrent laryngeal nerves, and inferior laryngeal arteries from the inferior thyroid arteries; the right lobe of the thyroid body, with the ends of its right inferior and superior arteries; the superior portions of the exterior of the right and left halves of the fibrous coat of the pharynx; portions of the left tensor palati muscle; the left hamular process; the superior end of the left stylo-pharyngeus muscle, to the point where it passes between the left middle constrictor and superior constrictor muscles; the vertical portion of the left stylo-glossus muscle. Dissect off the fascial coat from the exterior of the right and left inferior constrictor muscles, and the superior portions of the right and left, middle and superior constrictor muscles. Section (Plate 200) the left inferior constrictor muscle, reflect it off, externally, and cut it away from its anterior attachment, to the thyroid cartilage of the larynx (Plate 190); repeat the same with the left middle constrictor muscle—cut it away from the great cornu of the hyoid bone (Plate 190). Expose (Plate 200) the posterior surface of the left stylo-pharyngeus and superior constrictor muscles; also, the inferior of the left half of the fibrous coat of the pharynx. Change the position of the half head in the pharyngeal frame so as to expose the right postero-lateral face of the pharynx, etc. (Plate 201). Dissect the internal pterygoid muscle from its pterygoid-plate attachment; and section the inferior dental nerve as in Plate 201. Clear (Plate 201) the right external surfaces of the following parts: the inferior, middle, and superior constrictor muscles; the stylo-pharyngeus and stylo-glossus muscles. Display the pterygo-maxillary ligament, and the relations to it of the superior constrictor and buccinator muscles.

1. Inferior Constrictor Muscle, Plates 190, 196, 200, and 201.—This muscle is attached to the median-line raphe at the posterior of the pharynx, where it meets its fellow of the opposite side (Plates 200 and 201). Its fibres wind externally, anteriorly, and inferiorly, to enclose the postero-lateral wall of the pharyngeal cavity, exteriorly to its fibrous coat and the inferior portion of the middle constrictor muscle. It is attached, anteriorly, to the exterior of the lateral wall of the larynx—thyroid and cricoid cartilages (Plates 190, 196, and 201).

2. Middle Constrictor Muscle: Plates 190, 196, 200, 201, and 204; Fig. 1, Plate 205.—This muscle attaches itself, posteriorly, to the median-line raphe of the pharyngeal wall, meeting the muscle of the opposite side (Plates 200 and 201). Its inferior portion lies interiorly to the inferior constrictor muscle, its superior portion exteriorly to the inferior part of the superior constrictor muscle. Its fibres pass, in the postero-lateral walls of the pharynx, to their anterior attachment, to the interior of the superior border of the great cornu of the hyoid bone (Plates 190, 196, 201, and 204; Fig. 1, Plate 205).

3. Superior Constrictor Muscle: Fig. 2, Plate 188; Plates 190, 196, 200, 201, 203, and 204; and Fig. 1, Plate 205.—This muscle is located in the postero-lateral walls of the superior half of the pharynx. It lies exteriorly to the fibrous coat of the pharynx; its inferior half interiorly to the superior part of the middle constrictor muscle (Plate 200). Its attachment posteriorly is to the superior half of the common median-line raphe of the constrictor muscles (Plate 200). Anteriorly, its inferior fibres blend into the posterior of the lateral border of the tongue (Plates 196, 201, and 204; Fig. 1, Plate 205); its superior fibres pass to the inferior maxillary bone (Plate 190), the pterygo-maxillary ligament (Plates 201 and 203), and the hamular process and internal plate of the pterygoid process of the sphenoid bone (Plates 190, 200, 201, 203, and 204).

4. **Fibrous Coat of the Pharynx:** Fig. 2, Plate 188; Plates 199, 200, and 201.—This coat of the pharynx, common to both halves, is located interiorly to its muscular coat (the right and left superior, middle, and inferior constrictor, and stylo-pharyngeus muscles), and exteriorly to its submucous and mucous coats, and the right and left palato-pharyngeus muscles. It contributes to the postero-lateral walls of the cavity, and is attached, superiorly, to the occipital bone (at the median line of the inferior surface of its basilar process, Plate 199), the sphenoid bone (its body), and the temporal bone (its petrous portion). It forms, posteriorly, the median-line, fibrous, raphe (Plate 200), from which the right and left constrictor muscles (inferior, middle, and superior) are projected, externally and anteriorly. It also appears, free of muscle investment, superiorly, between the superior borders of the right and left superior constrictor muscles and the inferior surface of the base of the cranium (Plate 200).

5. **Stylo-pharyngeus Muscle,** Plates 190, 196, 200, 201, 203, and 204.—This muscle is attached: superiorly, to the posterior surface of the styloid process of the petrous portion of the temporal bone (Plate 190); inferiorly, to the fibrous coat of the pharynx (Plate 200) and the external face of the posterior border of the thyroid cartilage of the larynx (Plates 190 and 200). In its inferior course the muscle enters at first, between the planes of the superior and middle constrictor muscles; then it runs between the inferior constrictor muscle, exteriorly, and the fibrous coat of the pharynx, interiorly.

6. **Pterygo-maxillary Ligament,** Plates 201 and 203.—This is a stretch of fibrous tisues from the hamular process of the sphenoid bone to the internal surface of the lateral portion of the body of the inferior maxillary bone (at the attachment of the superior constrictor muscle, Plate 190). It forms a raphe for the common attachment of the posterior ends of the mid-fibres of the buccinator muscle and the anterior ends of the superior fibres of the superior constrictor muscle. This relation of the buccinator and superior constrictor muscles, right and

left, together with the fusion of the inferior fibres of the latter muscles with the tongue, determine the mouth and pharynx as a continuous muscular sac—*bucco-pharyngeal cavity*. The buccal portion is completed, anteriorly, by the orbicularis oris muscle, and, inferiorly, by the tongue; the pharyngeal portion is completed by the right and left, middle and inferior constrictor muscles, and the fibrous coat of the pharynx.

Dissection.—Turn the half head in the pharyngeal frame, presenting its posterior wall. Cut open (Plate 202) the pharynx, along its posterior median-line raphe, from the œsophagus to the cranium; loop back, with threads tied to the pharyngeal frame, its postero-lateral walls; take out the oakum from its interior and expose its mucous-membrane lined antero-lateral walls. Recognize the parts forming its incomplete anterior wall; also, its anterior, lateral, and inferior openings.

7. Walls and Openings of the Pharynx, Plate 202.—The *postero-lateral walls*, right and left, of the pharynx present five coats as follows: mucous membrane lining (Plate 202); a submucous plane containing the palato-pharyngeus muscle (Plate 203); a fibrous coat, before described (page 382) and illustrated (Plate 200); a muscular layer, consisting of the three constrictor, and stylo-pharyngeus muscles, right and left (Plates 200, 201, and 203); and a fascial coat, exteriorly to the muscular. Its *anterior wall* is incomplete, being formed by the postero-superior surface of the soft palate, the dorsum of the base of the tongue, and the posterior surface of the larynx. Its incomplete portions are: superiorly to the soft palate, where the posterior nares open into the right and left nasal cavities; and between the soft palate and dorsum of the tongue, where the posterior buccal orifice is located, and partially shut off from the pharynx by the pillars and uvula of the soft palate. The *openings into the pharynx* are seven in number: the right and left posterior narium, and the posterior buccal orifice, anteriorly; the orifices of the right and left Eustachian tubes, laterally; the superior openings of the larynx and œsophagus, inferiorly.

SOFT AND HARD PALATE.

Dissection.—The half head and appended organs should be swung in the pharyngeal frame, with the pharynx opened along the median line of its posterior wall, as in Plate 202.

Terms of Relation.—The general terms (page 2), and the special terms *interior*, *exterior*, and *lateral*—relatively to the buccal and pharyngeal cavities—serve to locate the parts of this dissection.

Bones, and Bone Attachments of Muscles, Plates 190 and 199 ; Fig. 2, Plate 205.—The bones forming the hard palate (Fig. 2, Plate 205) are : the right and left *superior maxillary* (their palatine processes) ; the right and left *palate* (their horizontal portions). The bones affording attachments to muscles of the soft palate are : the right and left *temporal* (their petrous portions) ; the *sphenoid* (its navicular fossa) ; the right and left *palate* (the posterior borders of their horizontal plates).

Dissection.—Looking through the stretched pharyngeal wall, the outlines of the right and left palato-pharyngeus muscle may be seen, located in the submucous plane, interiorly to the fibrous coat. Dissect (Plate 203) the mucous membrane from the interior of the right and left of the pharynx, and from the postero-superior surface of the soft palate ; display (Plate 203) the right and the left palato-pharyngeus, levator palati, and azygos uvulæ muscles ; and the pharyngeal ends of the right and left Eustachian tubes.

1. Palato-pharyngeus Muscle, Plate 203.—This muscle is located in the submucous plane of the lateral wall of the pharynx. It is attached inferiorly to the posterior border of the thyroid cartilage of the larynx ; thence it has a superior course to the soft palate, of which it forms the substance of its posterior pillar. It ends in the body of the soft palate, by a superior-internal and an inferior-external portion : the superior-internal portion consists of stray fibres to the superior surfaces of the palatine ends of the levator palati and the azygos uvulæ muscles, of a side, as far as the median line (Plate 203, right side) ; the inferior-external portion passes to the superior of, the external part of, the body of the soft palate, to blend with the palatine ends of the levator palati and tensor palati muscles, of a side (Plate 203, right side). A slip, from the palatine end of the inferior-external portion of the muscle, extends to the Eustachian tube, the *salpingo-pharyngeus muscle* (Plate 203, right side).

2. Levator Palati Muscle: Fig. 2, Plate 188 ; Plates 190, 199, 201, 203, and 204 ; Fig. 2, Plate 205.—The superior end of this muscle is attached to the petrous portion of the temporal bone (Plates 190 and 199); thence, it passes inferiorly and internally (Plates 196, 201, and 204), entering interiorly to the lateral wall of the pharynx, superiorly to the superior constrictor muscle of the same (Plates 201, 203, and 204). Its palatine end enters the postero-superior face of the body of the soft palate, blending with the palatine ends of the last-described muscle (Plate 203, right side), and continuing to meet its fellow of the opposite side at the median-line raphe of the soft palate.

3. Azygos Uvulæ Muscle, Plate 203, and Fig. 2, Plate 205. —This muscle is attached to the posterior, median-line angle of the horizontal plate of a palate bone; it is projected parallel with the median line, posteriorly and inferiorly, between the superior-internal palatine fibres of the palato-pharyngeus muscle (page 384), superiorly, and the horizontal portion of the tensor palati muscle, inferiorly; it forms, by its free end, one-half of the substance of the uvula.

Dissection.—Cut away (Plate 203, left side) the superior portion of the fibrous coat and superior constrictor muscle of the pharynx, trimming away the fibrous coat of the same along the posterior border of the stylo-pharyngeus muscle. Dissect (Plate 203, left side) from the postero-superior surfaces of the horizontal portion of the tensor palati muscle, and the superior face of the antero-inferior mucous membrane layer of the soft palate, the palatine ends of the palato-pharyngeus and levator palati muscles. Cut away (Plate 203, left side) the levator palati muscle. Display (Plate 203, left side): the tensor palati muscle; the hamular process of the sphenoid bone; the distribution of the ascending palatine artery; and more of the pharyngeal end of the Eustachian tube.

4. Tensor Palati Muscle, Plates 188, 190, 199, 200, 201, 203, and 204.—This muscle has a vertical and a horizontal portion: the *vertical portion* is attached, superiorly, to the navicular fossa at the external face of the superior end of the internal plate of the pterygoid process of the sphenoid bone (Plates 190 and 199); thence, it has an inferior course parallel with, externally to, and extending posteriorly to, the internal plate of the pterygoid process (Plates 200, 203, and 204), to wind inferiorly to the hamular process of the internal pterygoid plate; the *horizontal portion* has an internal course from the hamular process to the median line, spreading, antero-posteriorly, as it advances into the body of the soft palate (Plate 203). At a median-line, fibrous, raphe it meets its fellow of the opposite side.

5. Ascending Palatine Artery, Plates 196, 200, 201, 203, and 204.—This artery (venæ comites), branch of the facial artery (Plate 196), has a superior course, between the stylo-glossus muscle, externally, and the superior constrictor muscle, internally. A branch or branches of it penetrate the latter muscle to supply the tonsil (at times a *tonsillar artery* is given off directly from the facial artery). It runs to the superior border of the superior constrictor muscle, where it winds superiorly to it (Plates 200, 201, 203, and 204), to distribute to the substance of the soft palate (Plate 203, left side).

6. Eustachian Tube, Plates 202 and 203.—The pharyngeal end of this canal of communication between the cavity of the middle ear and the pharynx, is partly cartilaginous and partly fibrous in structure. It is projected, internally and inferiorly; its pharyngeal half runs along the internal side of the superior portion of the tensor palati muscle, to which it affords a partial attachment. Its pharyngeal opening is at the superior part of a lateral wall of the pharynx, posteriorly to a posterior narium, and a little superiorly to the antero-posterior plane of the floor of a nasal cavity.

DISSECTION.—Take the half head from the pharyngeal frame. Section (Plate 201) and cut away the right mylo-hyoid muscle; saw the right side of the anterior of the body of the inferior maxillary bone, along the section line in Fig. 1, Plate 188. Replace the half head in the pharyngeal frame, as in Plate 204; put a loop in the tip of the tongue, and another around the body of the inferior maxillary bone and tie them both to the pharyngeal frame. Cut away the posterior portions of the right superior, middle, and inferior constrictor muscles; then by loops, from their cut borders to the frame, bring the parts into position, as in Plate 204. Cut away the right buccinator muscle, pterygo maxillary ligament, and the anterior of the superior fibres of the superior constrictor muscle, as in Plate 204. Expose (Plate 204) the right palato-glossus muscle, and dissect the mucous membrane from the right border of the tongue. Recognize the pillars and the tonsils of the soft palate.

7. Palato-glossus Muscle, Plate 204.—This muscle lies in the submucous plane of the lateral wall of the posterior part of the buccal cavity, bridging, inferiorly, from the anterior of the body of the soft palate to the posterior portion of the lateral border of the tongue.

8. Pillars and Tonsils of the Soft Palate, Plates 203 and 204.—The pillars of the soft palate are two pairs of half arches at the sides of the posterior orifice of the buccal cavity. Those of a side diverge, inferiorly, from the body of the soft palate: the *posterior pillar*, determined by the palato-pharyngeus muscle (page 384; Plate 203), is directed, inferiorly, and a little posteriorly, to the lateral wall of the pharynx; the *anterior pillar*, formed by the palato-glossus muscle (page 386; Plate 204), is projected, inferiorly, to the posterior of the lateral border of the tongue. The *tonsils* are aggregations of follicles, which are lodged in the submucous plane of the spaces between the pillars of the soft palate, right and left; the follicles are lined by involutions of the buccal mucous membrane, and open into the buccal cavity. The muscles or pillars and the tonsils of the soft palate are lined, interiorly, by mucous membrane, and are covered exteriorly by the superior constrictor muscle (Plate 204).

DISSECTION.—*At this point dissect the tongue and contiguous parts, after which the dissection of the soft and hard palate may be completed* (page 391).

TONGUE AND CONTIGUOUS PARTS.

Terms of Relation.—The following will be used in this dissection: the general terms (page 2); and the special terms *interior* and *exterior*—relatively to the buccal cavity—*dorsum*, *base*, *apex*, and *lateral border*—to the tongue.

Bone Attachments of Extrinsic Muscles of the Tongue, Plate 190.—The bones affording attachments to these muscles are: the *sphenoid* (at its hamular processes); the right and left *temporal* (at the styloid processes of their petrous portions); the *inferior maxillary* (at the posterior and internal surfaces of its body); the *hyoid* (at the superior surfaces of its body and great cornu).

DISSECTION.—Section (as in Plate 204) the right glossopharyngeal nerve and dissect away its superior portion. Trace (Plate 204) the inferior and anterior part of the gustatory nerve, along the lateral border of the tongue. Follow (Plate 204) the duct of the submaxillary gland, anteriorly; and display the deep portion of the submaxillary gland, and the sublingual glandular tissue. Dissect out (Plate 204) the anterior of the hypoglossal nerve.

1. Right Submaxillary Ganglion, Plates 201 and 204.—This ganglion, one of the cephalic ganglia of the sympathetic nerve, is similar to that of the left side, which was described at page 373 and illustrated in Plate 197.

2. The Duct of, and Deep Portion of, the Submaxillary Gland, Plates 197 and 204; Fig. 1, Plate 205.—The duct of the submaxillary gland continues, anteriorly, from the gland posteriorly to the border of the mylo-hyoid muscle, between the mylo-hyoid muscle externally, and the hyo-glossus muscle, internally; it passes internally to the sublingual glandular tissue, and opens at the buccal floor, by the side of the frænum of the tongue. A deep portion of the submaxillary gland presents between the posterior part of the mylo-hyoid muscle and the anterior part of the hyo-glossus muscle.

3. Hypoglossal Nerve.—The cervical part of this nerve has been described (page 364) and illustrated (Plates 192 to 197, inclusive), to the point where it disappears, internally to the hyoid ends of the stylo-hyoid and digastric muscles. Its anterior and internal portion was partly described (page 365), and illustrated (Plate 197). Its latter portion runs between the mylo-hyoid muscle, externally, and the hyo-glossus and genio-hyo-glossus muscles, internally. It distributes branches (Plate 204) to the hyo-glossus, stylo-glossus, genio-hyoid, and genio-hyo-glossus muscles; its trunk then enters the substance of the tongue to supply its intrinsic muscle structure.

4. Tongue: Plates 202, 203, and 204; Fig. 1, Plate 205; Fig. 2, Plate 206.—This median-line, conical-shaped, organ arches, postero-anteriorly, into the floor of the buccal cavity. It results from the fusion of the free ends of (Fig. 1, Plate 205) five pairs of extrinsic muscles—genio-hyo-glossus, hyo-glossus, superior constrictor, stylo-glossus, and palato-glossus—with its intrinsic muscle fibres—longitudinal, transverse, and vertical. The dorsum, lateral borders, and apex of its complex muscle structure is covered by mucous membrane, which is closely studded with papillæ. Its *base* (Plate 204; Fig. 1, Plate 205) is fixed: to the hyoid bone, by the attachments of the pairs of genio-hyo-glossus and hyo-glossus muscles, posteriorly; to the inferior maxillary bone, by the attachment of the pair of genio-hyo-glossus muscles, anteriorly. Its *lateral borders*, which are moulded to the contour of the interior surfaces of the body and alveolar process of the inferior maxillary bone, are swung by three pairs of extrinsic muscles—the stylo-glossus, palato-glossus, and superior constrictor. Its *dorsum* arches, postero-anteriorly, presenting a pharyngeal (Plates 202 and 203 ; Fig. 1, Plate 206) and a buccal face (Plate 204). Its *apex* (Plate 204) or anterior free end is completely invested by mucous membrane.

DISSECTION.—Clear (Plate 204) the external surfaces of the right stylo-glossus, hyo glossus, and genio-hyoid muscles ; and portions of the genio-hyo-glossus muscle. Cut away (Plate 204) a piece of the posterior of the hyo-glossus muscle, in order to bring into view a part of the dorsal artery of the tongue, and the anterior direction of the glossopharyngeal nerve. Feel the course of the lingual artery internally to the hyo-glossus muscle.

5. **Stylo-glossus Muscle,** Plates 190, 194, 196, 200, 201, 203, and 204.—This extrinsic muscle of the tongue is attached, posteriorly, to the styloid process of the petrous portion of the temporal bone (Plates 190, 200, 201, 203, and 204) ; thence, it has an inferior and anterior course, externally to the superior constrictor muscle (Plates 196, 200, 201, 203, and 204) ; at the tongue its fibres blend into the lateral border of that organ (Plate 204 ; Fig. 1, Plate 205).

6. **Hyo-glossus Muscle:** Plates 190, 192, 196, 201, 203, and 204 ; Fig. 1, Plate 205.—This extrinsic muscle of the tongue is attached, inferiorly, to the exterior of the superior border of the great cornu of the hyoid bone (Plate 190) ; superiorly, its fibres merge into the lateral border of the tongue (Plate 204 ; Fig. 1, Plate 205).

7. **Genio-hyoid Muscle,** Plates 190, 195, 196, 197, and 204.—This muscle is described at page 365, with the parts exposed at the left side of the neck (Plates 195, 196, and 197). The genio-hyoid and mylo-hyoid muscles, right and left, form the muscular floor of the buccal cavity, and consequently belong to the region of the head, and not to the neck region. For the same reason the hyoid bone, as supporting the tongue and buccal floor, is a bone of the head.

DISSECTION.—Take the half head from the pharyngeal frame. Section (Plate 204) the pillars and tonsil of the soft palate, right and left, and the parts contiguous to them, thus dividing the anterior half of the head and appended organs into two portions : the superior, made up of the upper jaw region of the face and the anterior of the cranium ; the inferior, consisting of the tongue and larynx. Clear the right lateral surface of the tongue (Fig. 1, Plate 205) so as to display the tongue portions of: the lingual artery; the gustatory, glosso-pharyngeal, and hypoglossal nerves; the sublingual glandular tissue; the perforation of the mucous membrane of the buccal floor by the duct of the submaxillary gland; and the, complete, external surface of the genio-hyo-glossus muscle.

8. Lingual Artery and its Branches: Plates 192 to 197, inclusive; Plates 200, 201, 203, and 204; and Fig. 1, Plate 205. —This artery (vena comes), branch of the external carotid artery (page 367; Plates 192 to 197, inclusive), has a superior course from its origin, to the point where it turns to run internally, parallel with and superiorly to, the hyoid bone. Its tongue portion (Plate 204; and Fig. 1, Plate 205) enters between the hyo-glossus and middle constrictor muscles, and is continued, anteriorly, between the hyo-glossus and genio-hyo-glossus muscles; it appears in the anterior angle formed by the stylo-glossus and hyo-glossus muscles, where it bifurcates into the sublingual and ranine arteries (Fig. 1, Plate 205).

Branches of the lingual artery are: the *hyoid*, given off before the entrance of the artery internally to the hyo-glossus muscle (Plate 204); the *dorsal artery of the tongue*, arising internally to the hyo-glossus muscle, near its posterior border, has a superior course to the posterior of the tongue (Plate 204; Fig. 1, Plate 205); the *sublingual*, one of its branches of bifurcation, runs, anteriorly, on the external surface of the anterior portion of the genio-hyo-glossus muscle; the *ranine*, a branch of bifurcation, distributes to the anterior of the organ and terminates in the superior of the frænum of the mucous membrane of the tongue, where it has a direct anastomosis with its fellow of the opposite side.

9. Glossopharyngeal Nerve: Plate 204; Fig. 1, Plate 205.—The superior portion of this nerve has been described (pages 368 and 379) and illustrated (Plates 200 and 201). It enters between the hyo-glossus muscle, externally, and the lingual portion of the superior constrictor muscle, internally (Plate 204). It is continued to the external face of the genio-hyo-glossus muscle (Fig. 1, Plate 205), where its branches enter the submucous plane of the posterior lateral parts of the tongue, for ultimate distribution to the papillæ of that area of its mucous membrane.

10. Gustatory Nerve.—The superior portion of this nerve has been described (page 352), and illustrated (Plates 187, 188, 201, and 203). It runs externally to the stylo-glossus muscle (Plate 204), to reach the anterior of the lateral border and dorsum of the tongue, where its branches innervate the papillæ of that area of its mucous membrane.

11. Sublingual Glandular Tissue.—This is an aggregation of small masses of salivary gland tissue, located in the submucous plane of the floor of the buccal cavity, at the external surface of the anterior portion of genio-hyo-glossus muscle. From it numerous ducts (the ducts of Rivini) open, through the mucous membrane, into the buccal cavity.

12. Genio-hyo-glossus Muscle: Plates 190 and 204 ; Fig. 1, Plate 205.—This muscle is attached to bone: anteriorly, to the superior genial tubercie of the posterior surface of the body of the inferior maxillary bone (Plate 190) ; posteriorly, to the body of the hyoid bone (Fig. 1, Plate 205). Its glossal portion is formed by the free ends of its fibres, which blend into the half of the tongue.

SOFT AND HARD PALATE (Continued from page 387).

Dissection.—Place the superior portion of the half head (as sectioned page 389) with the inferior surfaces of the hard and soft palate uppermost (Fig. 2, Plate 205) ; introduce a wad of oakum under the soft palate ; pass a loop into the uvula and make the soft palate taut. Make a median-line incision (Fig. 2, Plate 205) of the antero-inferior mucous membrane of the soft palate ; reflect the left half of the same and display the inferior face of the horizontal portion of the left tensor palati muscle, and the posterior portion of the left azygos uvulæ muscle. Dissect (Fig. 2, Plate 205) the mucous membrane from the internal surfaces of the superior portions of the right palato-glossus and palato-pharyngeus muscles, and the right tonsil.

9. Tensor Palati Muscle, Fig. 2, Plate 205.—The postero-superior face of the horizontal portion of this muscle was before described (page 385) and illustrated (Plate 203). Its anterior-inferior or buccal surface stretches, internally, from the curve of the muscle around the hamular process of the internal plate of the pterygoid process of the sphenoid bone ; it widens as it advances to the median-line raphe, between it and its fellow of the opposite side.

10. Palato-pharyngeus and Palato-glossus Muscles; and the Tonsil.—The two muscles diverge, inferiorly, from the soft palate (page 387), and have the tonsil of the side lodged between them.

DISSECTION.—Dissect the mucous membrane from the left half of the hard palate (Fig. 2, Plate 205), and display the buccal portions of the descending palatine artery and anterior palatine nerve.

11. Descending Palatine Artery.—The buccal portion of this artery (venæ comites) appears at the buccal orifice of the posterior palatine canal. It runs anteriorly, in the angle formed by the alveolar process with the palatine process of the superior maxillary bone, supplying the mucous membrane of the hard palate and the contiguous gum; it anastomoses with the terminal branch of the naso-palatine artery, which enters the buccal cavity by the buccal orifice of the anterior palatine canal.

12. Anterior Palatine Nerve.—This nerve, branch from the spheno-palatine ganglion (page 407; Fig. 1, Plate 210), enters the buccal cavity, at the orifice of the posterior palatine canal, with the last-described artery. It accompanies the latter artery along the roof of the buccal cavity, distributing branches to the mucous membrane of the hard palate and the contiguous gum. The posterior palatine nerve, branch of the spheno-palatine ganglion, passes, by the accessory palatine canal (Plate 199) in the palate bone, to the soft palate. The external palatine nerve (when present), also a branch of the same ganglion, passes, by a special canal in the palate bone, to the soft palate.

Bones of the Hard Palate.—The osseous part of the hard palate is formed by the palatine processes of the right and left superior maxillary bones, and the horizontal plates of the right and left palate bones; their area is bordered by the alveolar processes of the, right and left, superior maxillary bones. These bone surfaces are covered by periosteum, a dense submucous tissue, and mucous membrane. The hamular processes of the, right and left, internal plates of the pterygoid processes of the sphenoid bone present posteriorly to, and independently of, the *tuberosities* of the superior maxillary bones.

LARYNX.

Terms of Relation.—The general terms (page 2), and the special terms *exterior* and *interior*—relatively to the cavity of the larynx—will be used in the dissection directions, and the descriptions, of the parts of this organ.

DISSECTION.—Cut away the lateral walls of the pharynx and the superior part of the œsophagus (Fig. 2, Plate 206). Hold the larynx and tongue (Fig. 2, Plate 206) so as to be able to look into the interior of the larynx, through its superior opening.

1. Antero-lateral Furrow, Fig. 2, Plate 206 (left side).—This is a mucous-membrane lined furrow, with an anterior and two lateral portions, partially surrounding the superior opening of the larynx. The anterior portion is between the pharyngeal face of the dorsum of the tongue and the antero-superior surface of the epiglottis ; the *frænum epiglottidis*, at the median line, and a right and left frenulum, at either side, bridge from the epiglottis to the base of the tongue. The lateral portions of the furrow are between the right and left *aryteno-epiglottidean folds*, internally, and the superior borders of the right and left alæ of the thyroid cartilage of the larynx, externally.

2. Interior of the Larynx.—Looking through the superior opening of the larynx into its cavity, it presents a mucous-membrane lining, which is continued, inferiorly, from the cavity of the pharynx, and passes, in turn, inferiorly into the trachea. Three constrictions of the canal present—a superior, a middle, and an inferior. The superior constriction—the superior opening of the larynx—is bounded : anteriorly, by the free border of the mucous-membrane covered *epiglottis ;* laterally, by the right and left *aryteno-epiglottidean fold* of mucous membrane ; posteriorly, are two mucous-membrane covered tips, divided by a cleft (the tips are determined by the apices of the arytenoid and the cornicula laryngis cartilages). The middle constriction is formed by the *false vocal cords.* The inferior, and greatest constriction is produced by the *true vocal cords.* The antero-posterior space between the true vocal cords is the *rima glottidis.* Through the rima glottidis are seen portions of the mucous-membrane lined interior of the anterior of the cricoid cartilage, and of the trachea.

DISSECTION.—Cut the tongue from the hyoid bone (Fig. 1, Plate 207), also the stumps of muscles from the thyroid cartilage of the larynx, and from the hyoid bone.

3. Extrinsic Muscles of the Larynx, Plates 190, 195, 196, 197, 200, 203, and 204.—There are five pairs of extrinsic muscles of the larynx, which are attached to the exterior of the alæ and to the superior cornua of the thyroid cartilage, and to the cricoid cartilage: two inferior, the pair of sterno-thyroid (Plates 190 and 195); two antero-superior, the pair of thyro-hyoid (Plates 190, 196, and 197); two posterior, the pair of inferior constrictor (Plates 190, 203, and 204); four superior and lateral, the pairs of stylo-pharyngeus (Plates 190, 200, and 203) and palato-pharyngeus (Plate 203).

DISSECTION.—Swing the larynx and superior part of the trachea in the frame (Figure 15, page 378) so as to present the right postero-lateral face of the larynx. Clear (Fig. 1, Plate 207) the exterior surfaces of the thyro-hyoid membrane, thyro-hyoid ligament, larynx, and trachea, so as to display the following parts: the thyro-hyoid membrane, with the ends of the superior laryngeal nerve and internal laryngeal artery protruding through it; the thyro-hyoid ligaments; the ala of the thyroid cartilage and half of the cricoid cartilage, with the crico-thyroid muscle bridging between them; the crico-thyroid articulation; and the crico-thyroid membrane. Dissect the pharyngeal mucous membrane from the posterior surface of the larynx, and expose the recurrent laryngeal nerve, the inferior laryngeal artery, the posterior crico-arytenoid and the arytenoid muscles.

4. Thyro-hyoid Membrane and Thyro-hyoid Ligaments: Plates 190, 194, 195, 196, and 197; Fig. 1, Plate 207; Plate 208.—The *thyro-hyoid membrane* is a stretch of fibrous tissue from the superior border of the thyroid cartilage of the larynx to the inferior border of the body and great cornua of the hyoid bone; laterally, it gives transit to the, right and left, superior laryngeal nerves and internal laryngeal arteries (Fig. 1, Plate 207). The *thyro-hyoid ligaments* (Fig. 1, Plate 207) are the lateral thickened borders of the thyro-hyoid membrane; they bridge from the superior cornua of the thyroid cartilage of the larynx to the tips of the great cornua of the hyoid bone.

5. Thyroid Cartilage: Plates 190, 195, 196, 197, 203, and 204; Fig. 1, Plate 207; Fig. 2, Plate 208.—This movable cartilage is shaped like a horizontal letter V—the apex anteriorly, the open base posteriorly. Its halves are called *alæ* (Fig. 1, Plate 207): their anterior meeting is the *angle* of the cartilage; from their posterior borders are projected the, right and left, inferior and the superior cornua.

6. Crico-thyroid Muscle, Plates 190, 195, 196, 197, and 207.—This, one of a pair of intrinsic muscles of the larynx, is attached: inferiorly and anteriorly, to the exterior of the ring-portion of the cricoid cartilage; superiorly and posteriorly, to the exterior of the posterior part of the inferior border of the ala of the thyroid cartilage.

7. Crico-thyroid Articulation, Plate 207.—The elements of this articulation are: a facet at the internal surface of the free end of an inferior cornu of the thyroid cartilage; a facet on the lateral surface of the signet-portion of the cricoid cartilage (Fig. 2, Plate 207); and a capsular ligament (Fig. 1, Plate 207) lined by synovial membrane.

8. Crico-thyroid Membrane, Plates 190, 197, and 207.—This is a sheet of fibrous tissue, that bridges between the superior border of the ring-portion of the cricoid cartilage and the inferior border of the thyroid cartilage. Interiorly, it is lined by mucous membrane (Fig. 1, Plate 208); exteriorly, are the, right and left, crico-thyroid and lateral crico-arytenoid muscles.

9. Posterior Crico-arytenoid Muscle, Fig. 1, Plate 207.—This, one of a pair of intrinsic muscles of the larynx, is attached: inferiorly and internally, to the exterior of the signet-portion of the cricoid cartilage; superiorly and externally, to the postero-external angle of the base of the arytenoid cartilage (Fig. 2, Plate 207).

10. Arytenoid Muscle.—This single, median-line, intrinsic muscle of the larynx crosses, transversely, between its attachments to the posterior surfaces of the, right and left, arytenoid cartilages.

Dissection.—Track the superior laryngeal nerve and internal laryngeal artery into the submucous tissue between the thyro-hyoid membrane, exteriorly, and the mucous membrane, interiorly; dissect away the thyro-hyoid ligament and the half of the thyro-hyoid membrane, exposing (Fig. 2, Plate 207) the submucous tissue exteriorly to the mucous membrane of the pharynx. Trace (Fig. 2, Plate 207), inferiorly, the superior laryngeal nerve and the internal laryngeal artery; crowd them, and the muscle tissue, interiorly to the ala of the thyroid cartilage (Fig. 2, Plate 207), internally from the cartilage, till the anterior attachment of the thyro-arytenoid muscle is seen; cut the thyroid cartilage vertically (Fig. 2, Plate 207), externally to the attachment of the muscle. Dissect (Fig. 2, Plate 207) the crico-thyroid muscle from its thyroid cartilage attachment; reflect it to the cricoid cartilage and cut it away, leaving a stump. Disarticulate the right crico-thyroid joint, and dissect away the posterior part of the right ala of the thyroid cartilage (Fig. 2, Plate 207). Display (Fig. 2, Plate 207) the branches of the superior laryngeal nerve and internal laryngeal artery. Trace (Fig. 2, Plate 207), superiorly, by cutting away the posterior crico-arytenoid muscle, the recurrent laryngeal nerve, and the inferior laryngeal artery; find the branches of the nerve to the intrinsic muscles of the larynx, and its communicating branch with the superior laryngeal nerve; expose the distribution of the artery and its anastomosis with the cricoid artery. Clear, and define (Fig. 2, Plate 207), the exterior surfaces of the cricoid cartilage, and the following intrinsic muscles of the larynx: the lateral crico-arytenoid, the thyro-arytenoid, the thyro-epiglottidean, and the aryteno-epiglottidean.

11. Superior Laryngeal Nerve, Plate 207.—This nerve has been described (page 365) and illustrated (Plates 192 to 197, inclusive) to the point where it disappears with the internal laryngeal artery (page 367), between the thyro-hyoid membrane, posteriorly, and the thyro-hyoid muscle, anteriorly. The nerve perforates the thyro-hyoid membrane (Fig. 1, Plate 207) to the submucous plane of tissue interiorly to the membrane (Fig. 2, Plate 207). Its several branches are: a middle (one or more), *laryngeal branch* (or branches), which is continued to the mucous-membrane lining of the larynx; a superior, *lingual branch*, that passes to the mucous membrane of the dorsum of the base of the tongue, and of the pharynx; an inferior, *communicating branch*, which communicates with the recurrent laryngeal nerve.

12. Internal Laryngeal Artery.—This artery (venæ comites), branch of the superior thyroid, has been described (page 367) and illustrated (Plate 194). It accompanies the last-described nerve through the thyro-hyoid membrane (Fig. 1, Plate 207), and distributes to the interior tissues of the larynx, to the base of the tongue, etc.

13. Recurrent Laryngeal Nerve and its Branches.—This nerve has been described (pages 242, 366, 372) and illustrated

(Plates 138, 196, and 197) to the point where it is about to enter the larynx. It passes, superiorly, into the larynx, between the posterior crico-arytenoid muscle and the posterior surface of the signet-portion of the cricoid cartilage. It distributes branches to intrinsic muscles of the larynx in the following order: to the posterior crico-arytenoid, arytenoid, lateral crico-arytenoid, thyro-arytenoid, thyro-epiglottidean, and aryteno-epiglottidean.

14. Inferior Laryngeal Artery.—This artery (venæ comites), branch of the inferior thyroid artery, accompanies the last-described nerve. It distributes to the intrinsic muscles, etc., of the larynx, and anastomoses with the cricoid artery (page 367).

15. Cricoid Cartilage, Plates 190, 195, 196, 197, 207, and 208.—This cartilage forms the fixed base of the larynx; it is signet-ring shaped, with the signet-portion posteriorly and the ring-portion anteriorly (Fig. 2, Plate 207); from it the trachea is continued, inferiorly.

16. Lateral Crico-arytenoid Muscle, Fig. 2, Plate 207.—This muscle, one of a pair of intrinsic muscles of the larynx, is attached, anteriorly, to the superior border of the ring-portion of the cricoid cartilage; thence it runs, under cover of the inferior border of the ala of the thyroid cartilage, to its posterior attachment to the inferior portion of the postero-external border of the arytenoid cartilage.

17. Thyro-arytenoid Muscle.—This muscle has two parts, an exterior and an interior; the *exterior*, lying interiorly to the ala of the thyroid cartilage, is attached: anteriorly, to the posterior face of the internal portion of the ala of the thyroid cartilage; posteriorly, to the mid-portion of the postero-external border of, and to the external surface of, an arytenoid cartilage.

18. Thyro-epiglottidean Muscle.—This muscle is the superiorly-diverging fibres of the exterior part of the last-described muscle, which pass to the epiglottis.

19. Aryteno-epiglottidean Muscle.—This consists of muscle fibres in the aryteno-epiglottidean fold of mucous membrane (page 393; Fig. 2, Plate 206), which bridge from the superior portion of the external face of the arytenoid cartilage, posteriorly, to the border of the epiglottis, anteriorly.

DISSECTION.—Take the larynx from the frame. Cut (Fig. 1, Plate 208), on the median line, the posterior of the trachea and the cricoid cartilage, and then between the arytenoid cartilages; make, anteriorly, a second median-line cut of the trachea, cricoid cartilage, crico-thyroid membrane, and thyroid cartilage; then slit the epiglottis, sufficiently, to allow the opening of the halves of the larynx. Suspend the larynx in the frame, so as to present its interior, as in Fig. 1, Plate 208. Demonstrate the ventricles of the larynx, and cavities of the, right and left, laryngeal pouches—insert a probe into the latter.

20. True Vocal Cords: Fig. 2, Plate 206; Plate 208.—These are a right and a left, antero-posterior, mucous-membrane covered, band, at the interior of the lateral walls of the laryngeal cavity; a cord extends from the posterior surface of the angle formed by the alæ of the thyroid cartilage (a little to one side of the median line), anteriorly, to the anterior angle of the base of an arytenoid cartilage, posteriorly.

21. False Vocal Cords.—These are located superiorly to the true vocal cords; they are a right and left, antero-posterior, mucous-membrane covered, ridge—less prominent than, and not so sharply defined as, the true vocal cords—along the interior of the lateral walls of the larynx.

22. Ventricles and Laryngeal Pouches of the Larynx, Plate 208.—The ventricles of the larynx are: a right and a left oval depression at the interior of the lateral walls of the larynx, between the false and true vocal cords. The *laryngeal pouches* are a right and a left, sac-like, involution of the mucous membrane of the larynx, which are projected, superiorly, between the interior and the exterior parts of the thyro-arytenoid muscles; they are located superiorly to, and open into, the ventricles.

DISSECTION.—Cut the right half of the epiglottis, and remove the right half of the larynx (Fig. 2, Plate 208); place the left half with its interior surface uppermost and dissect off its mucous membrane, and the half of the crico-thyroid membrane. Display (Fig. 2, Plate 208) the interior surfaces of the following parts of the left side of the larynx: the half of the cricoid cartilage; the internal surface of the arytenoid cartilage; portions of the crico-thyroid and lateral crico-arytenoid muscles; the inferior thyro-arytenoid ligament; the superior thyro-arytenoid ligament; the thyro-arytenoid, thyro-epiglottidean, and aryteno-epiglottidean muscles; and the epiglottis.

23. Arytenoid Cartilages: Fig. 2, Plate 206; Fig. 2, Plate 207; Plate 208.—These two cartilages are located at the superior surface of the signet-portion of the cricoid cartilage. An arytenoid cartilage is pyramidal in form, having: a triangular base, with anterior, postero-external, and postero-internal angles; internal, external, and posterior surfaces; anterior, postero-external, and postero-internal borders; and an apex. Of the base: it articulates by the posterior portion of its area (Fig. 2, Plate 208) with the superior surface of the signet-portion of the cricoid cartilage, to which it is held by a capsular and a posterior crico-arytenoid ligament; its anterior angle (Plate 208) is freely movable and affords attachment to the inferior thyro-arytenoid ligament; its postero-external angle (Fig. 2, Plate 207) gives attachment to the posterior crico-arytenoid muscle. Of the surfaces: the posterior affords attachment to the arytenoid muscle (Plate 208); the internal (Fig. 1, Plate 208) is a free surface covered by mucous membrane; the external affords part attachment to the thyro-arytenoid muscle and the superior thyro-arytenoid ligament. Of the borders: the postero-external (Fig. 2, Plate 207) gives attachment to the lateral crico-arytenoid, the thyro-arytenoid (exterior part), and the aryteno-epiglottidean muscles.

24. Thyro-arytenoid Muscle, Fig. 2, Plate 208.—The exterior of the exterior portion of this muscle and its thyro-epiglottidean fibres (the thyro-epiglottidean muscle) were described (page 397) and illustrated (Fig. 2, Plate 207). The *interior portion* of the muscle bridges from the external surface of the arytenoid cartilage—in the internal wall of the ventricle of the larynx, superiorly to the superior thyro-arytenoid ligament—to the posterior surface of the thyroid cartilage, to one side of its angle, and superiorly to the attachment of the exterior portion of the muscle. The interior surfaces of the exterior portion of the muscle, and of the thyro-epiglottidean muscle, present at the interior of the thyroid cartilage.

25. Superior Thyro-arytenoid Ligament.—This ligament, the border of a false vocal cord, bridges from the external surface of an arytenoid cartilage, posteriorly, to the posterior surface of the thyroid cartilage (to one side of the middle of its angle), anteriorly. It is so blended with the inferior border of the interior portion of the thyro-arytenoid muscle that it is not clearly defined.

26. Inferior Thyro-arytenoid Ligament.—This well-defined ligament, the essential element of a true vocal cord, extends, postero-anteriorly, from the anterior angle of the base of an arytenoid cartilage to the posterior surface of the thyroid cartilage (to one side of the middle of its angle), and inferiorly to the last-described ligament.

27. Ventricle and Laryngeal Pouch of the Larynx.—A ventricle was before described (page 398) and illustrated (Fig. 1, Plate 208): a laryngeal pouch may now be demonstrated as having the interior portion of the thyro-arytenoid muscle in its internal wall, and the exterior portion of the same muscle in its external wall.

28. Epiglottis or Epiglottic Cartilage.—In structure this is dense fibrous tissue with some cartilage tissue. It is pitcher-cover shaped, and is hinged—by its attachment—to the posterior surface of the thyroid cartilage—in, and to the sides of, the angle—at a point superiorly to the attachments of the superior thyro-arytenoid ligaments. Its surfaces are invested by mucous membrane (Fig. 2, Plate 206; Fig. 1, Plate 208), which form its frænum and frenula, anteriorly (page 393; Fig. 2, Plate 206), and its aryteno-epiglottidean folds, posteriorly (Fig. 2, Plate 206; Fig. 1, Plate 208). Two pairs of muscles act upon it; the aryteno-epiglottidean and thyro-epiglottidean (page 397; Fig. 2, Plates 207 and 208).

NASAL CAVITIES AND CONTIGUOUS PARTS.

Terms of Relation.—The general terms (page 2); and the special terms *interior* and *exterior*—relatively to the nasal cavities—will serve to locate parts described.

Nasal Cavities: their Boundary Walls; Osseous Openings; and Lining.—Fourteen bones, five cartilages, and fibrous tissue uniting the cartilages, form the walls of the two nasal cavities. These cavities have the following walls: an inferior, a right and left lateral, a superior, a right and left antero-lateral, and a median-line septum between the two cavities. The *inferior wall* (the superior surface of the hard palate) is formed by the following bones: the right and left superior maxillary (their palatine processes); the right and left palate (their horizontal plates). A *lateral wall* is contributed to by bones as follows: a superior maxillary (its nasal process and body); a lachrymal; the ethmoid (its lateral mass and turbinate processes of same); a palate (its vertical plate); a turbinate; and the sphenoid (the internal plate of its pterygoid process). The bones of the *superior wall* are: the ethmoid (its cribriform plate); the sphenoid (its body); the vomer (its alæ); the right and left palate (their sphenoidal processes). The *antero-lateral walls* are constructed by the frontal bone (its nasal spine); the right and left nasal bones; the cartilages of the alæ (the right and left superior lateral, inferior lateral, and sesamoid), and the fibrous tissue of the alæ (connecting the cartilages and forming the alar borders of the anterior nares). The *median-line septum* between the two cavities is formed by: the ethmoid bone (the nasal portion of its perpendicular plate); the vomer bone; and the cartilage of the septum.

The osseous openings, covered by mucous membrane, of a narium are: at the superior wall, the foramina in a half of the cribriform plate of the ethmoid bone (for entering branches from the bulb of the olfactory nerve), and the points of entrance of the nasal nerve, the anterior ethmoidal artery, and the posterior ethmoidal artery; at the external wall, the spheno-palatine foramen (for the entrance of the nasal branches of the spheno-palatine ganglion, and the spheno-palatine branch of the internal maxillary artery); at the anterior of the inferior wall, the incisor foramen of the anterior palatine canal (for the exit into the mouth of the naso-palatine nerve and artery).

Mucous membrane (the Schneiderian membrane) lines the interiors of the nasal cavities, covering intimately the periosteum of the osseous, and the perichondrium of the cartilaginous, areas.

1. Anterior Nares, Plate 197.—These are the right and left facial openings into the nasal cavities. Their borders are formed of fibrous tissue, which is covered, exteriorly and interiorly, by the skin.

2. Posterior Nares: Plates 199, 202, and 203; Fig. 1, Plate 206.—The pharyngeal openings of the nasal cavities, the posterior nares, present at either side of the median line, anteriorly to the superior portion of the pharynx. Their osseous boundaries are (Plate 199): superiorly, the body of the sphenoid bone, the sphenoidal processes of the palate bones, and the alæ of the vomer; laterally, the internal plates of the pterygoid processes of the sphenoid bone; inferiorly, the posterior borders of the horizontal plates of the right and left palate bones—from this border the soft palate is projected, posteriorly; at the median line they are divided by the vomer. These osseous boundaries are covered by periosteum and mucous membrane (Fig. 1, Plate 206).

3. Posterior View of the Interior of the Nasal Cavities, Fig. 1, Plate 206.—Looking into the nasal cavities, through the posterior nares, portions of the following parts, covered by mucous membrane, may be seen: the right and left, postero-anterior, inferior walls of the nasal cavities, slightly concave transversely; the right and left surfaces of the median-line septum between the cavities; the right and left external walls, presenting the posterior ends of the shelf-like projections of the right and left turbinate bones, inferiorly, and the right and left turbinate processes of the ethmoid bone, superiorly. Between these osseous shelves are the posterior portions of the right and left inferior, middle, and superior meatuses.

Dissection.—Saw to the left of the median line, through the anterior of the base of the cranium into the left nasal cavity; also through the inferior wall of the same cavity, at the side of the septum. So place the halves of the upper jaw region of the face as to present the interiors of the internal and external walls of the left nasal cavity, as in Plate 209. Recognize the projections from, and the galleries along, the external wall of the nasal cavity.

4. Mucous-membrane Covered Turbinate Bone, Plate 209.—This bone forms a shelf-like internal projection from the external wall of a nasal cavity. It is articulated to a continuous, antero-posterior ridge, on the interior surfaces of the following bones, of a side: a superior maxillary (its body); a lachrymal; the ethmoid (its lateral mass); a palate (its vertical plate); and the sphenoid (the internal plate of its pterygoid process). From this broad base it turbinates or whirls (like the inferior half of a letter S) to its internal free border.

5. Mucous-membrane Covered Turbinate Processes of the Ethmoid Bone.—These processes are two turbinate portions, inferior and superior, of the ethmoid bone, which are projected, internally, from the internal surface of a lateral mass of that bone, into the superior half of a nasal cavity. The inferior is larger than the superior, and both are smaller than the turbinate bone.

6. Mucous-membrane Lined Inferior, Middle, and Superior Meatuses.—These are three antero-posterior galleries, along the external wall of a nasal cavity; they are determined by the mucous-membrane covered turbinate bone and turbinate processes of the ethmoid bone. An *inferior meatus* has: the inferior wall of a nasal cavity inferiorly; the inferior portions of the body of a superior maxillary bone and the vertical plate of a palate bone externally; a turbinate bone superiorly. A *middle meatus* is bounded as follows: inferiorly, by a turbinate bone; externally, by portions of a superior maxillary bone (its nasal process and body), a lachrymal bone, a lateral mass of the ethmoid bone, and a palate bone (its vertical plate); superiorly, an inferior turbinate process of the ethmoid bone. A *superior meatus* is walled as follows: inferiorly, by an inferior turbinate process of the ethmoid bone; externally, by a lateral mass of the ethmoid bone; superiorly, by a superior turbinated process of the ethmoid bone. Superiorly to the superior turbinate process of the ethmoid a small antero-posterior space presents, which might almost be regarded as an attempt at a fourth meatus. Between the nasal septum and the free borders of a turbinate bone and the turbinate processes of the ethmoid bone, of a nasal cavity, there is an unobstructed space, which will admit an instrument from the anterior narium to the posterior surface of a nasal bone.

DISSECTION.—Dissect away (Plate 209) the mucous membrane from the external wall of the nasal cavity, posteriorly to the mucous-membrane covered turbinate processes of the ethmoid bone and turbinate bone. Find the spheno-palatine foramen, and trace the artery and nerves, entering the cavity by it, dissecting them out of the submucous plane of the external and the internal wall of the cavity. Find the nerve entering the external wall of the nasal cavity inferiorly to the spheno-palatine foramen. Display the arteries and nerve, entering through the superior wall of the cavity; trace their branches, inferiorly, by dissecting them out of the submucous plane of the external, and of the internal, wall of the cavity.

7. Spheno-palatine Foramen, Plate 209.—This foramen, of a nasal cavity, is located in the external wall of a nasal cavity, posteriorly to the posterior end of an inferior turbinate process of the ethmoid bone.

8. Spheno-palatine Artery: Plate 209 ; Fig. 1, Plate 210. —This artery (venæ comites) enters a nasal cavity by the spheno-palatine foramen. It gives off an internal and an external branch : the internal branch or *naso-palatine artery* (Plate 209) has an anterior and inferior course in the submucous plane of the nasal septum, to the incisor foramen of the anterior palatine canal, through which it passes to the buccal surface of the hard palate ; the external branch is projected inferiorly, sending off anterior branches into the submucous plane upon the inferior turbinate process of the ethmoid bone, the turbinate bone, and the walls of the middle and inferior meatuses.

9. Naso-palatine Nerve, Plate 209.—This nerve, of a nasal cavity, enters by the spheno-palatine foramen. It passes to the submucous plane of the nasal septum, where it accompanies the above-described naso-palatine artery.

10. Superior Nasal Nerves: Plate 209 ; Fig. 1, Plate 210. —These nerves, of a nasal cavity, enter with the last-described nerve. They have an anterior and a superior course, ramifying in the submucous plane upon the turbinated processes of the ethmoid bone, and in the same plane of a superior meatus.

11. Inferior Nasal Nerve.—This nerve enters a nasal cavity posteriorly to the turbinate bone ; it runs anteriorly, sending branches into the submucous plane upon the turbinate bone, and into the same plane of a middle and an inferior meatus.

12. Anterior Ethmoidal Artery.—This artery (venæ comites), branch of the ophthalmic artery (page 343 ; Plate 186), enters at the superior wall of a nasal cavity, in company with the nasal nerve (page 342 ; Plate 186). It bifurcates into an internal and an external branch : the *internal branch* is projected, anteriorly and inferiorly, into the submucous plane of the lateral face of the nasal septum ; the *external branch* runs in the submucous plane of the antero-lateral wall of a nasal cavity.

13. Posterior Ethmoidal Artery.—This artery (venæ comites) enters a nasal cavity through its superior wall, posteriorly to the last-described artery. It bifurcates into an external and an internal branch : the *external branch* distributes in the submucous plane upon the superior turbinate process of the ethmoid bone, and in the superior meatus ; the *internal branch* ramifies in the submucous plane of the mid-portion of the superior part of the lateral face of the nasal septum.

14. Nasal Nerve.—This nerve enters through the superior wall of the cavity in company with the anterior ethmoidal artery (page 342 ; Plate 186). It bifurcates into an external and an internal branch, which accompany, respectively, the branches of the anterior ethmoidal artery. The external branch perforates the antero-lateral wall of the nasal cavity, to appear at its exterior surface in the subcutaneous plane (page 342 ; Fig. 2, Plate 182 ; Plate 183 ; Fig. 2, Plate 184).

15. Frontal Sinuses.—These are a right and a left space, divided by a median-line septum, between the exterior and interior tables of the supra-orbital area of the frontal bone. They are produced by the absorption of the diploë of that region of the bone. They are lined by mucous membrane, continued into them from the nasal cavities through the right and left infundibulum openings.

16. Sphenoidal Sinuses.—These are a right and a left space, divided by a median-line septum, in the body of the sphenoid bone. They are lined by mucous membrane, continued into them from the nasal cavities, through the openings of the sphenoidal sinuses.

Dissection.—Cut away, with the curved scissors, the turbinate bone and the turbinate processes of the ethmoid bone. Find and demonstrate the openings through the external and superior walls of the nasal cavity, which communicate with contiguous cavities.

17. Openings of Communication of a Nasal Cavity with Contiguous Cavities.—The openings through the external wall are partially or completely concealed by the turbinate bone and the turbinate processes of the ethmoid bone (Plate 209). They are located as follows (Fig. 1, Plate 210) : the *nasal duct opening*, at the anterior of an inferior meatus, is the communication from a lachrymal sac (Fig. 1, Plate 184); the *infundibulum opening*, at the anterior of a middle meatus, is from a frontal sinus and the anterior cells of a lateral mass of the ethmoid bone; the *maxillary sinus opening*, at the mid-portion of a middle meatus, is into the maxillary sinus of a side; the *posterior ethmoidal opening*, at the anterior of a superior meatus, is into the posterior cells of a lateral mass of the ethmoid bone. At the posterior of the superior wall (Plate 209; Fig. 1, Plate 210) is the *sphenoidal sinus opening*, into the sphenoidal sinus of a side. By the above openings the mucous membrane of a nasal cavity passes out to line the respective canals and cavities communicated with.

Dissection.—Following (Fig. 1, Plate 210) the descending palatine artery and the anterior palatine nerve, open, in a superior direction (with the bone forceps or the chisel and mallet), the posterior palatine canal as far as the inferior wall of the sphenoidal sinus (remove the fragments of bone). Trace the descending palatine artery and the anterior palatine nerve superiorly; find the inferior nasal branch of the nerve; display the spheno-palatine ganglion and its branches, also the internal maxillary artery and its branches.

18. Spheno-palatine Ganglion; its Roots; and its Branches, Fig. 1, Plate 210.—This ganglion, one of the cephalic ganglia of the sympathetic nervous system, is located in the spheno-palatine fossa, inferiorly to the sphenoidal sinus, superiorly to the posterior palatine canal, and posteriorly to the spheno-palatine foramen. Its roots are: *two sensory roots*, which enter the superior part of the ganglion, being derived from the superior maxillary division of the sensory root of the trifacial nerve; its *motor* and *sympathetic roots* enter the posterior part of the ganglion, as the Vidian nerve, viz.: the latter nerve is formed (page 347; Plates 185 and 186) by the large superficial petrosal nerve (page 346) from the facial nerve—the motor root of the ganglion—and the large deep petrosal nerve (page 347) from the sympathetic plexus upon the intracranial portion of the internal carotid artery—the sympathetic root of the ganglion.

The branches of the ganglion are the following: the *naso-palatine nerve*, before described (page 404) and illustrated (Plate 209); the *superior nasal* nerve, before described (page 404) and illustrated (Plate 209); the *anterior palatine nerve*, is projected, inferiorly, into the posterior palatine canal, where it gives off the *inferior nasal nerve* (page 404; Plate

209; Fig. 1, Plate 210) and enters the buccal cavity, to distribute as before described (page 392) and illustrated (Fig. 2, Plate 206); the *posterior palatine nerve* (Fig. 1, Plate 210) has an inferior course, through the accessory palatine canal, from which it emerges (Plate 199) to distribute to the soft palate; the *external palatine nerve*, when present (absent in the dissection Fig. 1, Plate 210), runs inferiorly through the external palatine canal to supply parts of the soft palate. The *pterygo-palatine nerve*, when present, is projected, posteriorly, through the pterygo-palatine canal for distribution to the pharynx.

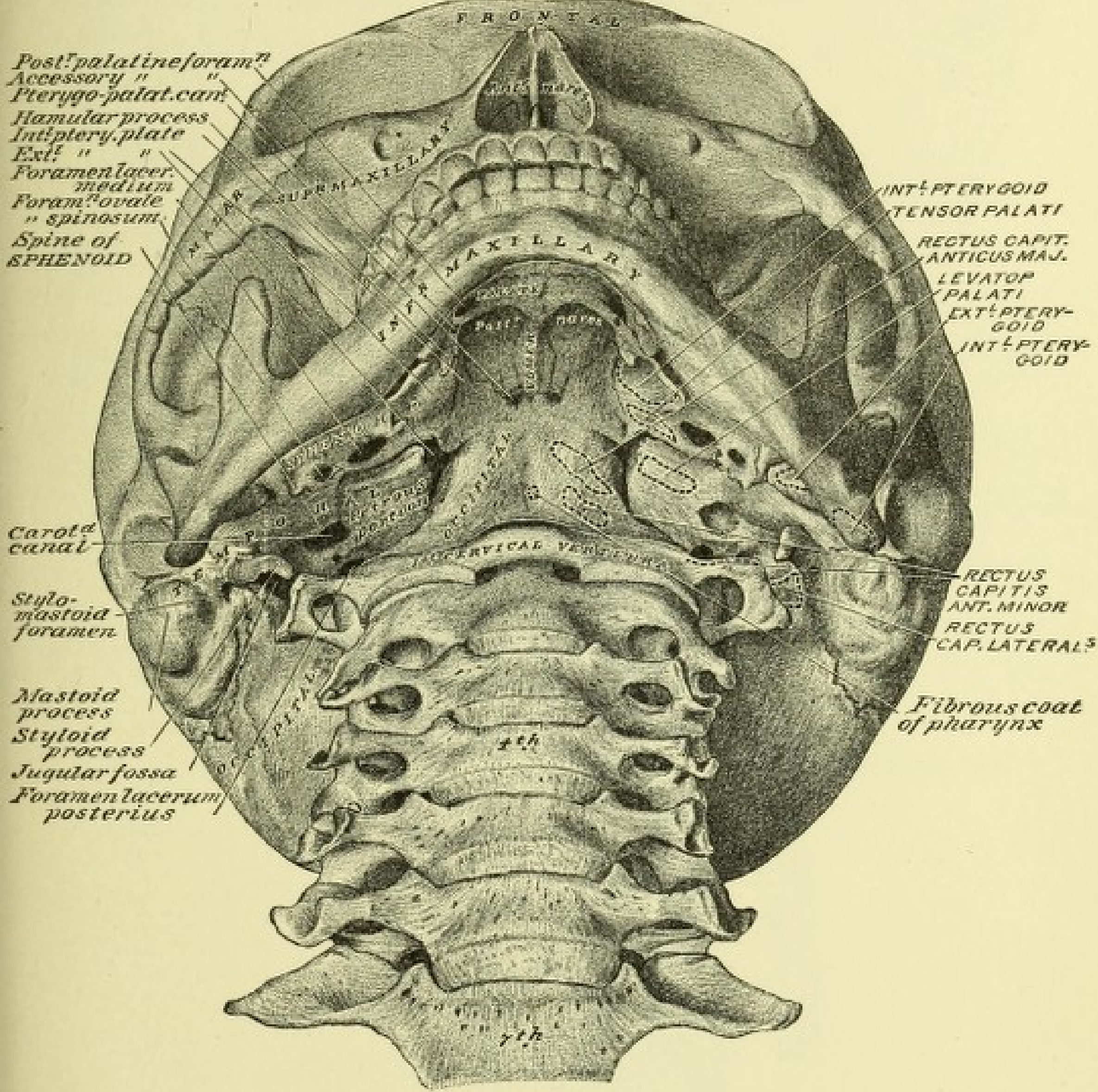
19. Internal Maxillary Artery and its Branches: Plate 209; Fig. 1, Plate 210.—The external portion of this artery was before described (page 348) and illustrated (Plate 187). Its internal portion is lodged in the spheno-palatine fossa, where it gives off the following branches: two, very small, branches, the *Vidian artery* and the *pterygo-palatine artery*, are projected posteriorly into the Vidian and the pterygo-palatine canals, respectively—they accompany the nerves of the same name, described above—and distribute to the mucous membrane of the superior part of the anterior pharyngeal wall; the *descending palatine artery* runs, inferiorly, in the posterior palatine canal to enter the buccal cavity, as before described (page 392) and illustrated (Fig. 2, Plate 206); and the *spheno-palatine*, its terminal branch, enters a nasal cavity and distributes to the interior of its walls, as before described (page 404) and illustrated (Plate 209).

DISSECTION.—Saw, antero-posteriorly, through the superior maxillary bone, or, at the level of the malar process of the superior maxillary bone. Place the two pieces, as sectioned, in the position shown in Fig. 2, Plate 210.

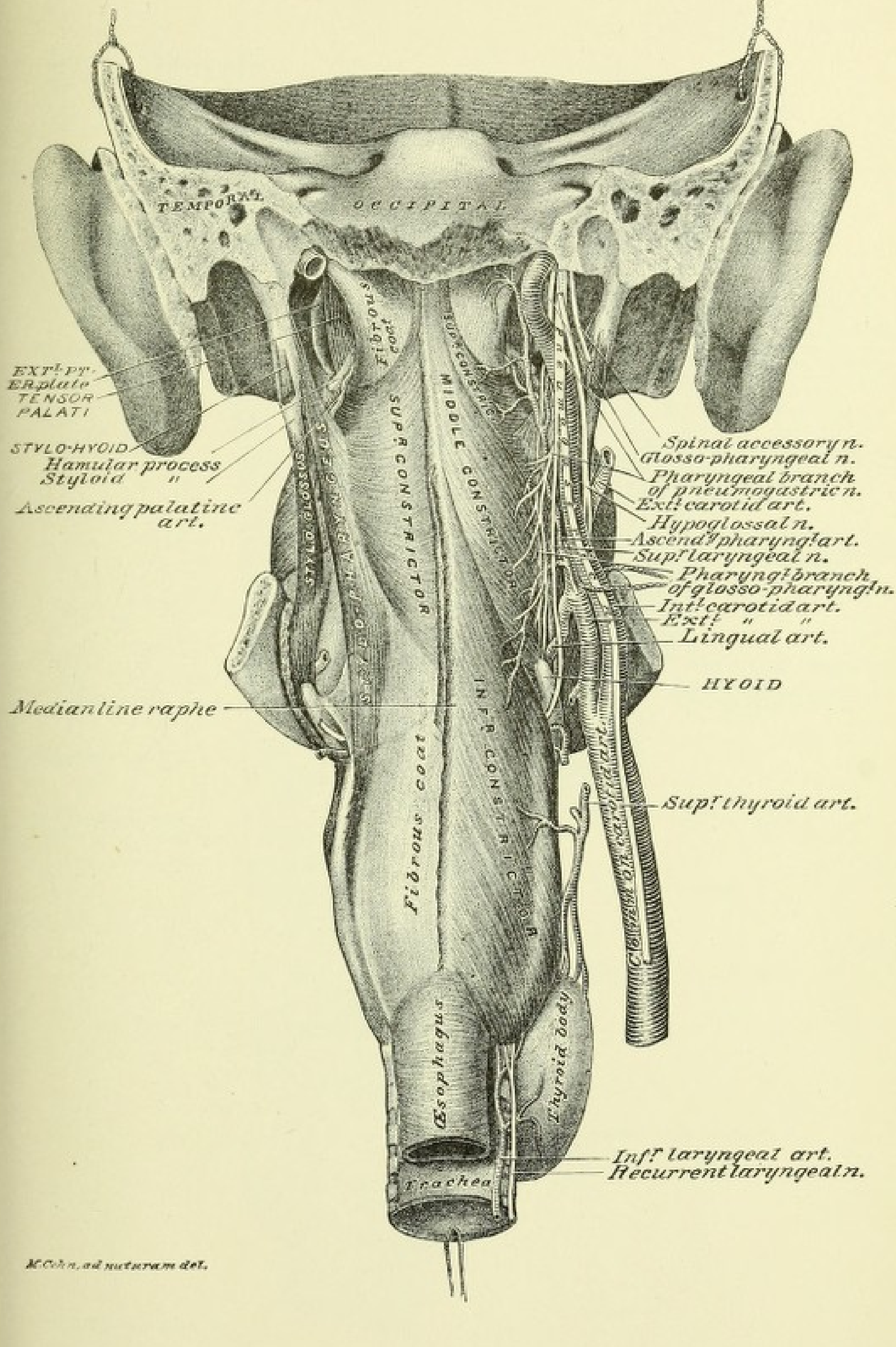
20. Maxillary Sinus (Antrum of Highmore), Fig. 2, Plate 210.—This is a cavity in the body of the superior maxillary bone; it communicates with a nasal cavity, by an opening in the external wall of the middle meatus (page 406; Fig. 1, Plate 210), through which the mucous membrane of nasal cavity passes to line the sinus. A maxillary sinus has the following walls: an internal, which is the external wall of the nasal cavity of the side; an antero-external, which is the antero-external portion of the body of th esuperior maxillary bone;

a superior, which is the floor of the orbit; a posterior, which is the portion of the superior maxillary bone that articulates with a pterygoid process of the sphenoid bone; an inferior, which is the part of the body of the superior maxillary bone situated superiorly to the alveolar process of the bone—the thinnest, and most inferior, point of this wall is opposite the alveolus of the second molar tooth.

21. Ethmoidal Cells.—These are small cavities in, and result from the honeycombed structure of, the lateral masses of the ethmoid bone. In each lateral mass of the bone, these cells are divided into two, non-communicating, sets of cells, the *posterior* and the *anterior*. By their respective openings into a nasal cavity—the posterior ethmoidal opening and the infundibulum—they receive a lining of mucous membrane; vessels, and nerves, also pass to them from the nasal cavity, through the submucous plane.



M. Cohn, ad naturam del.


TEMPORAL
OCCIPITAL
EXTL. PT. E. plate
TENSOR PALATI
STYLO-HYOID
Hamular process
Styloid "
Ascending palatine art.
Medianline raphe
Fibrous coat
SUPR. CONSTRICTOR
MIDDLE CONSTRICTOR
INFR. CONSTRICTOR
STYLO-GLOSSUS
Fibrous coat
Spinal accessory n.
Glosso-pharyngeal n.
Pharyngeal branch of pneumogastric n.
Extl. carotid art.
Hypoglossal n.
Ascendg. pharyngl. art.
Supr. laryngeal n.
Pharyngl. branch of glosso-pharyngl. n.
Intl. carotid art.
Extl. " "
Lingual art.
HYOID
Supr. thyroid art.
Common carotid art.
Œsophagus
Thyroid body
Trachea
Infr. laryngeal art.
Recurrent laryngeal n.
M. Cohn, ad naturam del.

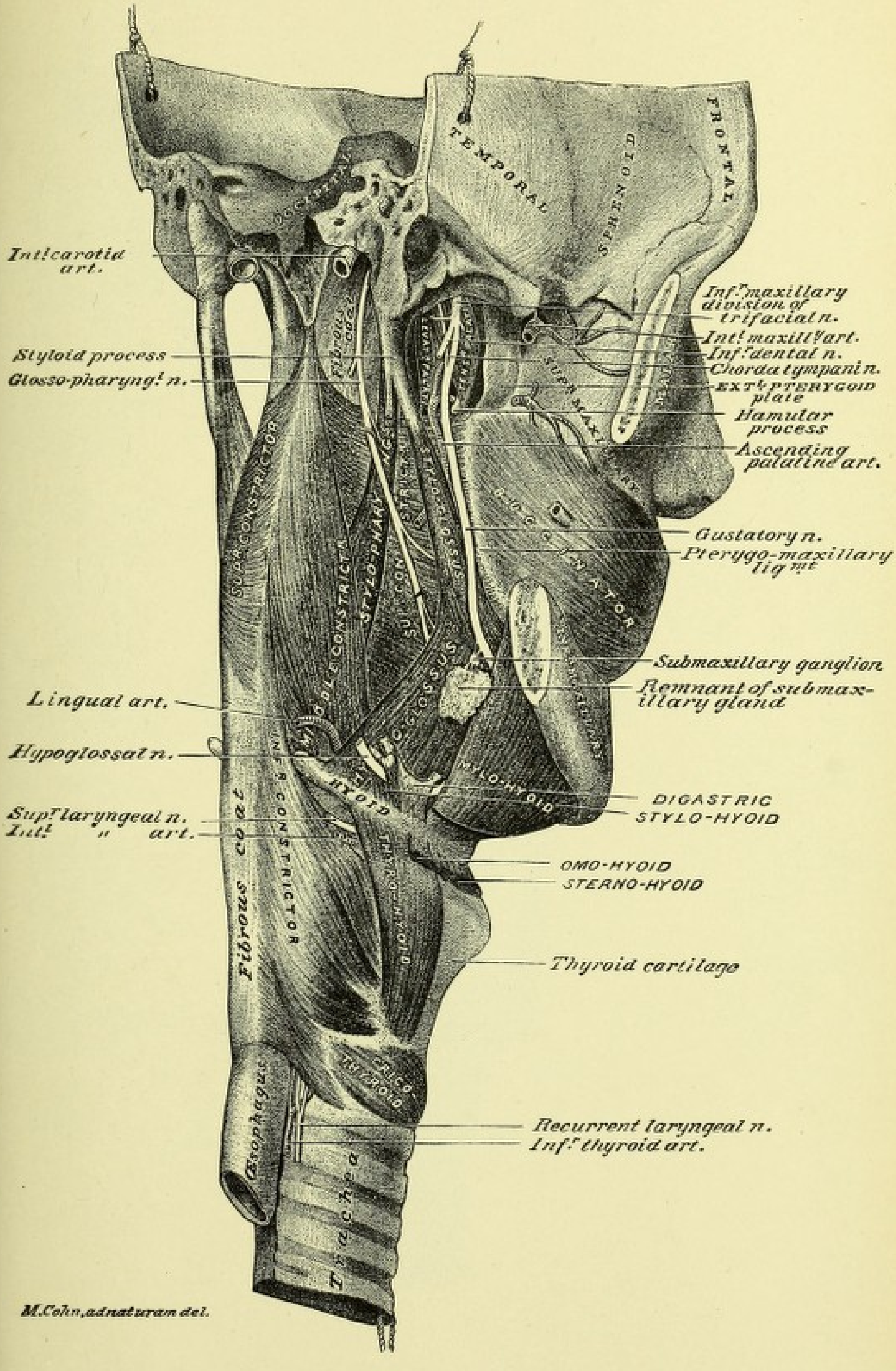


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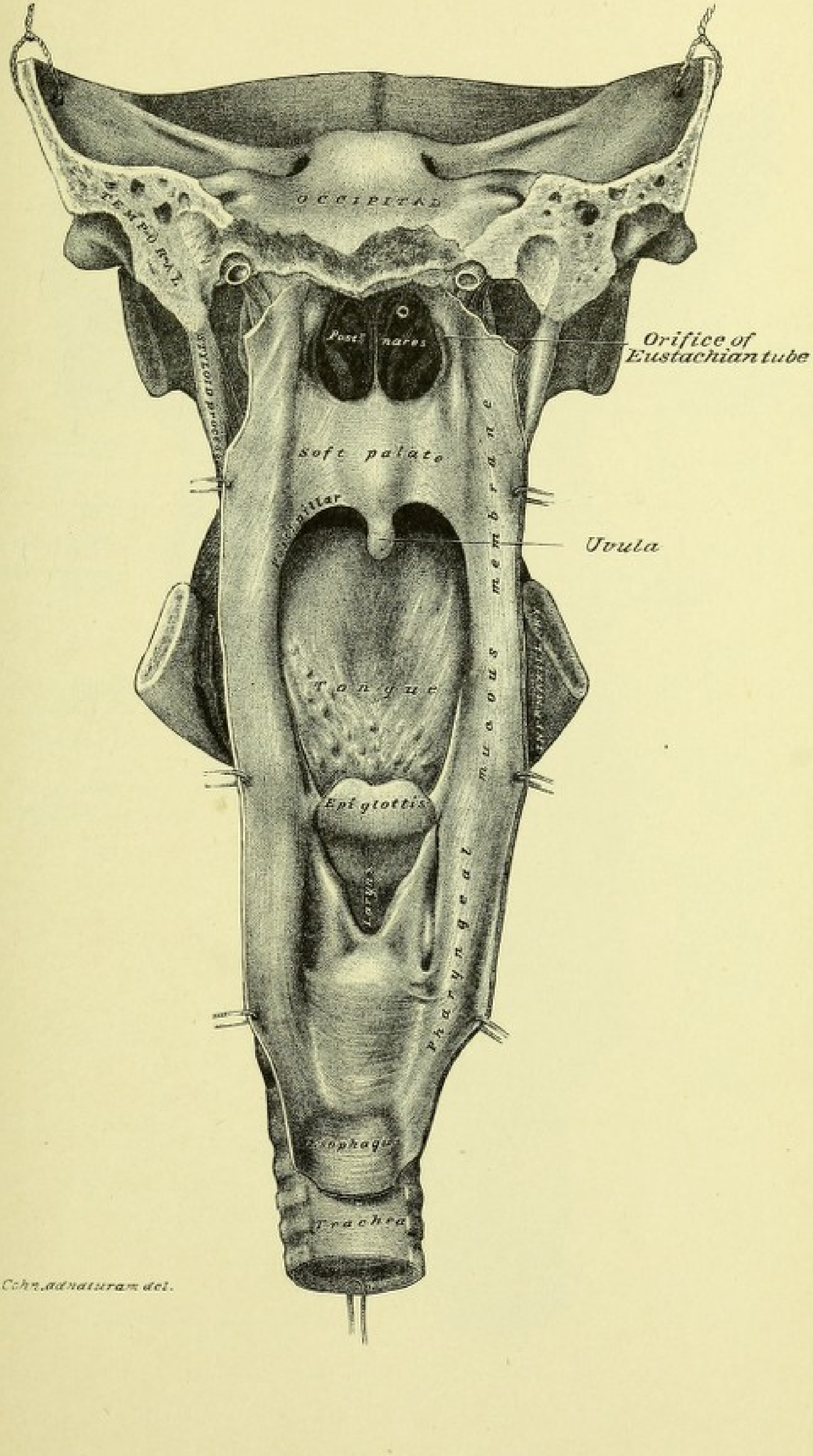
PLATE 202



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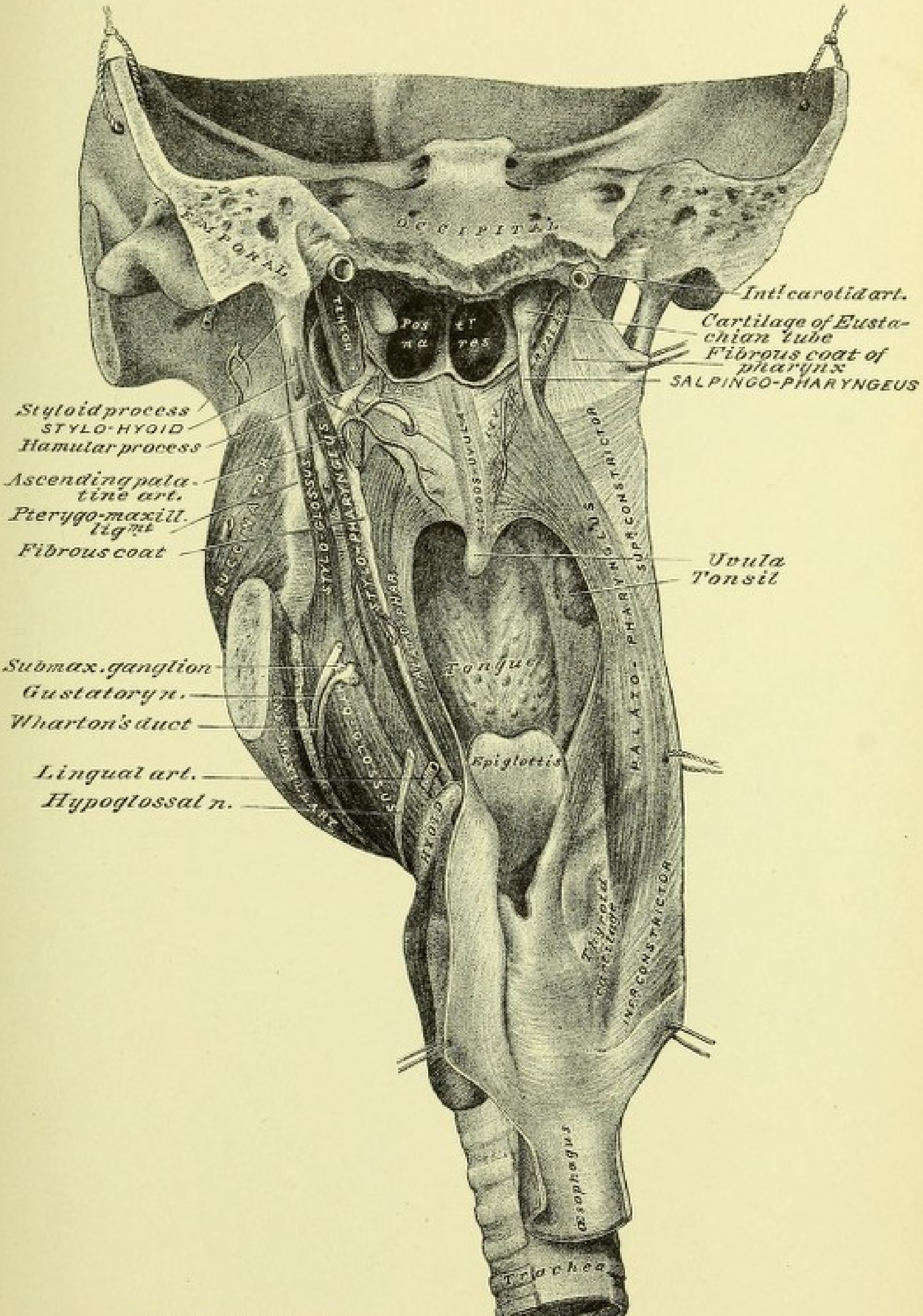
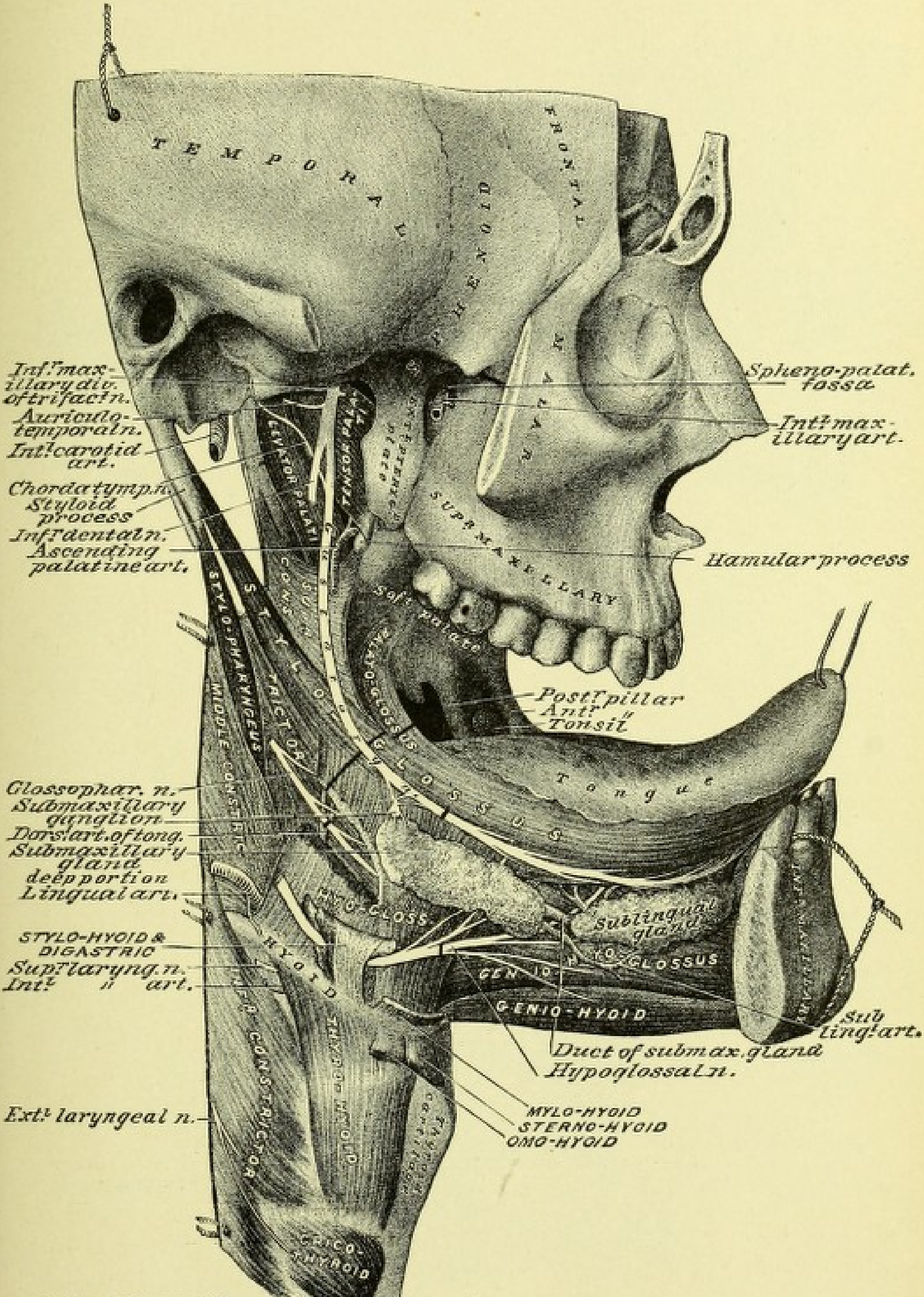

OCCIPITAL
TEMPORAL
Int! carotid art.
Cartilage of Eustachian tube
Fibrous coat of pharynx
SALPINGO-PHARYNGEUS
Styloid process
STYLO-HYOID
Hamular process
Ascending palatine art.
Pterygo-maxill. ligmt
Fibrous coat
Uvula
Tonsil
Submax. ganglion
Gustatory n.
Wharton's duct
Lingual art.
Hypoglossal n.
Tongue
Epiglottis
Œsophagus
Trachea
M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

FIG. 1

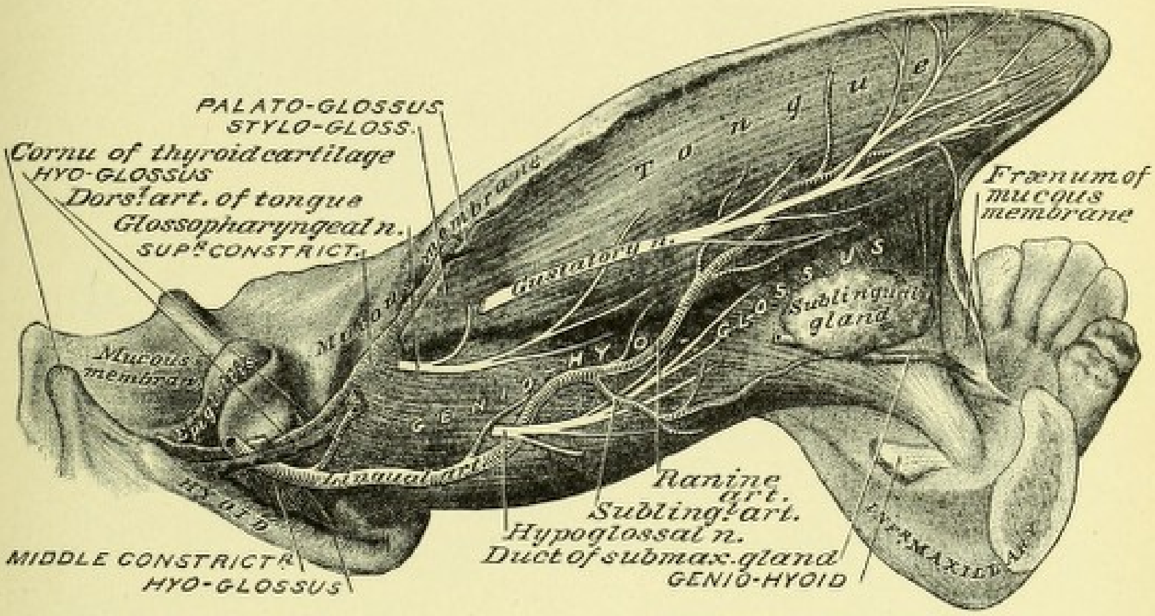


FIG. 2

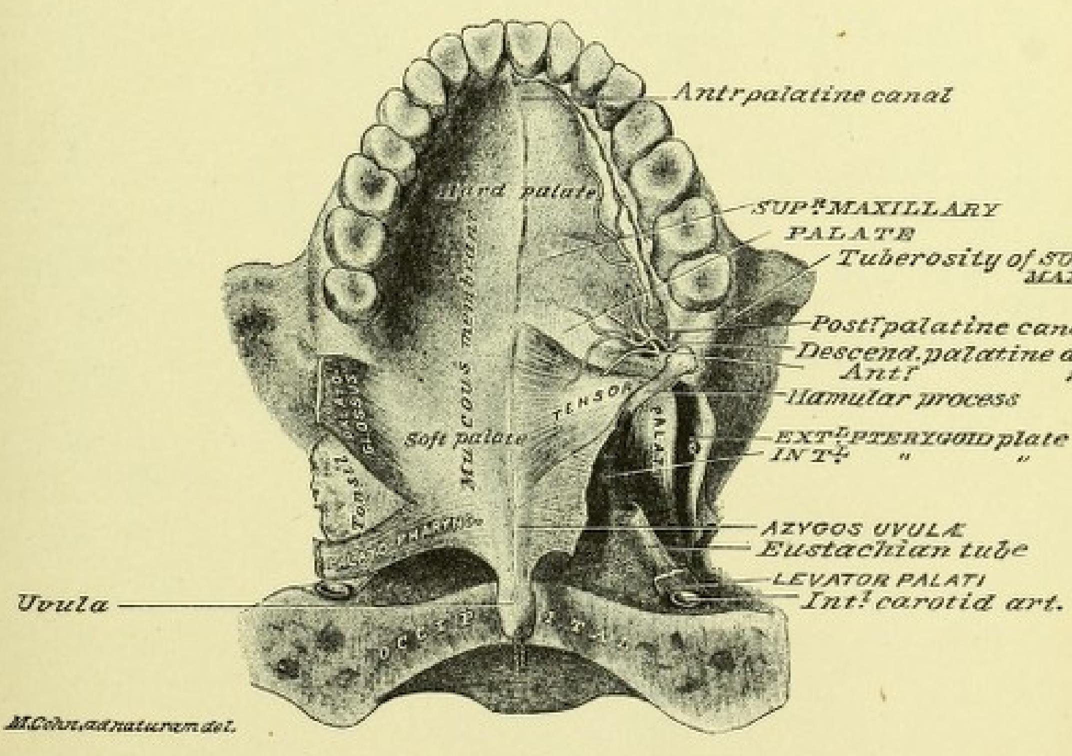


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FIG. 1

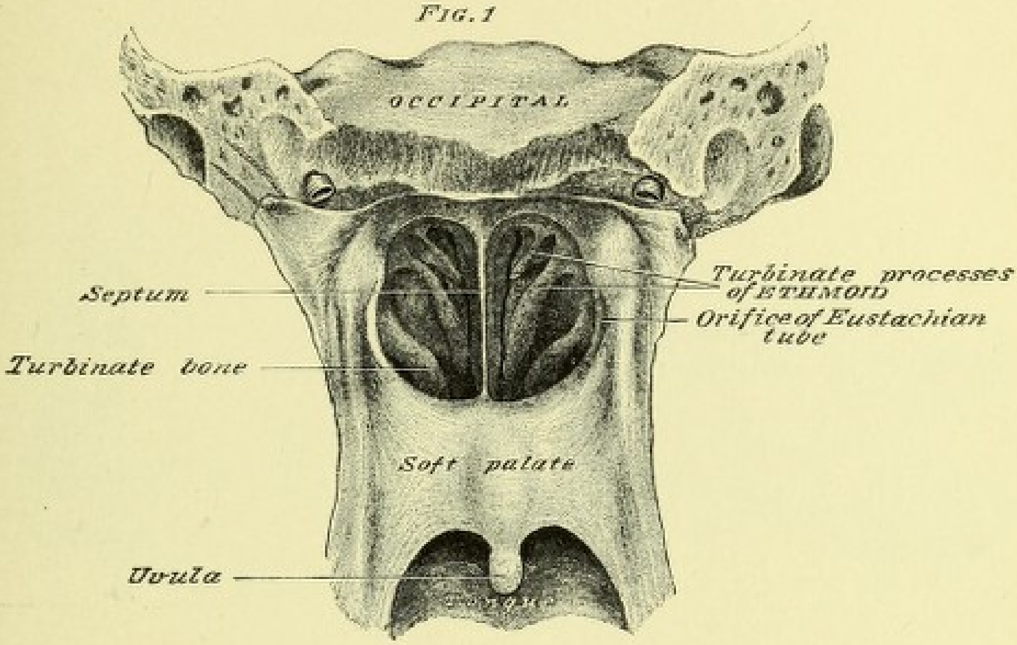

FIG. 2

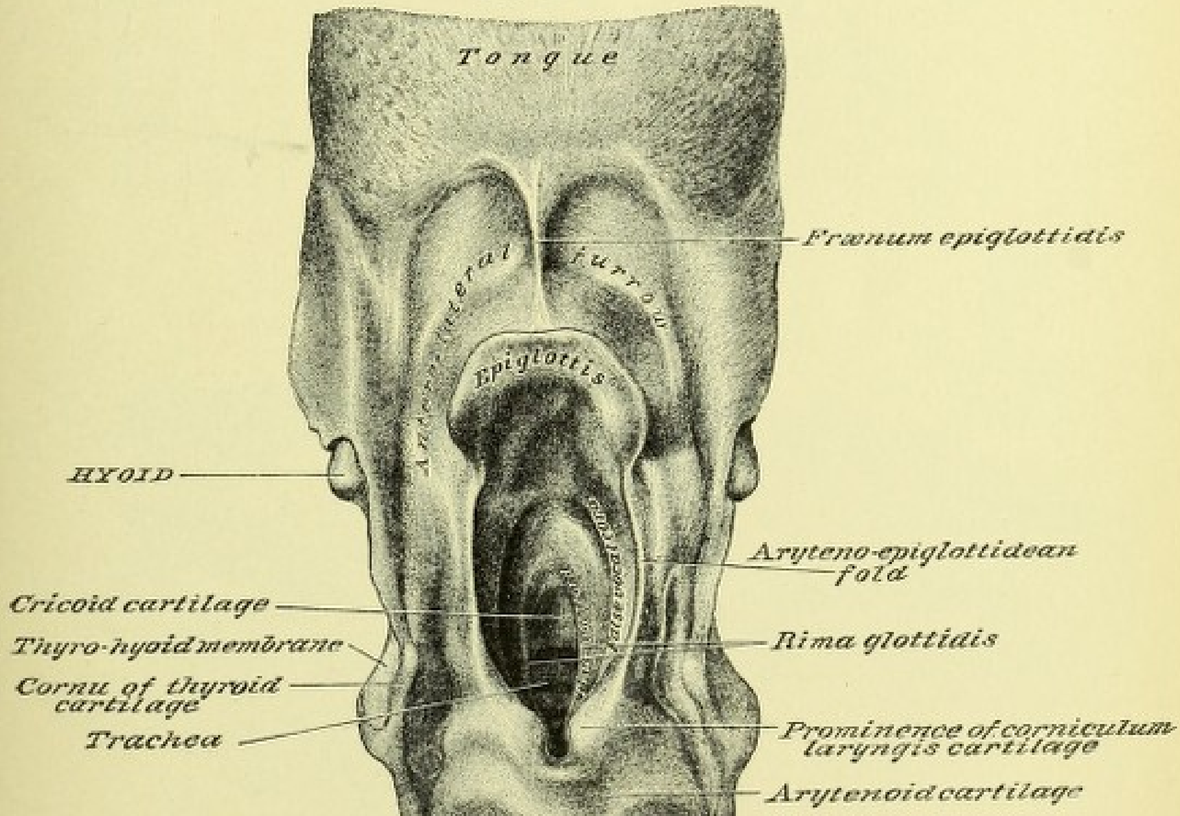

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FIG. 1 FIG. 2

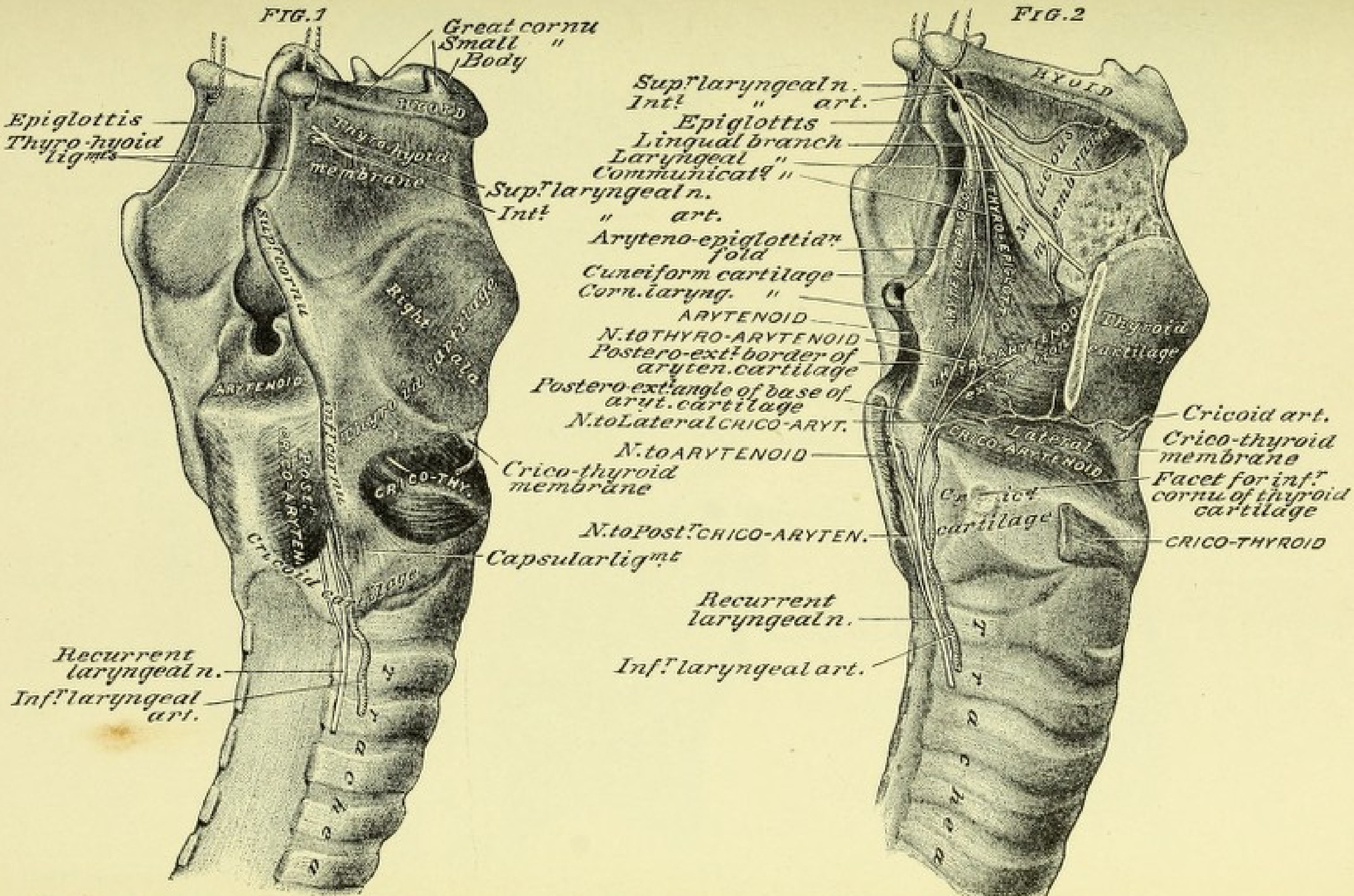

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FIG. 1

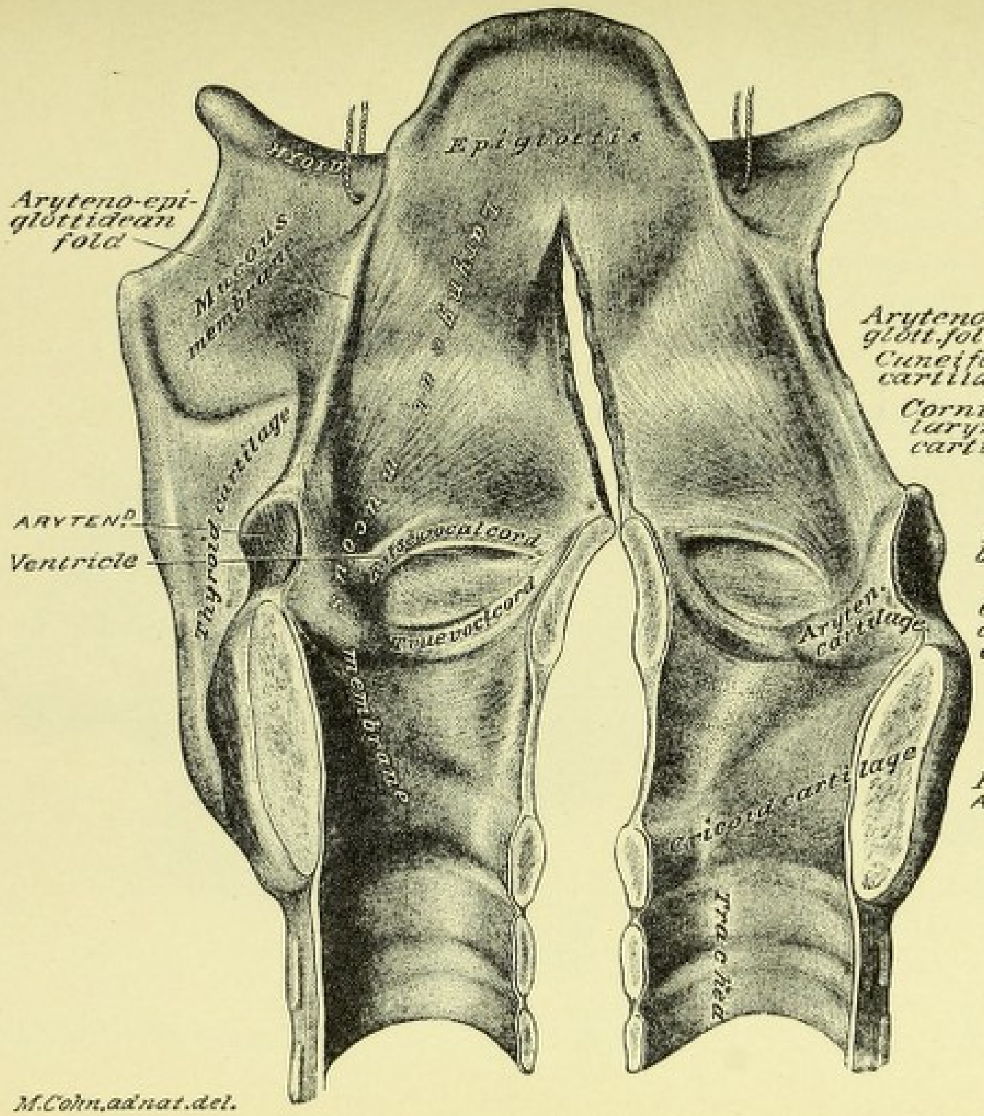
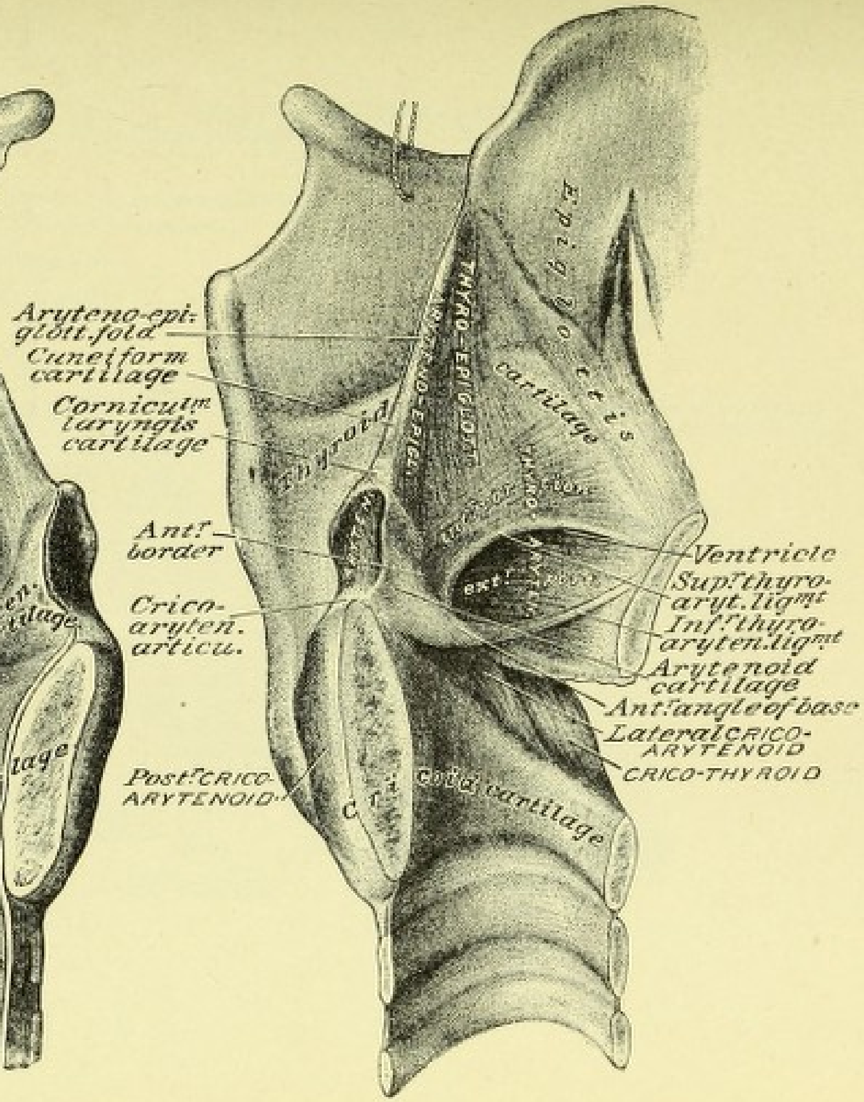


FIG. 2



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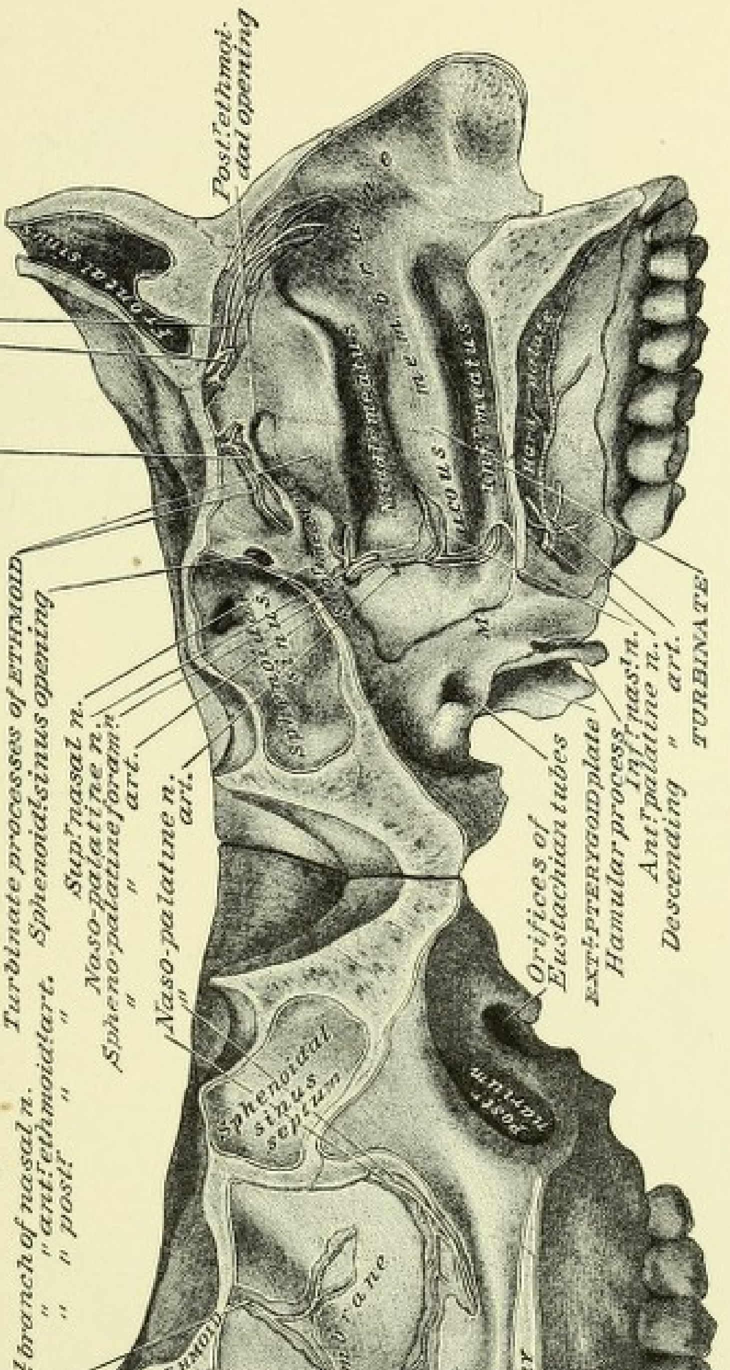


M. Cohn. ad naturam del.

FIG. 1

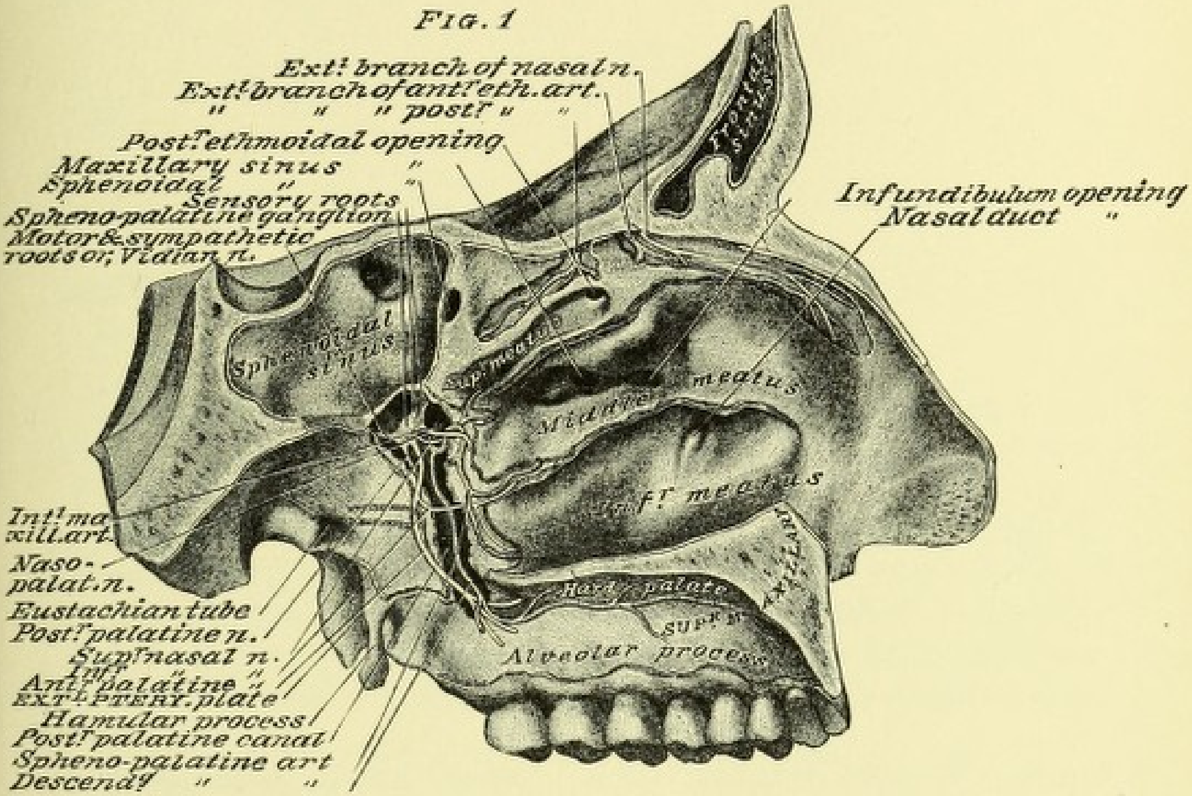
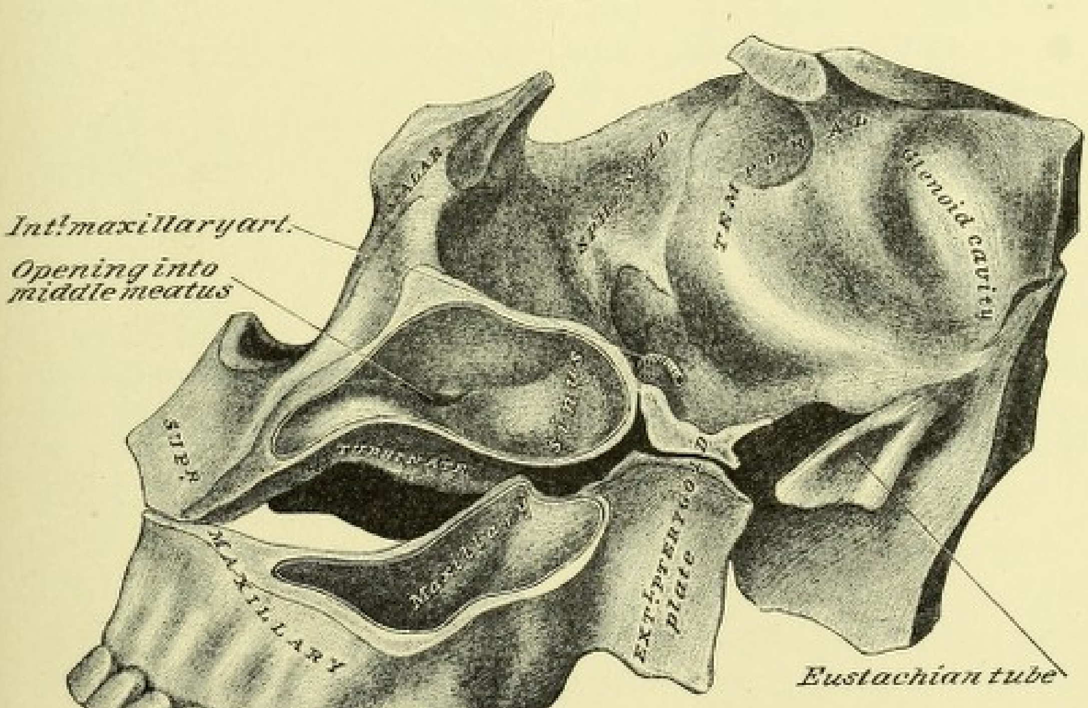


FIG. 2



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TWENTY-SEVENTH DISSECTION.

ARTERIES OF THE BRAIN; EXTERIOR OF THE CEREBRUM; PARTS OF THE BRAIN.

DISSECTION.—The brain, as removed from the cranium (page 324), may now be taken out of the solution of chloride of zinc, in which it has been kept.

Terms of Relation.—The general terms of relation (page 2), and the special terms *vertex*, *base*, *lateral area*—applied to the brain in general—*interior* and *exterior*—applied to the ventricular cavities—will be used in describing the arteries of the brain, the exterior of the cerebrum, and the parts of the brain.

Membranes of the Brain, Plates 179 and 180.—The three investing membranes—*dura mater*, *arachnoid*, and *pia mater* —of the brain are described at pages 322, 323, and 324; also the *subdural* and *subarachnoidean* spaces at page 323.

Venous Sinuses of the Cranium.—These intracranial venous canals are described at pages 323 and 326.

ARTERIES OF THE BRAIN.

DISSECTION.—Place the brain upon a dissecting board, with its base uppermost (Plate 211). *It is to be remembered, that the brain is turned over, and that its inferior surface looks superiorly instead of inferiorly.* Trace the arteries of the posterior half of the base, viz.: the vertebral, the basilar, and the posterior cerebral, with their branches.

1. Vertebral Arteries and their Branches, Plate 211.—The entrances of these arteries into the cranium by the foramen magnum were before described (page 325) and illustrated (Plate 180). Their intracranial portions have an antero-superior course upon the antero-inferior surface of the medulla oblongata; at the superior limit of the latter they converge to form the basilar artery. The branches of this portion of a vertebral artery are: the *posterior spinal* (not illustrated) arises from the beginning of the artery, and joins its fellow of the opposite side, to form the single *posterior spinal artery* trunk, which passes inferiorly to the posterior surface of the spinal cord; the *anterior spinal*, from the internal side of the artery, joins its fellow of the opposite side to form the single *anterior spinal artery* trunk, which descends to the anterior of the spinal cord; the *inferior cerebellar*, from the external side of the artery, distributes to the postero-inferior part of the cerebellum.

2. Basilar Artery and its Branches.—This single, median-line, artery has an antero-superior course, at the antero-inferior surface of the pons Varolii, from its inferior to its superior border. Its branches are projected to the right and left, as follows: short branches to the pons Varolii; the *auditory*, which pass to, and subsequently accompany, the auditory and facial nerves; the *anterior cerebellar*, which are projected to the inferior surface of the cerebellum; the *superior cerebellar*, which are continued upon the superior portion of the antero-inferior surface of the pons Varolii, to reach the superior surface of the cerebellum.

3. Posterior Cerebral Arteries and their Branches.—These arteries arise from the bifurcation of the basilar artery, opposite the superior border of the antero-inferior surface of the pons Varolii. They diverge, laterally, over the crura cerebri, to distribute to the inferior surface of the cerebrum—its temporo-sphenoidal and occipital lobes. Its branches are: the *posterior perforating*, which are small arteries, that enter the foramina of the posterior perforated space (Plate 214); the *posterior choroid* (not illustrated) to the posterior of the choroid plexus.

Dissection.—Insert small pieces of wood into the longitudinal fissure and the fissure of Sylvius. Find the stumps of the internal carotid arteries, and trace their branches upon the anterior half of the base of the cerebrum. Display the anterior and posterior communicating arteries, and demonstrate the circle of Willis.

4. Internal Carotid Arteries and their Branches.—These arteries enter the cranium, at the apices of the petrous portions of the temporal bones, from the internal orifices of the carotid canals (Plate 186, right side); thence they run internally, exteriorly to the dura mater, to the lateral surfaces of the body of the sphenoid bone; at these points they are projected, inferiorly, through the dura mater, and appear at the sides of the sella turcica of the sphenoid bone (Plate 180; Plate 185, right side).

The branches of the intracranial portion of an internal carotid artery are: the *ophthalmic*, before described (page 326) and illustrated (Plate 180); the *anterior choroid*, which enters the middle horn of a lateral ventricle (Fig. 2, Plate 218) to contribute to the choroid plexus; the terminal end of the artery bifurcates. The *middle cerebral artery*, one of the branches of bifurcation, passes, from its origin, into the fissure of Sylvius; its branches enter the pia mater upon the frontal, central, parietal, and temporo-sphenoidal lobes of the cerebrum, to supply these several lobes. The *anterior cerebral artery*, one of the branches of bifurcation, bends internally, and anteriorly, to enter the longitudinal fissure, upon the inferior surface of the rostrum of the corpus callosum; it then curves, superiorly, over the anterior reflection of the corpus callosum, to run, antero-posteriorly, upon the superior surface of the latter or the floor of the longitudinal fissure; its branches enter the pia mater upon the internal and the inferior surfaces of the frontal lobe to distribute to these portions of the lobe.

5. Anterior and Posterior Communicating Arteries.—The *anterior communicating artery* is a short, transverse trunk, by which the anterior cerebral arteries anastomose; it is located at the posterior of the anterior portion of the longitudinal fissure upon the inferior surface of the rostrum of the corpus callosum.

The *posterior communicating arteries* are two, short, oblique, vessels, that unite the internal carotid and the posterior cerebral arteries.

6. Circle of Willis.—This is an arterial circuit at the centre of the inferior surface of the brain, which is formed by the following arteries: anteriorly, the anterior communicating; posteriorly, the bifurcation of the basilar; a side of the circle presents, in order, antero-posteriorly, the anterior cerebral, the internal carotid, the posterior communicating, and the posterior cerebral; this half circuit, repeated on the opposite side, completes the circle of Willis.

EXTERIOR OF THE CEREBRUM.

DISSECTION.—Cut the arteries (with the scissors) between the nerve origins at the base of the brain (Plates 211 and 214); pick away (with the forceps) the pieces of arteries from between the nerves; then (with the forceps) peel off the pia mater, and included vessels, from the exterior of the brain (this is best done by short twitches of portions of the membrane). Holding the brain so as to be able to see its vertex (Plate 212) and a lateral (Plate 213) area of one of its hemispheres, alternately, determine the fissures, the furrows, the lobes, the sulci, the lobules, and the convolutions of the exterior of the cerebrum. Open the fissure of Sylvius by everting, inferiorly, the temporo-sphenoidal lobe of the cerebrum.

1. Fissures and Furrows of the Vertex and Lateral Area of a Hemisphere of the Cerebrum, Plates 212 and 213.—These areas of the exterior of the cerebrum present three fissures and two furrows—three antero-posterior and two transverse. The *longitudinal fissure* is a complete, antero-posterior, median-line fissure, located between the hemispheres (Plate 212) of the cerebrum; it lodges the falx cerebri of the dura mater, and has the superior surface of the corpus callosum for its floor. The *fissure of Sylvius* is an incomplete, antero-posterior, fissure, which is located at a lateral area of the exterior of the cerebrum; it has a long posterior and a short anterior division. The *furrow of Rolando* is a well-marked, transverse furrow, which has an oblique course, inferiorly and anteriorly, from a point externally to the junction of the posterior and middle third of the longitudinal fissure (Plate 212) to a point superiorly to the middle of the fissure of Sylvius (Plate 213). The *occipito-parietal fissure* is a transverse fissure, which has a slightly oblique course, externally and posteriorly, from the posterior third of the longitudinal fissure to the inferior border of the posterior part of the cerebrum. The *intraparietal furrow* (Plate 213) is a short, antero-posterior, furrow, which runs, anteriorly, from about the middle of the occipito-parietal fissure to the ascending parietal convolution of the parietal lobe.

2. Lobes of the Cerebrum, Plates 211 to 215, inclusive.—A hemisphere of the cerebrum presents five lobes. The *frontal lobe* is bounded: at the median line, by the longitudinal fissure (Plates 211 to 215, inclusive); posteriorly, by the furrow of Rolando (Plates 212, 213, and 215) and the central lobe (Plates 213 and 214); inferiorly, by the fissure of Sylvius and the central lobe (Plate 213). The *parietal lobe* is bounded: at the median line, by the longitudinal fissure (Plates 212 and 215); anteriorly, by the furrow of Rolando (Plates 212, 213, and 215); posteriorly, by the occipito-parietal fissure; inferiorly, by the fissure of Sylvius and the temporo-sphenoidal lobe (Plate 213). The *occipital lobe* (Plates 212, 213, and 214) is bounded: at the median line, by the posterior part of the longitudinal fissure; anteriorly, by the occipito-parietal fissure; inferiorly, by the cerebellum. The *temporo-sphenoidal lobe* (Plate 213) is bounded: superiorly, by the fissure of Sylvius and the parietal lobe; as a free portion of the cerebrum, it is lodged posteriorly to the frontal lobe, and externally to the central lobe. The *central lobe* is located at the floor of the fissure of Sylvius, where it is bounded: superiorly, by the operculum of the frontal and parietal lobes (Plates 213 and 214); anteriorly, by the frontal lobe (Plates 213 and 214); internally, at the base of the cerebrum, by the anterior perforated space (Plate 214).

DISSECTIONS.—Section the right hemisphere of the cerebrum so as to slice off its vertex portion, as in Plate 215. Cut away the anterior border of the left temporo-sphenoidal lobe, as in Plate 214. Demonstrate the convolutions and lobules of the five lobes of the cerebrum as determined by sulci, which present with variable degrees of uniformity and definition in different brains.

3. Convolutions and Sulci of a Frontal Lobe, Plates 212 to 215, inclusive.—The convolutions of this lobe may be demonstrated as follows: at its vertex and external-lateral surfaces, the *ascending frontal* (Plates 212, 213, and 215) lies parallel with, and between the furrow of Rolando, posteriorly, and the *transverse frontal sulcus*, anteriorly; the *superior frontal*, the *middle frontal*, and the *inferior frontal* divided by the *superior frontal sulcus* and the *inferior frontal sulcus*, are anteriorly to the ascending frontal sulcus, and run postero-anteriorly, therefrom; at its inferior surface, the *posterior orbital*, the *anterior orbital*, and the *internal orbital* (Plate 214) are determined by the *orbital sulcus;* at its internal-lateral surface, or the wall of the longitudinal fissure, the *marginal convolution*, and the *convolution of the corpus callosum*, are defined by the *calloso marginal sulcus*.

4. Lobules, Convolutions, and Sulci of a Parietal Lobe, Plates 212, 213, and 215.—The vertex and external-lateral area of this lobe present the following: the *ascending parietal convolution* posteriorly to, and parallel with, the furrow of Rolando; posteriorly to the ascending parietal convolution, the intraparietal furrow (page 412; Plates 212 and 213) divides the posterior part of this lobe into a *superior parietal lobule* (Plates 212 and 215) and an *inferior parietal lobule* (Plates 212 and 213)—in the latter sulci determine the *supra-marginal convolution*, anteriorly, and the *angular convolution*, posteriorly. The internal-lateral surface or wall of the longitudinal fissure of this lobe presents the *quadrate lobule* (Plate 215), which is bounded: anteriorly, by the calloso-marginal sulcus; inferiorly, by the convolution of the corpus callosum; posteriorly, by the occipito-parietal fissure.

5. Convolutions, Sulci, and Lobule of an Occipital Lobe. —Of this lobe sulci, at its postero-external surface, map out, more or less definitely, the *superior occipital*, the *middle occipital*, and the *inferior occipital convolutions* (Plate 212). At its internal-lateral surface or its portion of the wall of the longitudinal fissure, is the *calcarine sulcus*, and the area called the *cuneate lobule.*

6. Convolutions and Sulci of the Temporo-sphenoidal Lobe, Plates 213 and 214.—At the external-lateral face of this lobe are the following: the *superior temporo-sphenoidal convolution* and the middle *temporo-sphenoidal convolution*, separated by the *superior temporo-sphenoidal sulcus* (Plate 213). Its inferior surface (Plate 214) presents: the continuations of the superior and middle convolutions divided by the last-named sulcus; the *inferior temporo-sphenoidal convolution* has the *middle temporo-sphenoidal sulcus* separating it from the middle convolution; the *collateral sulcus* marks off the *uncinate convolution* from the last-named convolution.

7. Convolutions and Sulci of the Central Lobe, Plate 213. —The short vertical convolutions of the exterior of this lobe are determined by from four to six shallow, parallel, and vertical sulci.

PARTS OF THE BRAIN.

Brain, Plates 212, 213, and 214.—This intracranial organ is a mass of grey and white neural tissue, which is variously distributed in its parts. It is divided: primarily, into four parts—

the *cerebrum*, the *pons Varolii*, the *cerebellum*, and the *medulla oblongata;* secondarily, each of these parts is made up of distinguishable portions. The organ has a mean weight, in the adult (taking both sexes) of from two and a half to three and a quarter pounds, with the extremes at two and four pounds —the male brain ranges a little over one-quarter of a pound heavier than the female.

DISSECTION.—Place the brain with its inferior surface uppermost.

1. Basal Surface of the Brain, Plate 214.—This surface of the brain presents the following: parts of the cerebrum—inferior surfaces of frontal and temporo-sphenoidal lobes, anterior perforated spaces, lamina cinerea, optic commissure and optic tracts, pituitary body, tuber cinereum, corpora mammillaria, crura cerebri, and posterior perforated space; the antero-inferior surfaces of the pons Varolii, medulla oblongata, and cerebellum; and the origins from the exterior of the brain —cerebrum, pons Varolii, and medulla oblongata—of the twelve pairs of cranial nerves.

2. Longitudinal Fissure.—The anterior of this cerebral fissure divides, antero-posteriorly, the frontal lobes, at their basal surfaces; it is limited posteriorly by the inferior portion of the anterior reflection—the *rostrum*—of the corpus callosum, and the lamina cinerea.

3. Anterior Perforated Spaces.—These areas are bounded: anteriorly, by the posterior orbital convolution of the frontal lobe and the olfactory nerve; externally, by the central lobe; posteriorly and internally, by the optic tract and the optic commissure. Its openings give transit to branches of the middle cerebral artery (Plate 211), which pass, superiorly, to the corpus striatum of the cerebrum.

4. Lamina Cinerea.—This is a stretch of neural tissue (grey), from the posterior of the rostrum of the corpus callosum to the optic commissure, and posteriorly to the latter to the tuber cinereum. It is between the right and left anterior perforated spaces, and closes in the anterior recess of the inferior wall of the third ventricle of the cerebrum.

5. Optic Tracts and Optic Commissure.—The *optic tracts* or *peduncles* are a right and a left band, which wind, inferiorly, around the external sides of the crura cerebri (Plate 214, left side), to the anterior of the inferior surface of the crura, whence they have an anterior, and internal, course to their anterior convergence. The *optic commissure* is the point of junction of the right and left optic tracts or peduncles ; it is located between the anterior perforated spaces, posteriorly to the lamina cinerea, and anteriorly to the tuber cinereum.

6. Crura Cerebri or Cerebral Peduncles.—These are two columns of neural tissue, which are projected, right and left, from the anterior of the pons Varolii ; they pass to, and cross superiorly to, the optic tracts into the right and the left hemisphere, respectively, of the cerebrum.

7. Interpeduncular Space.—This is an area—sometimes spoken of as lozenge-shaped or like the diamond figure on a playing-card—located at the centre of the basal surface of the brain, and bounded as follows : antero-laterally, by the optic commissure and its converging peduncles or the optic tracts ; postero-laterally, by the pons Varolii and the diverging cerebral peduncles or crura cerebri. It encloses the tuber cinereum, the pituitary body suspended by the infundibulum, the corpora mammillaria, and the posterior perforated space. These parts form the floor of the third ventricle of the cerebrum.

8. Tuber Cinereum.—This is a stretch of nerve tissue from the posterior of the optic commissure to the corpora mammillaria, and crura cerebri. From its anterior portion the infundibulum is projected inferiorly.

9. Pituitary Body.—This is a flattened, transversely ovoid body, about the size of a pea, which is held, by the infundibulum, to the tuber cinereum. It is lodged, *in situ*, in the sella turcica—superior surface of the body of the sphenoid bone—where it is covered by the dura mater ; in taking the brain from the cranium (page 324), the infundibulum was seen emerging from the centre of this portion of the dura mater. As removed from the sella turcica, the pituitary body hangs from the tuber cinereum, by the infundibulum, as a cherry on its fruit-stalk.

10. Corpora Mammillaria.—These are two symmetrical, small, mamma-like prominences located between : the tuber cinereum, anteriorly; the crura cerebri, right and left, laterally; and the posterior perforated space, posteriorly. They are the terminal ends of the anterior pillars of the fornix (Fig. 2, Plate 217).

11. Posterior Perforated Space.—This triangular space is located between: the corpora mammillaria, anteriorly; the crura cerebri, laterally; and the pons Varolii, posteriorly. Its perforations give transit to small arterial twigs, from the bifurcation of the basilar artery into the posterior cerebral arteries (Plate 211), which pass, superiorly, into the cerebrum, to supply the thalami optici, corpora quadrigemina, etc.

12. Pons Varolii.—The antero-inferior surface of this part of the brain presents a somewhat quadrangular area. Anteriorly from it, the crura cerebri are projected superiorly; posteriorly and inferiorly, it is continuous with the medulla oblongata; laterally, the right and left middle or pons Varolii peduncles of the cerebellum pass to the right and left hemisphere of that part of the brain.

13. Medulla Oblongata.—This part of the brain is continued superiorly from the spinal cord—in fact, it is the cranial portion of the cord; it passes, anteriorly and superiorly, into the pons Varolii and cerebellum.

14. Cerebellum.—The basal surface of this part of the brain shows it lodged between the medulla oblongata, inferiorly, and the occipital lobes of the cerebrum, superiorly. Its antero-inferior surface extends, laterally and posteriorly, from the medulla oblongata and pons Varolii; its mid-portion being superposed upon the postero-superior surfaces of the two latter parts of the brain.

15. Exterior Origins of the Twelve Pairs of Cranial Nerves, Plates 211 and 214; Fig. 1, Plate 222.—The twelve pairs of cranial nerves present their exterior origins from the brain, at the basal surfaces of the cerebrum, pons Varolii, and medulla oblongata.

The *first* or *olfactory* nerves are projected, anteriorly, from the cerebrum, from points anteriorly to the anterior perforated spaces (Plate 214); they are lodged in the olfactory sulci

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(Plate 214) at the inferior surfaces of the frontal lobes of the cerebrum ; at their anterior ends are enlargements, the *olfactory bulbs* (Plate 214), from which the distributing filaments of the nerves are given off.

The *second* or *optic* nerves are given off, anteriorly, right and left, from the optic commissure.

The *third* or *oculomotor* nerves emerge from the internal surfaces of the posterior thirds of the crura cerebri, and wind out of the posterior part of the interpeduncular space.

The *fourth* or *trochlear* nerves arise from the valve of Vieussens (Fig. 2, Plate 221) and appear winding inferiorly and anteriorly, externally to the posterior ends of the crura cerebri.

The *fifth* or *trifacial* nerves come out from the lateral surfaces of the pons Varolii—a large sensory and a small motor root.

The *sixth* or *abducent* nerves appear, at either side, from the groove between the antero-inferior surfaces of the pons Varolii and medulla oblongata.

The *seventh* or *facial* nerves present, from the sides of the postero-superior surface of the medulla oblongata, over the posterior borders of the middle or pons Varolii peduncles of the cerebellum.

The *eighth* or *auditory* nerves have their exterior origins in the same way as, but posteriorly to, the seventh. A small nerve, the *nerve of Wrisberg*, appears between the origins of the seventh and eighth nerves.

The *ninth* or *glossopharyngeal* nerves emerge from the medulla oblongata, from the superior part of the grooves posteriorly to its olivary bodies.

The *tenth* or *pneumogastric* nerves spring, by a number of filaments, from the same grooves of the medulla oblongata as the ninth, but inferiorly to them.

The *eleventh* or *spinal accessory* nerves arise from the lateral column of the medulla oblongata, and—as its name implies—from the spinal cord—the cervical portion of its lateral column (Plate 153) ; the accessory spinal portions of the nerves enter the cranium by the foramen magnum (page 325 ; Plate 180).

The *twelfth* or *hypoglossal* nerves are projected, by a number of filaments, from the grooves, of the medulla oblongata anteriorly to its olivary bodies.

DISSECTION.—Remove, by an antero-posterior section, the vertex portion of the right cerebral hemisphere, to correspond with the sectioned left hemisphere in Plate 215.

16. Centrum Ovale of Vieussens, Plate 215.—This is the sectioned plane of the hemispheres of the cerebrum, at the level of the corpus callosum (of which one-half is shown in Plate 215). It presents: the circumferential grey neural tissue, in the walls of the sulci between the convolutions; the central mass of white neural tissue; and the commissural character of the corpus callosum.

17. Corpus Callosum, Plates 214 to 218, inclusive.—This is a transverse commissure of neural tissue (white) between the hemispheres of the cerebrum. It is located at the level of the floor of the longitudinal fissure, and extends, right and left, from a median-line *raphe* (Plates 215 and 216). At about the centre of the mid-line surfaces of the cerebral hemispheres, it occupies nearly one-half of their antero-posterior diameter. Its portions receiving special names are: its anterior point of reflection, inferiorly, the *genu* (Plates 215 and 216); its inferior portion, from the anterior reflection, the *rostrum* (Plate 214); its posterior portion, the *splenium* (Plates 215 and 216; Fig. 1, Plate 217; Fig. 2, Plate 218).

DISSECTION.—Section through the corpus callosum, antero-posteriorly, on either side of the median-line, as in Plate 216, thereby opening the roofs of the cavities of the right and left lateral ventricles; introduce the handle of the scalpel into the openings made, and turn off the roofs of the cavities, and of the right and left anterior and posterior cornua, externally; trim away the displaced portions of the corpus callosum, circumferentially, as in Plate 216. Slice off an additional part of the occipital lobe of the right hemisphere of the cerebrum (Plate 216).

18. Right and Left Lateral, or First and Second Ventricles of the Brain, Plates 216, 217, and 218.—These intracerebral cavities are located, antero-posteriorly, at either side of the median line. The parts of a lateral ventricle are: the *cavity* at the mid-portion of a hemisphere of the cerebrum; an *anterior cornu* or projection of the ventricle into the frontal lobe; a *posterior cornu*, or extension of the ventricle into the occipital lobe; and a *middle cornu* (Fig. 2, Plate 218) or continuation of the ventricle into the temporo-sphenoidal lobe. The cavity of a lateral ventricle is bounded as follows: superiorly, by the half of the corpus callosum (Plate 215); internally, by the septum lucidum, anteriorly, and by the attachment, along the median line, of the inferior surface of the corpus callosum to the superior surface of the fornix, posteriorly; externally, by a part of the *corpus striatum;* inferiorly, and in order antero-posteriorly, by portions of the *corpus striatum*, the *tænia semicircularis*, the *anterior tubercle* of the *thalamus opticus*, the *choroid plexus*, and the *fornix*.

19. Septum Lucidum.—This is a median-line, vertical partition, between the anterior portions of the cavities of the right and left lateral or first and second ventricles; it passes from the inferior surface of the anterior of the superior portion of the corpus callosum, superiorly, to the superior surface of the rostrum of the corpus callosum, inferiorly; and from the posterior surface or concavity of the genu of the corpus callosum, anteriorly, to the anterior surface or convexity of the anterior pillars of the fornix, posteriorly.

20. Foramen of Monro, Plate 216; Fig. 1, Plate 217.—This is located posteriorly to the anterior pillars of the fornix, as a curved deficiency or slit in the partition between the cavities of the lateral ventricles (a bristle is passed through it); by it the two lateral ventricles and the third ventricle communicate.

21. Corpus Striatum, Plates 216 and 217; Fig. 1, Plate 218.—This is one of the two anterior, basal, ganglia of the cerebrum. It has two portions: an intraventricular, which projects into the cavity of the lateral ventricle at its external and inferior wall; and an extraventricular, which is lodged in the cerebral mass, externally to the cavity of the lateral ventricle.

22. Tænia Semicircularis.—This is a narrow band of neural tissue (white), which may be traced, antero-posteriorly, in the cavity of a lateral ventricle, where it is bedded in the groove between a corpus striatum and a thalamus opticus. It extends posteriorly and externally from the pillars of the fornix, anteriorly.

23. Anterior Cornu of a Lateral Ventricle, Plates 216, 217, and 218.—This is the anterior ventricular recess, into the frontal lobe of a cerebral hemisphere.

24. Posterior Cornu of a Lateral Ventricle.—This is the posterior ventricular extension into the occipital lobe of a cerebral hemisphere. Its internal wall presents the intra-ventricular projection of a cerebral convolution, which is called the *hippocampus minor*. At the floor or inferior wall of its anterior portion, a prominence appears, the *eminentia collateralis.*

DISSECTION.—Section the corpus callosum (Plate 216); reflect its anterior portion, thereby exposing the cavity of the fifth ventricle of the brain (Fig. 1, Plate 217); reflect its posterior portion, by cutting it from the superior surface of the fornix, as in Fig. 1, Plate 217.

25. Septum Lucidum and Fifth Ventricle of the Brain, Plates 217 and 218.—The septum lucidum as sectioned demonstrates its right and left, antero-posterior, lamina, of white neural tissue, which enclose a median-line space, the *fifth ventricle.*

26. Fornix, Plates 216, 217, and 218.—This is an antero-posterior sheet of white neural tissue, which bridges the median line. Its parts are: a body, two anterior pillars and the corpora mammillaria, two posterior pillars and the corpora fimbriata. The *body* and *posterior pillars*, are in the cavities of the lateral ventricles (Fig. 1, Plate 217) where they form a triangular-shaped plane; its apex is directed anteriorly, and it is reflected inferiorly, as its *anterior pillars;* its borders are free and are internally to, and parallel with, the right and left choroid plexus; its base, for its central portion, fuses with the splenium of the corpus callosum, while its lateral portions are its *posterior pillars*, a right and a left; the latter curve inferiorly, and externally, to enter the middle cornua of the lateral ventricles.

27. Choroid Plexus of a Lateral Ventricle of the Brain, Plate 216; Fig. 1, Plate 217.—This is a plexus of vessels, which is located in the floor of the cavity, and in the middle cornu, of a lateral ventricle of the brain. In the cavity it is externally to, and parallel with, a free border of the body of the fornix. Anteriorly it converges to, and disappears inferiorly and posteriorly to, an anterior pillar of the fornix; posteriorly, it curves inferiorly and externally, along the external border of a posterior pillar of the fornix, to enter the middle cornu of a lateral ventricle.

28. Thalamus Opticus.—A portion of the superior surface—the *anterior tubercle*—of this body—one of the posterior, basal, cerebral ganglia—presents, at the floor of the cavity of a lateral ventricle, between a tænia semicircularis, externally, and a choroid plexus, internally.

DISSECTION.—Section the fornix at the anterior section line in Fig. 1, Plate 217; reflect the anterior and posterior portions as in Fig. 2, Plate 217. (This is done with the handle of the scalpel, which slides it off from the superior surface of the velum interpositum).

29. Anterior Pillars of the Fornix, Plates 214, 216, and 217; Fig. 1, Plate 218.—These are the anterior reflections of the fornix—a right and a left pillar—which pass, inferiorly, to the base of the brain, where they terminate as the corpora mammillaria, before described (page 416) and illustrated (Plate 214).

30. Velum Interpositum, Fig. 2, Plate 217; Fig. 1, Plate 218.—This is a triangular, intraventricular, portion of the pia mater of the brain, which is projected, anteriorly, from the inferior surfaces of the occipital lobes of the cerebral hemispheres; it enters the lateral ventricle, inferiorly to the splenium of the corpus callosum and the body of the fornix. Its borders support the choroid plexuses.

31. Intraventricular Veins, Plates 216 and 217.—These are small veins, which ramify in the interior walls of the lateral ventricles. They converge to a right and a left vessel, which curve, internally, to enter posteriorly to the anterior pillars of the fornix (Plate 217); they pass inferiorly to the velum interpositum, where they become the *venæ Galeni.*

DISSECTION.—Cut (Fig. 2, Plate 217) the veins emptying into the venæ Galeni; dissect away the intraventricular veins. Turn off, as in Fig. 1, Plate 218, the velum interpositum, and the right and left choroid plexus, posteriorly, upon the reflected posterior portion of the fornix (Fig. 2, Plate 217).

32. Venæ Galeni, Fig. 2, Plate 217; Fig. 1, Plate 218.—These are two antero-posterior veins, which run parallel with, and at either side of, the median line, at the inferior surface of the velum interpositum.

33. Choroid Plexus of the Third Ventricle of the Brain, Fig. 1, Plate 218.—The anterior ends of the choroid plexuses of the lateral ventricles curve inferiorly to the venæ Galeni, to where they meet at the median line, anteriorly ; along the median line, and between the venæ Galeni, they are continued, antero-posteriorly, as the choroid plexus of the third ventricle. Posteriorly, it broadens to surround the pineal body.

34. Pineal Body and its Crura, Fig. 1, Plate 218 ; Figs. 2 and 3, Plate 222.—This (misnamed a gland) is a small, reddish, cone-shaped body, which is lodged between the velum interpositum, superiorly, and the nates of the corpora quadrigemina (Fig. 2 , Plate 222), inferiorly. It projects a right and a left crus, anteriorly, along the superior-internal borders of the thalami optici ; they are continued to the anterior pillars of the fornix.

35. Thalamus Opticus, Plates 216, 217, and 218.—This body—one of the two posterior, basal ganglia of the cerebrum —was referred to at pages 419 and 421. It is oval in shape and located as follows : internally, and partly inferiorly, to a tænia semicircularis, and a corpus striatum (its posterior portion) ; externally to, and forming the lateral wall of, the third ventricle of the brain (Fig. 1, Plate 218) ; inferiorly to the half of the velum interpositum and a choroid plexus—except where the anterior tubercle of a thalamus opticus appears at the floor of the cavity of a lateral ventricle (Plates 216 and 217). Its superior surface presents an *anterior* and a *posterior tubercle* (Fig. 1, Plate 218).

36. Third Ventricle of the Brain, Fig. 1, Plate 218.—This intracerebral cavity is bounded : superiorly, by the velum interpositum (Fig. 2, Plate 217) ; laterally, by the right and left thalamus opticus, respectively ; anteriorly, by the anterior pillars of the fornix ; posteriorly, by the corpora quadrigemina ; inferiorly by the lamina cinerea, and the parts contained in the interpeduncular space (page 415 ; Plate 214)—the tuber cinereum, the corpora mammillaria, and the posterior perforated space. The ventricular cavity is crossed by three transverse commissures : an *anterior commissure*, of white neural tissue, lies anteriorly to the anterior pillars of the fornix (Fig. 2, Plate 217 ; Fig. 1, Plate 218), and unites the anterior portions of the thalami optici ; a *posterior commissure* (Fig. 1, Plate 218 ; Fig. 3, Plate 222), of white neural tissue, located anteriorly to the corpora quadrigemina, bridges between the posterior portions of the thalami optici ; a *middle commissure* presents as a broad band of grey neural tissue, which spans the ventricular cavity between the internal surfaces of the thalami optici. By the foramen of Monro, before described (page 420) and illustrated (Plate 216 ; Fig. 1, Plate 217) the third ventricle communicates with the right and left lateral or first and second ventricles. At the posterior wall of the third ventricle, and inferiorly to the posterior commissure of the same, a small opening presents, the anterior orifice of the *aqueduct of Sylvius* (a bristle protrudes from it).

Dissection.—Replace the velum interpositum (Fig. 2, Plate 217) and the fornix (Fig. 1, Plate 217) ; cut the fornix, the right and the left choroid plexus, and the velum interpositum, along the section line transversely across the fornix and choroid plexuses (Fig. 1, Plate 217) ; remove the anterior portions of the sectioned parts, as in Fig. 2, Plate 218. Cut, transversely, through the external wall of the left lateral ventricle—along the posterior transverse section line shown at the left side of Fig. 1, Plate 218—down to the floor of the middle cornu of the ventricle ; continue, by a curved incision, anteriorly, at the level of the floor of the cornu (Fig. 2, Plate 218) ; make a transverse cut through the cerebral mass—along the anterior transverse section line at the left side of Fig. 1, Plate 218—as far as the middle of the left thalamus opticus ; then remove the lateral wedge of the included part of cerebrum, by an oblique cut through the posterior portion of the left thalamus opticus.

37. Middle Cornu of a Lateral Ventricle of the Brain, and its Contained Parts, Fig. 2, Plate 218.—This is the recess of a cavity of a lateral ventricle, into the temporo-sphenoidal lobe of a hemisphere of the cerebrum. Its direction is tortuous, viz.: posteriorly, externally, inferiorly, anteriorly, and internally. Its internal wall is formed by the *hippocampus major*, which is the intraventricular projection of a cerebral convolution. A posterior pillar of the fornix, and a choroid plexus are reflected into this cornu, from the cavity of a lateral ventricle—the fornix here presents its *corpus fimbriatum portion.* The latter and the choroid plexus are applied to the internal wall of a middle cornu, upon the hippocampus major. The choroid plexus here receives the *anterior choroid artery.*

Dissection.—Cut the right hemisphere of the cerebrum along the anterior, transverse section line shown at the right side of Fig. 1, Plate 218 ; cut along the section line directed anteriorly from the last named line out into the anterior portion of the longitudinal fissure (Fig. 1, Plate 218).

38. Anterior Transverse Section of the Basal Ganglia of the Cerebrum, Fig. 1, Plate 219.—This section of a hemisphere of the cerebrum presents the following: the fissure of Sylvius between the anterior portion of the temporo-sphenoidal lobe, inferiorly, and the central lobe, and the operculum of the frontal lobe, superiorly. Internally to, and running parallel with, the central lobe, is a line of grey neural tissue, the *claustrum;* internally to the claustrum is the *external capsule*—white neural tissue—of the basal ganglia; internally to the external capsule is the *nucleus lenticularis*—grey neural tissue—of the extra-ventricular portion of the corpus striatum; the *internal capsule* of the basal ganglia is internally to the nucleus lenticularis; the anterior portion of the *thalamus opticus* is between the internal capsule and the cavity of the third ventricle of the brain; superiorly to the external portion of the thalamus opticus is the anterior portion of the *nucleus caudatus* or intra-ventricular projection of the corpus striatum.

Dissection.—Cut the right hemisphere of the cerebrum, along the posterior, transverse, section line, shown at the right half of Fig. 1, Plate 218. Remove the slice of the cerebrum anteriorly to the cut.

39. Posterior Transverse Section of the Basal Ganglia of the Cerebrum, Fig. 2, Plate 219.—This section, of a hemisphere of the cerebrum, presents the same parts of the basal ganglia of the cerebrum as the anterior section, described above, with this difference: the *thalamus opticus* occupies a much larger area; the *nucleus lenticularis* has a smaller area; the *nucleus caudatus* is very much smaller, and is located externally to the superior portion of the thalamus opticus.

Dissection.—Remove the temporo-sphenoidal and occipital lobes of the left hemisphere of the cerebrum, by cutting through the left posterior pillar of the fornix and the splenium of the corpus callosum, out into the posterior part of the longitudinal fissure (Fig. 2, Plate 218). Cut away the frontal lobe of the left hemisphere of the cerebrum, by the anterior section line from the thalamus opticus out into the anterior portion of the longitudinal fissure (shown on the left side of Fig. 1, Plate 218). Remove the temporo-sphenoidal and occipital lobes of the right hemisphere of the cerebrum, by the oblique cut through the posterior portion of the right thalamus opticus (as on the left side of Fig. 1, Plate 218), and the cut through the right posterior pillar of the fornix and the splenium of the corpus callosum (as shown, on the left side, in Fig. 2, Plate 218). Hold the cerebellum and medulla oblongata so as to expose the interior of the fourth ventricle of the brain (as in Fig. 1, Plate 220).

40. Postero-inferior Opening into the Fourth Ventricle of the Brain, Fig. 1, Plate 220.—The postero-inferior portion of this ventricle is located between the postero-superior surface of the medulla oblongata and the inferior surface of the cerebellum. The sides of its floor present the diverging *restiform bodies* of the medulla oblongata or inferior peduncles of the cerebellum entering the latter part of the brain.

41. Cerebellum, Plate 211; Plates 213 to 218, inclusive; Plates 220 and 221; Fig. 2, Plate 222.—This portion of the brain is located inferiorly to the occipital lobes of the hemispheres of the cerebrum, and postero-superiorly to the medulla oblongata and pons Varolii. It is in continuity with the other three parts of the brain, as follows: with the medulla oblongata by the *restiform bodies* of the latter, which are its, right and left, *inferior* or *medulla oblongata peduncles* (Plate 220; Fig. 2, Plate 222); with the pons Varolii by the inferior, transverse, fibres of the same, which form its, right and left, *middle* or *pons Varolii peduncles* (Plate 214; Fig. 1, Plate 220; Fig. 2, Plate 222); with the cerebrum by the *processi e cerebello ad testes*, which are its, right and left, *superior* or *cerebrum peduncles* (Fig. 2, Plate 220; Fig. 2, Plate 222). It is divided into a *right* and a *left hemisphere* by a postero-inferior *notch* (Fig. 2, Plate 220; Fig. 1, Plate 221). Its median-line portion is commissural between the hemispheres, forming the *inferior* and the *superior vermiform processes* (Plate 220; Fig. 1, Plate 221). Its surface differs from that of the cerebrum, in that it presents laminæ separated by linear furrows, instead of convolutions divided by sulci.

DISSECTION.—Section the peduncles of the cerebellum, as follows: the right and left inferior peduncles, and the right and left middle peduncles (Fig. 1, Plate 220; Fig. 2, Plate 222); the right and left superior peduncles, as in Fig. 2, Plate 222. Place the cerebellum so as to present its antero-inferior surface (Fig. 2, Plate 220); cut away the right amygdala.

42. Antero-inferior Surface of the Cerebellum, Plate 220.—Anteriorly, the cerebellum presents a broad notch (Fig. 2, Plate 220) for its adaptation to the postero-superior surfaces of the medulla oblongata and the processi e cerebello ad testes—this surface contributes to the *roof of the fourth ventricle;* it is within this area that the right and left *superior*, *middle*, and *inferior peduncles of the cerebellum* enter its substance (Fig.

2, Plate 220). Anteriorly, at its median-line portion, between its superior peduncles is the *lingula* (Fig. 2, Plate 220; Fig. 1, Plate 221), which *in situ*, rests upon the superior surface of the valve of Vieussens, between the processi e cerebello ad testes (Fig. 2, Plate 222). Along the median line of its inferior surface is a depressed area, the *vallecula*, within which is located the inferior portion of the transverse commissure between the hemispheres, the *inferior vermiform process* (Fig. 2, Plate 220). The latter process presents, in order antero-posteriorly, several distant prominences: the *nodule*, the *uvula*, the *pyramid*, and the *tuber uvulæ*. Laterally, there pass from the nodule to the right and left flocculus of the hemispheres, respectively, a thin band of white neural tissue, the right and left *inferior medullary velum* (Fig. 2, Plate 220). The inferior surface of a hemisphere of the cerebellum presents, near its external lateral border, a *horizontal fissure*. Minor fissures (not named) divide this surface of a hemisphere into areas, named as follows: externally to the horizontal fissure is the inferior face of the *postero-superior lobe;* internally and anteriorly to the horizontal fissure are the *postero-inferior lobe*, the *slender lobe*, the *biventral lobe*, the *flocculus*, and the *amygdala*.

DISSECTION.—Turn the cerebellum so as to present its superior surface (Fig. 1, Plate 221).

43. Superior Surface of the Cerebellum, Fig. 1, Plate 221. —At this area of the cerebellum is seen the posterior *notch*, which divides the organ into a right and a left hemisphere. The superior part of its median-line, commissural, portion presents the *superior vermiform process*, which is surmounted by a part of the *lingula*. At this surface of a cerebellar hemisphere are found the following defined areas: the partial superior face of the *postero-inferior lobe*, is at its postero-internal border; a part of the *horizontal fissure* divides the latter lobe from the *postero-superior lobe;* and anteriorly to the latter lobe is the *antero-superior lobe*.

DISSECTION.—Place the cerebellum upon its superior surface, with its posterior border toward you, and section its hemispheres (Fig. 2, Plate 221) as follows: the right, by a transverse antero-posterior cut, near the middle of its vertical diameter; the left, by a transverse vertical cut at about the middle of its antero-posterior diameter.

44. Structural Appearances of the Cerebellum, Fig. 2, Plate 221.—The interior of the cerebellum presents circumferential grey and central white neural tissue. The lamination of its exterior determines a peculiar foliated appearance at the circumference of its vertical section called *arbor vitæ*—this results from the grey neural tissue borders to the minor fissures of its exterior, in contrast with the central white neural tissue. At the side of the median line the central, white, neural tissue of a cerebellar hemisphere presents a small area bordered by a dentated line of grey neural tissue, with a lighter-colored centre, the *corpus dentatum*.

DISSECTION.—Cut away the stump of the cerebrum anteriorly to the pons Varolii, as in Fig. 1, Plate 222; place the same, with the pons Varolii and medulla oblongata portions of the brain, in the position shown in Fig. 1, Plate 222. Follow the left optic tract to the geniculate bodies of the left thalamus opticus.

45. Optic Tract, and the External and Internal Geniculate Bodies of a Thalamus Opticus, Fig. 1, Plate 222.—The optic tracts were partly described (page 415) and illustrated (Plate 214). An optic tract may be followed, externally and posteriorly, to the inferior surface of the posterior portion of a thalamus opticus, where it enters the two prominences of the *external* and *internal geniculate body* there located.

DISSECTION.—Turn the part of the brain, Fig. 1, Plate 222, upon its antero-inferior surface, so as to display its postero-superior area, as in Fig. 2, Plate 222.

46. Corpora Quadrigemina, Fig. 1, Plate 218; Figs. 2 and 3, Plate 222.—These present as four prominences, two anterior —*nates*—and two posterior—*testes;* they are divided by a median line and a transverse furrow (Fig. 2, Plate 222), and are located posteriorly to the cavity of the third ventricle, and the internal portions of the right and left thalamus opticus. The *pineal body* is lodged superiorly to the anterior portions of the nates (page 422; Figs. 2 and 3, Plate 222). From the external and the internal geniculate bodies, respectively, an optic tract branches to the natis and testis, of a side, by well-marked lateral welts, the *superior* and *inferior brachium* of the latter bodies, respectively.

47. Processi e Cerebello ad Testes, Fig. 2, Plate 222.—These are a right and a left band of white neural tissue, which are projected postero-inferiorly from the right and left testis, respectively, of the corpora quadrigemina, to the cerebellum; they are the superior or cerebrum peduncles of the cerebellum (page 426; Fig. 2, Plate 220).

48. Valve of Vieussens and the Fourth Pair of Cranial or the Trochlear Nerves.—This valve is a sheet of grey neural tissue, that bridges between the internal borders of the processi e cerebello ad testes; upon the superior surface of its posterior portion the lingula (Fig. 2, Plate 220) of the cerebellum is lodged. From the superior surface of its anterior portion the fourth pair of cranial or the *trochlear* nerves take their exterior origins.

DISSECTION.—Return the portion of brain to its former position, as in Fig. 1, Plate 222.

49. Crura Cerebri or Cerebral Peduncles, Plate 214; Fig. 1, Plate 222.—These were partly described (page 415) and illustrated (Plate 214). They diverge, right and left, from the anterior of the pons Varolii; they are projected from the latter to the basal ganglia of the cerebrum—the thalami optici and the corpora striata. The third pair of cranial or the trochlear nerves wind over their external, to their inferior, surfaces; and the third pair of cranial or *oculomotor* nerves have their exterior origins from their internal surfaces.

50. Pons Varolii, Plates 211 and 214; Fig. 1, Plate 220; Fig. 1, Plate 222.—This part of the brain, before referred to (page 216; Plate 214), is the commissure between the other three parts of the organ. Its inferior, and exterior, fibres are transversely commisural between the hemispheres of the cerebellum, forming its right and left middle or pons Varolii peduncles (page 422; Plates 214 and 220; Fig. 1, Plates 221). Its interior and superior, substance is longitudinally commissural between the medulla oblongata and the cerebrum. Its postero-superior surface contributes to the floor of the fourth ventricle (Fig. 3, Plate 222). The fifth pair of cranial or *trifacial* nerves (a sensory and a motor root) emerge from the anterior of its lateral portion.

51. Medulla Oblongata, Plates 211 and 214; Fig. 1, Plate 220; Plate 222.—This portion of the brain was before referred to (page 417; Plate 214). Besides being the most vital nerve centre, its parts are longitudinally commissural: between the spinal cord and the cerebellum; and between the spinal cord and the pons Varolii. Its grey neural tissue is central, but by the divergence, at its postero-superior surface of its posterior—longitudinal portions, its central grey neural tissue is exposed, at the medulla oblongata portion of the floor of the fourth ventricle of the brain (Fig. 2, Plate 222).

52. Antero-lateral Surface of the Medulla Oblongata, Plate 214; Fig. 1, Plate 222.—This area of the medulla oblongata presents the following: an *anterior median fissure* continued from the spinal cord; externally to, and parallel with, the fissure is an anterior, longitudinal, column, continued from the lateral column of the spinal cord, the *pyramid*—its fibres decussate at the bottom of the fissure, with those of its fellow of the opposite side; externally to a pyramid is a *lateral column* continued from the same column of the spinal cord—which has an *olivary body* lodged in its superior end—the spinal accessory nerve has a partial exterior origin from this column of the medulla oblongata; a slight *antero-lateral groove* presents between an olivary body and a pyramid, from which the exterior origin of the hypoglossal nerve is projected (page 418; Plates 211 and 214)—inferiorly the groove is traceable to the spinal cord; posteriorly to a lateral column is a *funiculus of Rolando*, inferiorly, which is continued into a *restiform body*, superiorly; between an olivary and a restiform body a *postero-lateral groove* exists, from which a *glosso-pharyngeal* and a *pneumogastric* nerve are given off—the groove is not well defined, inferiorly. A transverse groove divides the medulla oblongata from the pons Varolii—the *abducent*, *facial nerve of Wrisberg*, and *auditory* nerves are projected from this fissure, contiguously to the olivary bodies.

Dissection.—Turn the portion of brain (Fig. 1, Plate 222) upon its antero-inferior surface, thereby presenting its postero-superior face (Fig. 2, Plate 222).

53. Postero-superior Surface of the Medulla Oblongata, Fig. 1, Plate 220; Figs. 2 and 3, Plate 222.—This area presents the following: a *posterior-median fissure;* for its inferior half, and at either side of the fissure, are the right and left *funiculus gracilis*, which broaden superiorly into a right and left *clava*, and diverge externally; externally to the latter, and separated from them by longitudinal grooves are the right and left *funiculus cuneatus;* externally to, parallel with, and separated by slight grooves from, the last-described funiculi, are the right and left *funiculus of Rolando.* The two last named funiculi diverge, superiorly, and fuse to form the right and left *restiform body*, respectively, or the inferior or medulla oblongata peduncles of the cerebellum. The right and left divergence of the posterior longitudinal portions of the medulla oblongata determines the inferior apex of the floor of the fourth ventricle.

DISSECTION.—Make two longitudinal cuts along the lines of fusion of the valve of Vieussens with the right and left processi e cerebello ad testes; reflect the former anteriorly upon the corpora quadrigemina, as in Fig. 3, Plate 222.

54. Interior of the Fourth Ventricle of the Brain, Fig. 1, Plate 220; Figs. 2 and 3, Plate 222.—The postero-inferior opening of this ventricular cavity was described (page 425) and illustrated (Fig. 1, Plate 220). Superiorly its roof is formed, antero-posteriorly by: the *valve of Vieussens* (Fig. 2, Plate 222); the right and left *processus e cerebello ad testes* (Fig. 2, Plate 222); and the ventricular area of the antero-inferior surface of the *cerebellum* (Plate 220). Laterally, it is bounded by (Figs. 2 and 3, Plate 222): the fusion of the right and left *processus e cerebello ad testes* with the *pons Varolii;* the internal surfaces of the right and left *restiform bodies* of the medulla oblongata; and the divergence of the *funiculi* at the posterior of the medulla oblongata. Inferiorly, is its floor, which is divided into two portions: for its inferior third, the *medulla oblongata portion*, which is formed by the superior part of the postero-superior face of the medulla oblongata; for its superior two-thirds, the *pons Varolii portion*, which is the postero-superior area of the pons Varolii.

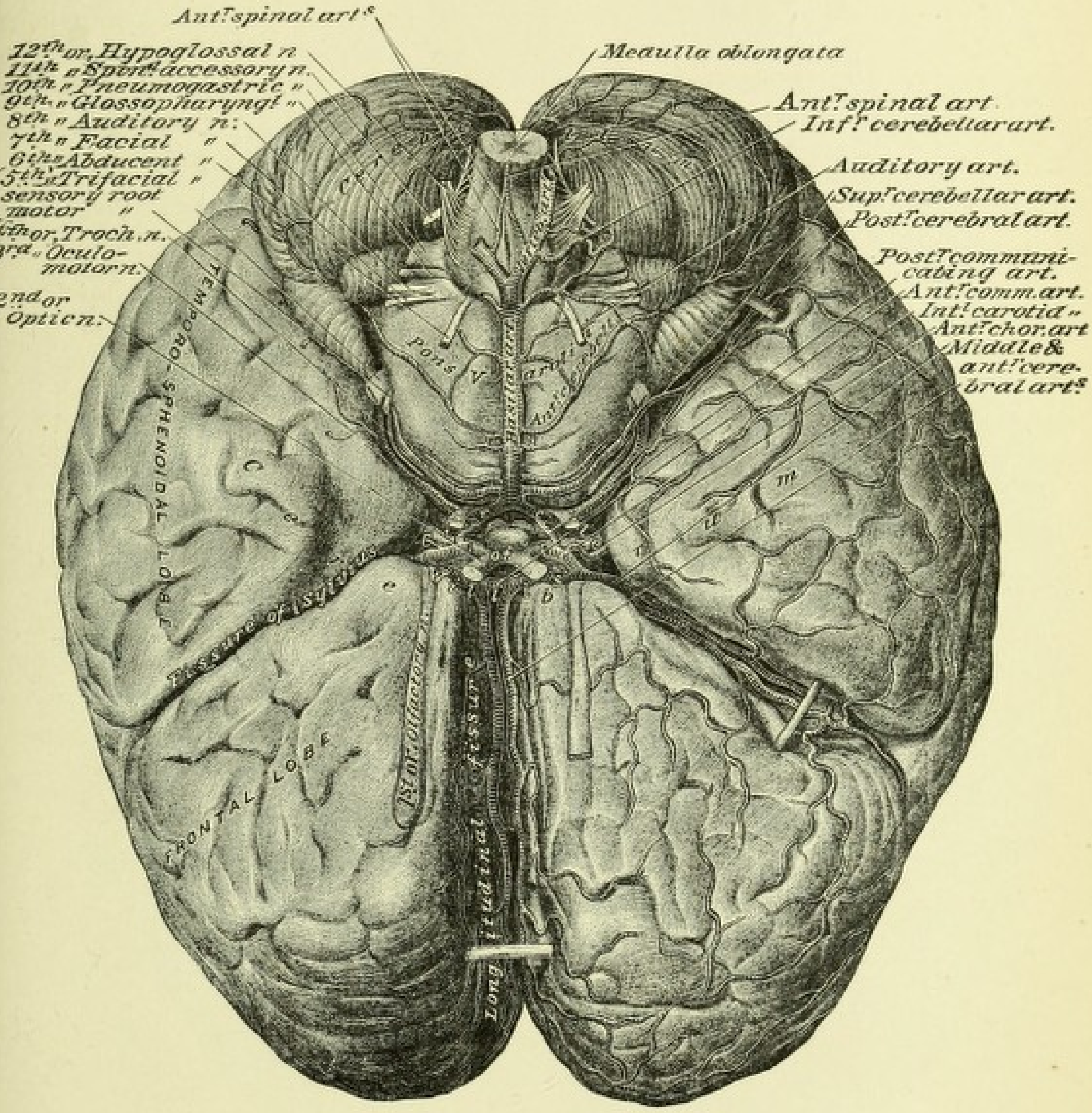
The *medulla oblongata portion* of the floor of the fourth ventricle (Fig. 2, Plate 222) is shaped like a pen-point, hence it is named the *calamus scriptorius*—at the bottom of the cavity of the tip is the opening into the *central canal of the spinal cord.* At the median line of the portion is a longitudinal groove, the *median sulcus;* from the lateral portions of the floor, superficial linear markings of fibres present, the *striæ acusticæ,* which pass externally, out of the ventricle, and join the auditory nerve, right and left, respectively.

The *pons Varolii portion* of the floor of the fourth ventricle (Fig. 3, Plate 222) presents the superior continuance of the *median sulcus.* At its superior end is the posterior opening of the *aqueduct of Sylvius* (a bristle emerges from it); the anterior opening of this aqueduct was described (page 423) and illustrated (Fig. 1, Plate 218; the aqueduct or canal runs between these two openings, inferiorly to the corpora quadrigemina, from the third (page 423; Fig. 1, Plate 219) to the fourth ventricle of the brain. At the external ends of the transverse line of junction of the two portions of the fourth ventricle are the *lateral recesses* of the cavity.

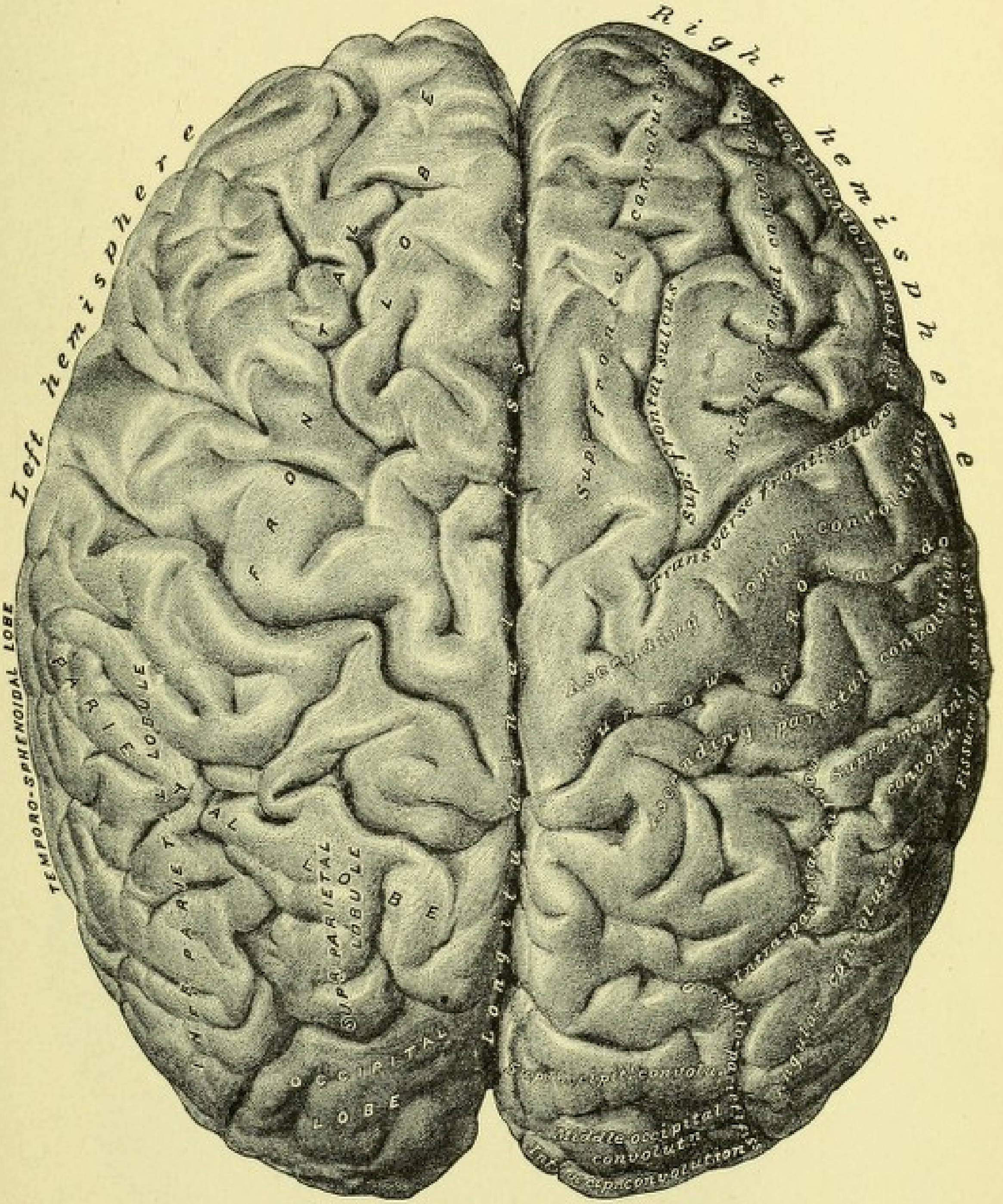
Dissection.—Section, as in Fig. 3, Plate 219, longitudinally, at the left of the median line, through the medulla oblongata, pons Varolii, corpora quadrigemina, crus cerebri, and thalamus opticus.

55. Structural Appearances of the Medulla Oblongata, Pons Varolii, Corpora Quadrigemina, Crus Cerebri, and Thalamus Opticus, Fig. 3, Plate 219.—This section of these parts is made to afford an approximate appreciation of the distribution of the grey and white neural tissues through them.

FINIS.

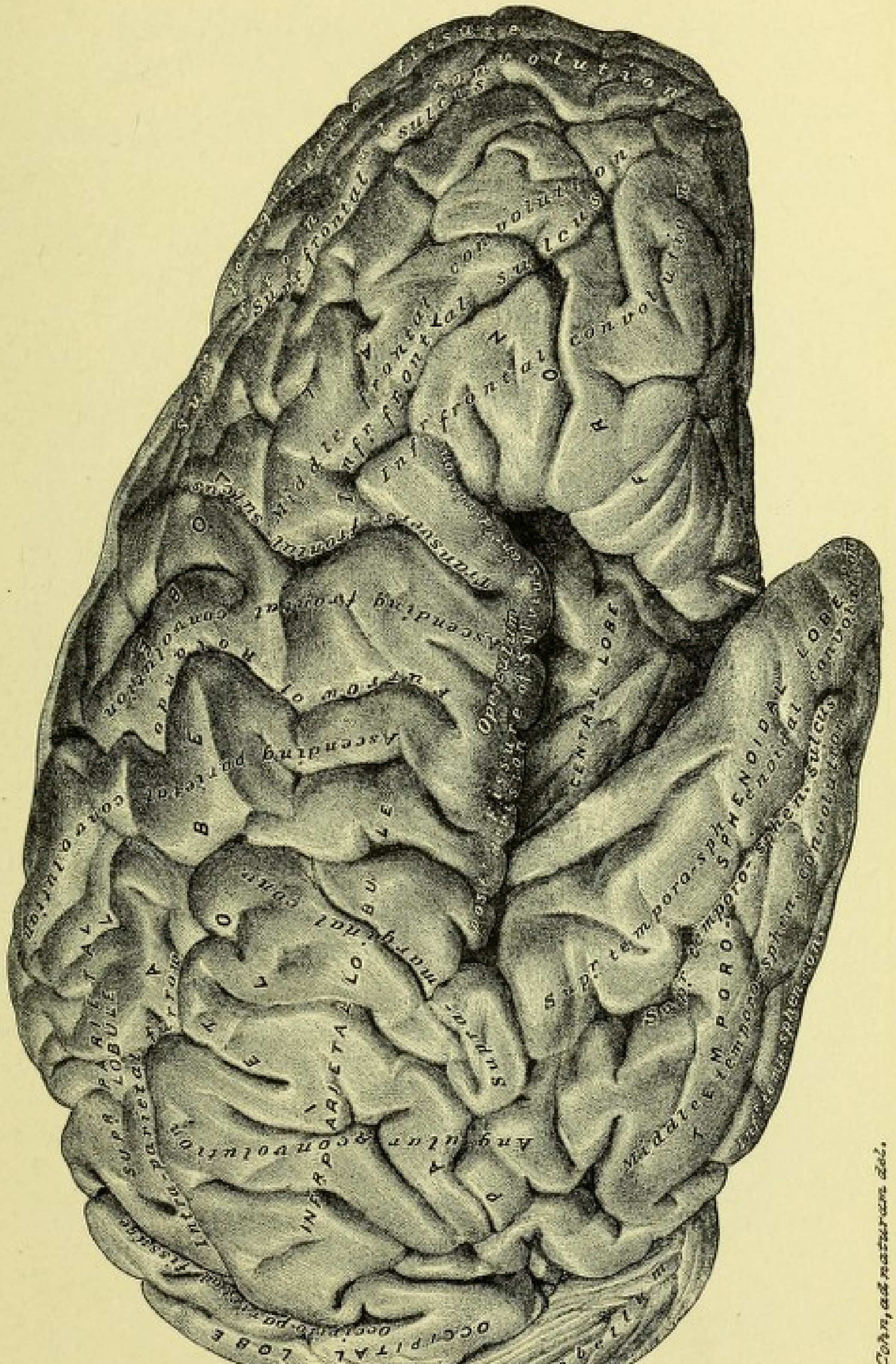


M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

PLATE 213



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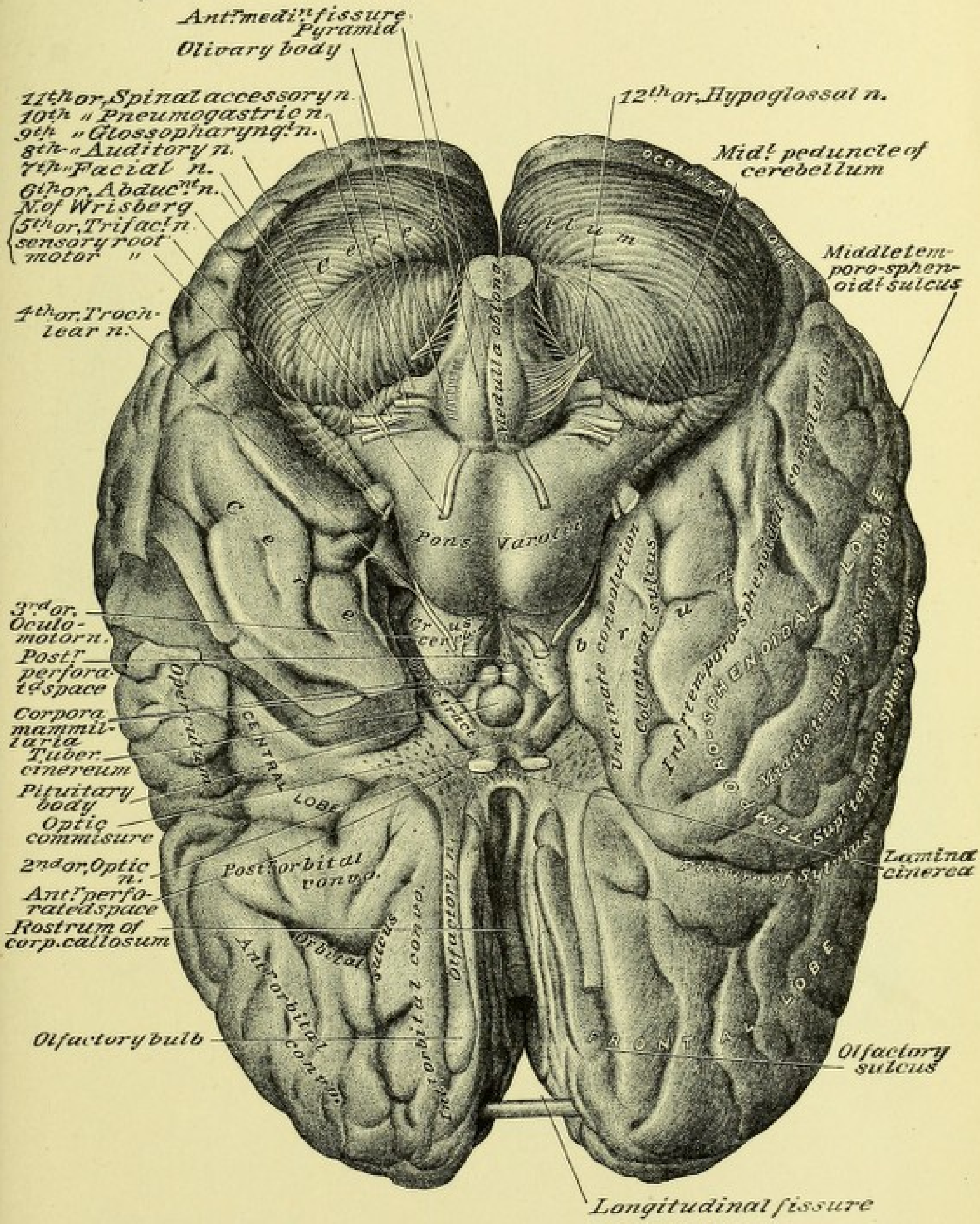

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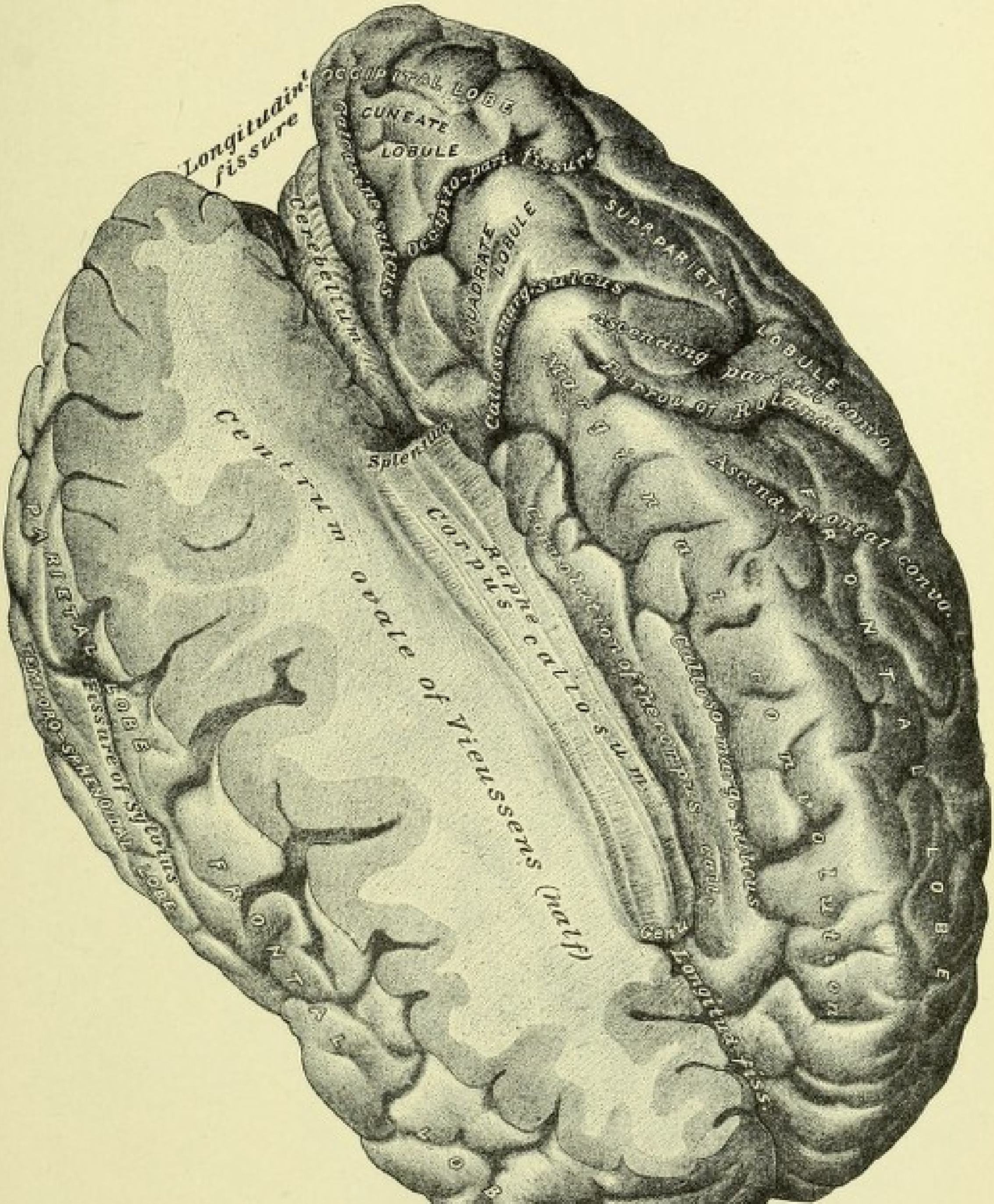

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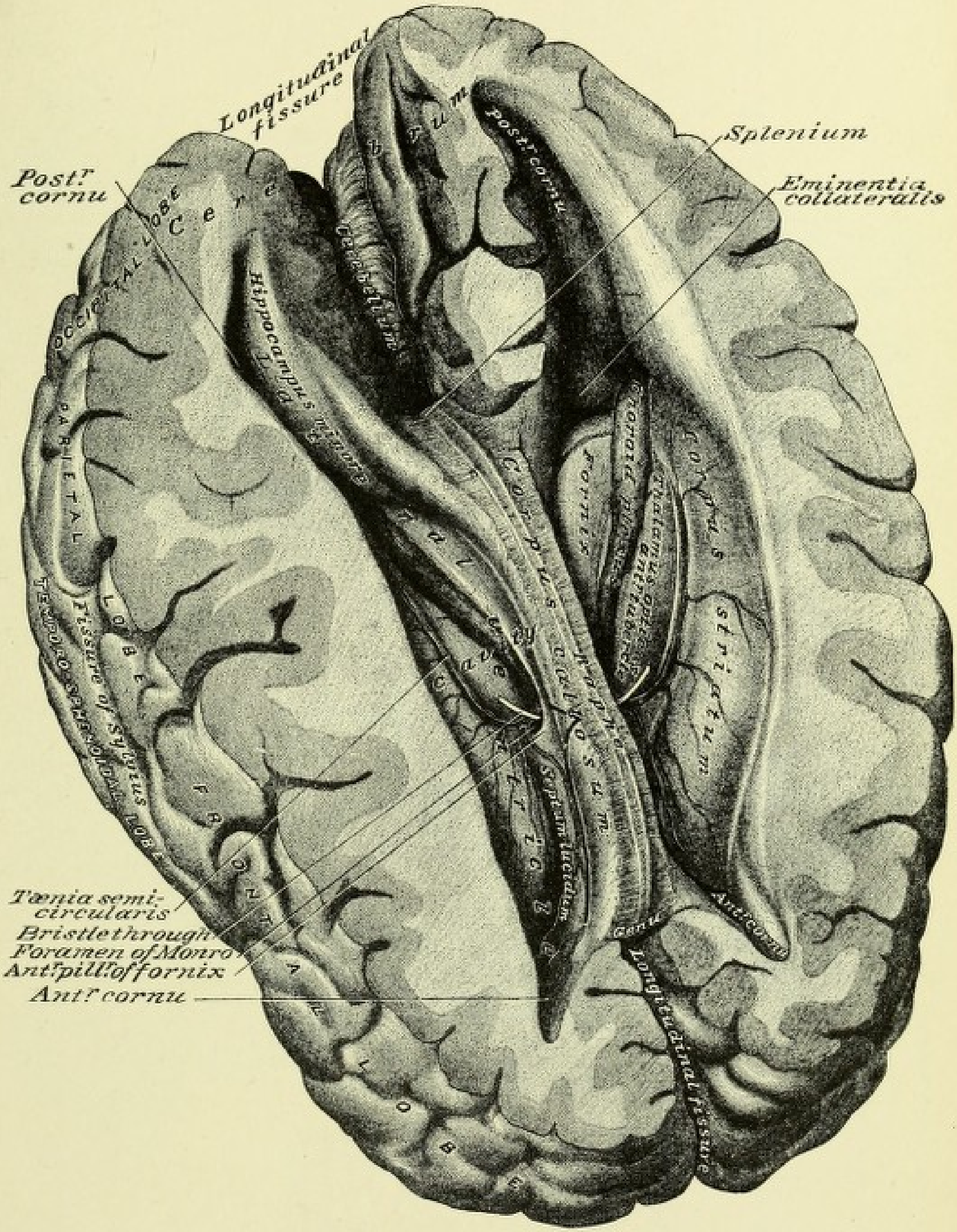

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FIG. 1

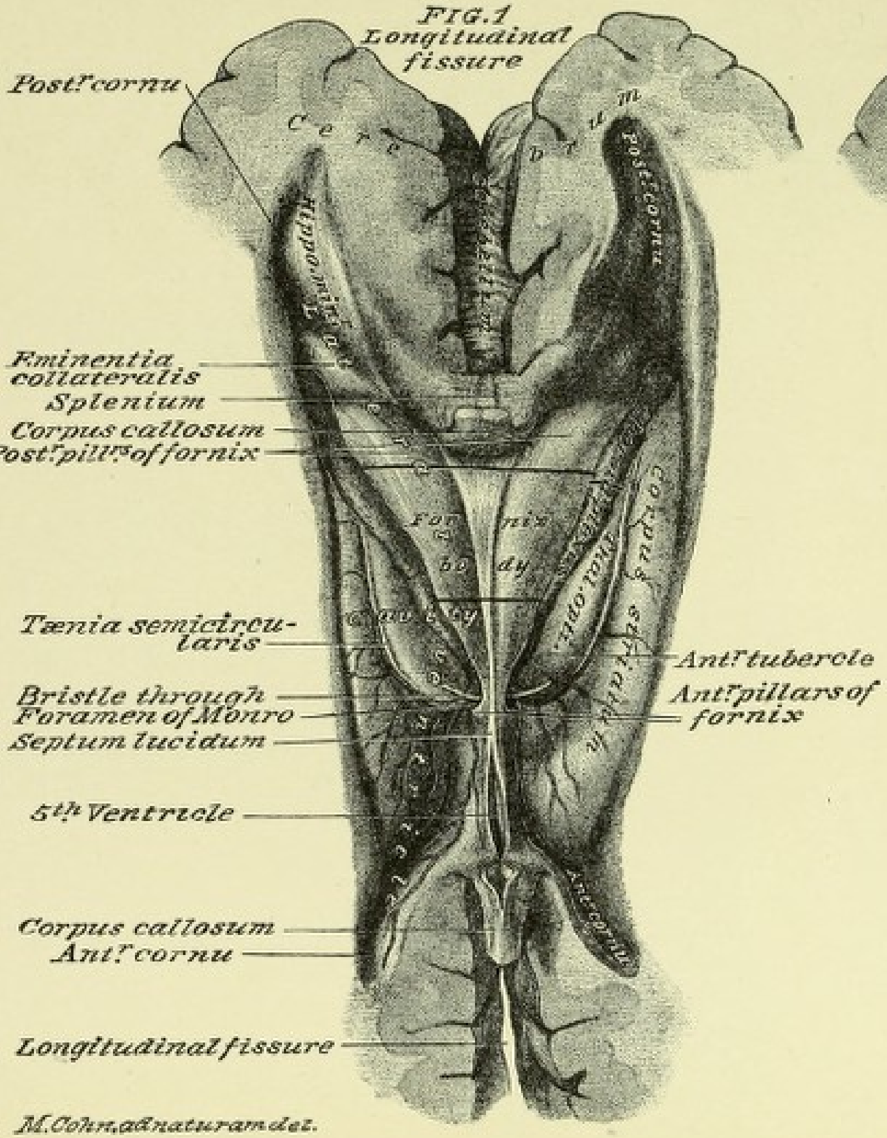
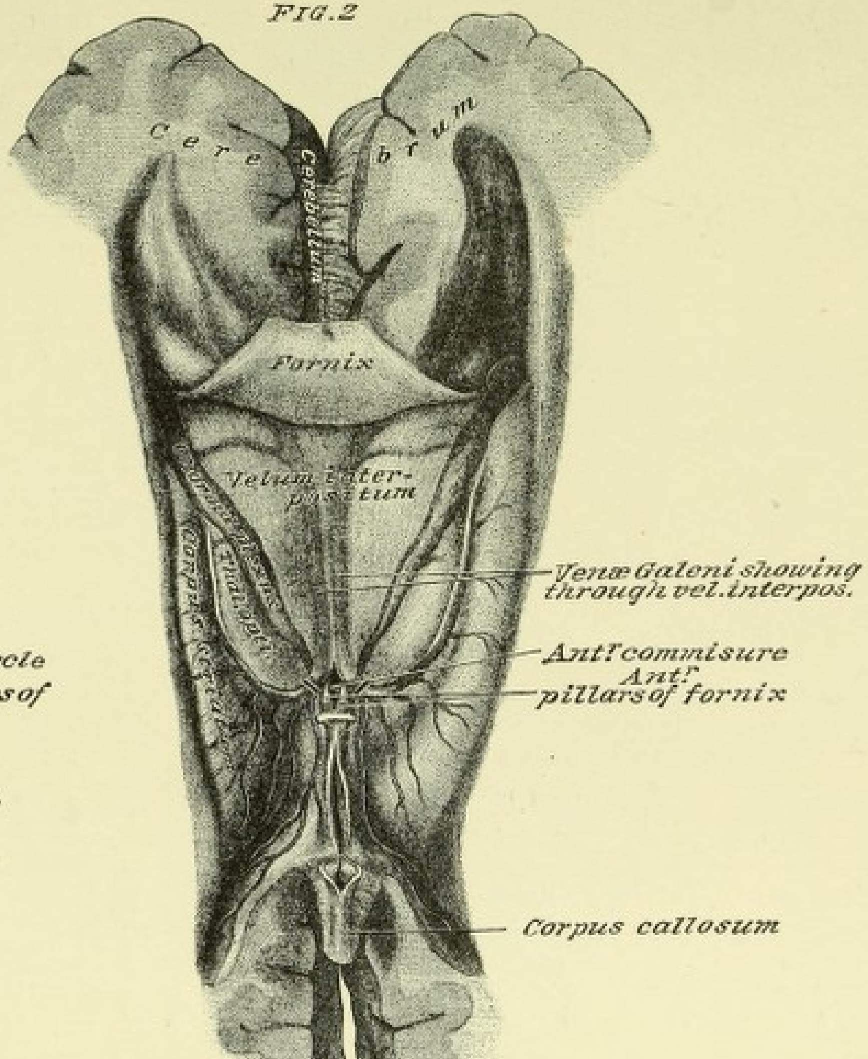


FIG. 2



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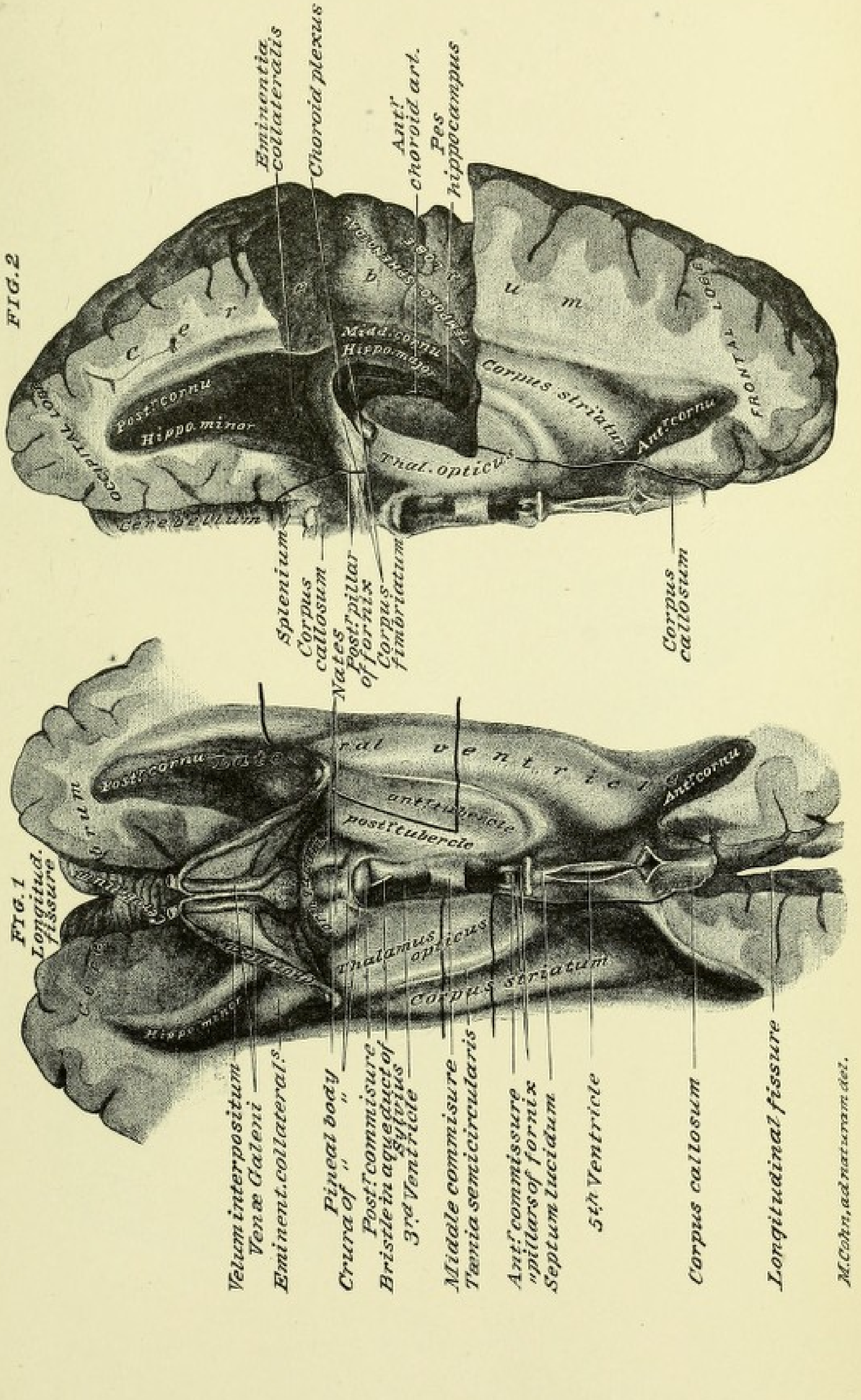
FIG. 1
Longitud. fissure
Velum interpositum
Venæ Galeni
Eminent. collateral.s
Pineal body
Crura of "
Post.r commisure
Bristle in aqueduct of Sylvius
3rd Ventricle
Middle commisure
Tænia semicircularis
Ant.r commissure
" pillars of fornix
Septum lucidum
5th Ventricle
Corpus callosum
Longitudinal fissure
Nates
Post.r cornu
Hippo. minor
ral ventricle
ant.r tubercle
post.r tubercle
Thalamus opticus
Corpus striatum
Ant.r cornu
FIG. 2
Eminentia collateralis
Choroid plexus
Ant.r choroid art.
Pes hippocampus
Midd. cornu
Hippo. major
Post.r cornu
Hippo. minor
Occipital lobe
Cerebellum
Thal. opticus
Corpus striatum
Ant.r cornu
Frontal lobe
Splenium
Corpus callosum
Post.r pillar of fornix
Corpus fimbriatum
Corpus callosum
M. Cohn, ad naturam del.

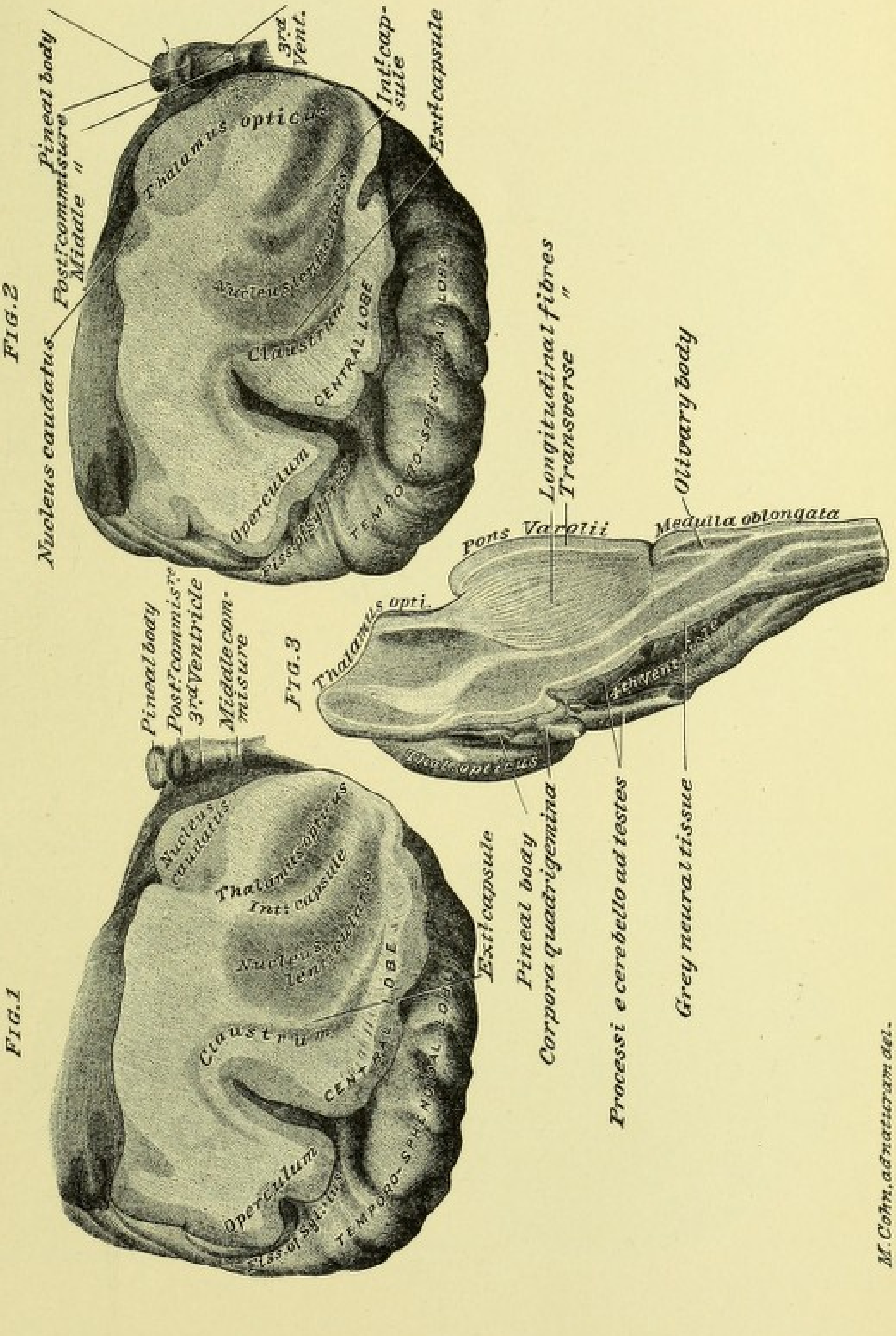

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FIG. 1

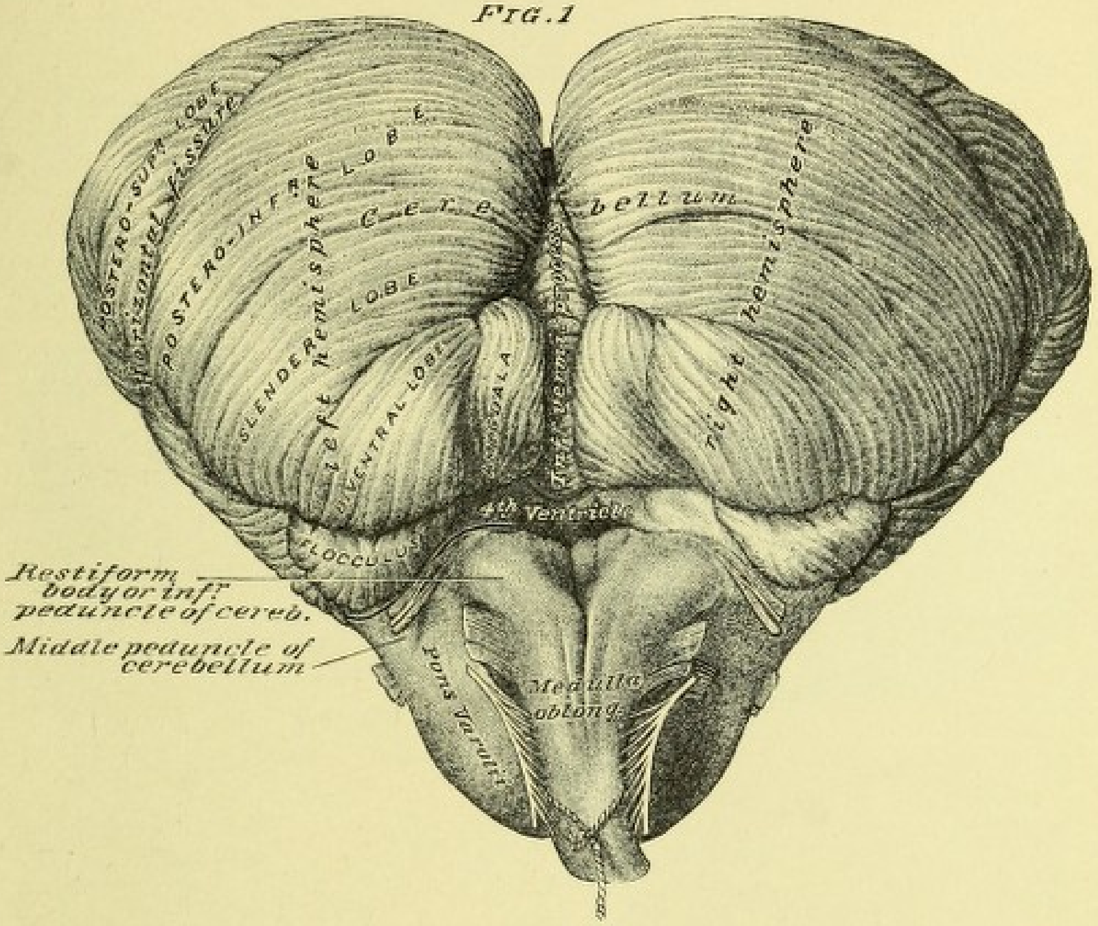
POSTERO-SUPR LOBE
Horizontal fissure
POSTERO-INFR LOBE
SLENDER LOBE
left hemisphere
C e r e b e l l u m
BIVENTRAL LOBE
AMYGDALA
Infr vermif. process
right hemisphere
4th Ventricle
FLOCCULUS
Restiform body or infr. peduncle of cereb.
Middle peduncle of cerebellum
Pons Varolii
Medulla oblong.

FIG. 2

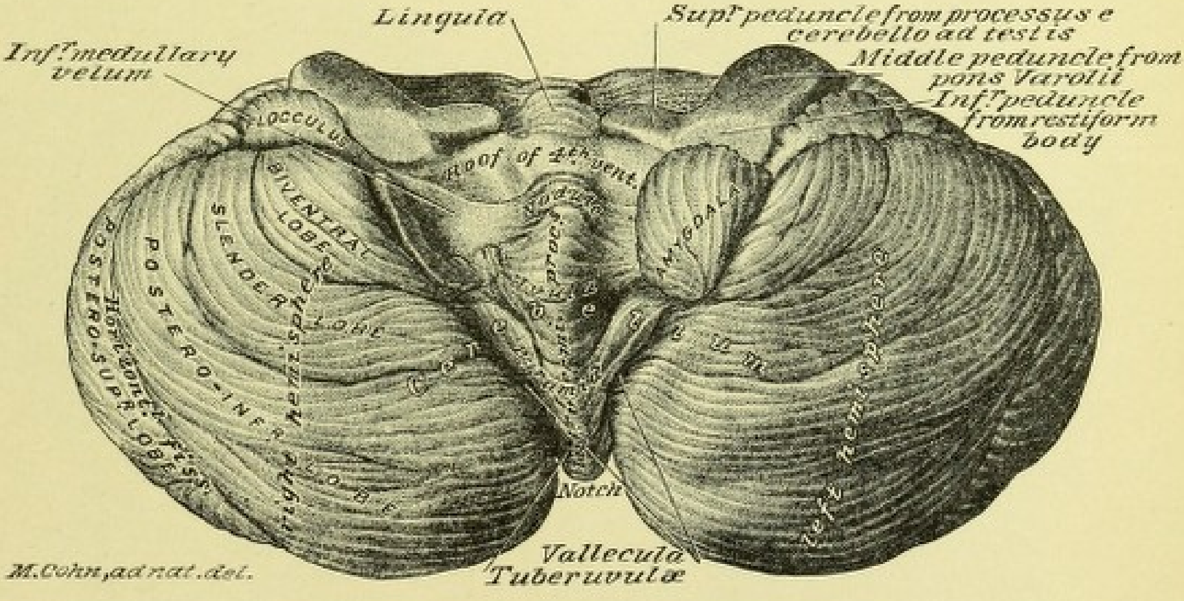
Lingula
Supr peduncle from processus e cerebello ad testis
Infr medullary velum
Middle peduncle from pons Varolii
Infr peduncle from restiform body
FLOCCULUS
Roof of 4th vent.
BIVENTRAL LOBE
SLENDER LOBE
POSTERO-SUPR LOBE
Horizontal fissure
POSTERO-INFR LOBE
AMYGDALA
right hemisphere
left hemisphere
Notch
Vallecula
Tuberuvulæ
M. Cohn, ad nat. del.

FIG. 1

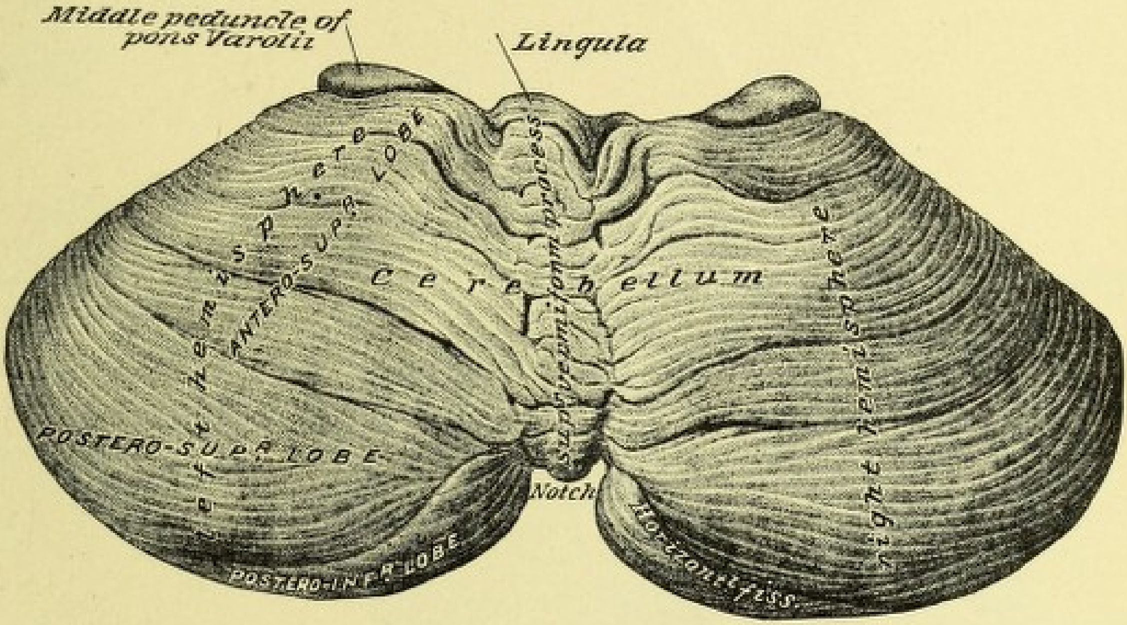

FIG. 2

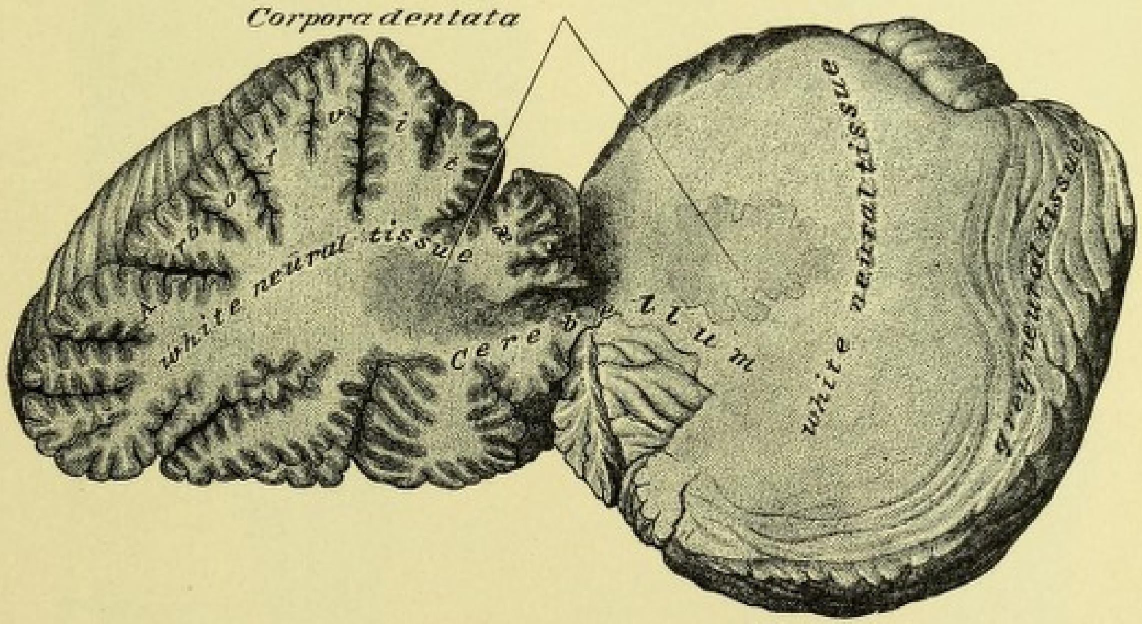

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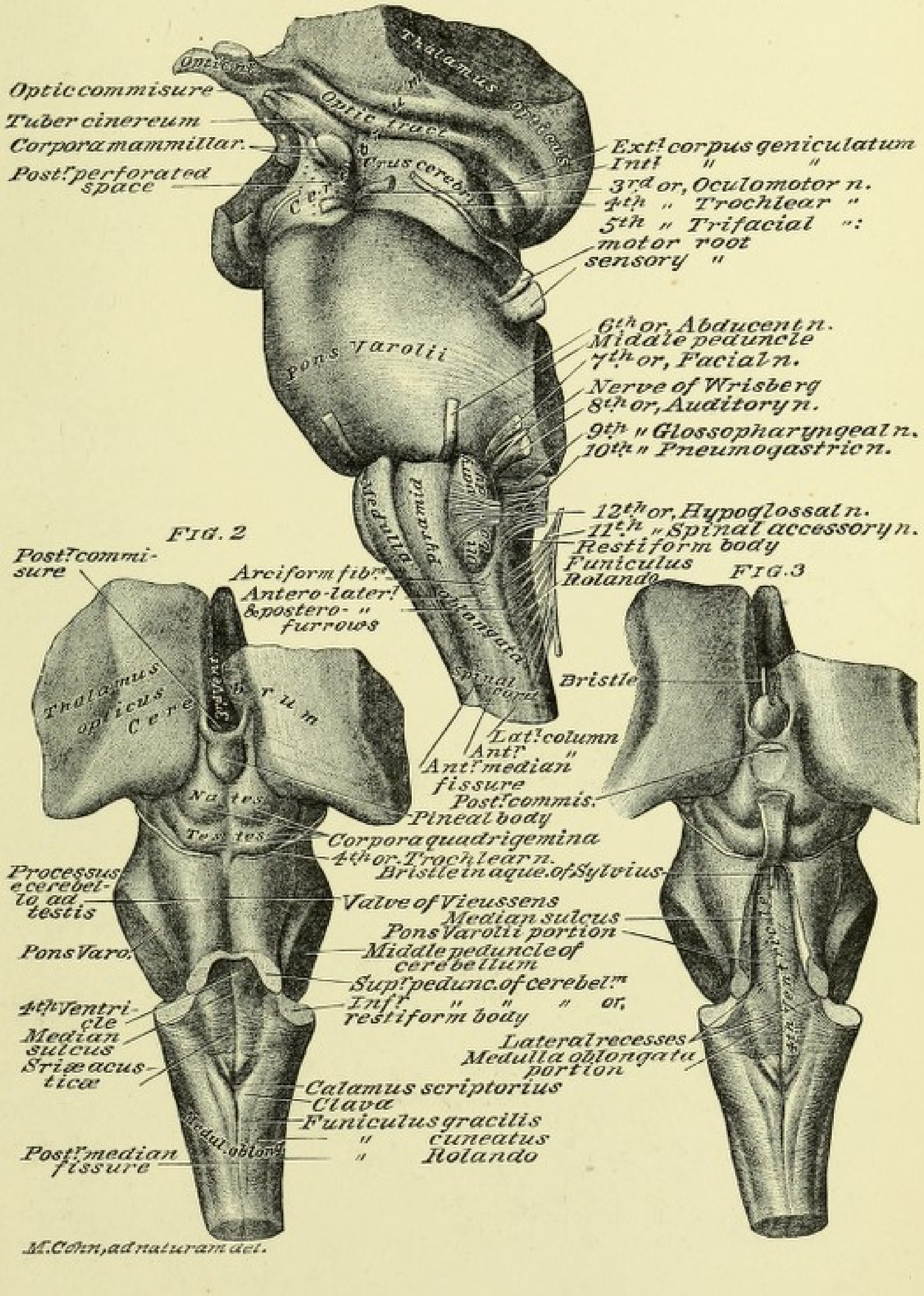
PLATE 222.

FIG. 1



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INDEX.

☞ *This index has been compiled with two styles of figures: the first, which come before the semicolons—1-2-3-4-5-6-7-8-9-0—refer to the pages of the text; the second, which come after the semicolons—***1, 2, 3, 4, 5, 6, 7, 8, 9, 0***—refer to the Plates. To avoid complication, references to the Figures of the Plates are omitted, the Plate reference being considered sufficient. A Plate reference, like this—***192** *to* **197***—means that the part referred to is illustrated in the plates from* **192** *to* **197**, *inclusive.*