PRACTICAL HUMAN ANATOMY

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A.E.HANSON,
PHILA, PA.

A E Hanson
UC. 92
Med. Dep


SEM EFEITO
de Medicina e Cirurgia de S. Paulo


INSTITUTO DE CIÊNCIAS BIOMÉDICAS - USP
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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.

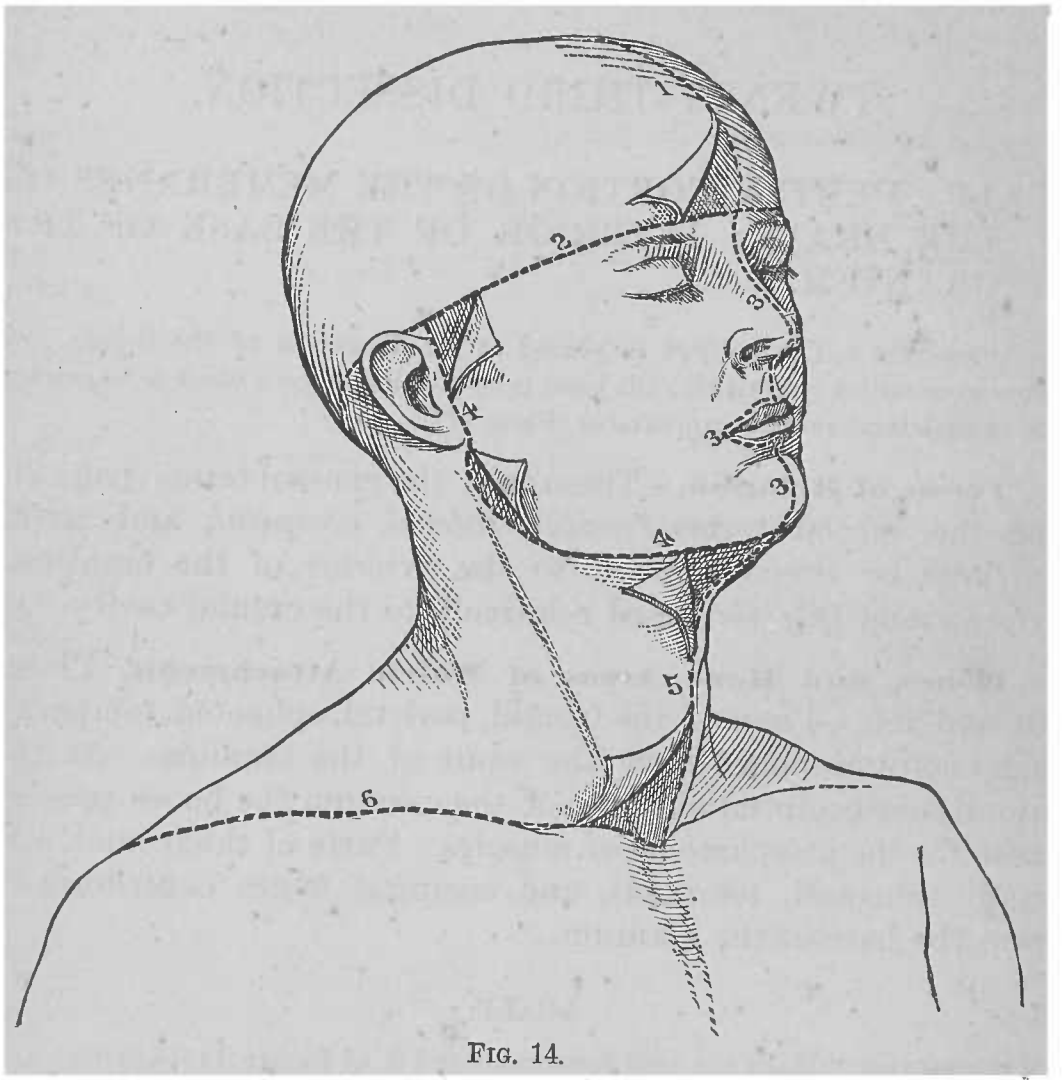


FIG. 14.

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 zygo-

matic 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).

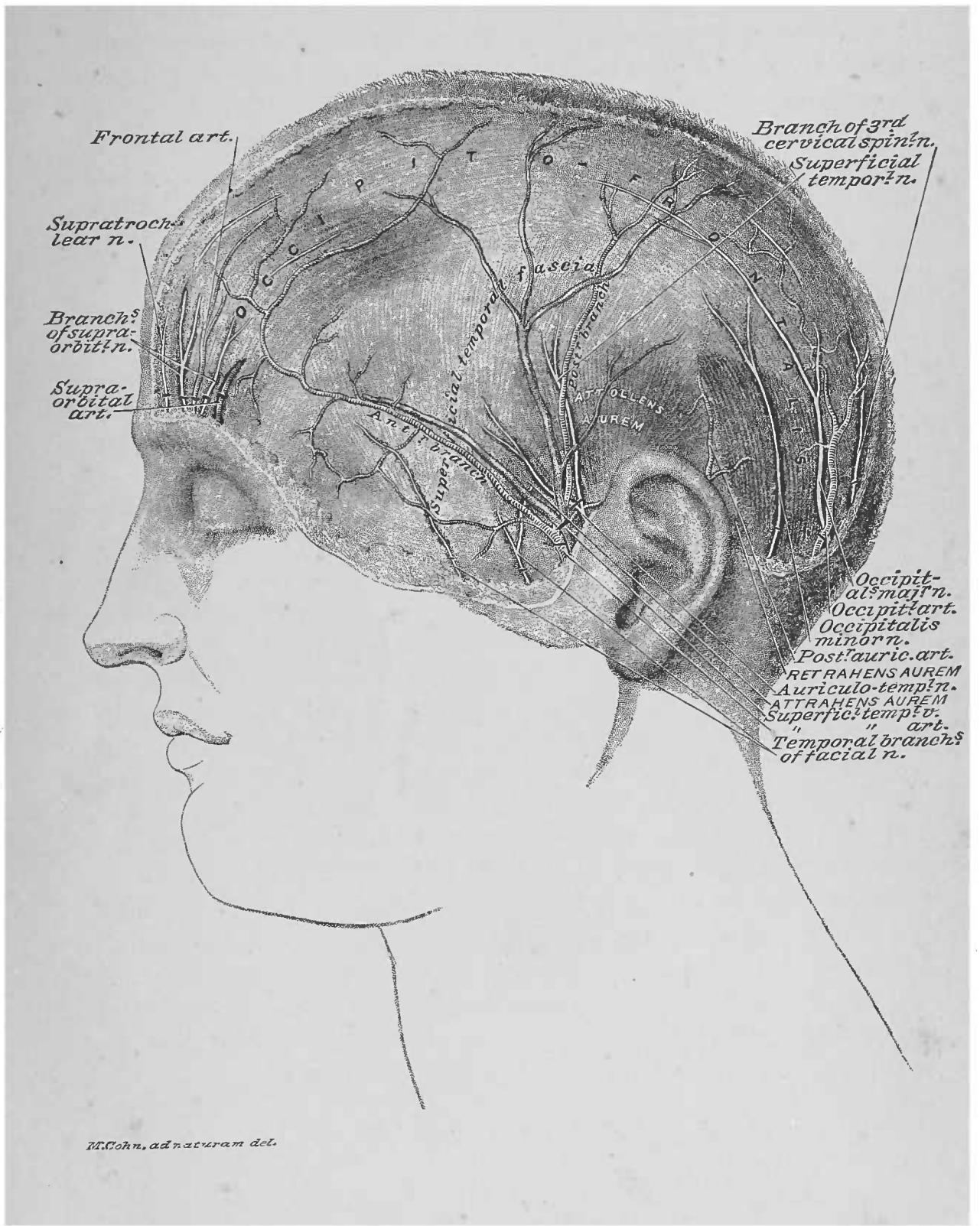

Frontal art.
Supratrochlear n.
Branchs of supra-orbit.n.
Supra-orbital art.
OCCIPITO-FRONTALIS
Superficial temporal fascia
Ant. branch
Superficial temporal art.
Post. branch
ATT. OLLENS AUREM
Branch of 3rd cervical spin.n.
Superficial tempor.n.
Occipit-alis majr n.
Occipit.l art.
Occipitalis minor n.
Post.l auric. art.
RETRAHENS AUREM
Auriculo-temp.l n.
ATTRAHENS AUREM
Superfic.l temp.l v.
" " art.
Temporal branchs of facial n.
M. Cohn, ad naturam del.

FIG. 1

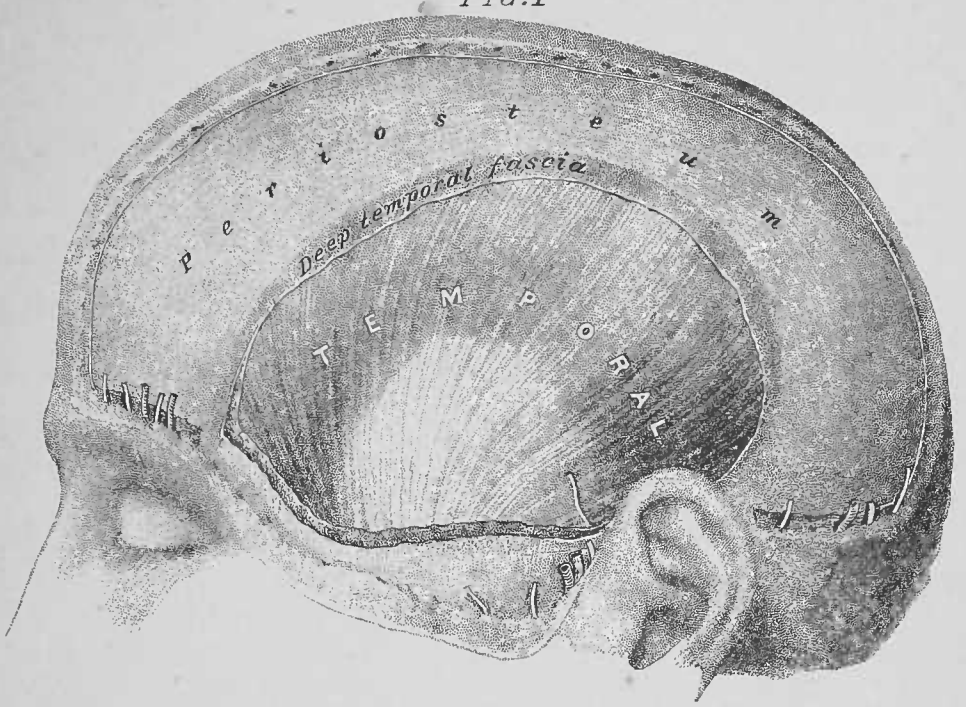
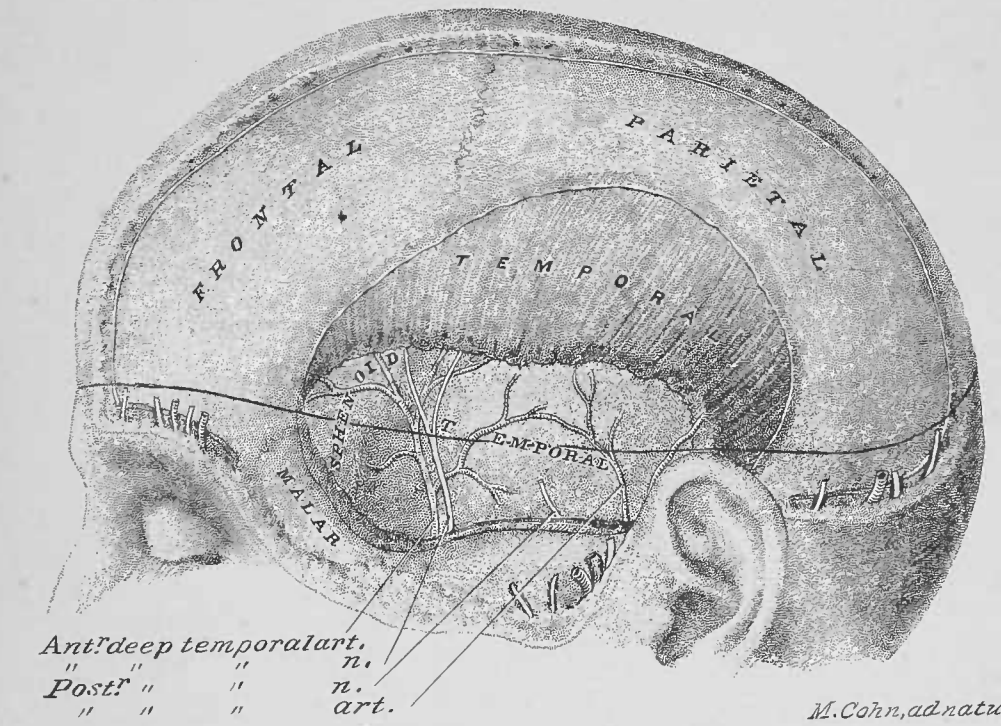
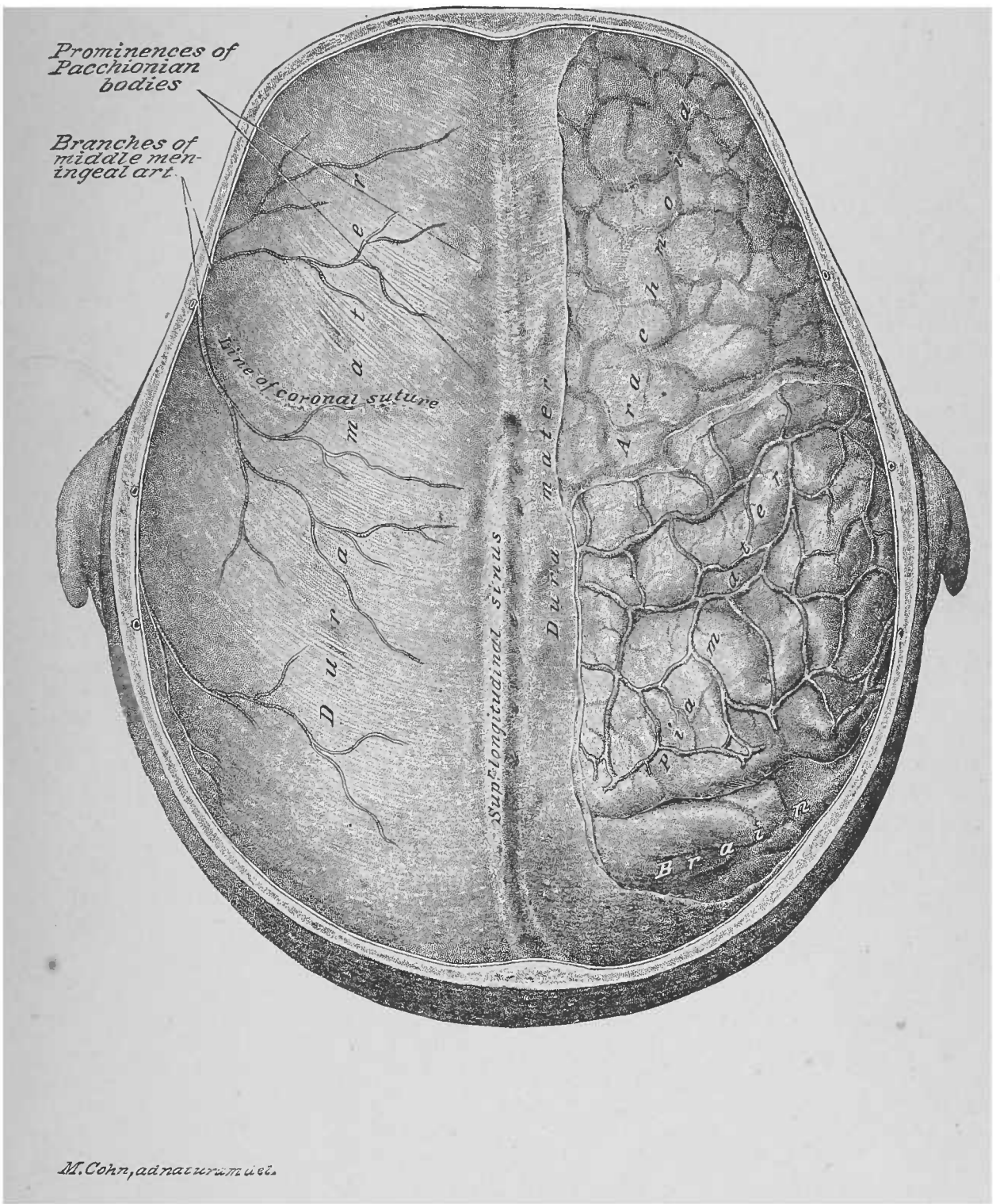


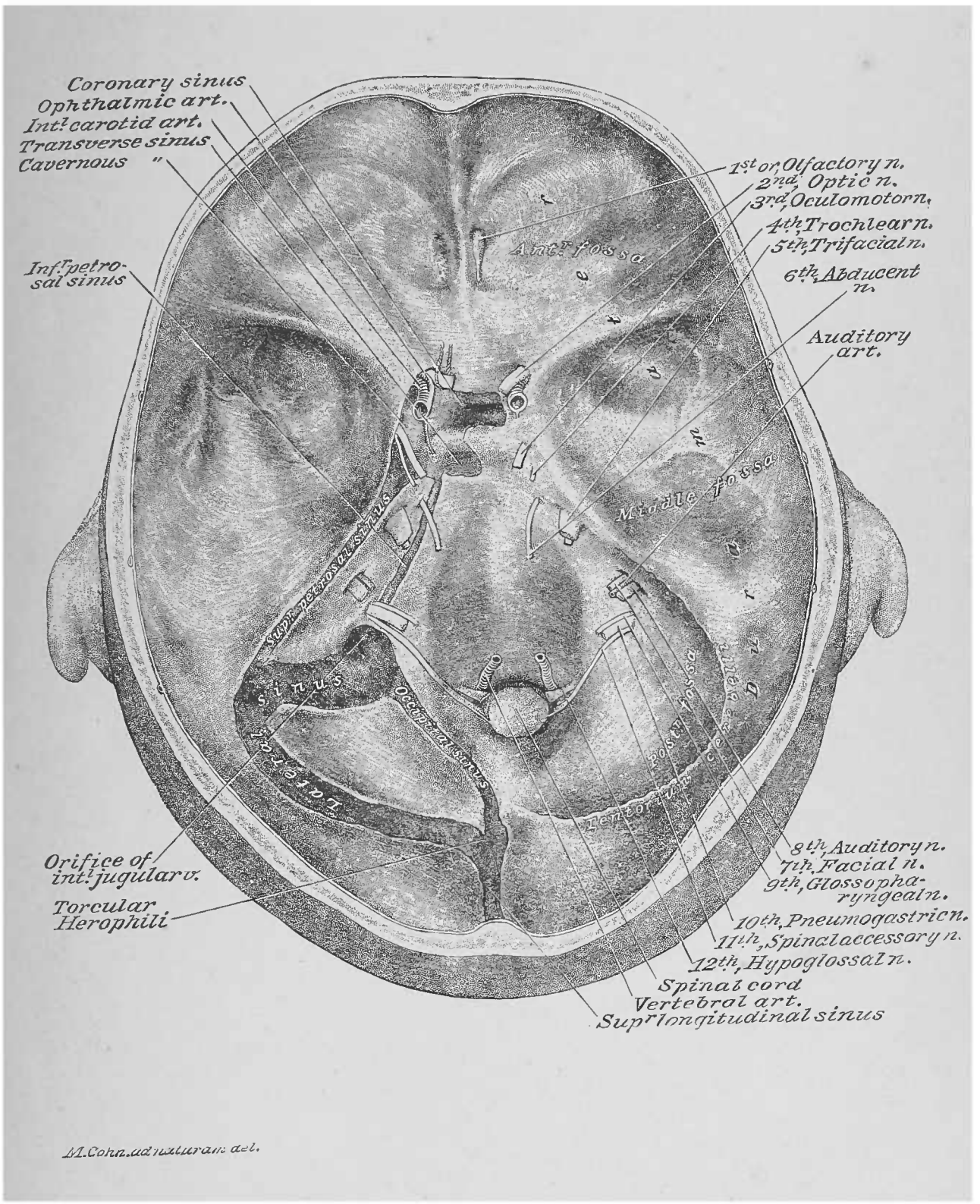
FIG. 2



Ant.r deep temporal art.
" " " n.
Post.r " " n.
" " " art.

M. Cohn, ad naturam del.


Prominences of Pacchionian bodies
Branches of middle meningeal art.
Dura mater
Line of coronal suture
Superior longitudinal sinus
Dura mater
Arachnoid
Pia mater
Brain
M. Cohn, ad nat. del.


Coronary sinus
Ophthalmic art.
Int.l carotid art.
Transverse sinus
Cavernous "
Inf.r petrosal sinus
1st or Olfactory n.
2nd, Optic n.
3rd, Oculomotor n.
4th, Trochlear n.
5th, Trifacial n.
6th, Abducent n.
Auditory art.
Ant.r fossa
Middle fossa
Sup.r petrosal sinus
Occipital sinus
Lateral sinus
Tentorium cerebelli
Post.r fossa
8th, Auditory n.
7th, Facial n.
9th, Glossopharyngeal n.
10th, Pneumogastric n.
11th, Spinal accessory n.
12th, Hypoglossal n.
Spinal cord
Vertebral art.
Sup.r longitudinal sinus
Orifice of int.l jugular v.
Torcular Herophili
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 pos-

teriorly 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, the eyelids, etc.

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 mus-

cle; 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: *lachrymal* (page 339); *arteria centralis retinæ* (see below); *supra-orbital* (pages 337 and 338); *posterior ciliary; superior* and *inferior muscular*, to the intra-orbital muscles; *posterior* and *anterior ethmoidal*, which leave the orbital cavity, at its internal wall, by the posterior and the anterior ethmoidal foramen, respectively; *palpebral*, which bifurcates into a superior and an inferior branch, for the respective eyelids (Plate 184); 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 de-

ficiency 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,

* See Appendix, 4.

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 sur-

face 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.

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7. Inferior Maxillary Division of the Sensory Root, and the Motor Root, of the Trifacial Nerve, Plate 188.—The intracranial 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

*See Appendix, 5.

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 re-

ferred 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. Its branches are: to the parotid gland; to contiguous muscles; the *stylo-mastoid*, which enters the stylo-mastoid foramen to distribute to parts of the auditory apparatus; the *auricular*, to the auricle; the *mastoid*, to contiguous muscles and integument (page 320; Plate 177).

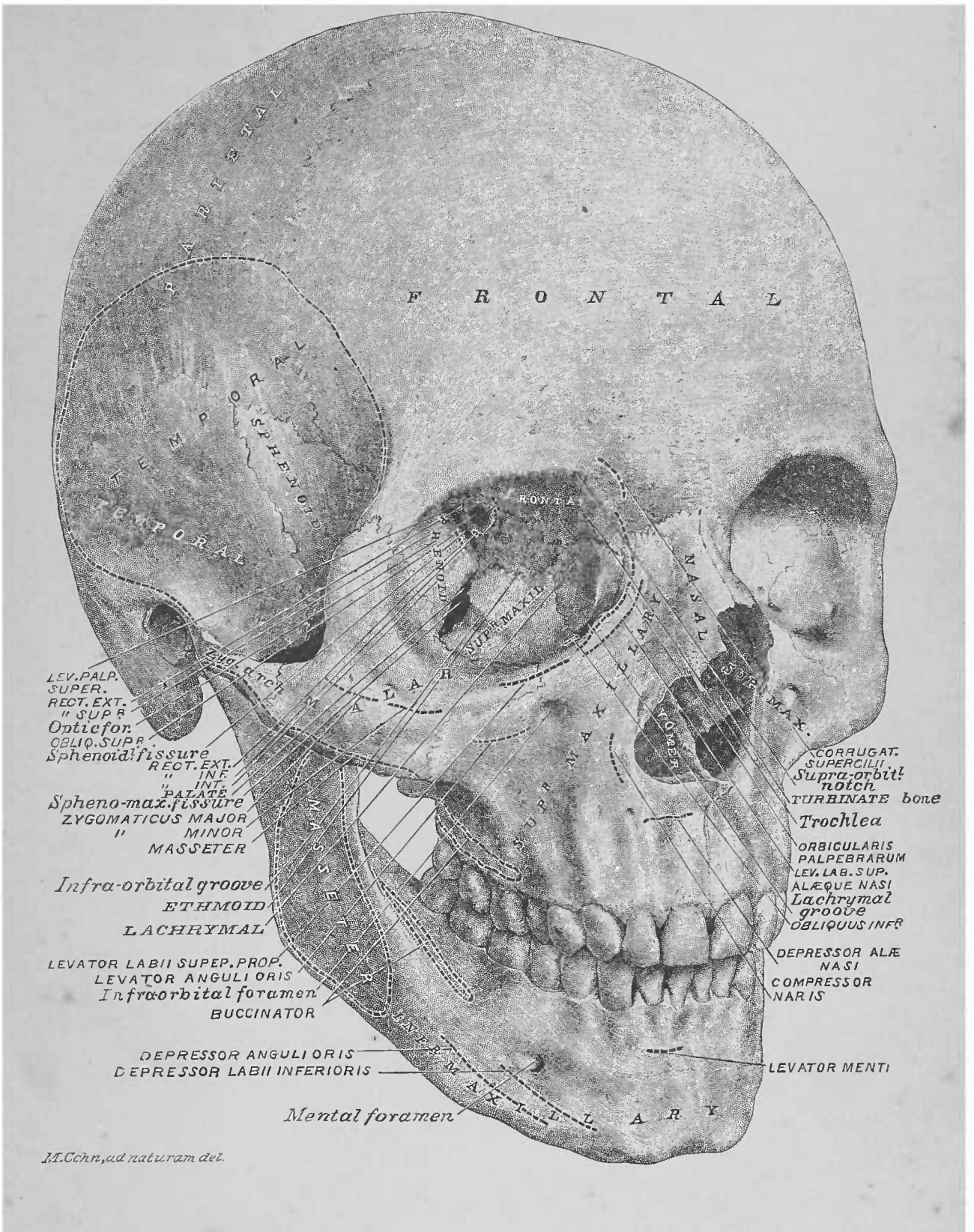

F R O N T A L
PARIETAL
TEMPORAL
SPHENOID
NASAL
NASAL SUP. MAX.
LACHRYMAL
SUPERMAXILLARY
VOMER
MALAR
MASSETERIC
INFERMAXILLARY
LEV. PALP. SUPER.
RECT. EXT.
" SUP R
Optic for.
OBLIQ. SUPR.
Sphenoid fissure
RECT. EXT.
" INF.
" INT.
PALATE
Spheno-max. fissure
ZYGOMATICUS MAJOR
" MINOR
MASSETER
Infra-orbital groove
ETHMOID
LACHRYMAL
LEVATOR LABII SUPEP. PROP.
LEVATOR ANGULI ORIS
Infræorbital foramen
BUCCINATOR
DEPRESSOR ANGULI ORIS
DEPRESSOR LABII INFERIORIS
Mental foramen
CORRUGAT. SUPERCILII
Supra-orbit! notch
TURBINATE bone
Trochlea
ORBICULARIS PALPEBRARUM
LEV. LAB. SUP. ALÆQUE NASI
Lachrymal groove
OBLIQUUS INFR
DEPRESSOR ALÆ NASI
COMPRESSOR NARIS
LEVATOR MENTI
M. Cohn, ad naturam del.

FIG. 1

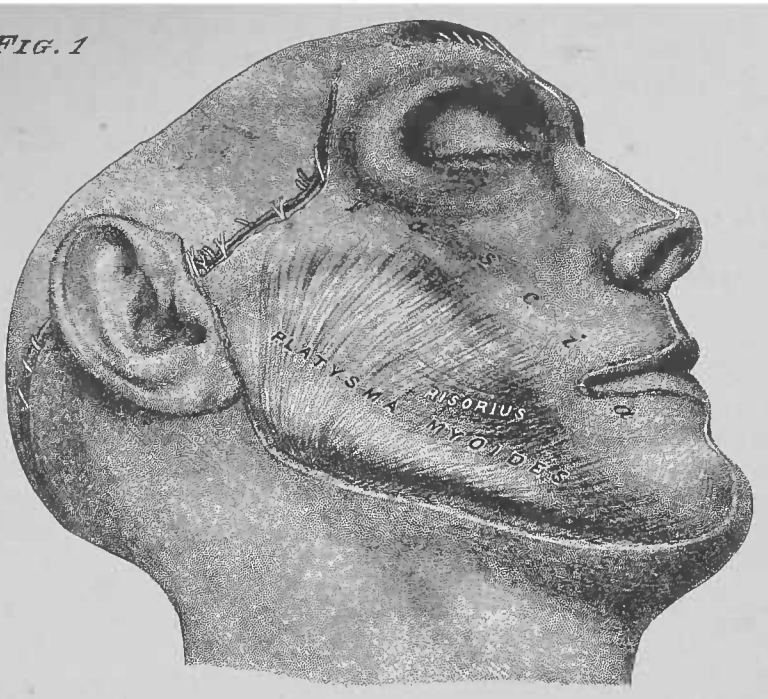
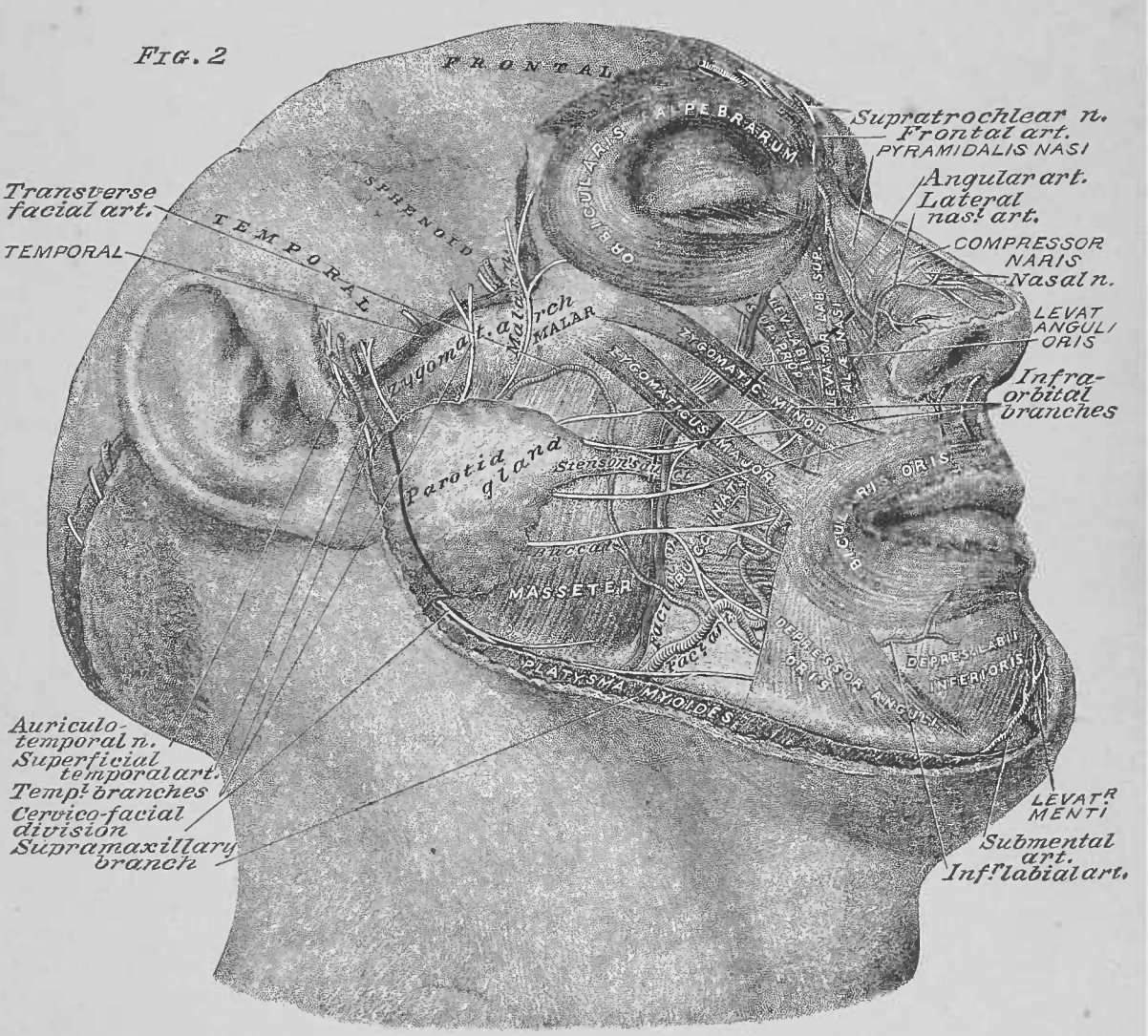
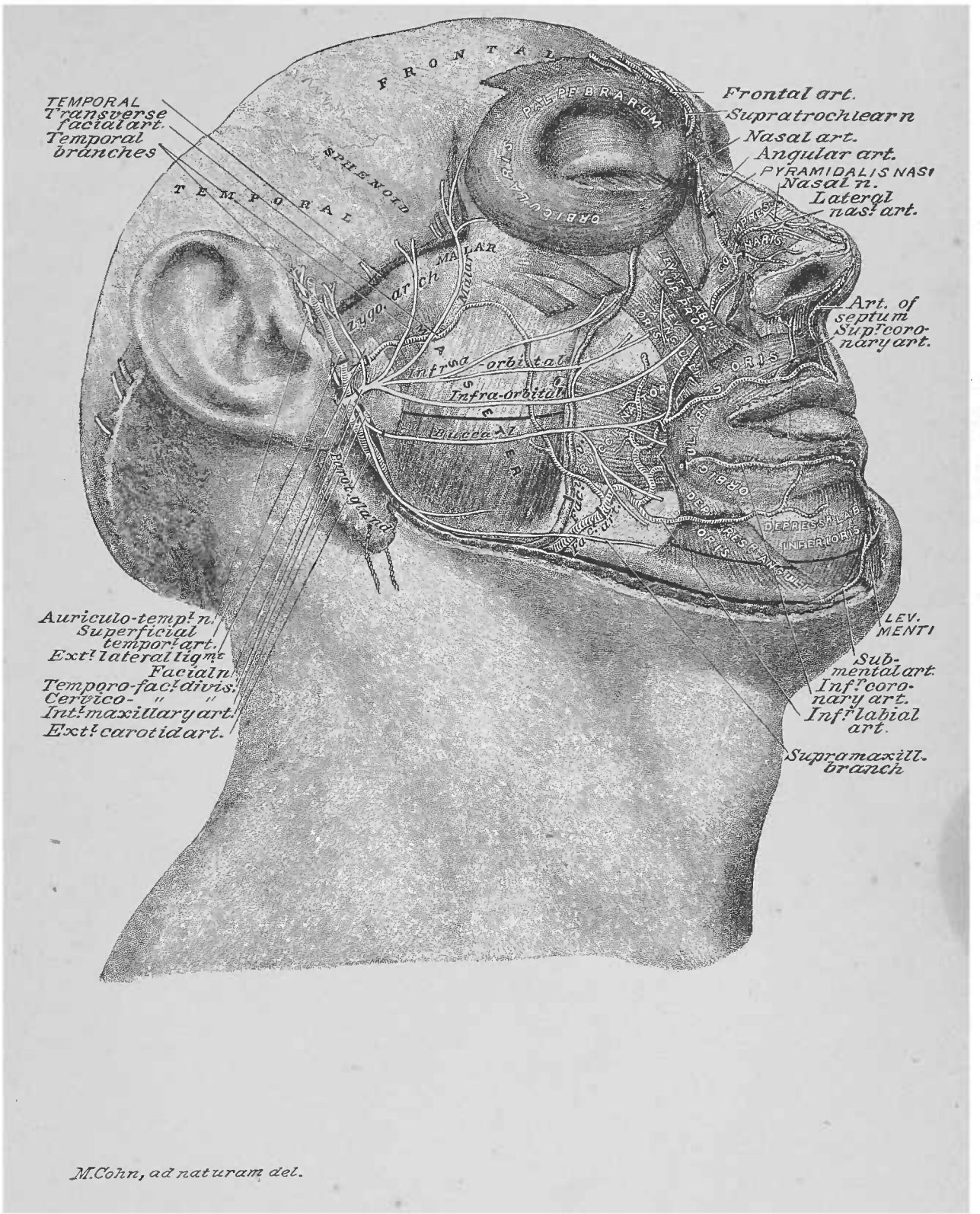


FIG. 2



M. Cohn, ad naturam del.



M. Cohn, ad naturam del.

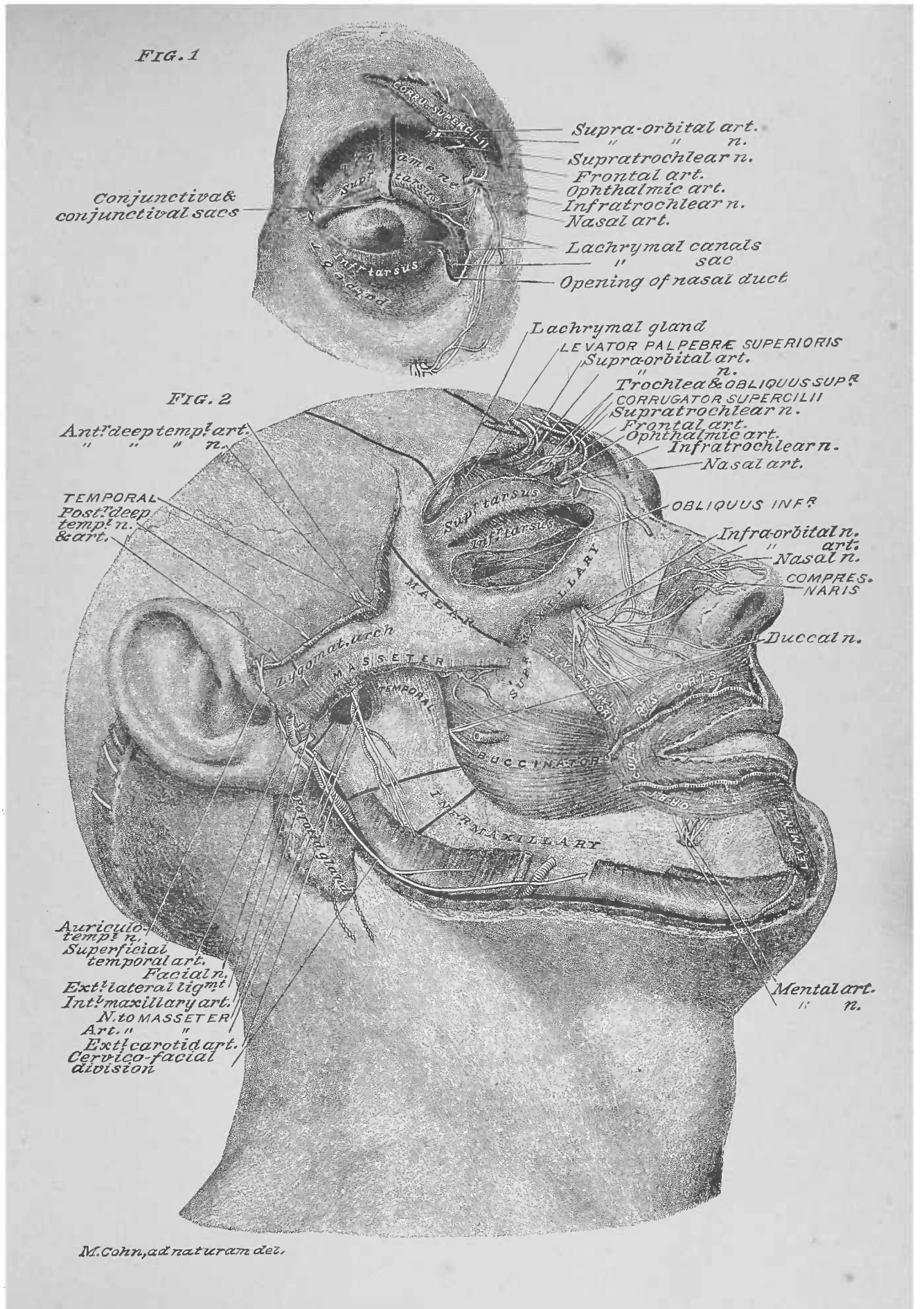


FIG. 1
Supra-orbital art.
" " n.
Supratrochlear n.
Frontal art.
Ophthalmic art.
Infratrochlear n.
Nasal art.
Conjunctiva & conjunctival sacs
Lachrymal canals
" sac
Opening of nasal duct
Lachrymal gland
LEVATOR PALPEBRÆ SUPERIORIS
Supra-orbital art.
" n.
Trochlea & OBLIQUUS SUP.R
CORRUGATOR SUPERCILII
Supratrochlear n.
Frontal art.
Ophthalmic art.
Infratrochlear n.
Nasal art.
FIG. 2
Ant.r deep templ art.
" " " n.
TEMPORAL
Post.r deep templ n. & art.
OBLIQUUS INF.R
Infra-orbital n.
" art.
Nasal n.
COMPRES. NARIS
Buccal n.
ZYGOMAT. ARCH
MASSETER
TEMPORAL
BUCCINATOR
INFRA-MAXILLARY
Auriculo-templ n.
Superficial temporal art.
Facial n.
Ext.l lateral ligmt
Int.l maxillary art.
N. to MASSETER
Art. " "
Ext.l carotid art.
Cervico-facial division
Mental art.
" n.
M. Cohn, ad naturam del.

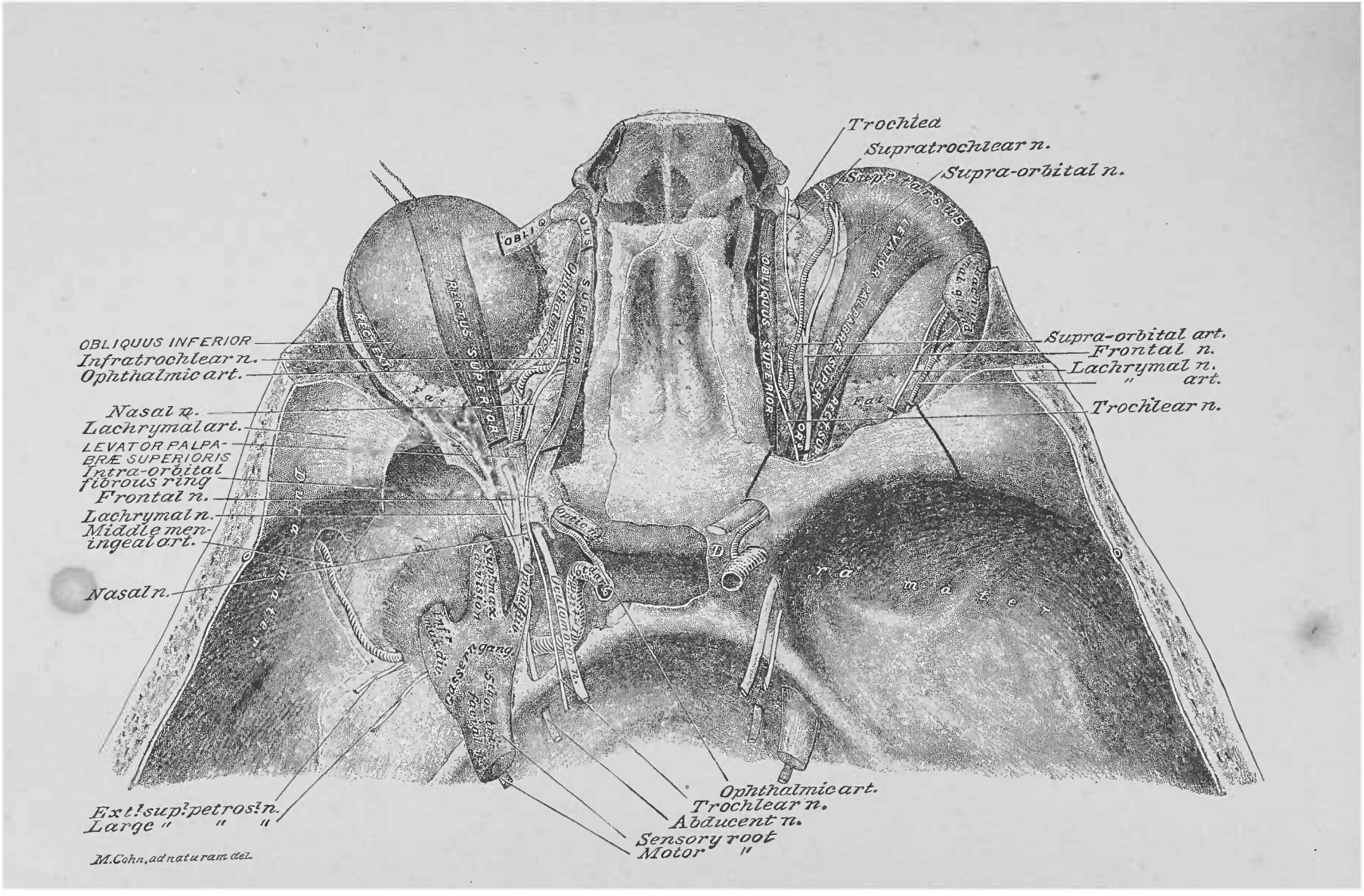

Trochlea
Supratrochlear n.
Supra-orbital n.
OBLIQUUS INFERIOR
Infratrochlear n.
Ophthalmic art.
Nasal n.
Lachrymal art.
LEVATOR PALPA-
BRÆ SUPERIORIS
Intra-orbital
fibrous ring
Frontal n.
Lachrymal n.
Middle men-
ingeal art.
Nasal n.
Supra-orbital art.
Frontal n.
Lachrymal n.
" art.
Trochlear n.
Ophthalmic art.
Trochlear n.
Abducent n.
Sensory root
Motor "
M. Cohn, ad naturam del.

PLATE 185

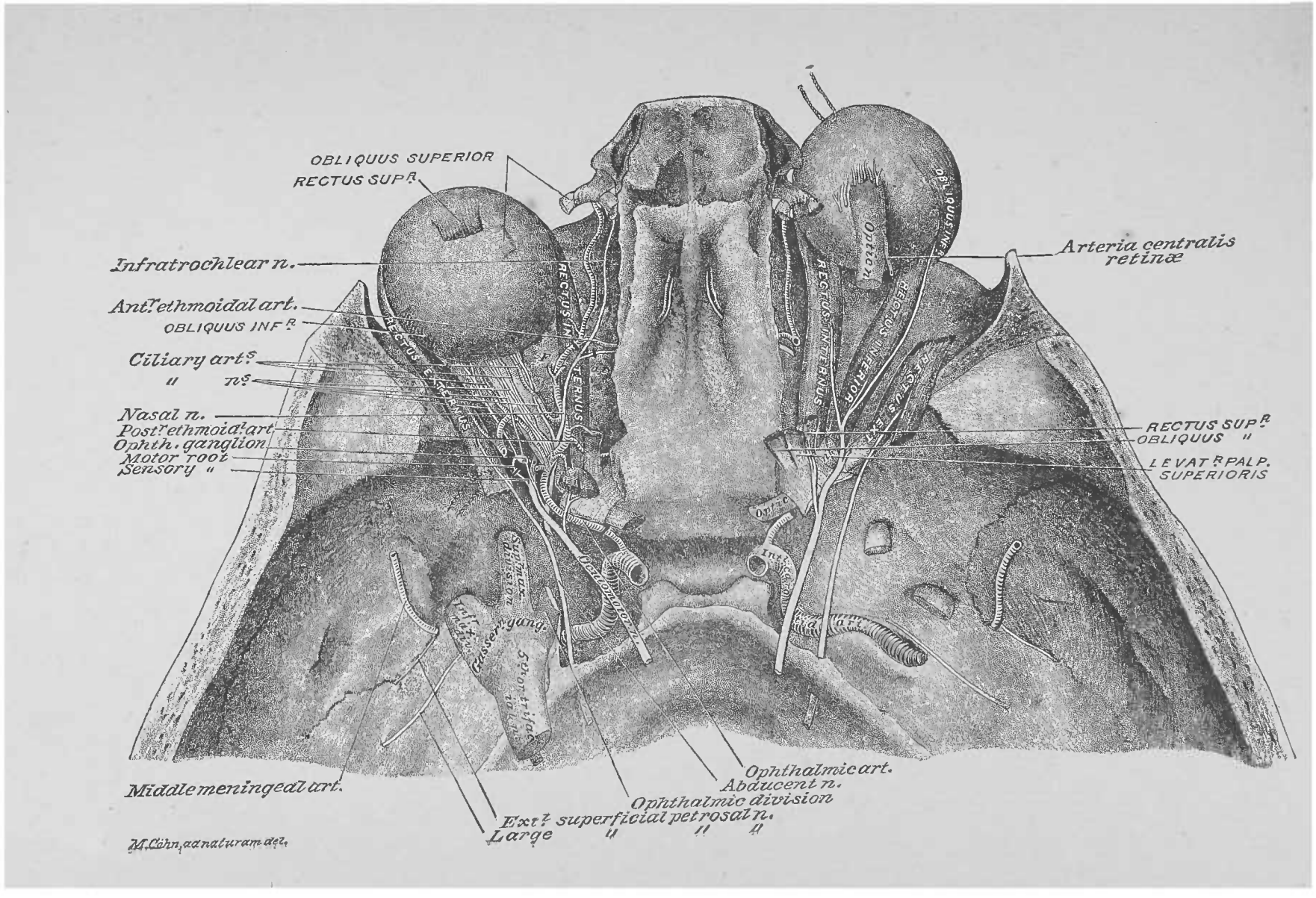

OBLIQUUS SUPERIOR
RECTUS SUP.R
Infratrochlear n.
Ant.r ethmoidal art.
OBLIQUUS INF.R
Ciliary arts.
" ns.
Nasal n.
Post.r ethmoid.l art
Ophth. ganglion
Motor root
Sensory "
Arteria centralis retinæ
RECTUS SUP.R
OBLIQUUS "
LEVAT.R PALP. SUPERIORIS
Middle meningeal art.
Ophthalmic art.
Abducent n.
Ophthalmic division
Ext.l superficial petrosal n.
Large " " "
M. Cohn, ad naturam del.

PLATE 186

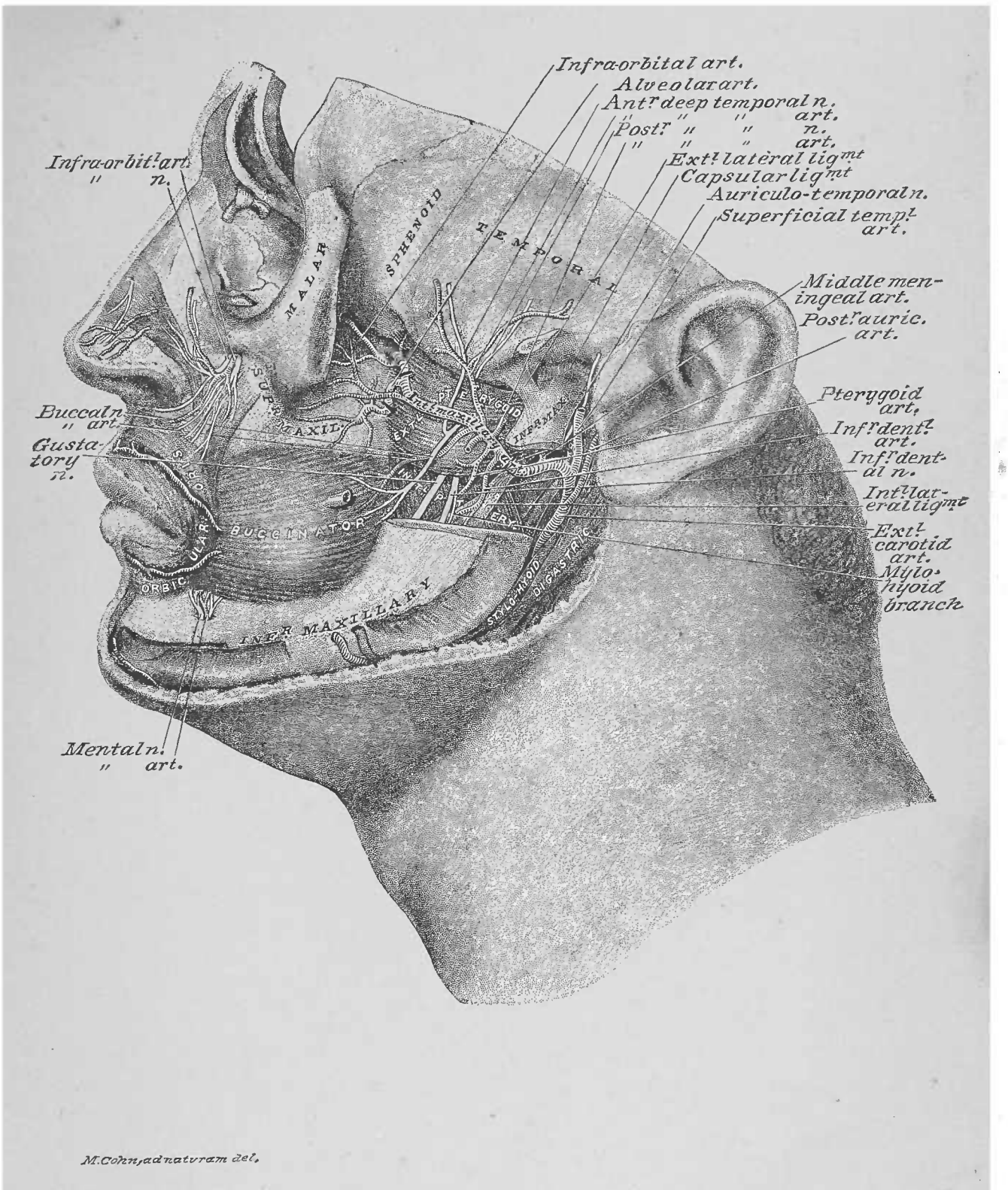

Infra-orbital art.
Alveolar art.
Ant.r deep temporal n.
" " " art.
Post.r " " n.
" " " art.
Ext.l lateral ligmt
Capsular ligmt
Auriculo-temporal n.
Superficial temp.l art.
Middle meningeal art.
Post.r auric. art.
Pterygoid art.
Inf.r dent.l art.
Inf.r dental n.
Int.l lateral ligmt
Ext.l carotid art.
Mylohyoid branch
Infra-orbit.l art.
" n.
Buccal n.
" art.
Gustatory n.
Mental n.
" art.
MALAR
SPHENOID
TEMPORAL
SUPR MAXIL.
BUCCINATOR
ORBIC. ULAR
INFR MAXILLARY
M.Cohn, ad natvram del.

FIG. 1

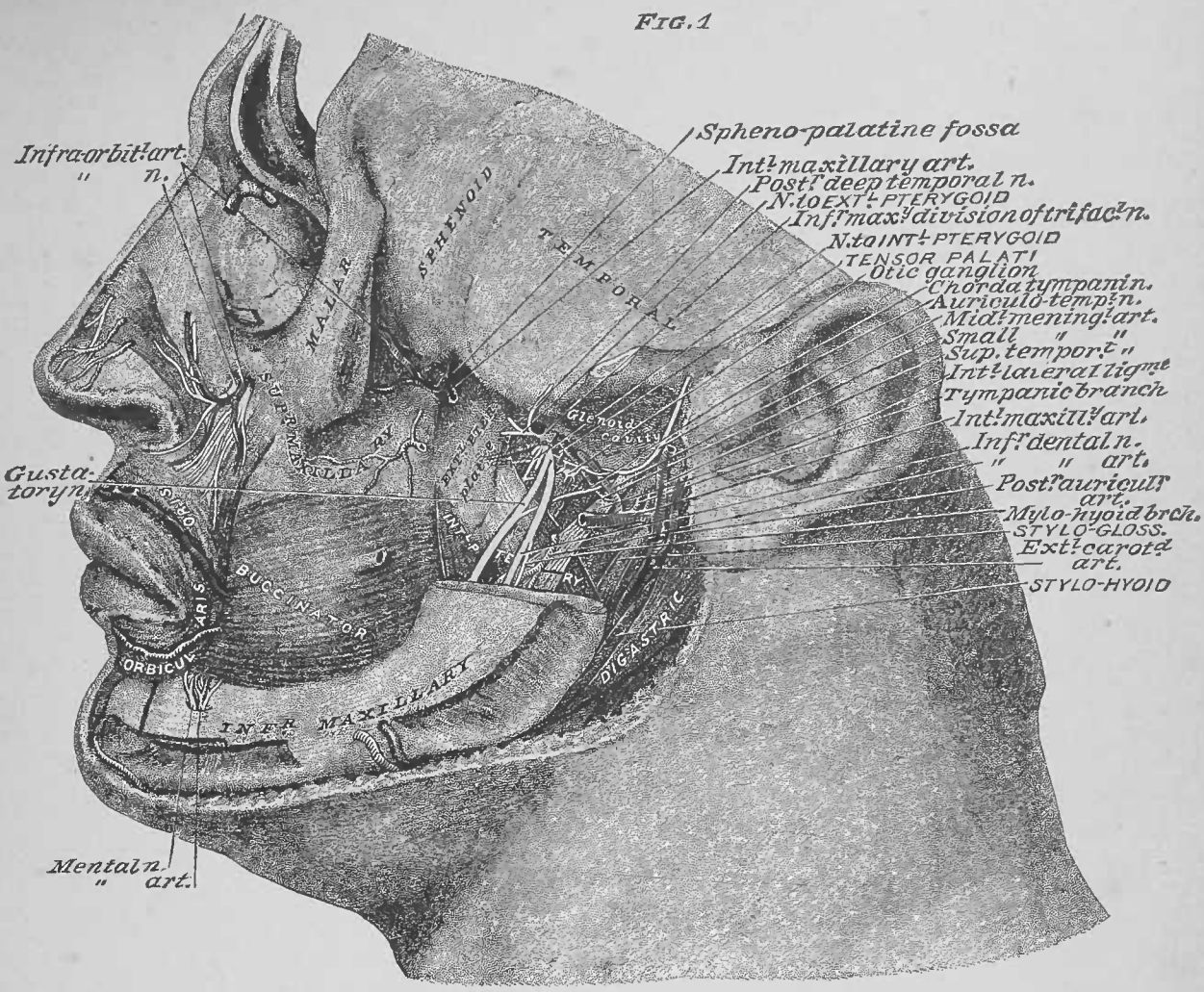
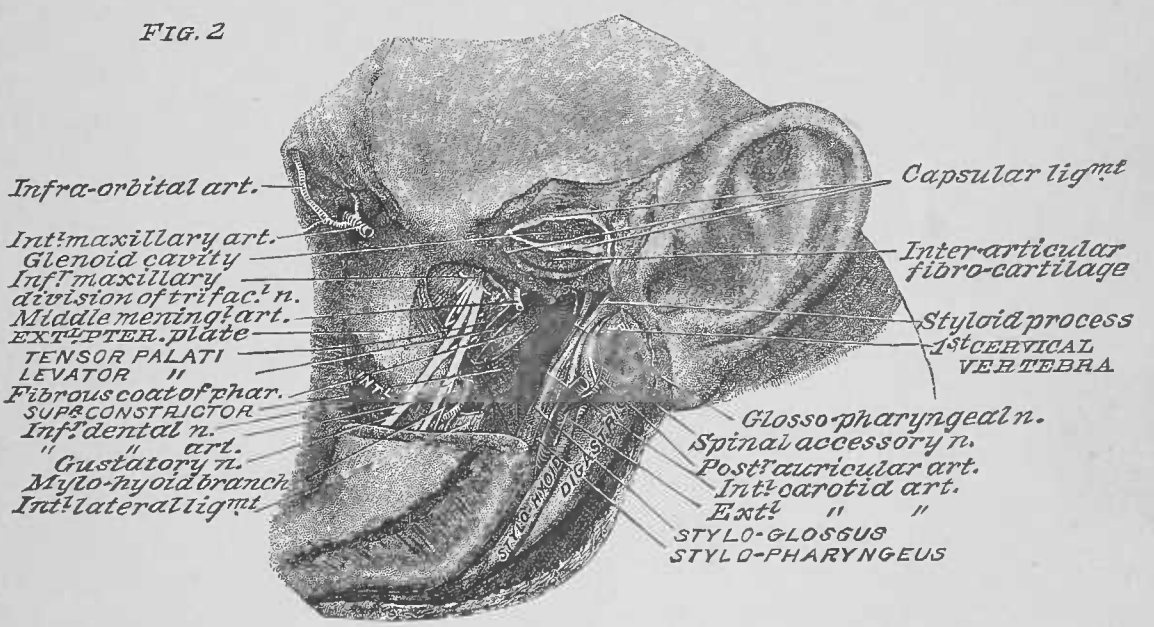


FIG. 2



M. Conn, 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, located in the antero-lateral area of the neck, is attached: inferiorly, by a *sternal* portion, to the exterior surface of the superior part of the sternum, and, by a *clavicular* portion, to the superior border of the internal third or half of the clavicle; superiorly, to the exterior of the mastoid portion of the temporal bone and of the occipital bone (Plate 189).

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 bor-

der 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 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 right lymphatic duct; 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

* See Appendix, 6.

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 border of the hyo-glossus muscle; thence it passes

internally to the posterior belly of the digastric and the stylo-hyoid muscles; it then crosses the external surface of the hyo-glossus muscle to where it disappears to 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, ap-

pears 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; the glosso-pharyngeal nerve; and the external laryngeal 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).

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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

*See Appendix, 7.

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 stylo-mastoid 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).

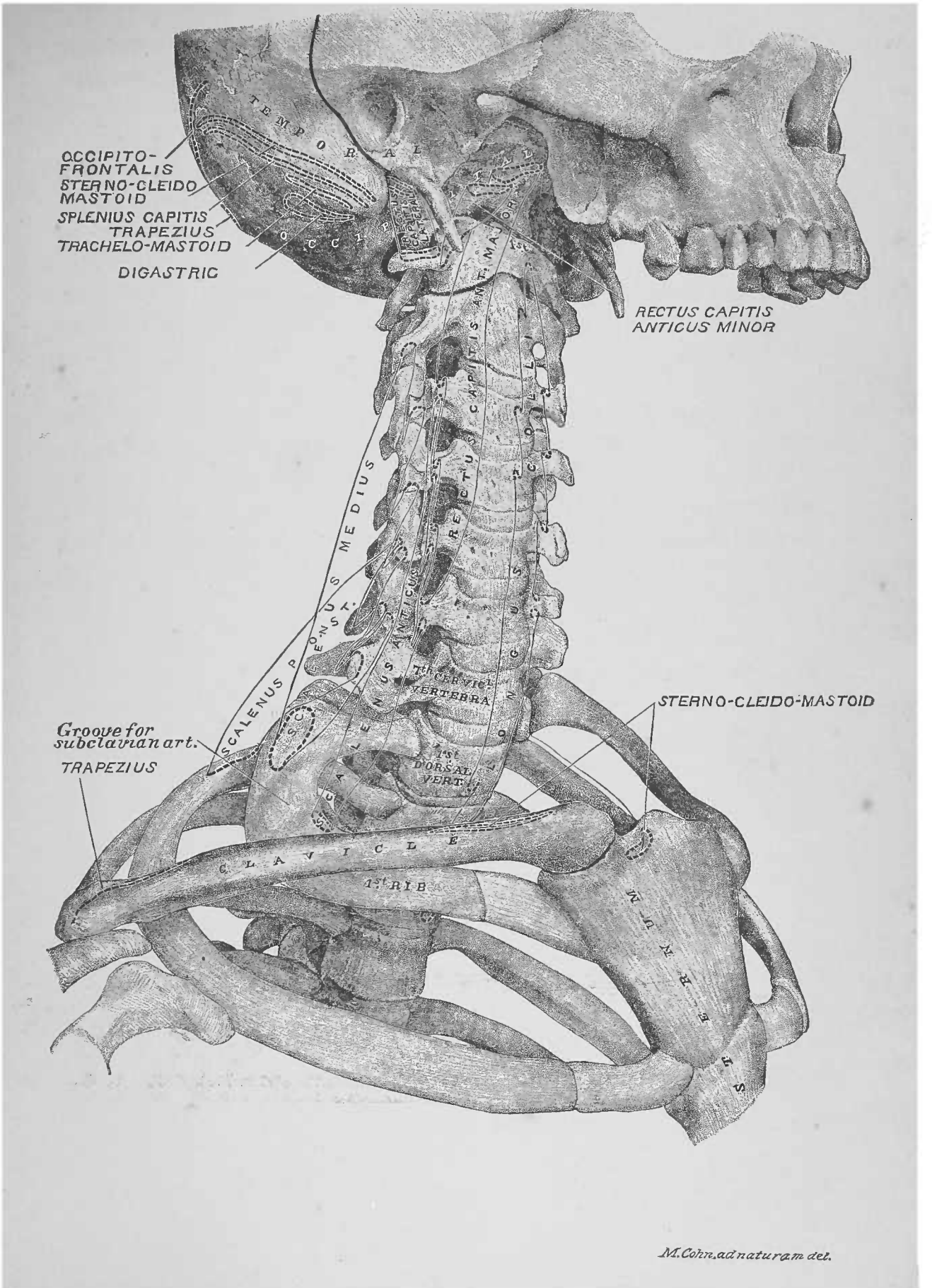
74. Anterior Divisions of Cervical-spinal Nerves, Plate 198.—These nerves are projected laterally, superiorly to the transverse processes of the cervical vertebræ, and posteriorly to the vertebral artery.

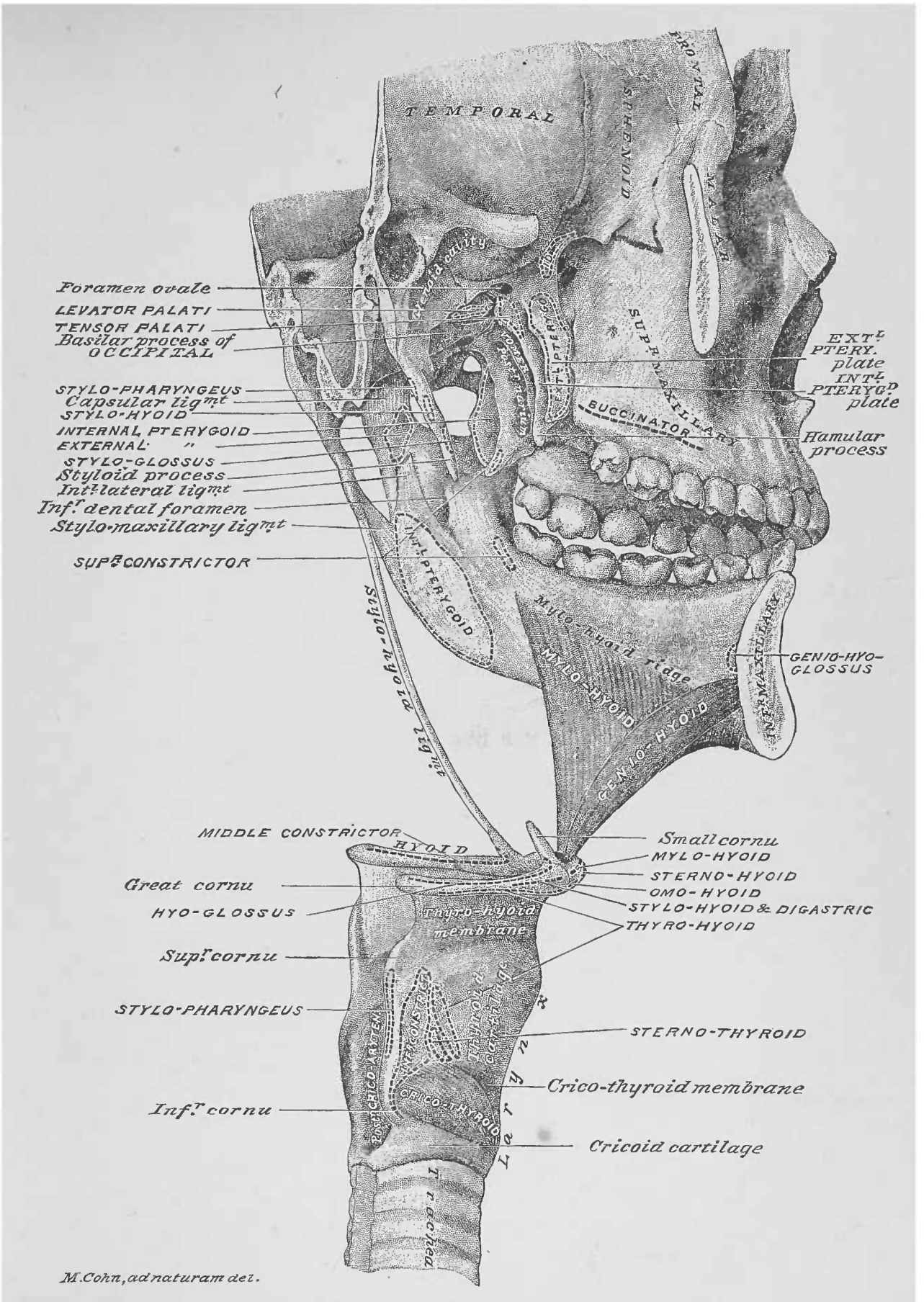
75. Scalenus Anticus Muscle, Plates 189, 192, and 194 to 198, inclusive.—This muscle is attached; superiorly (Plates 189 and 198), to the anterior tubercles of the transverse processes of the cervical vertebræ, third to sixth, inclusive; infe-

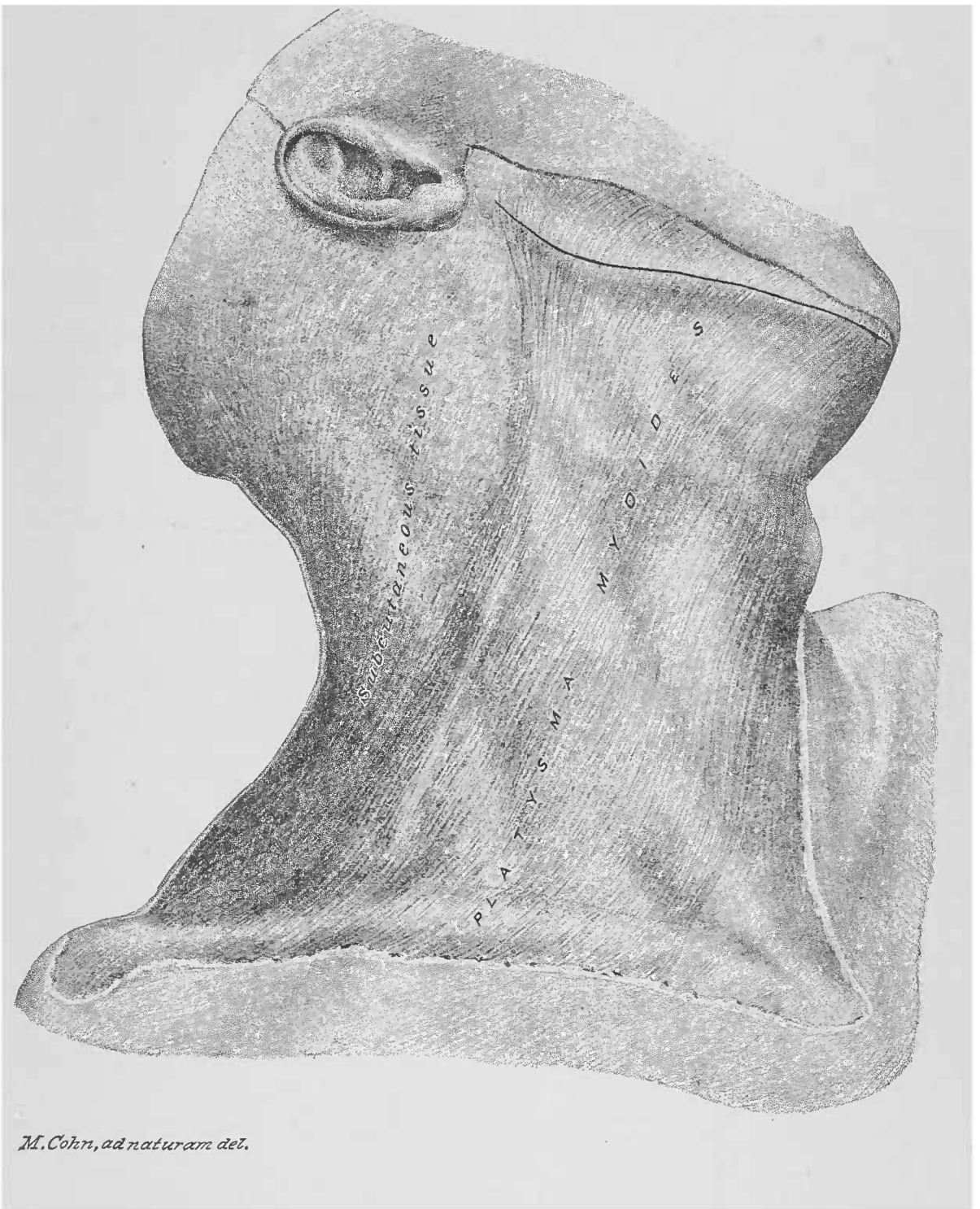
riorly (Plate 189), to the tubercle between the subclavian grooves (the internal for the subclavian vein, the external for the subclavian artery) on the exterior surface of the first rib.

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.

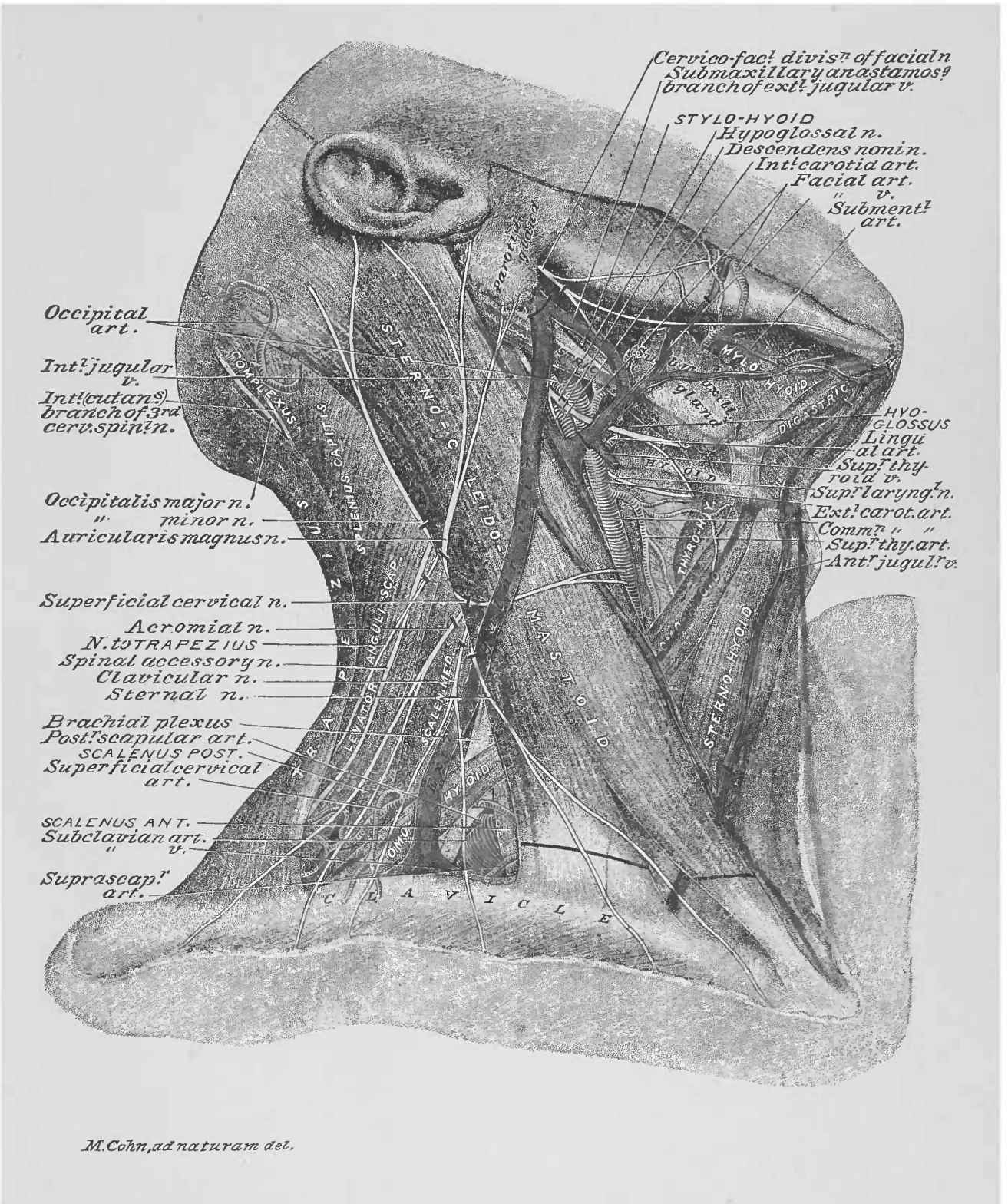
77. Scalenus Posticus Muscle: Fig. 2, Plate 150; Plates 189, and 192 to 197, inclusive.—This muscle is attached: superiorly, to the posterior tubercles of the fifth, sixth, and seventh cervical vertebræ; inferiorly (Fig. 2, Plate 150; Plate 189), to the exterior surface of the second rib, externally to the second levator costa muscle. It is located in a plane posteriorly to the last-described muscle.


OCCIPITO-FRONTALIS
STERNO-CLEIDO MASTOID
SPLENIUS CAPITIS
TRAPEZIUS
TRACHELO-MASTOID
DIGASTRIC
TEMPORAL
OCCIPITAL
RECTUS CAPITIS ANTICUS MINOR
SCALENUS POST.
SCALENUS MEDIUS
RECTUS CAPITIS ANTICUS MAJOR
LONGUS COLLI
7th CERVICAL VERTEBRA
1st DORSAL VERT.
STERNO-CLEIDO-MASTOID
Groove for subclavian art.
TRAPEZIUS
CLAVICLE
1st RIB
STERNUM
M. Cohn, ad naturam del.

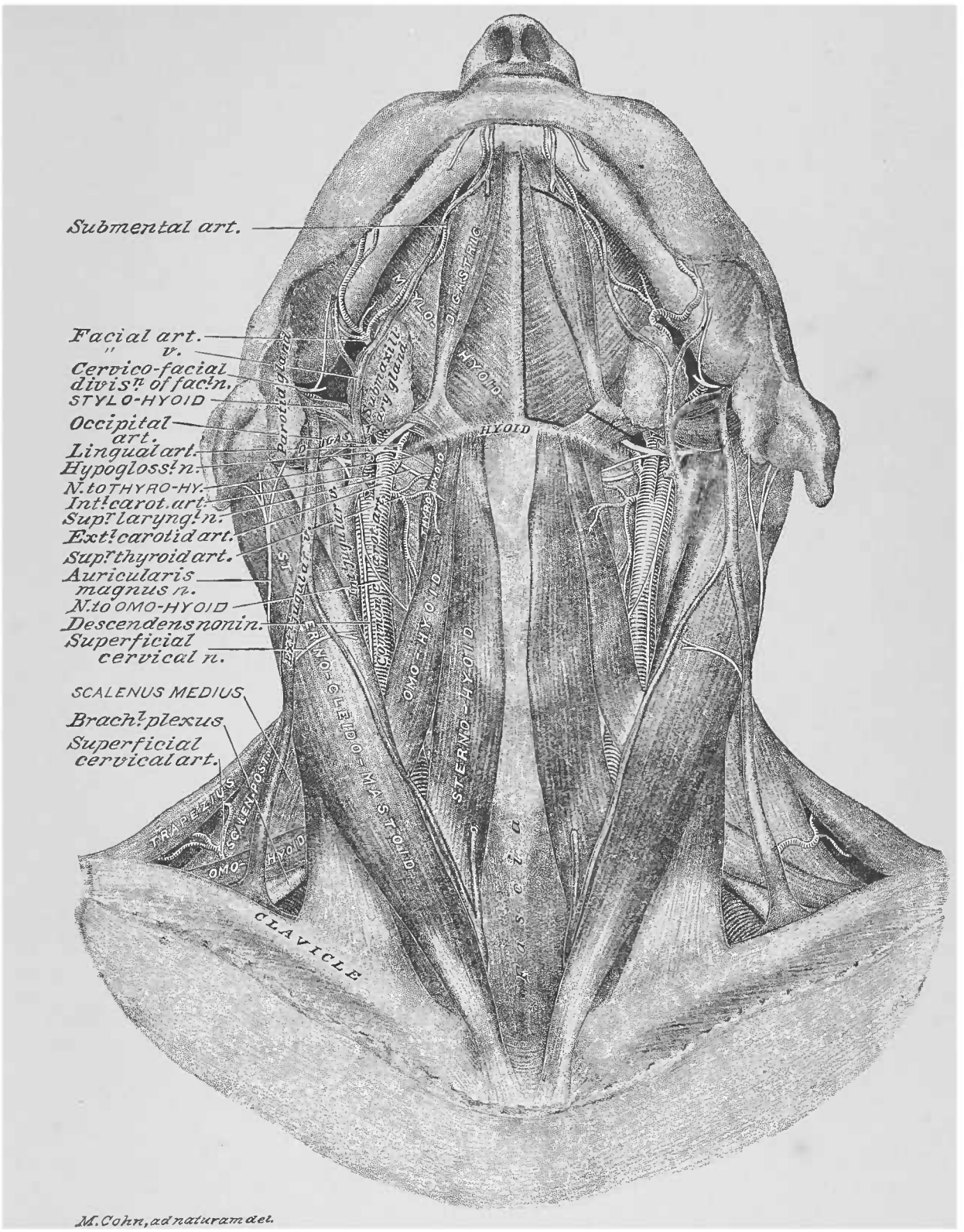

TEMPORAL
SPHENOID
FRONTAL
MALAR
Glenoid cavity
Foramen ovale
LEVATOR PALATI
TENSOR PALATI
Basilar process of OCCIPITAL
STYLO-PHARYNGEUS
Capsular ligmt
STYLO-HYOID
INTERNAL PTERYGOID
EXTERNAL "
STYLO-GLOSSUS
Styloid process
Intl lateral ligmt
Infl dental foramen
Stylo-maxillary ligmt
SUPR CONSTRICTOR
Post. Palatine
EXTL PTERY. plate
INTL PTERYGD plate
SUPR MAXILLARY
BUCCINATOR
Hamular process
INFR MAXILLARY
GENIO-HYO-GLOSSUS
Stylo-hyoid ligt
INTL PTERYGOID
Mylo-hyoid ridge
MYLO-HYOID
GENIO-HYOID
MIDDLE CONSTRICTOR
HYOID
Small cornu
MYLO-HYOID
STERNO-HYOID
OMO-HYOID
STYLO-HYOID & DIGASTRIC
THYRO-HYOID
Great cornu
HYO-GLOSSUS
Thyro-hyoid membrane
Supl cornu
STYLO-PHARYNGEUS
Thyroid cartilage
STERNO-THYROID
Crico-thyroid membrane
Inf.r cornu
CRICO-THYROID
Cricoid cartilage
M.Cohn, ad naturam del.

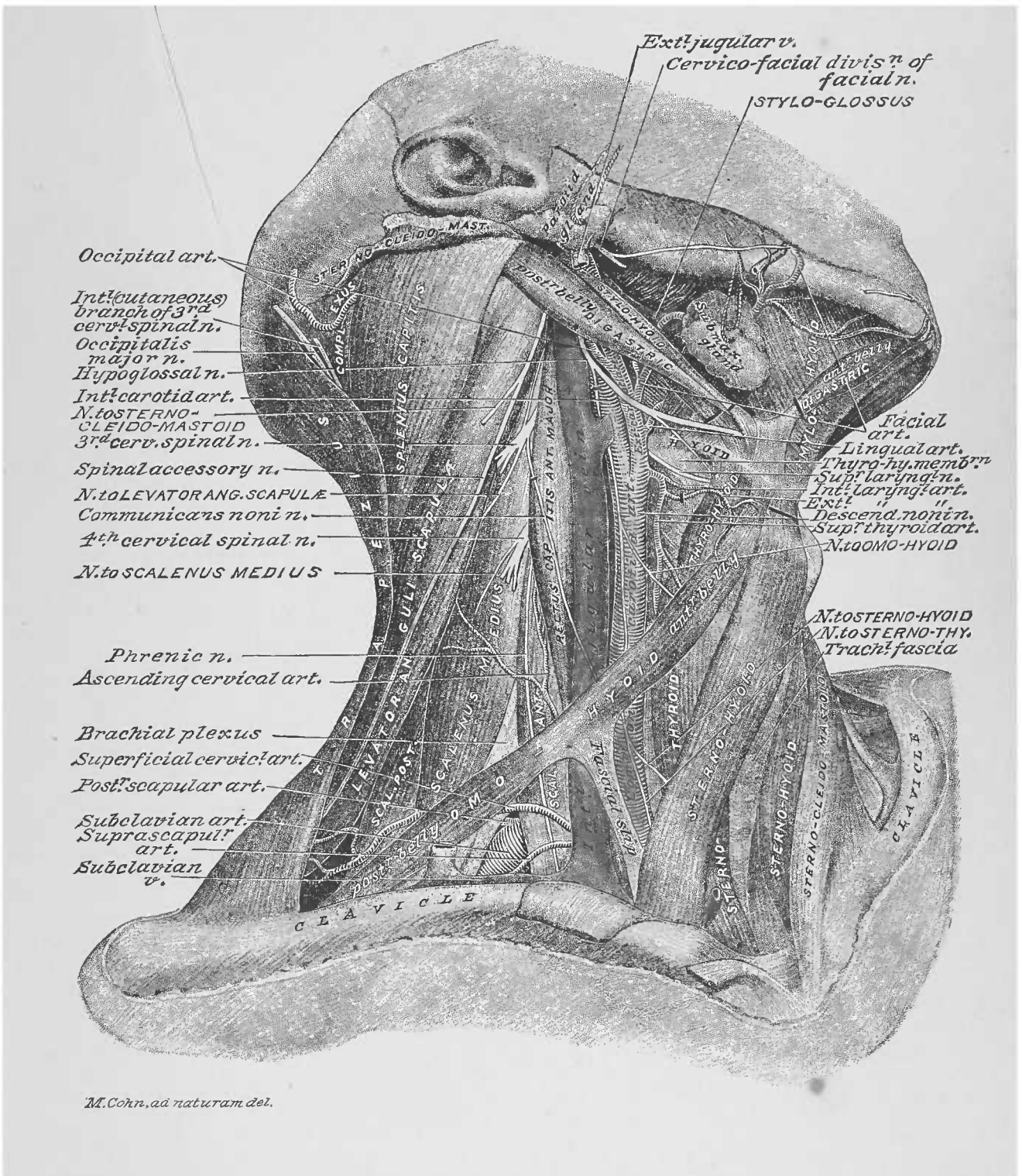


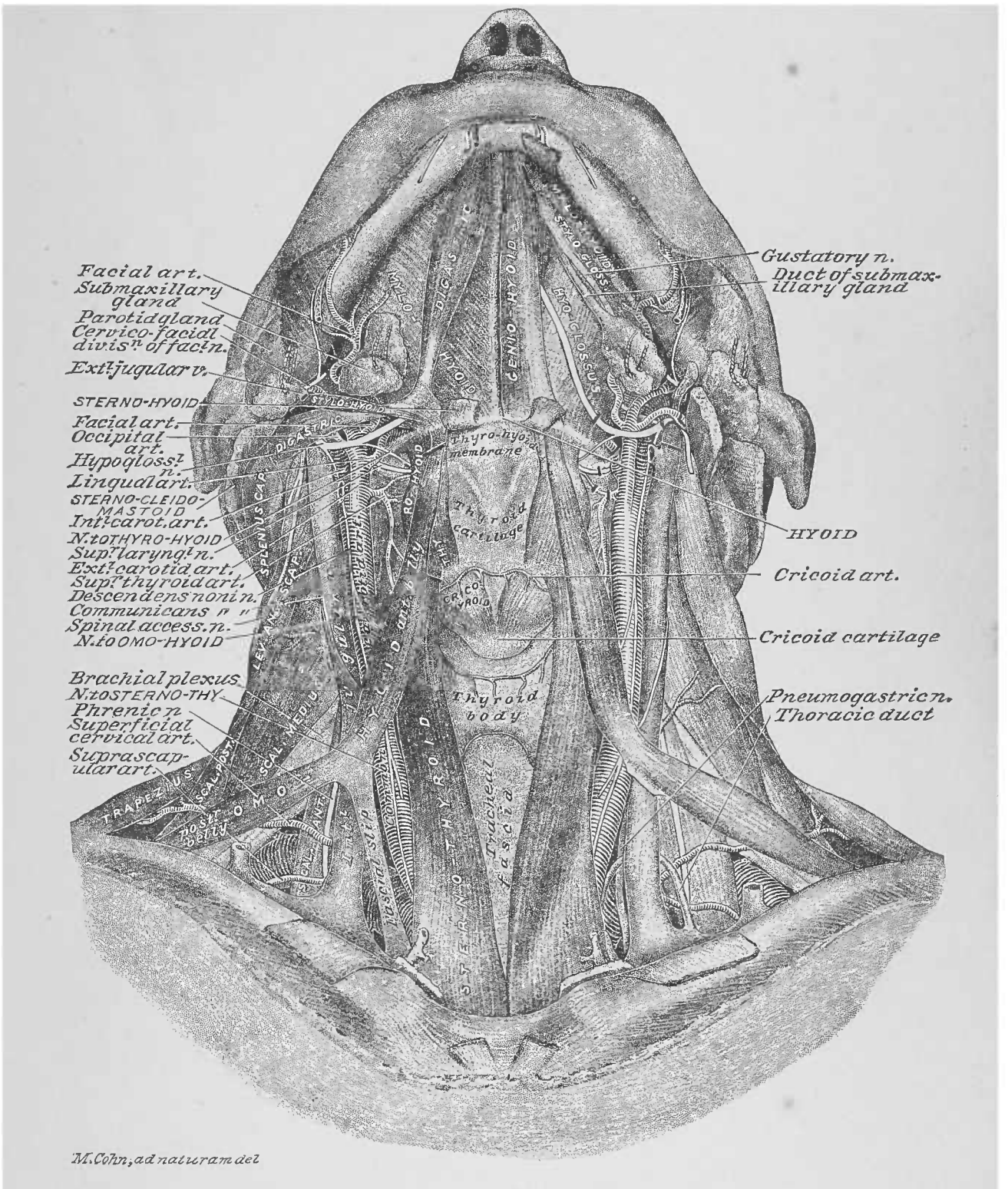
M. Cohn, ad naturam del.

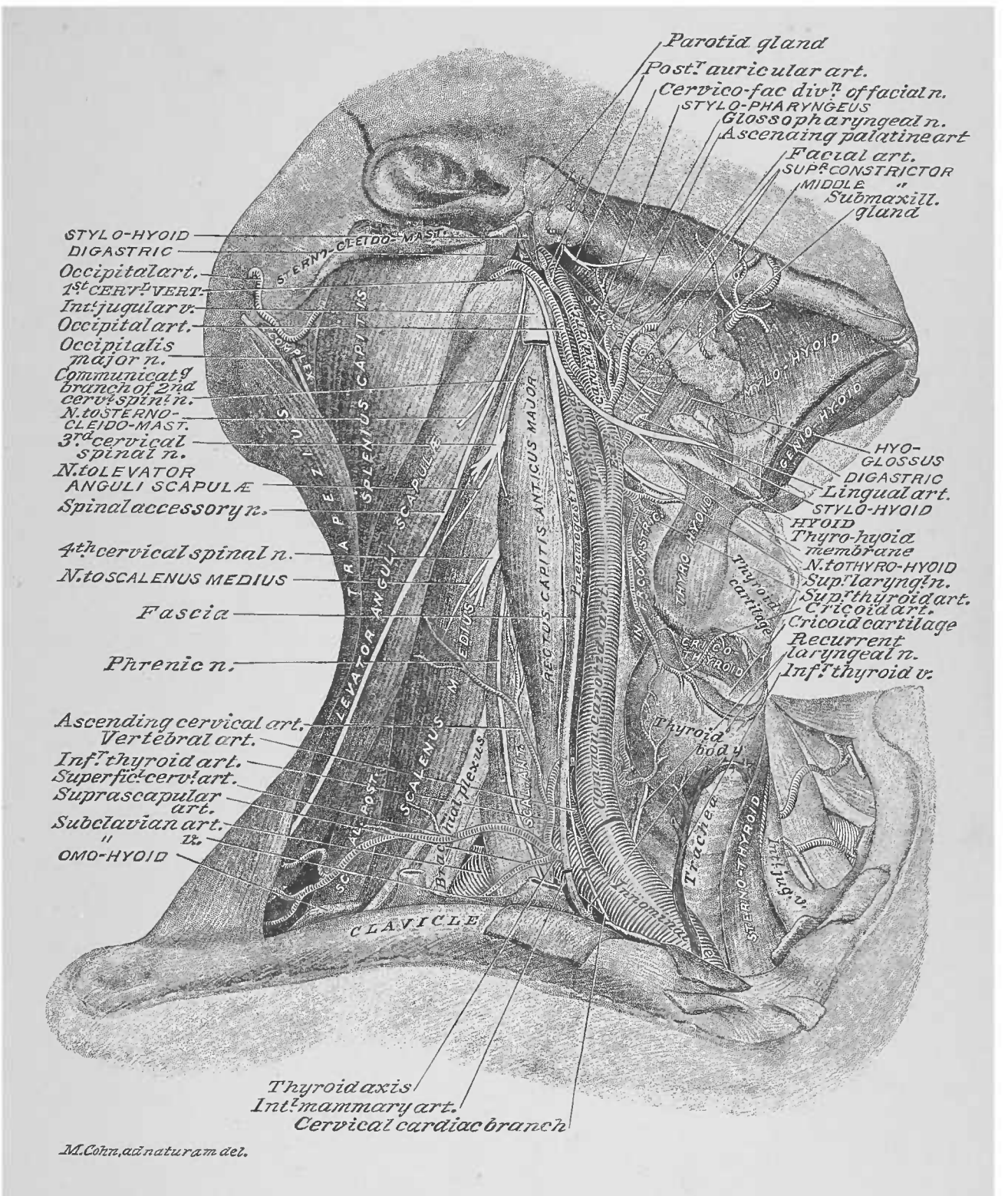


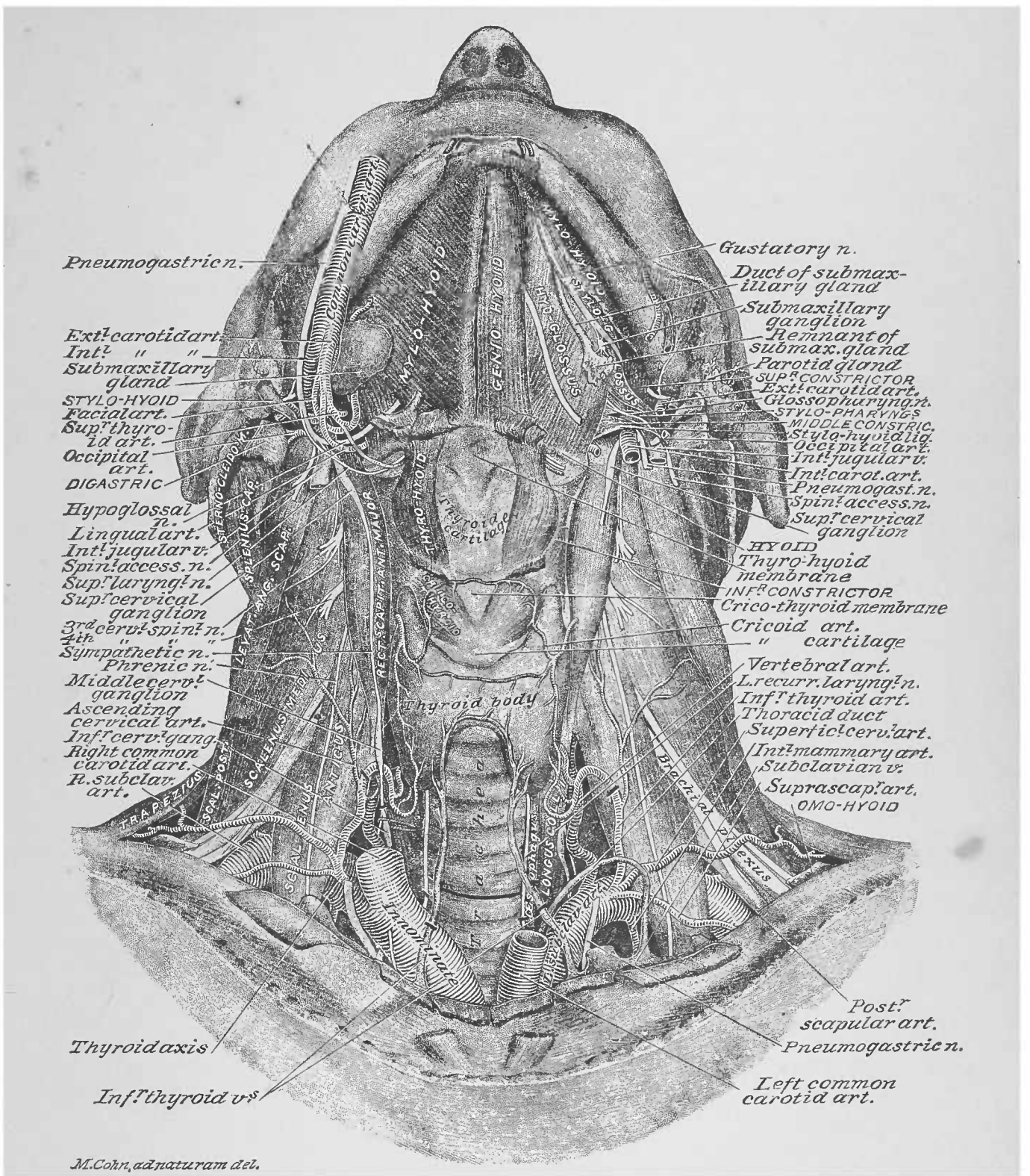
M. Cohn, ad naturam del.


Submental art.
Facial art.
" v.
Cervico-facial divis.n of fac.n.
STYLO-HYOID
Occipital art.
Lingual art.
Hypoglossal n.
N. to THYRO-HY.
Int.l carot. art.
Sup.r laryng.l n.
Ext.l carotid art.
Sup.r thyroid art.
Auricularis magnus n.
N. to OMO-HYOID
Descendens noni n.
Superficial cervical n.
SCALENUS MEDIUS
Brach.l plexus
Superficial cervical art.
Parotid gland
Submaxill. gl.
D. CASTRIC.
OMO-HYOID
HYOID
STERNO-HYOID
STERNO-CLEIDO-MASTOID
TRAPEZIUS
SCALEN. POST.
OMO-
HYOID
CLAVICLE
M. Cohn, ad naturam del.

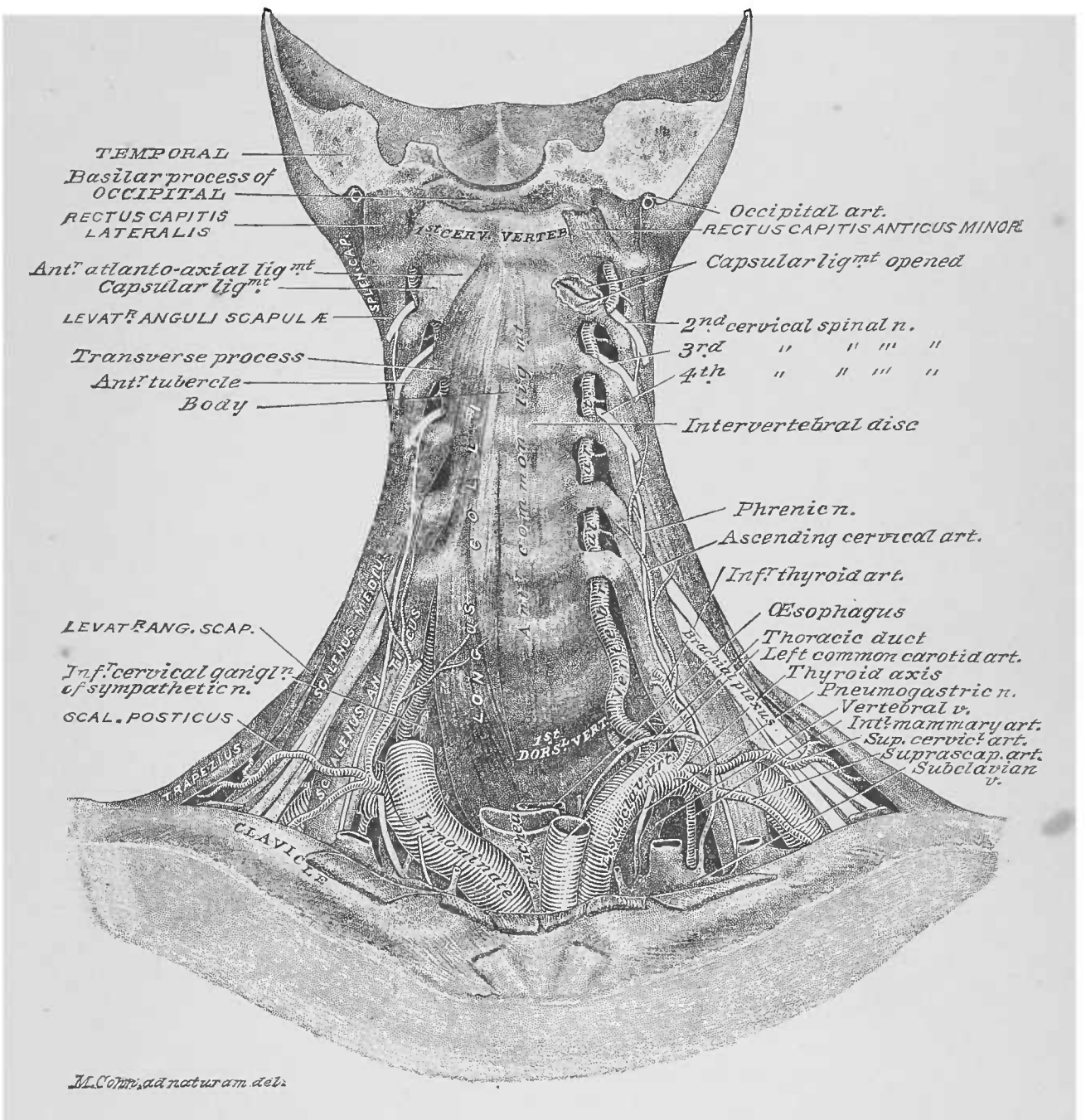

Ext.l jugular v.
Cervico-facial divis.n of facial n.
STYLO-GLOSSUS
Occipital art.
Int.l (cutaneous) branch of 3rd cerv.l spinal n.
Occipitalis major n.
Hypoglossal n.
Int.l carotid art.
N. to STERNO-CLEIDO-MASTOID
3rd cerv. spinal n.
Spinal accessory n.
N. to LEVATOR ANG. SCAPULÆ
Communicans noni n.
4th cervical spinal n.
N. to SCALENUS MEDIUS
Phrenic n.
Ascending cervical art.
Brachial plexus
Superficial cervic.l art.
Post.l scapular art.
Subclavian art.
Suprascapul.r art.
Subclavian v.
Facial art.
Lingual art.
Thyro-hy. memb.rn
Supr laryng.l n.
Int.l laryng.l art.
Ext.l " "
Descend. noni n.
Supr thyroid art.
N. to OMO-HYOID
N. to STERNO-HYOID
N. to STERNO-THY.
Trach.l fascia
STERNO-CLEIDO-MAST.
COMPLEXUS
SPLENIUS CAPITIS
TRIANGULI SCAPULÆ
LEVATOR ANG. SCAPULÆ
SCAL. POST.
SCALENUS MEDIUS
SCALENUS ANT.
POST.r belly of DIGASTRIC
STYLO-HYOID
HYOID
THYRO-HYOID
STERNO-HYOID
STERNO-CLEIDO-MASTOID
CLAVICLE
M. Cohn, ad naturam del.


Facial art.
Submaxillary gland
Parotid gland
Cervico-facial divis.n of facin.
Ext.l jugular v.
STERNO-HYOID
Facial art.
Occipital art.
Hypoglossl. n.
Lingual art.
STERNO-CLEIDO-MASTOID
Int.l carot. art.
N. to THYRO-HYOID
Sup.r laryng.l n.
Ext.l carotid art.
Sup.r thyroid art.
Descendens noni n.
Communicans " "
Spinal access. n.
N. to OMO-HYOID
Brachial plexus
N. to STERNO-THY.
Phrenic n.
Superficial cervical art.
Suprascapular art.
Gustatory n.
Duct of submaxillary gland
HYOID
Cricoid art.
Cricoid cartilage
Pneumogastric n.
Thoracic duct
Thyro-hyoid membrane
Thyroid cartilage
Thyroid body
Facia
GENIO-HYOID
MYLO-HYOID
DIGAS. PT.
HYO-GLOSSUS
STYLO-GLOSS.
STYLO-HYOID
OMO-HYOID
STERNO-THYROID
SPLENIUS CAP.
LEVAT. SCAP.
SCAL. MEDIUS
SCAL. POST.
TRAPEZIUS
M. Cohn, ad naturam del.


Parotid gland
Post.r auricular art.
Cervico-fac div.n of facial n.
STYLO-PHARYNGEUS
Glossopharyngeal n.
Ascending palatine art.
Facial art.
SUP.r CONSTRICTOR
MIDDLE "
Submaxill. gland
STYLO-HYOID
DIGASTRIC
Occipital art.
1st CERV.l VERT.
Int.l jugular v.
Occipital art.
Occipitalis major n.
Communicat.g branch of 2nd cervi spin.l n.
N. to STERNO-CLEIDO-MAST.
3rd cervical spinal n.
N. to LEVATOR ANGULI SCAPULÆ
Spinal accessory n.
4th cervical spinal n.
N. to SCALENUS MEDIUS
Fascia
Phrenic n.
Ascending cervical art.
Vertebral art.
Inf.r thyroid art.
Superfic.l cerv.l art.
Suprascapular art.
Subclavian art.
" v.
OMO-HYOID
STERNO-CLEIDO-MAST.
TRAPEZIUS
LEVATOR ANGULI SCAPULÆ
SPLENIUS CAPITIS
SCALENUS POST.
SCALENUS MEDIUS
Brachial plexus
SCALENUS ANT.s
RECTUS CAPITIS ANTICUS MAJOR
Rectus capitis lateralis
Common carotid art.
STYLO-HYOID
STYLO-GLOSSUS
STYLO-PHARYNGEUS
HYO-GLOSSUS
DIGASTRIC
Lingual art.
STYLO-HYOID
HYOID
Thyro-hyoid membrane
N. to THYRO-HYOID
Sup.r laryng.l n.
Sup.r thyroid art.
Crico-id art.
Cricoid cartilage
Recurrent laryngeal n.
Inf.r thyroid v.
THYRO-HYOID
Thyroid cartilage
CRICO-THYROID
Thyroid body
Trachea
STERNO-THYROID
Int.l jug.r v.
CLAVICLE
Thyroid axis
Int.l mammary art.
Cervical cardiac branch
M. Cohn, ad naturam del.



M. Cohn, ad naturam del.


TEMPORAL
Basilar process of OCCIPITAL
RECTUS CAPITIS LATERALIS
Ant.r atlanto-axial lig.mt
Capsular lig.mt
LEVAT.R ANGULI SCAPULÆ
Transverse process
Ant.r tubercle
Body
1st CERV. VERTEB.
Occipital art.
RECTUS CAPITIS ANTICUS MINOR
Capsular lig.mt opened
2nd cervical spinal n.
3rd " " " "
4th " " " "
Intervertebral disc
Phrenic n.
Ascending cervical art.
Inf.r thyroid art.
Œsophagus
Thoracic duct
Left common carotid art.
Thyroid axis
Pneumogastric n.
Vertebral v.
Int.l mammary art.
Sup. cervic.l art.
Suprascap. art.
Subclavian v.
LEVAT.R ANG. SCAP.
Inf.r cervical gangl.n. of sympathetic n.
SCAL. POSTICUS
SPLENIUS CAPITIS
SCALENUS MEDIUS
SCALENUS ANTICUS
LONGUS COLLI
TRANSVERSALIS COLLI
1st DORS.l VERT.
TRAPEZIUS
CLAVICLE
Brachial plexus
M. Colon. ad naturam del.

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 glossopharyngeal (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.

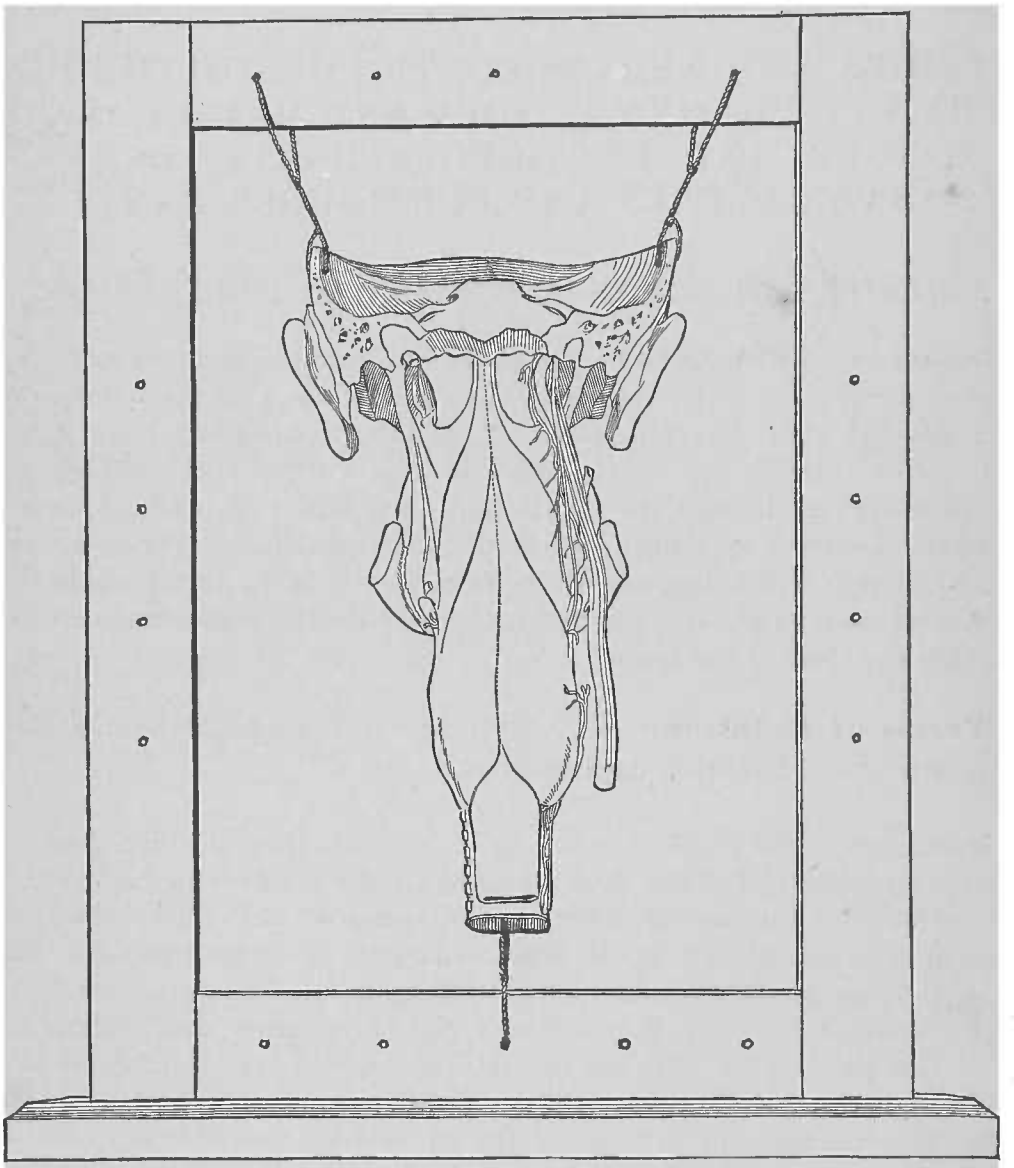


FIGURE 15.

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 posterior belly of the digastric and the stylo-hyoid muscles. Its anterior and internal portion was partly described (page 365), and illustrated (Plate 197). Its latter portion runs between the mylo-hyoid muscle, exteriorly, and the hyo-glossus and genio-hyo-glossus muscles, interiorly. 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 maxil-

lary 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 tubercle 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 *frœnum 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 sphèno-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.

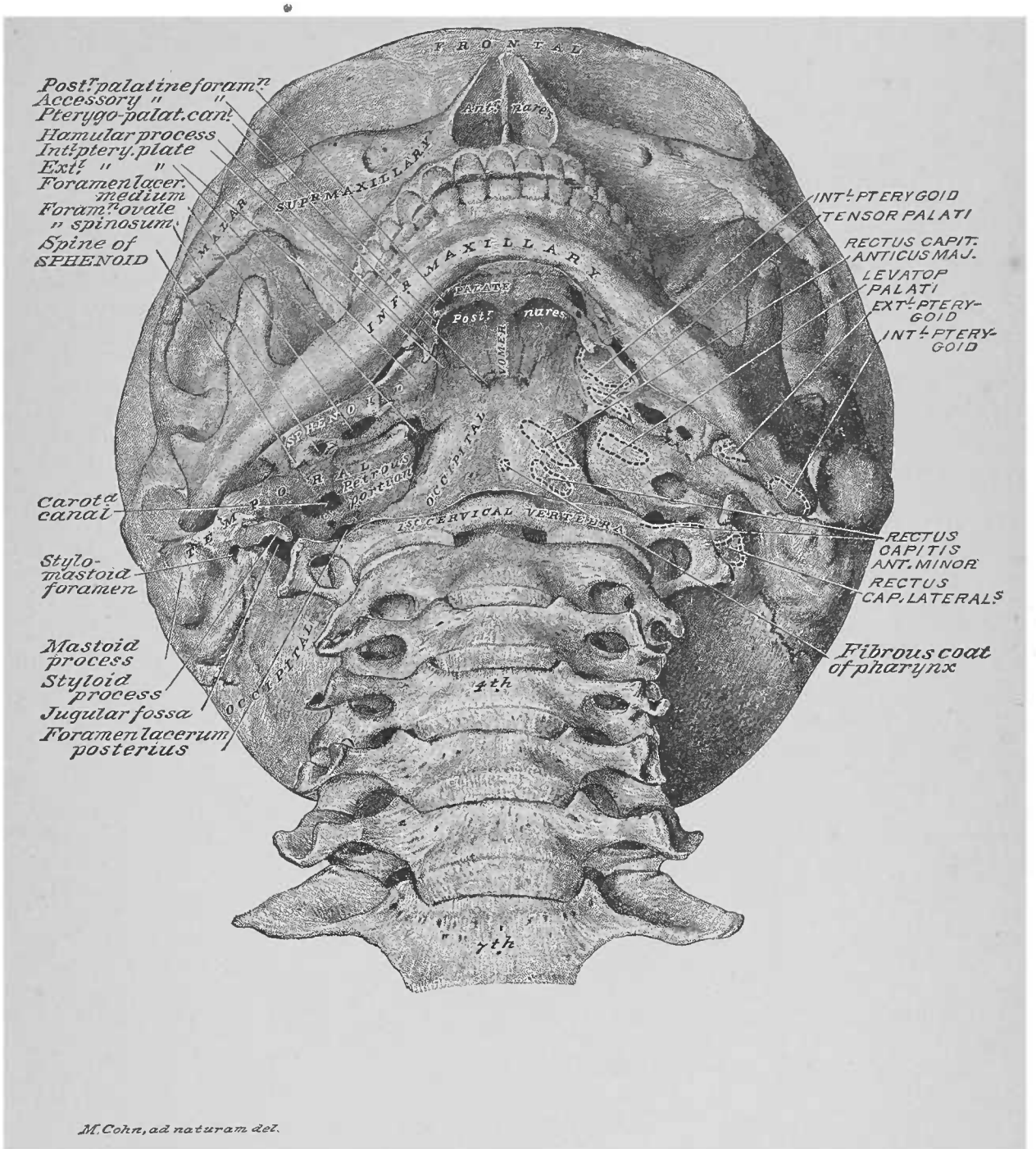
19. Internal Maxillary Artery and its Branches: Plate 209; Fig. 1, Plate 210.—The external portion of this artery was before described (page 348) and illustrated (Plate 187). Its internal portion is lodged in the spheno-palatine fossa, where it gives off the following branches: two, very small, branches, 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.



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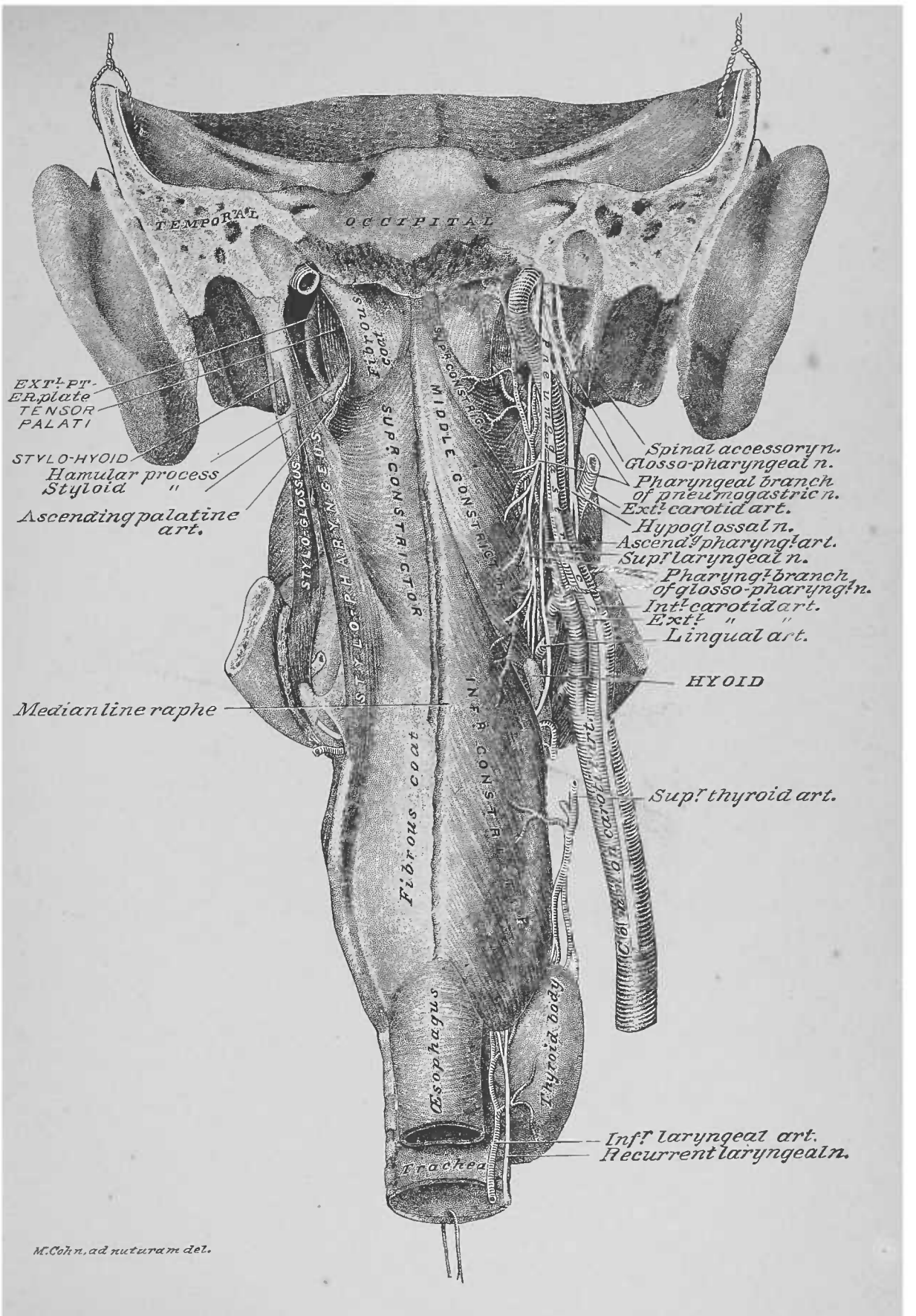
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Hamular process
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STYLO-GLOSSUS
STYLO-PHARYNGEUS
STYLOID coat
SUP. CONSTRICTOR
MIDDLE CONSTRICTOR
INFR CONSTR
Fibrous coat
Pharynx
Oesophagus
Thyroid body
Trachea
Spinal accessory n.
Glosso-pharyngeal n.
Pharyngeal branch of pneumogastric n.
Extl carotid art.
Hypoglossal n.
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Supr laryngeal n.
Pharyngl branch of glosso-pharyngl n.
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HYOID
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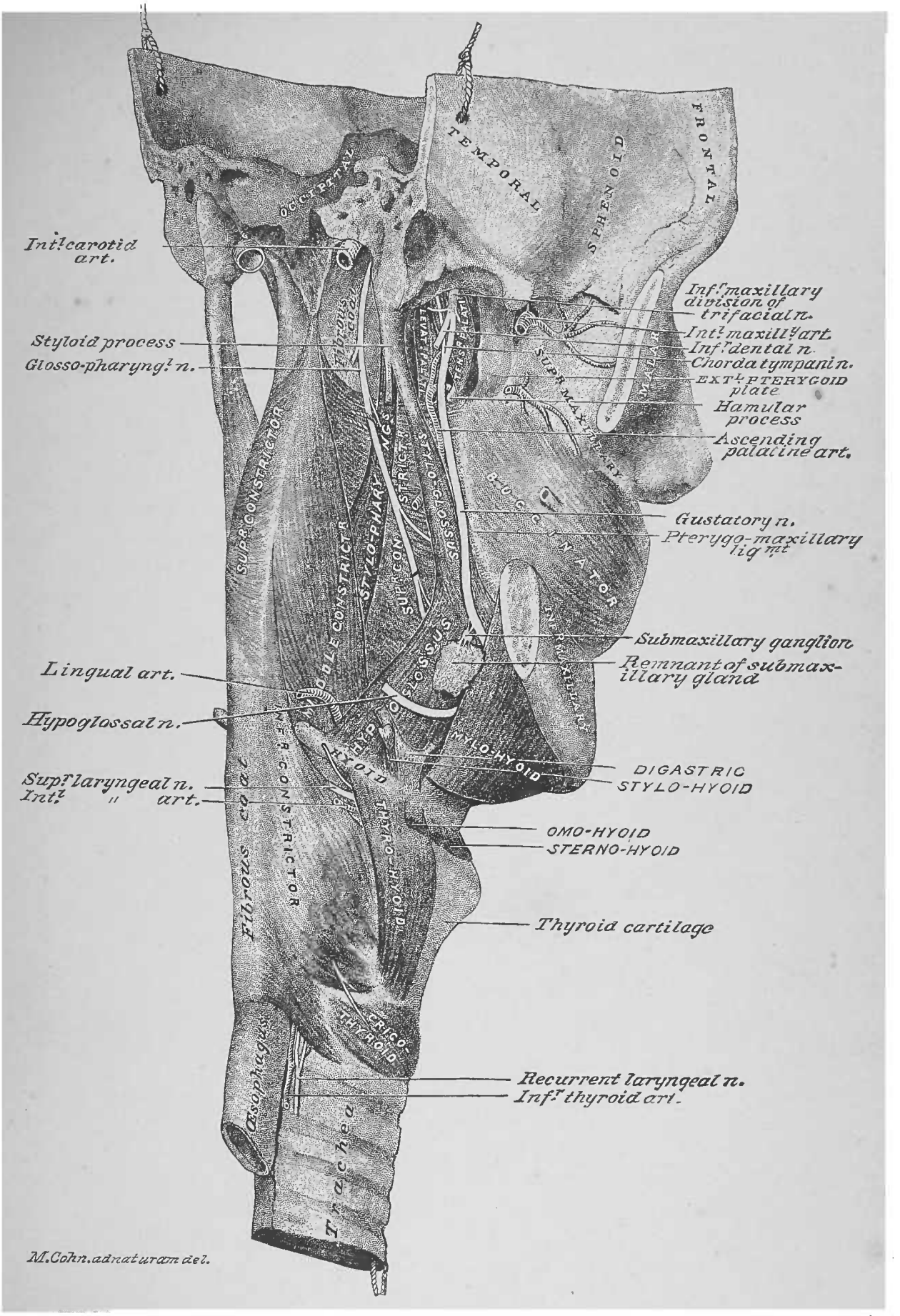
Carotid
Inf.r laryngeal art.
Recurrent laryngeal n.
M. Cohn, ad naturam del.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Chorda tympani n.
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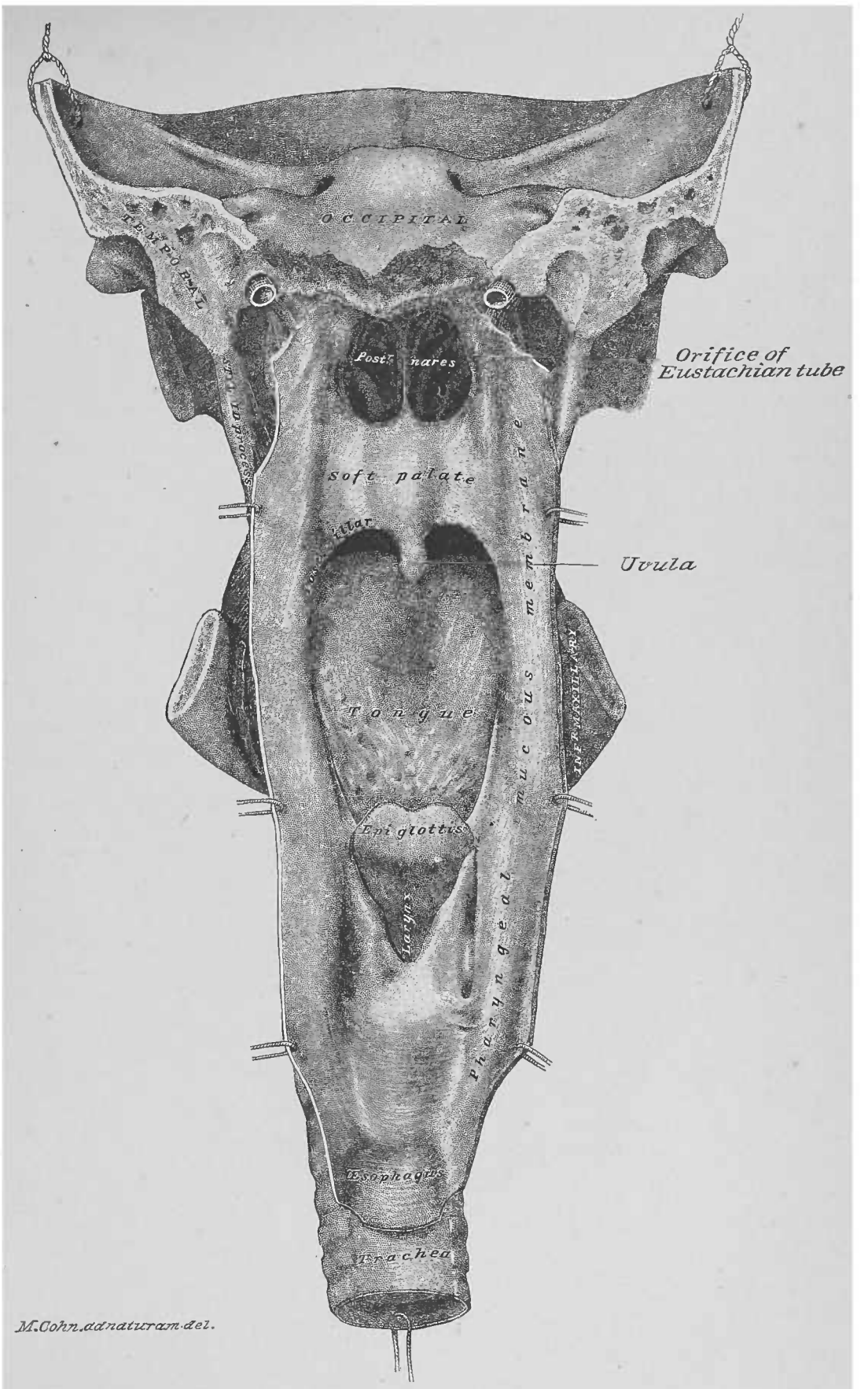
Hamular process
Ascending palatine art.
Gustatory n.
Pterygo-maxillary lig.nt
Submaxillary ganglion
Remnant of submaxillary gland
DIGASTRIC
STYLO-HYOID
OMO-HYOID
STERNO-HYOID
Thyroid cartilage
Recurrent laryngeal n.
Inf.r thyroid art.
TEMPORAL
SPHENOID
FRONTAL
OCCIPITAL
SUPR. CONSTRICTOR
STYLO-PHARYNGEUS
MID. CONSTRICTOR
INF. CONSTRICTOR
STYLO-GLOSSUS
HYO-GLOSSUS
GENIO-HYOID
THYRO-HYOID
CRICO-THYROID
Fibrous coat
Pharynx
Larynx
Oesophagus
Trachea
M.Cohn. ad naturam del.


OCCIPITAL
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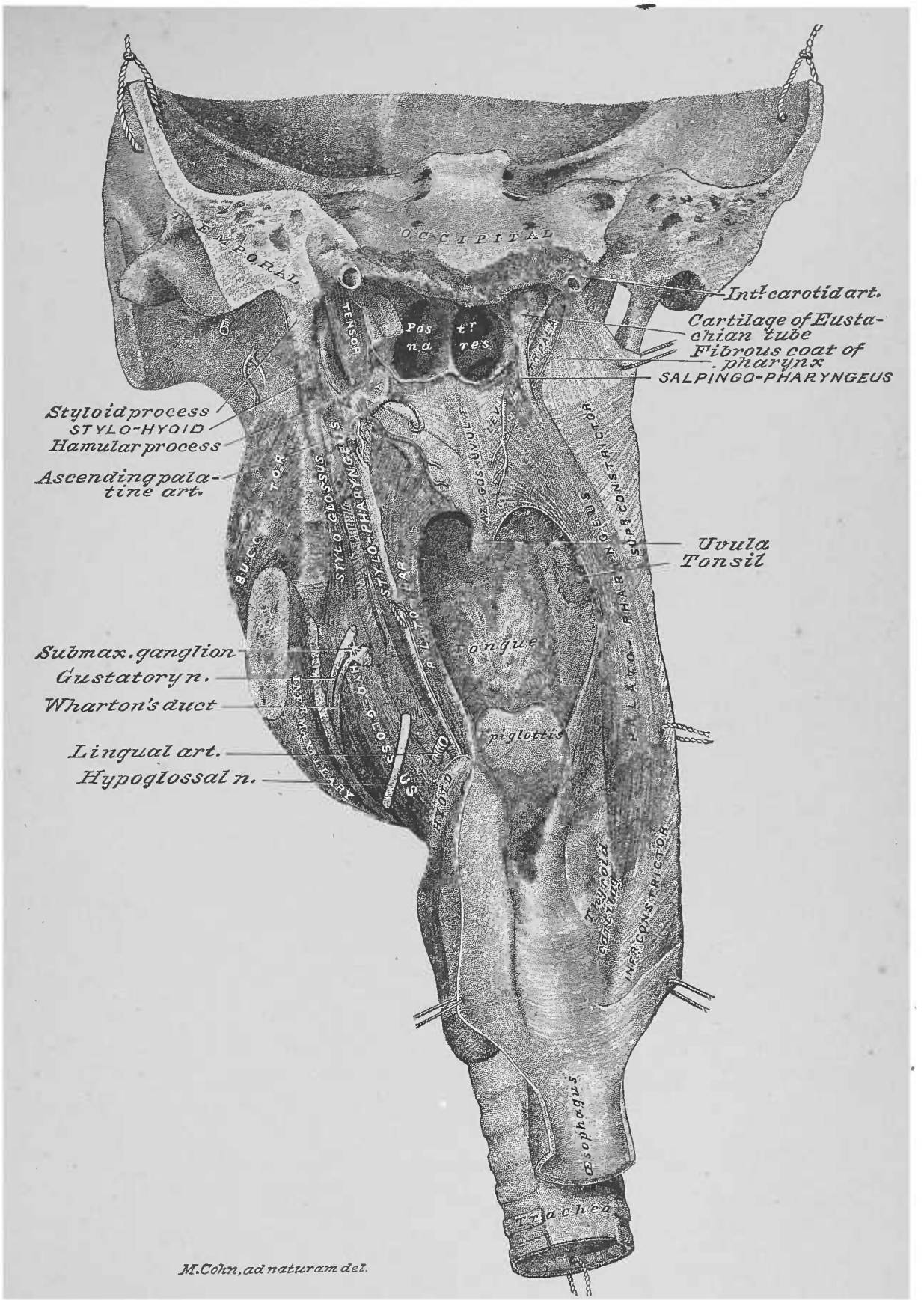
Orifice of Eustachian tube
soft palate
Uvula
Tongue
Epiglottis
Larynx
pharyngeal mucous membrane
Esophagus
Trachea
M.Cohn.ad naturam del.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TEMPORAL
Int.l carotid art.
Cartilage of Eustachian tube
Fibrous coat of pharynx
SALPINGO-PHARYNGEUS
Styloid process
STYLO-HYOID
Hamular process
Ascending palatine art.
TENSOR
Posterna res
LEVATOR
CONSTRICTOR
Uvula
Tonsil
Submax. ganglion
Gustatory n.
Wharton's duct
Lingual art.
Hypoglossal n.
tongue
epiglottis
Oesophagus
Trachea
M. Cohn, ad naturam del.

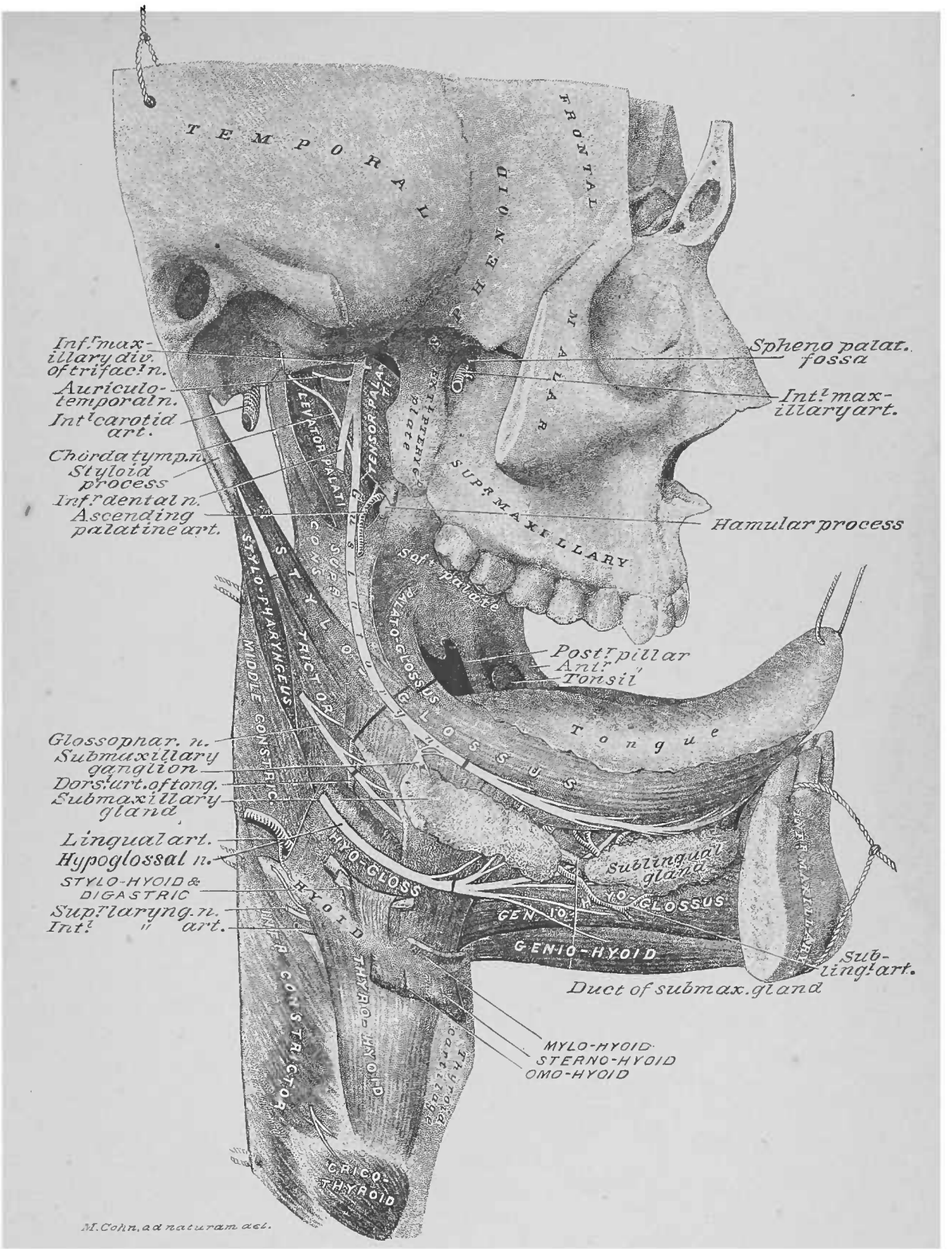
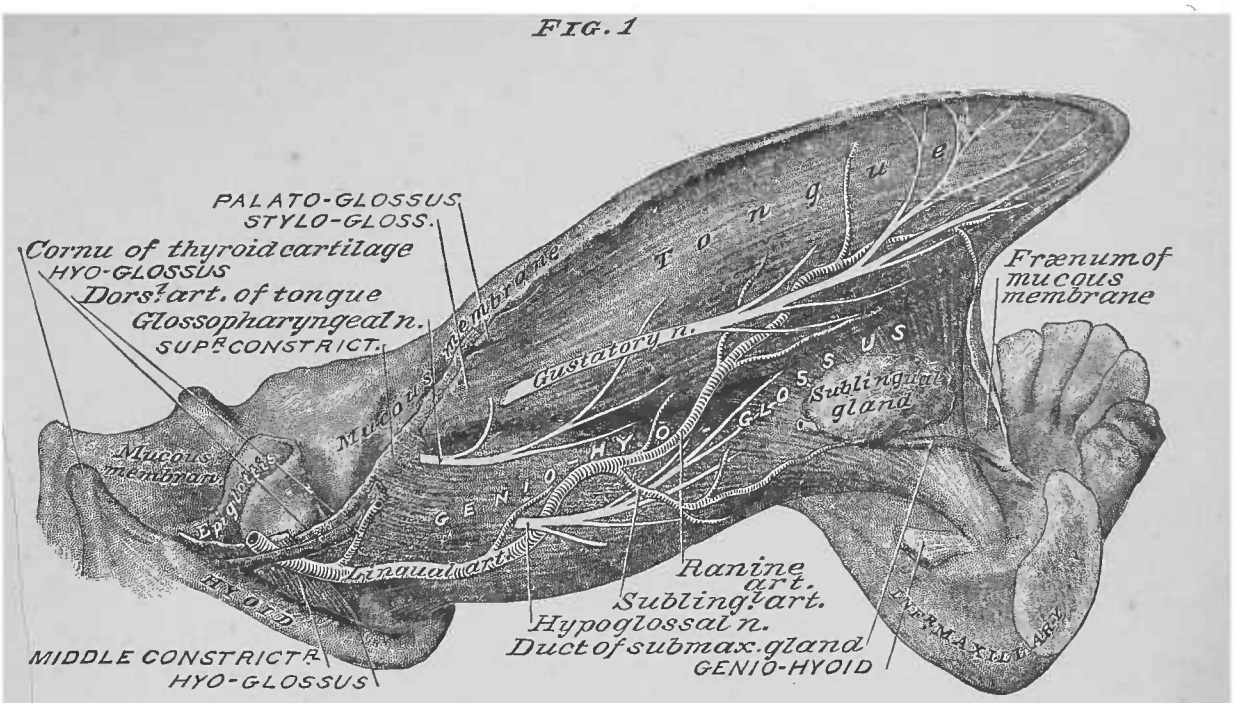

TEMPORAL
SPHENOID
FRONTAL
ALAR
Inf.r max-illary div. of trifac.r n.
Auriculo-temporal n.
Int.l carotid art.
Chorda tymp. n.
Styloid process
Inf.r dental n.
Ascending palatine art.
Levator palati
Tensor palati
Cartilage
Sup.r maxillary
Spheno palat. fossa
Int.l max-illary art.
Hamular process
Stylo-pharyngeus
Constrictor sup.r
Styloglossus
Palato-glossus
Soft palate
Post.r pillar
Ant.r
Tonsil
Tongue
Glossophar. n.
Submaxillary ganglion
Dors.l art. of tong.
Submaxillary gland
Lingual art.
Hypoglossal n.
Stylo-hyoid & digastric
Sup.r laryng. n.
Int.l " art.
Middle constric.
Hyo-gloss
Hyoid
Inf.r constrictor
Thyro-hyoid
Thyroid cartilage
Crico-thyroid
Sublingual gland
Hyo-glossus
Gen. hyo.
Genio-hyoid
Inf.r max-illary art.
Sub-ling.l art.
Duct of submax. gland
Mylo-hyoid
Sterno-hyoid
Omo-hyoid
M. Cohn, ad naturam del.

FIG. 1


PALATO-GLOSSUS
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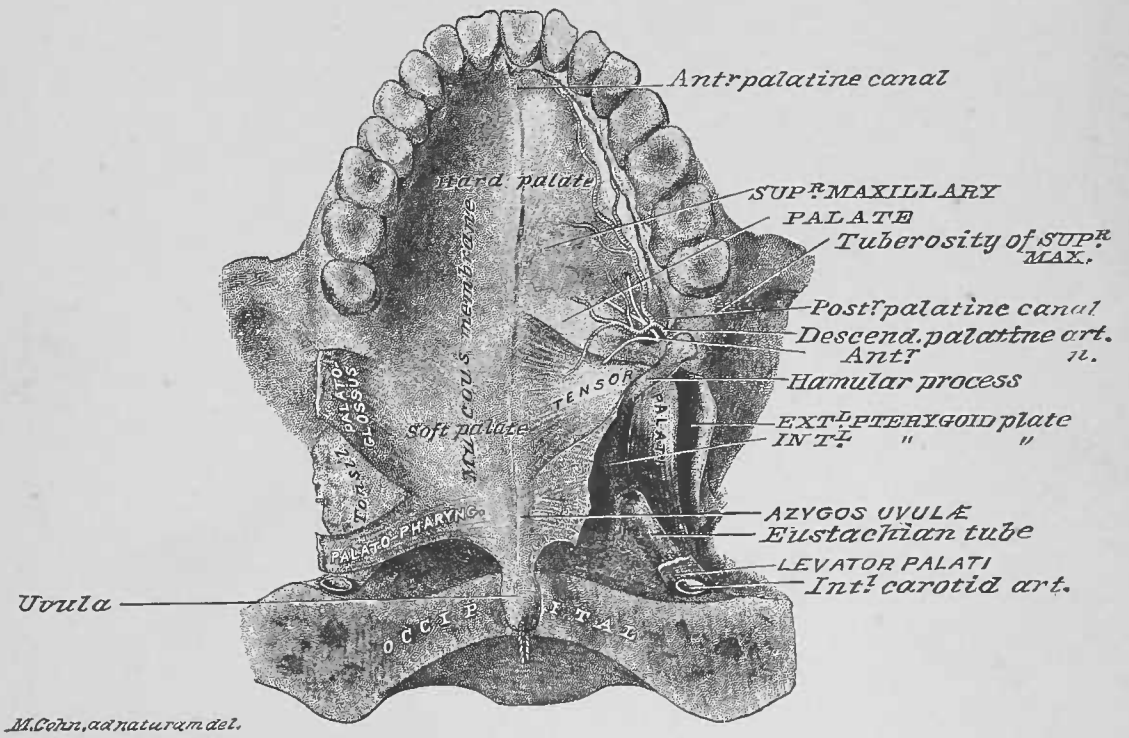
Cornu of thyroid cartilage
HYO-GLOSSUS
Dors.l art. of tongue
Glossopharyngeal n.
SUP.R CONSTRICT.
Mucous membrane
Gustatory n.
Tongue
Frænum of mucous membrane
Sublingual gland
Mucous membran.
Epiglottis
GENIO-HYOID
Lingual art.
Ranine art.
Subling.l art.
Hypoglossal n.
Duct of submax. gland
INF.R MAXILLARY
HYOID
MIDDLE CONSTRICT.R
HYO-GLOSSUS

FIG. 2


Antr palatine canal
Hard palate
SUP.R MAXILLARY
PALATE
Tuberosity of SUP.R MAX.
Post.r palatine canal
Descend. palatine art.
Ant.r n.
Hamular process
Mucous membrane
TENSOR
PALAT.
EXT.L PTERYGOID plate
INT.L " "
soft palate
TOR.S PALATO-GLOSSUS
AZYGOS UVULÆ
Eustachian tube
PALATO-PHARYNG.
LEVATOR PALATI
Int.l carotid art.
Uvula
OCCIPITAL
M. Cohn, ad naturam del.

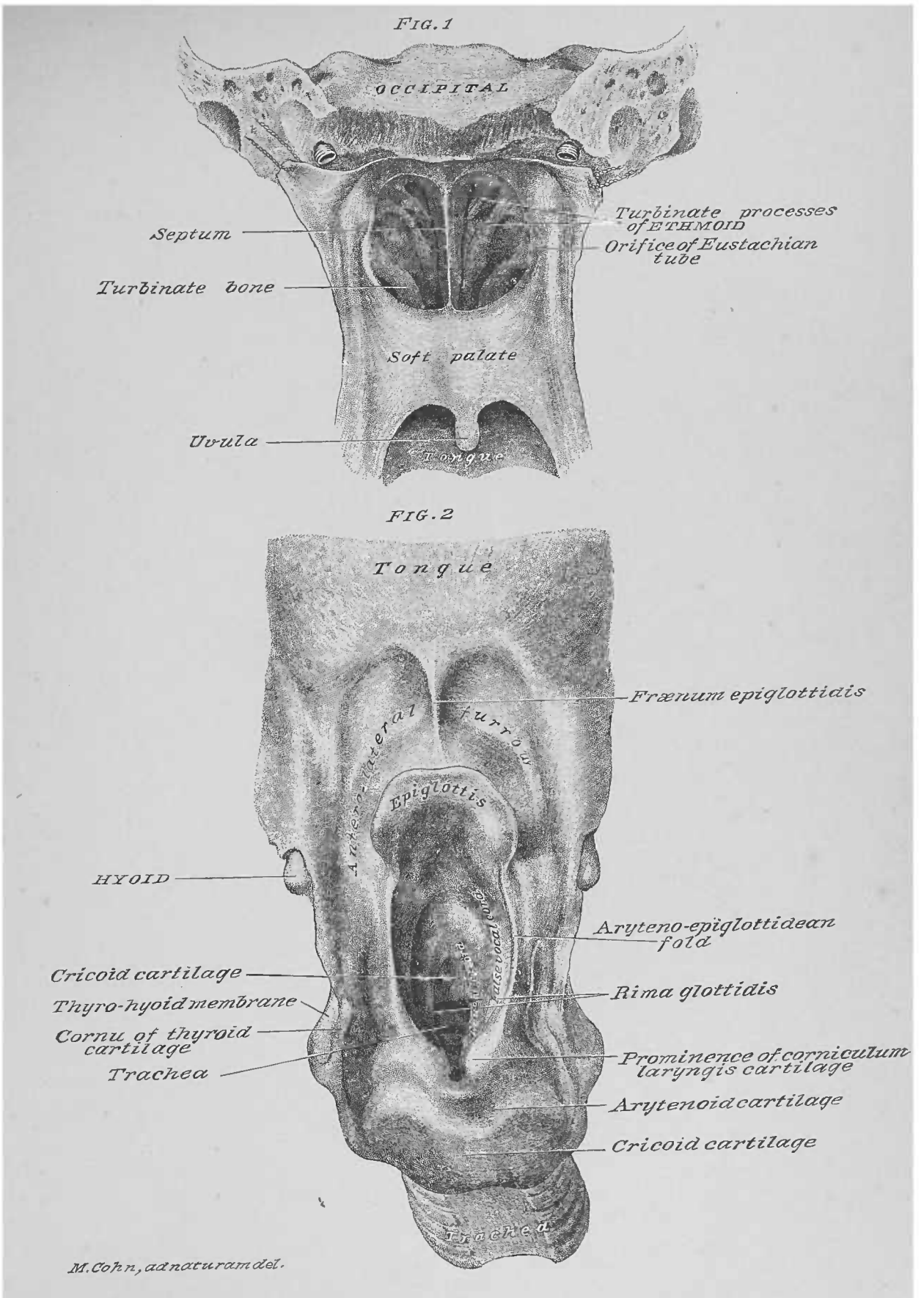


FIG. 1
OCCIPITAL
Turbinate processes of ETHMOID
Septum
Orifice of Eustachian tube
Turbinate bone
Soft palate
Uvula
Tongue
FIG. 2
Tongue
Frænum epiglottidis
Antero-lateral furrow
Epiglottis
HYOID
Aryteno-epiglottidean fold
Cricoid cartilage
Rima glottidis
Thyro-hyoid membrane
Cornu of thyroid cartilage
Prominence of corniculum laryngis cartilage
Trachea
Arytenoid cartilage
Cricoid cartilage
Trachea
M. Cohn, ad naturam del.

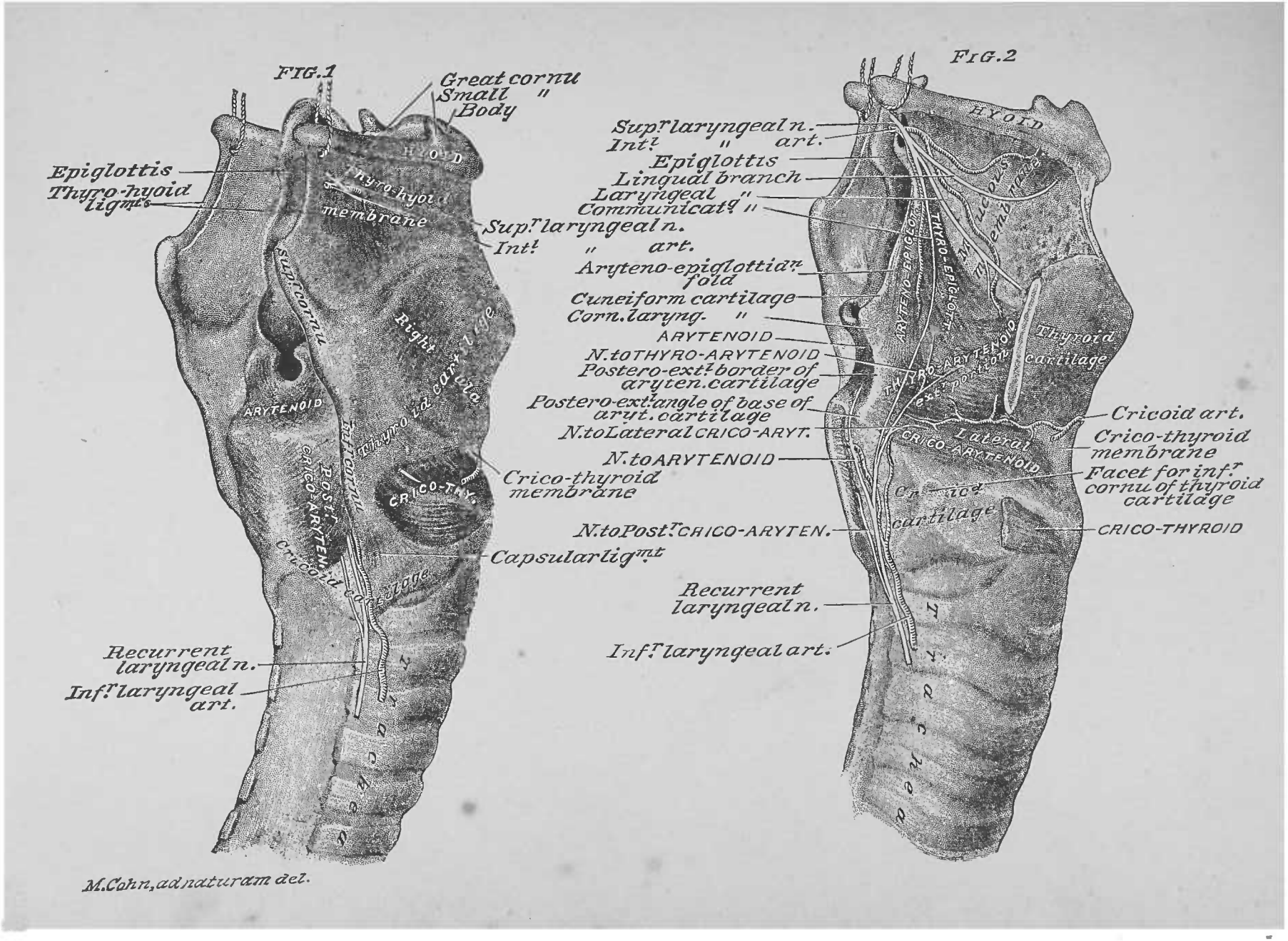


FIG.1
Great cornu
Small "
Body
HYOID
Epiglottis
Thyro-hyoid ligmts
Thyro-hyoid membrane
Sup.r laryngeal n.
Int.l " art.
Sup.r cornu
Right thyro-arytenoid cartilage
ARYTENOID
Inf.r cornu
Post.r CRICO-ARYTENOID
CRICO-TH. ligt
Crico-thyroid membrane
Capsular ligmt
Recurrent laryngeal n.
Inf.r laryngeal art.
FIG.2
Sup.r laryngeal n.
Int.l " art.
Epiglottis
Lingual branch
Laryngeal "
Communicat.g "
HYOID
Aryteno-epiglottian fold
Cuneiform cartilage
Corn. laryng. "
ARYTENOID
N. to THYRO-ARYTENOID
Postero-ext.l border of aryten. cartilage
Postero-ext.l angle of base of aryt. cartilage
N. to Lateral CRICO-ARYT.
N. to ARYTENOID
N. to Post.r CRICO-ARYTEN.
Recurrent laryngeal n.
Inf.r laryngeal art.
THYRO-EPIGLOTT.
ARYTENO-EPIGLOTT.
Thyroid cartilage
Cricoid art.
Crico-thyroid membrane
Lateral CRICO-ARYTENOID
Facet for inf.r cornu of thyroid cartilage
CRICO-THYROID
M. Cohn, ad naturam del.

PLATE 207

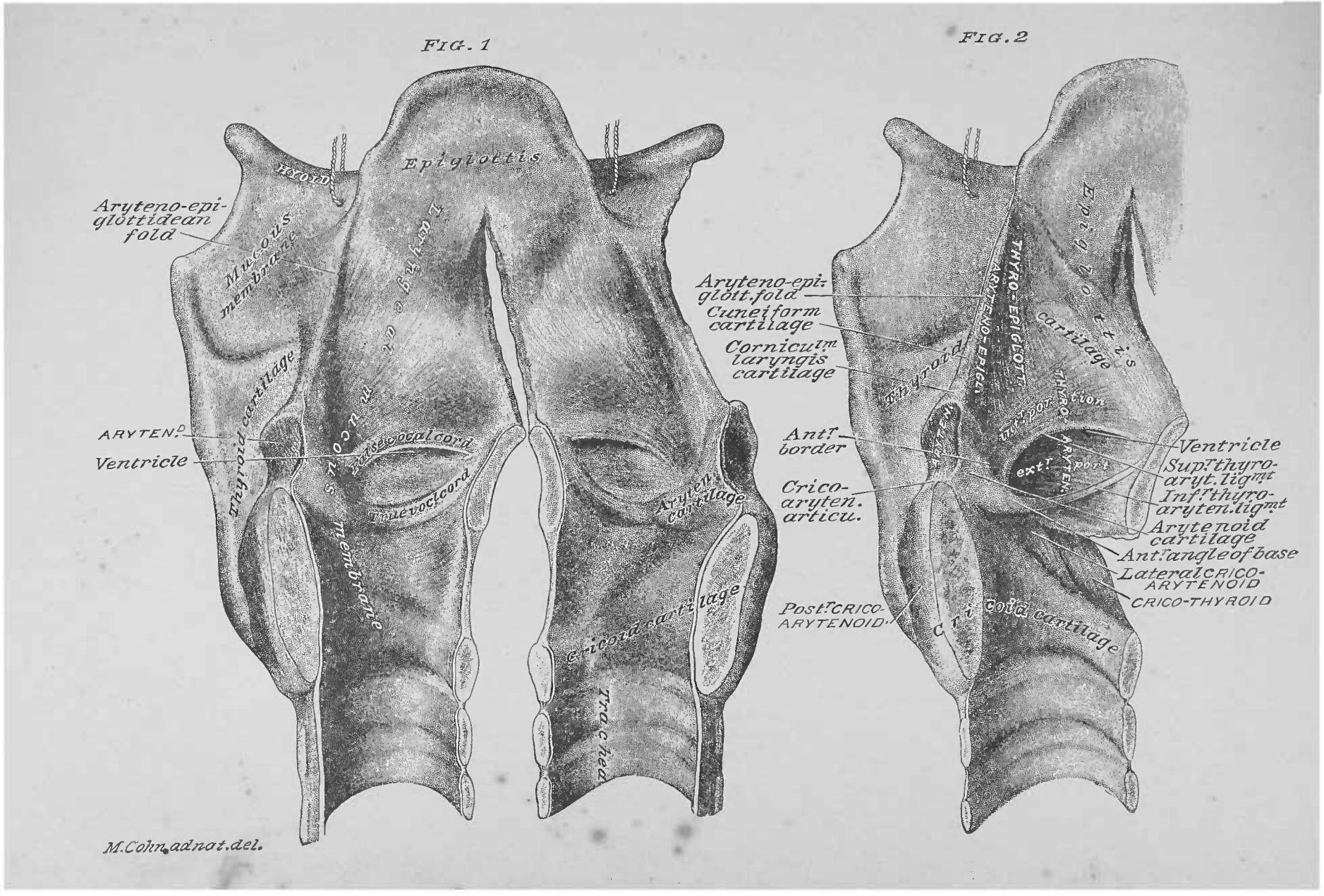


FIG. 1
Epiglottis
Hyoid
Aryteno-epi-glottidean fold
Mucous membrane
Thyroid cartilage
ARYTEN.D
Ventricle
Thyro-arytenoideus muscle
Thyro-epiglottic
Thyro-hyoid
Thyro-arytenoid membrane
Thyro-arytenoid
Aryten.d cartilage
Cricoid cartilage
Trachea
M. Cohn, adnat. del.
FIG. 2
Aryteno-epi-glott. fold
Cuneiform cartilage
Cornicul.m laryngis cartilage
Thyroid
ARYTENO-EPIGLOTT.
THYRO-EPIGLOTT.
Epiglottis cartilage
Ant.r border
Crico-aryten. articu.
Ventricle
Sup.r thyro-aryt. lig.mt
Inf.r thyro-aryten. lig.mt
Arytenoid cartilage
Ant.r angle of base
Lateral CRICO-ARYTENOID
CRICO-THYROID
Post.r CRICO-ARYTENOID
Cricoid cartilage

PLATE 208

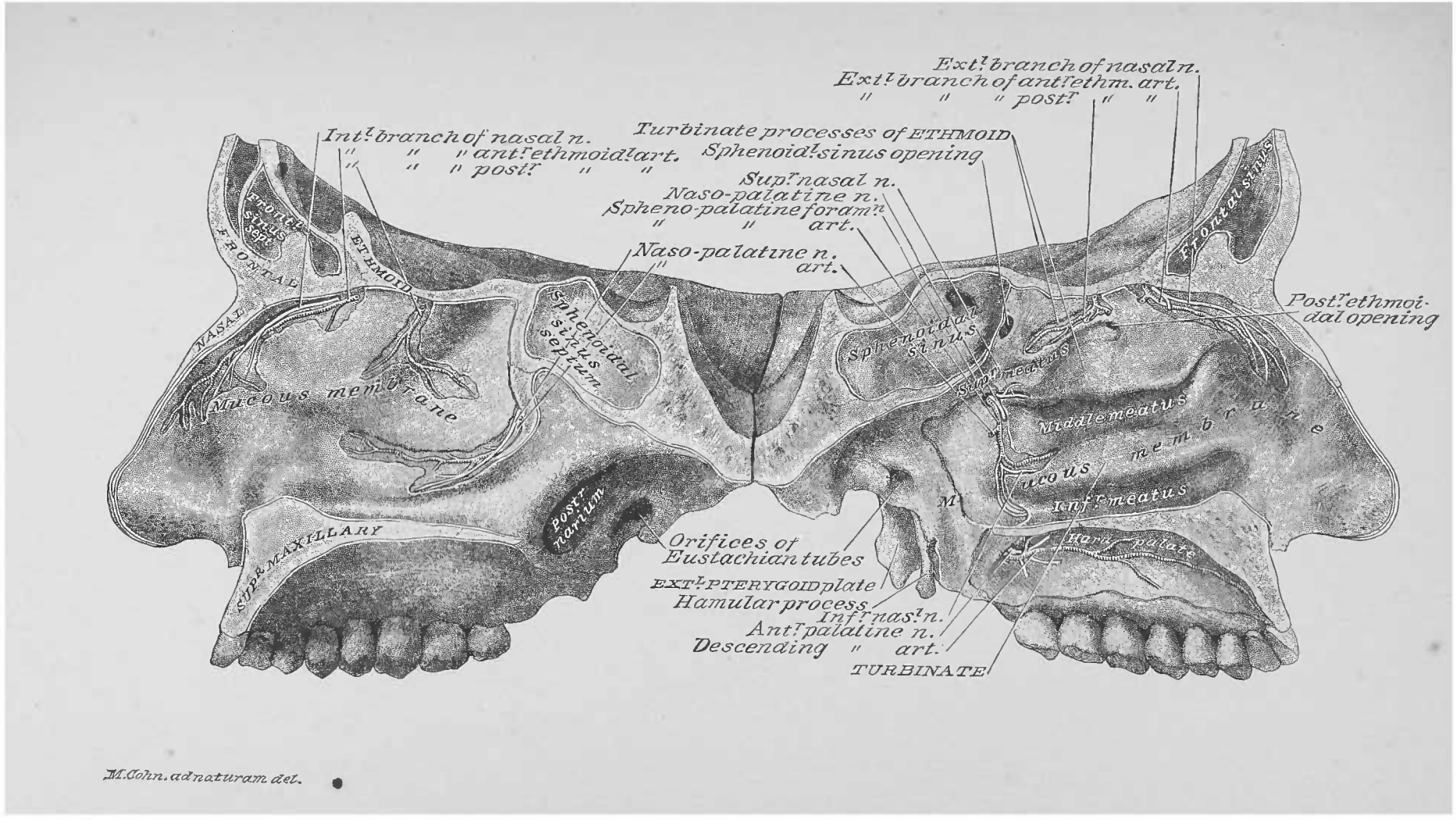

Ext.l branch of nasal n.
Ext.l branch of ant.r ethm. art.
" " " post.r " "
Int.l branch of nasal n.
" " " ant.r ethmoid.l art.
" " " post.r " "
Turbinate processes of ETHMOID
Sphenoid.l sinus opening
Sup.r nasal n.
Naso-palatine n.
Spheno-palatine foram.n
" " art.
Naso-palatine n.
" art.
FRONTAL SINUS
FRONTAL
ETHMOID
NASAL
Mucous membrane
Sphenoidal sinus septum
Post.r narium
SUP.r MAXILLARY
Orifices of Eustachian tubes
EXT.l PTERYGOID plate
Hamular process
Inf.r nas.l n.
Ant.r palatine n.
Descending " art.
TURBINATE
Sphenoidal Sinus
Sup.r meatus
Middle meatus
Mucous membrane
Inf.r meatus
Hard palate
Post.r ethmoidal opening
M.Cohn. ad naturam del.

PLATE 209

FIG. 1

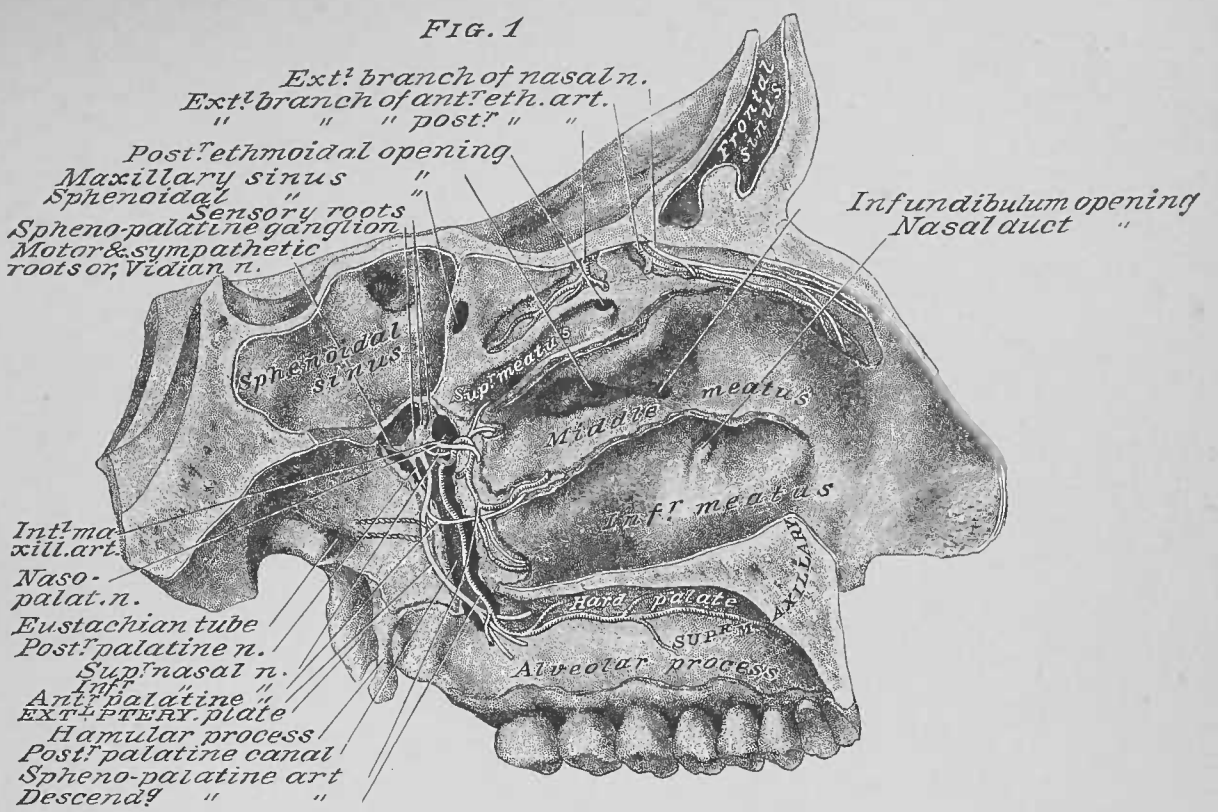
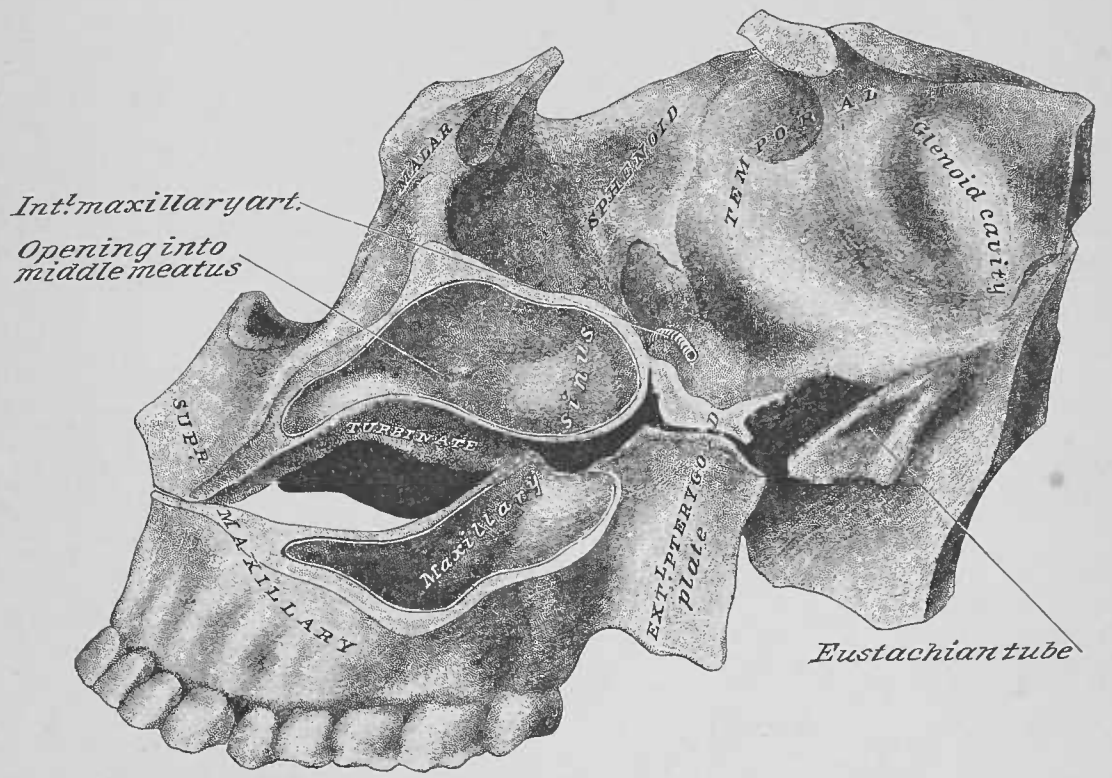


FIG. 2



M. Cohn, ad naturam del.

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 verte-

bral 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 Syl-

vius 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

(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, anteroposteriorly 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

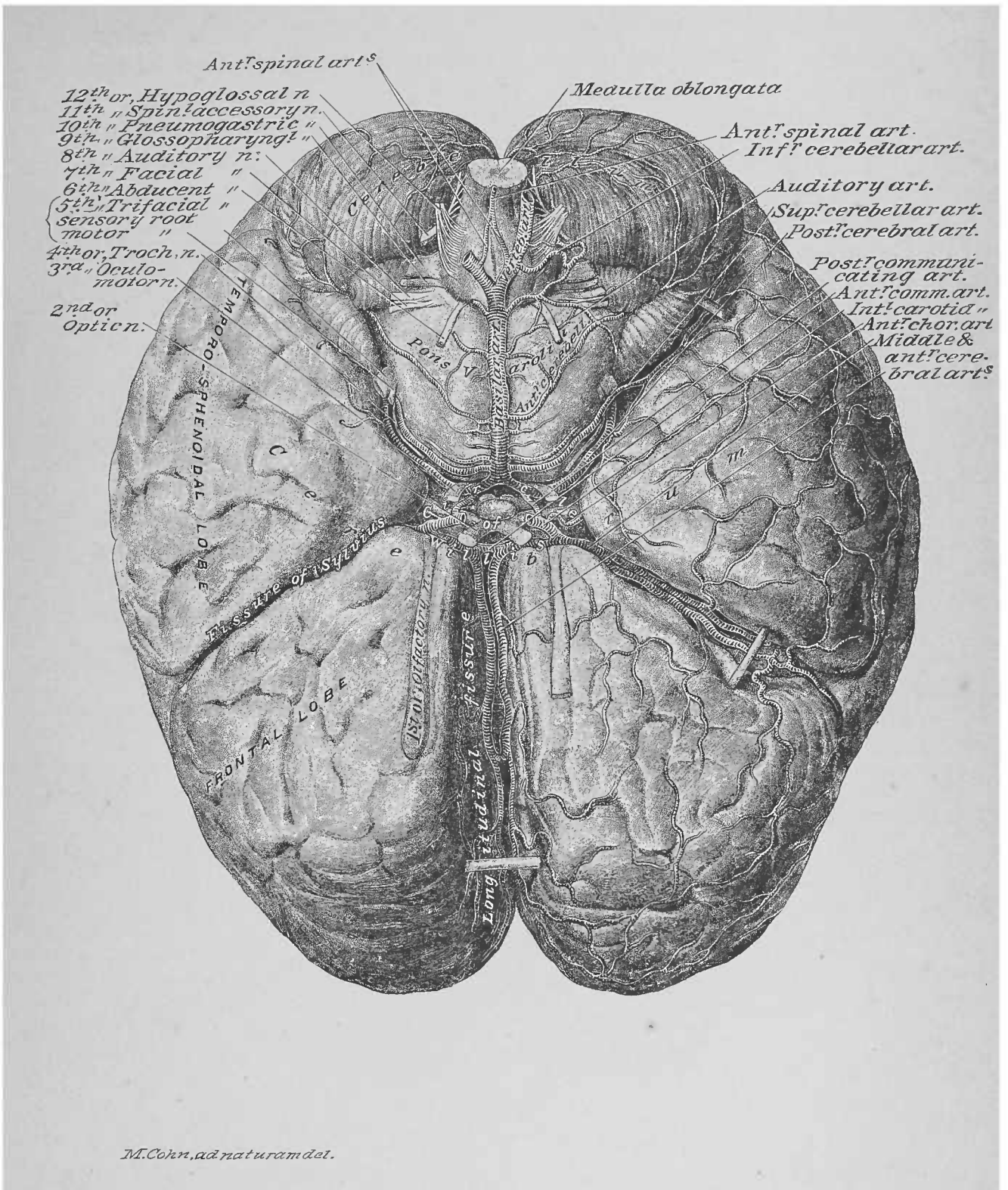
striæ acusticæ, which pass externally, out of the ventricle, and join the auditory nerve, right and left, respectively

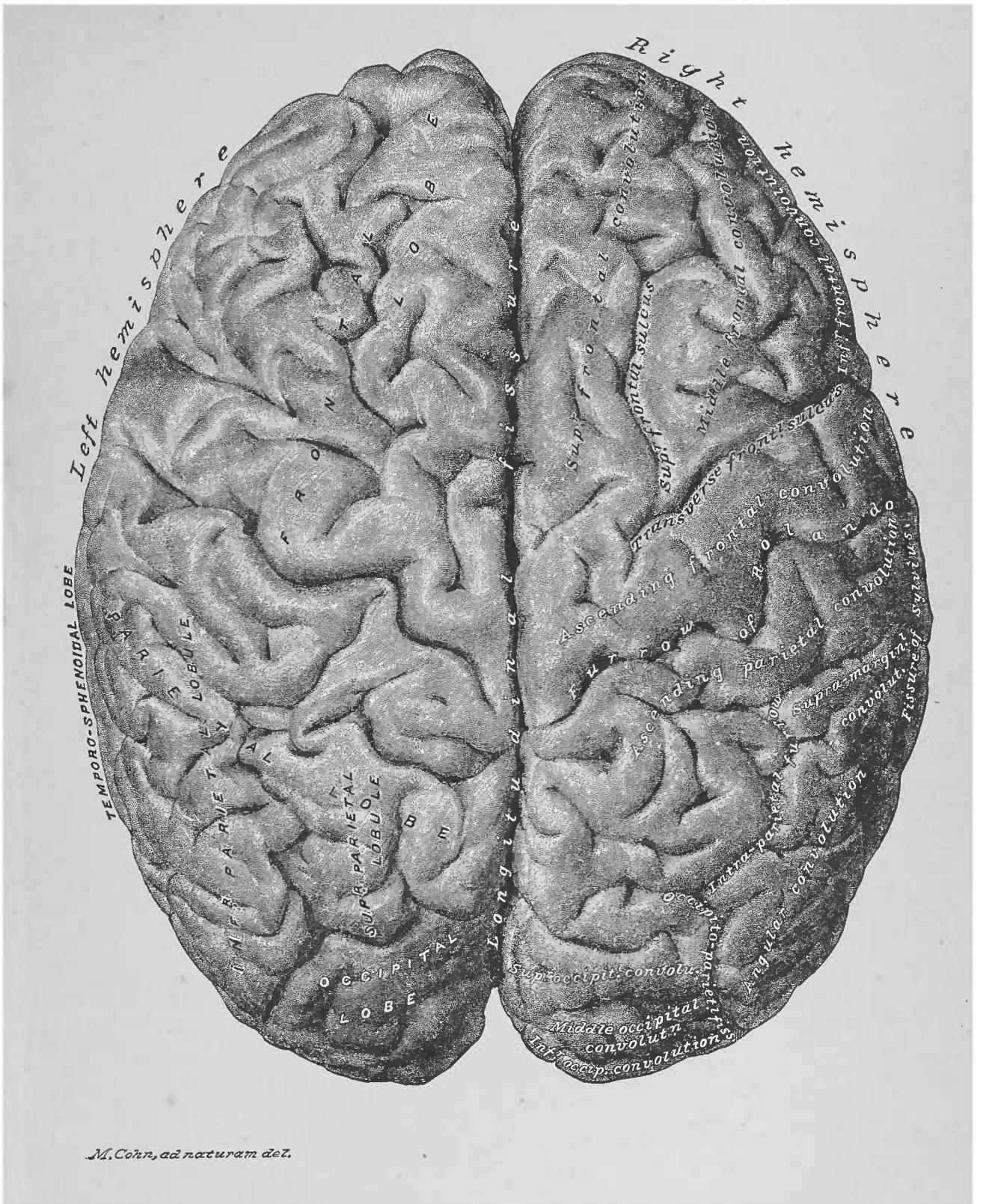
The *pons Varolii portion* of the floor of the fourth ventricle (Fig. 3, Plate 222) presents the superior continuance of the *median sulcus*. At its superior end is the posterior opening of the *aqueduct of Sylvius* (a bristle emerges from it); the anterior opening of this aqueduct was described (page 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.

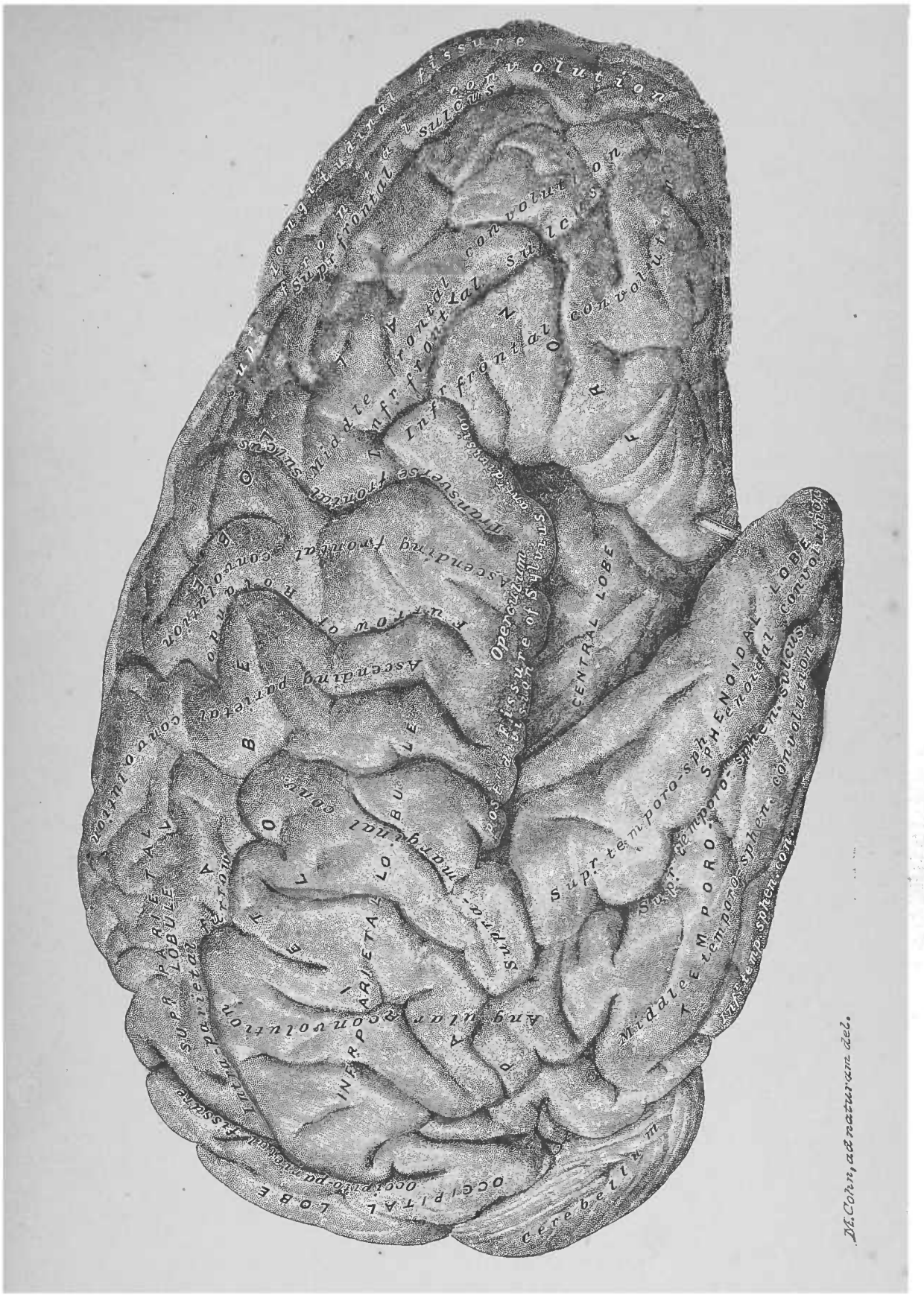
Dissection.—Section, as in Fig. 3, Plate 219, longitudinally, at the left of the median line, through the medulla oblongata, pons Varolii, corpora quadrigemina, crus cerebri, and thalamus opticus.

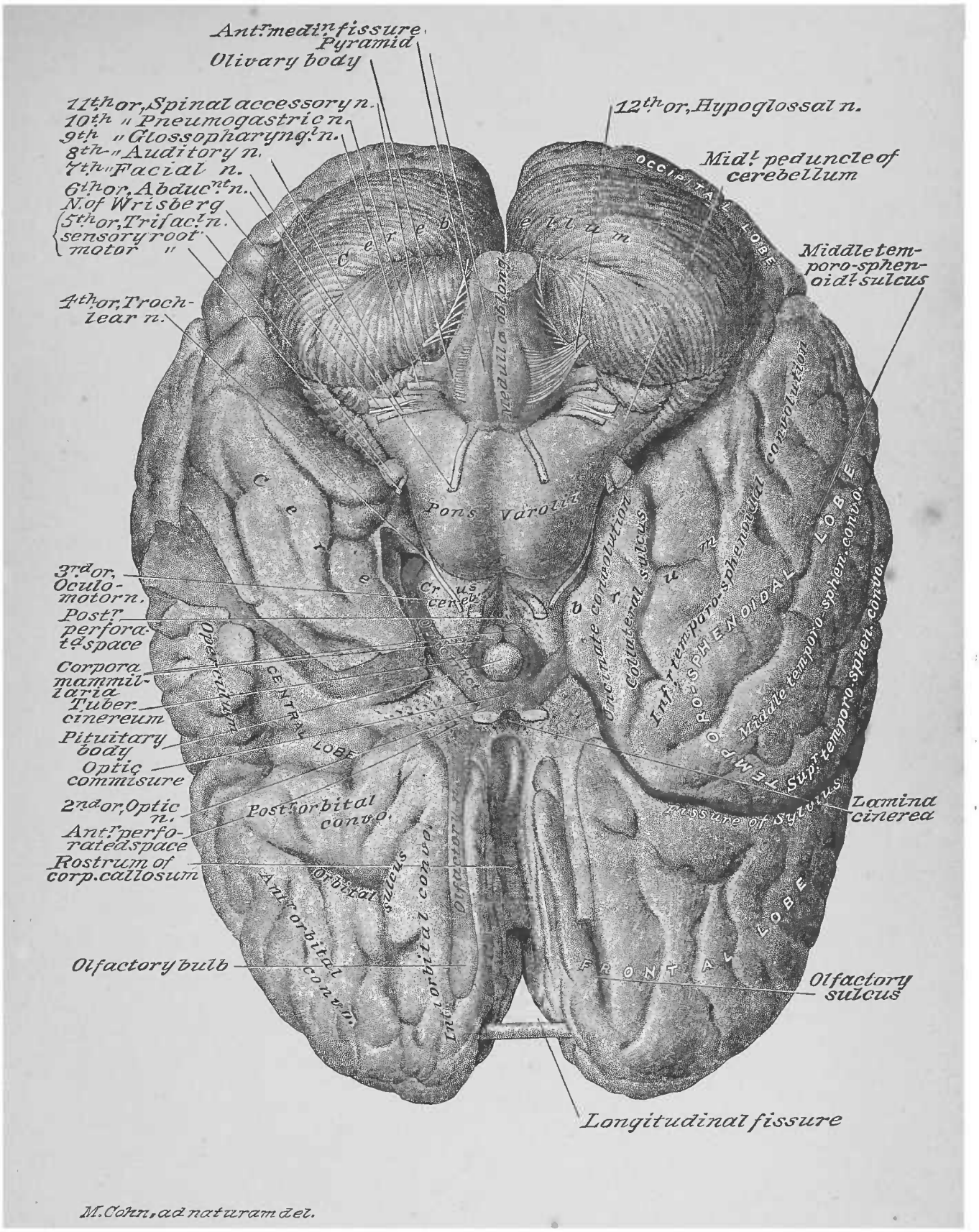
55. Structural Appearances of the Medulla Oblongata, Pons Varolii, Corpora Quadrigemina, Crus Cerebri, and Thalamus Opticus, Fig. 3, Plate 219.—This section of these parts is made to afford an approximate appreciation of the distribution of the grey and white neural tissues through them.

FINIS.

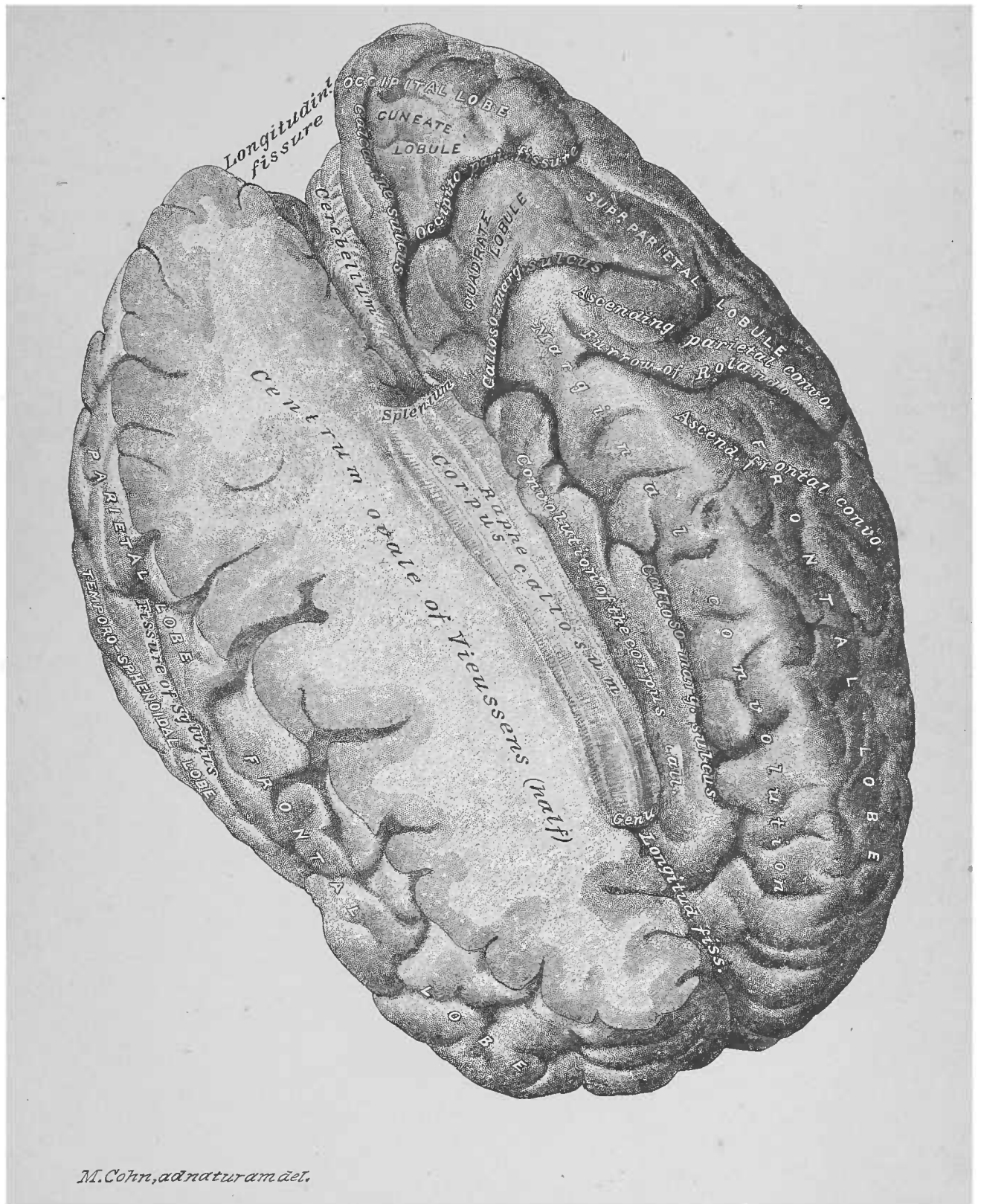

Ant.r spinal arts
12th or, Hypoglossal n
11th " Spin.l accessory n.
10th " Pneumogastric "
9th " Glossopharyng.l "
8th " Auditory n:
7th " Facial "
6th " Abducent "
5th " Trifacial "
sensory root
motor "
4th or, Troch. n.
3rd " Oculo-motor n.
2nd or Optic n.
Meaulla oblongata
Ant.r spinal art.
Inf.r cerebellar art.
Auditory art.
Sup.r cerebellar art.
Post.l cerebral art.
Post.r communi-cating art.
Ant.r comm. art.
Int.l carotid "
Ant.r chor. art
Middle & ant.r cere-bral arts
Pons
TEMPORO-SPHENOIDAL LOBE
FRONTAL LOBE
Fissure of Sylvius
Olfactory n.
Longitudinal fissure
M.Cohn, ad naturam del.


Left hemisphere
Right hemisphere
TEMPORO-SPHENOIDAL LOBE
FRONTAL LOBE
PARIETAL LOBULE
INFR. PARIETAL LOBULE
SUPR. PARIETAL LOBULE
OCCIPITAL LOBE
Longitudinal fissure
Superfrontal convolution
Superfrontal sulcus
Middle frontal convolution
Inf. frontal convolution
Transverse frontal sulcus
Ascending frontal convolution
Ascending parietal convolution
Fissure of Rolando
Supra-marginal convolution
Angular convolution
Occipito-temporal convolution
Sup. occipit. convolu.
Middle occipital convolutn
Inf. occip. convolutions
M. Conn, ad naturam del.

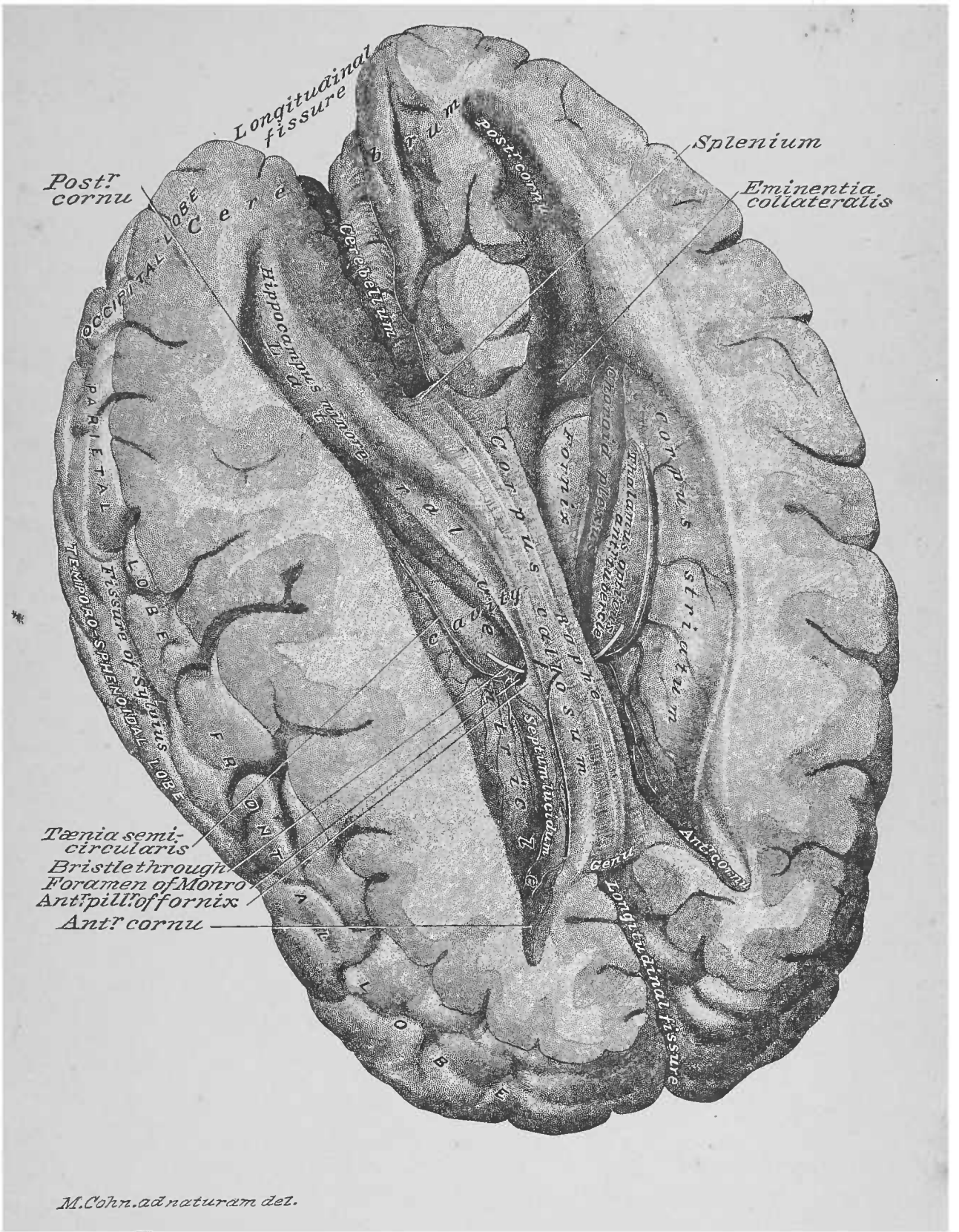

Longitudinal fissure
Superior frontal convolution
Middle frontal convolution
Inferior frontal convolution
Ascending frontal convolution
Ascending parietal convolution
Supra-marginal convolution
Angular convolution
Superior temporo-sphenoidal convolution
Middle temporo-sphenoidal convolution
Inferior temporo-sphenoidal convolution
Occipito-parietal fissure
Transverse frontal sulcus
Inferior frontal sulcus
Ascending frontal sulcus
Fissure of Rolando
Ascending parietal sulcus
Intra-parietal sulcus
Operculum
Posterior ramus of fissure of Sylvius
CENTRAL LOBE
FRONTAL LOBE
PARIETAL LOBE
OCCIPITAL LOBE
INTERPARIETAL LOBULE
Cerebellum
M. Cohn, ad naturam del.



M. Cohn, ad naturam del.



M. Cohn, ad naturam del.


Longitudinal fissure
Post.r cornu
Splenium
Eminentia collateralis
Cerebellum
Hippocampus minor
Fornix
Choroid plexus
Corpus striatum
Corpus callosum
Raphe
Septum lucidum
Ant.r com.
Genu
Longitudinal fissure
Tænia semicircularis
Bristle through Foramen of Monro
Ant.r pill.r of fornix
Ant.r cornu
M.Cohn. ad naturam del.

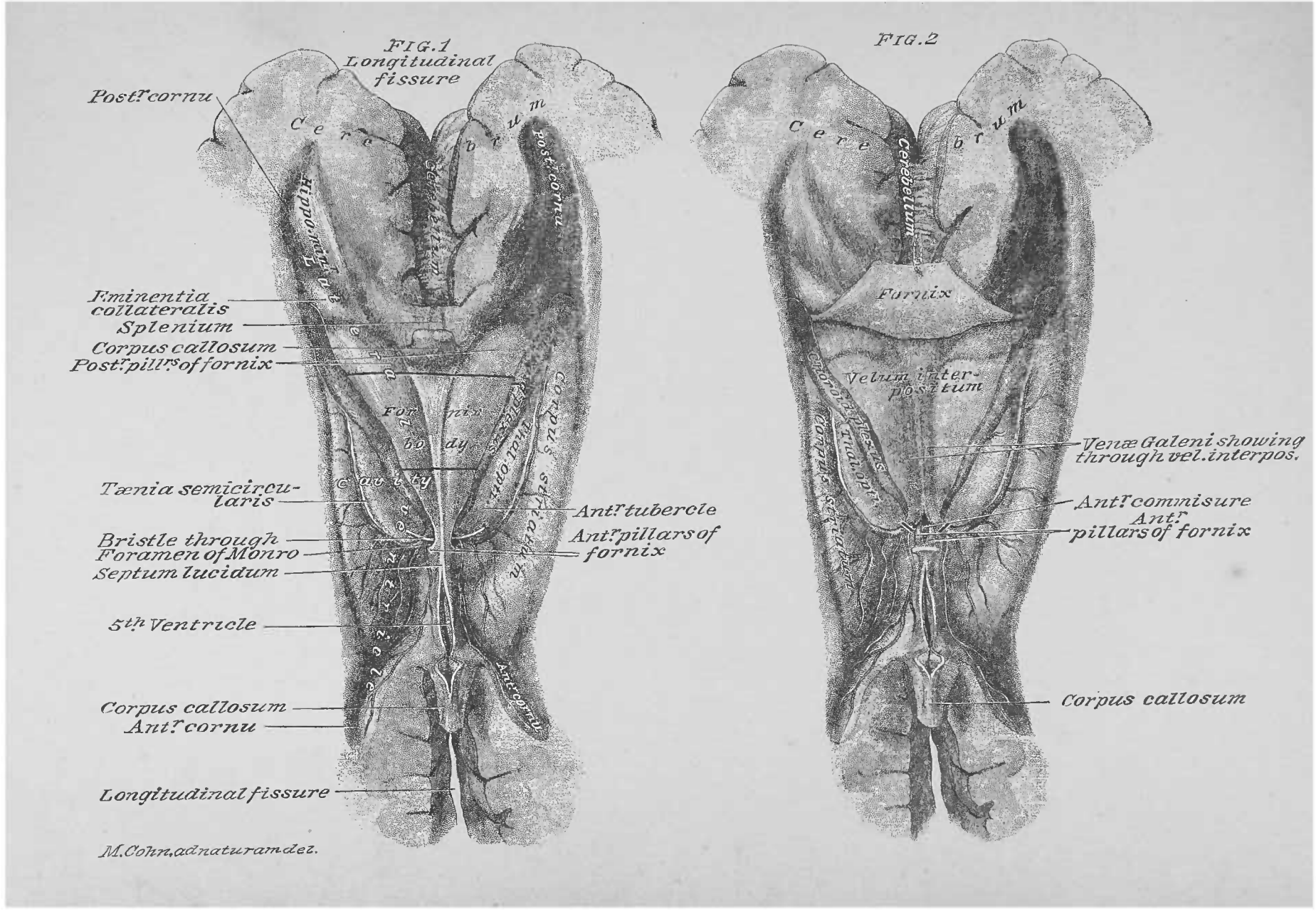


FIG.1
Longitudinal fissure
Post.r cornu
Cerebrum
Cerebellum
Hippocampus
Eminentia collateralis
Splenium
Corpus callosum
Post.r pill.rs of fornix
Fornix body
Cavity
Tænia semicircularis
Bristle through Foramen of Monro
Septum lucidum
5th Ventricle
Corpus callosum
Ant.r cornu
Longitudinal fissure
Thal. opt.
Corpus striatum
Ant.r tubercle
Ant.r pillars of fornix
Ant.r cornu
M.Cohn, a natura del.
FIG.2
Cerebellum
Cerebrum
Fornix
Velum interpositum
Choroid Plexus
Thal. opt.
Corpus striatum
Venæ Galeni showing through vel. interpos.
Ant.r commisure
Ant.r pillars of fornix
Corpus callosum

PLATE 217.

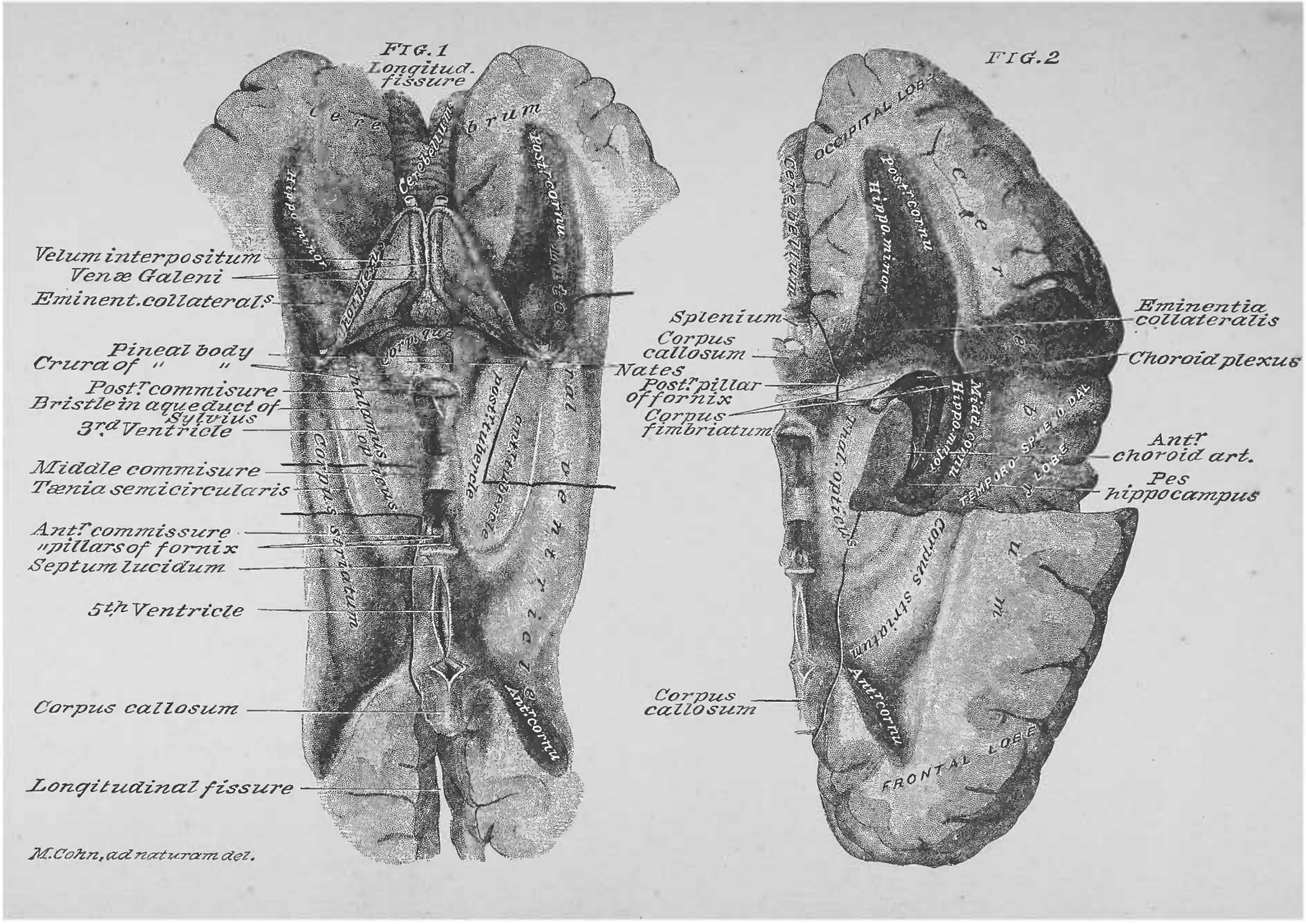


FIG. 1
Longitud. fissure
Velum interpositum
Venæ Galeni
Eminent. collaterals
Pineal body
Crura of " "
Post.r commisure
Bristle in aqueduct of Sylvius
3rd Ventricle
Middle commisure
Tænia semicircularis
Ant.r commissure
" pillars of fornix
Septum lucidum
5th Ventricle
Corpus callosum
Longitudinal fissure
M. Cohn, ad naturam del.
FIG. 2
Splenium
Corpus callosum
Nates
Post.r pillar of fornix
Corpus fimbriatum
Eminentia collateralis
Choroid plexus
Ant.r choroid art.
Pes hippocampus
Corpus callosum

PLATE 218.

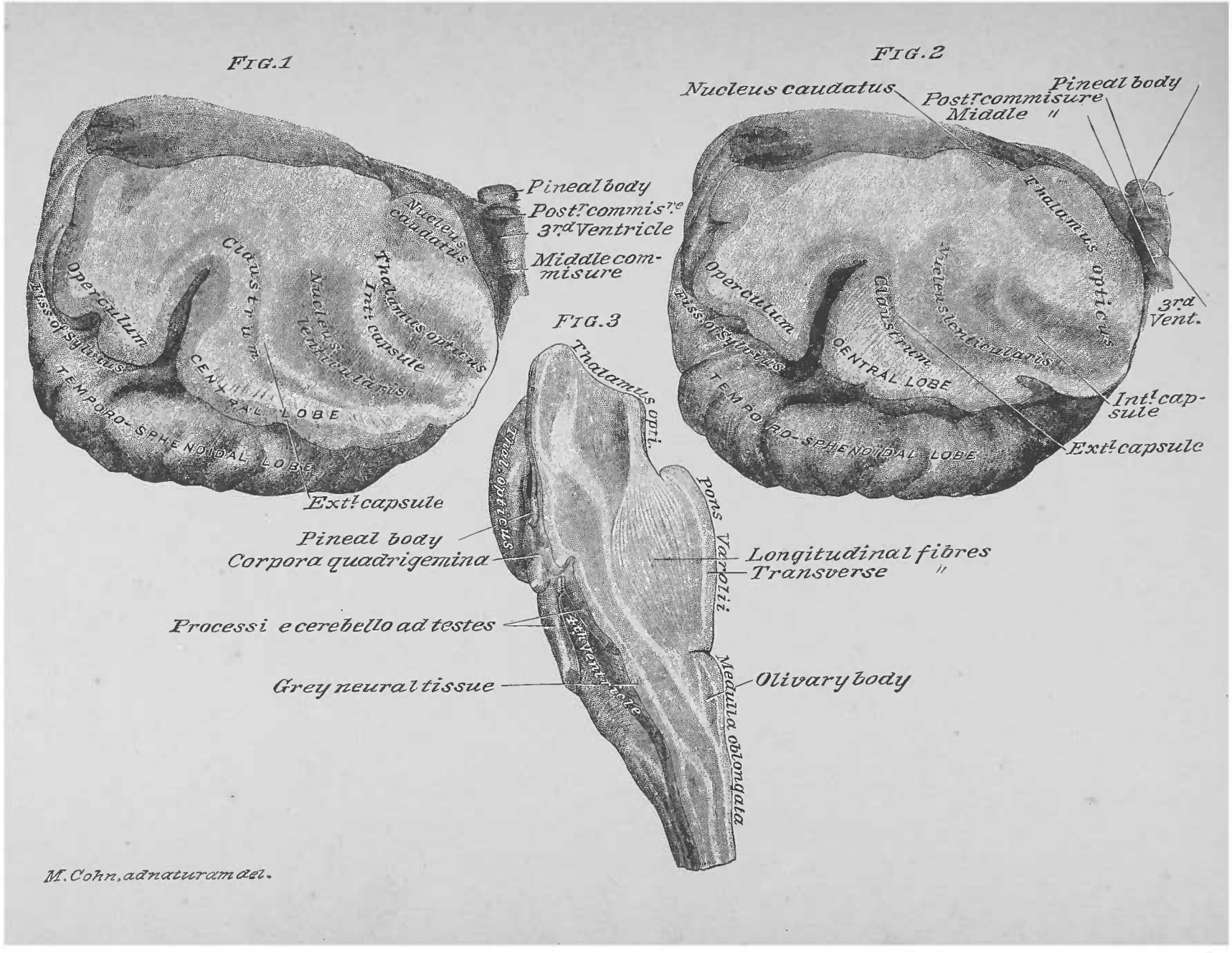


FIG.1
Pineal body
Post.l commis.re
3rd Ventricle
Middle commisure
Nucleus caudatus
Claustrum
Nucleus lenticularis
Thalamus opticus
Int.l capsule
Operculum
Fissure of Sylvius
CENTRAL LOBE
TEMPORO-SPHENOIDAL LOBE
Ext.l capsule
FIG.2
Nucleus caudatus
Post.l commisure
Middle "
Pineal body
Thalamus opticus
3rd Vent.
Operculum
Fissure of Sylvius
Claustrum
Nucleus lenticularis
CENTRAL LOBE
TEMPORO-SPHENOIDAL LOBE
Int.l capsule
Ext.l capsule
FIG.3
Thalamus opti.
Pons Varolii
Longitudinal fibres
Transverse "
Pineal body
Corpora quadrigemina
Processi e cerebello ad testes
Grey neural tissue
Olivary body
Medulla oblongata
M. Cohn, ad naturam del.

PLATE 219.

FIG. 1

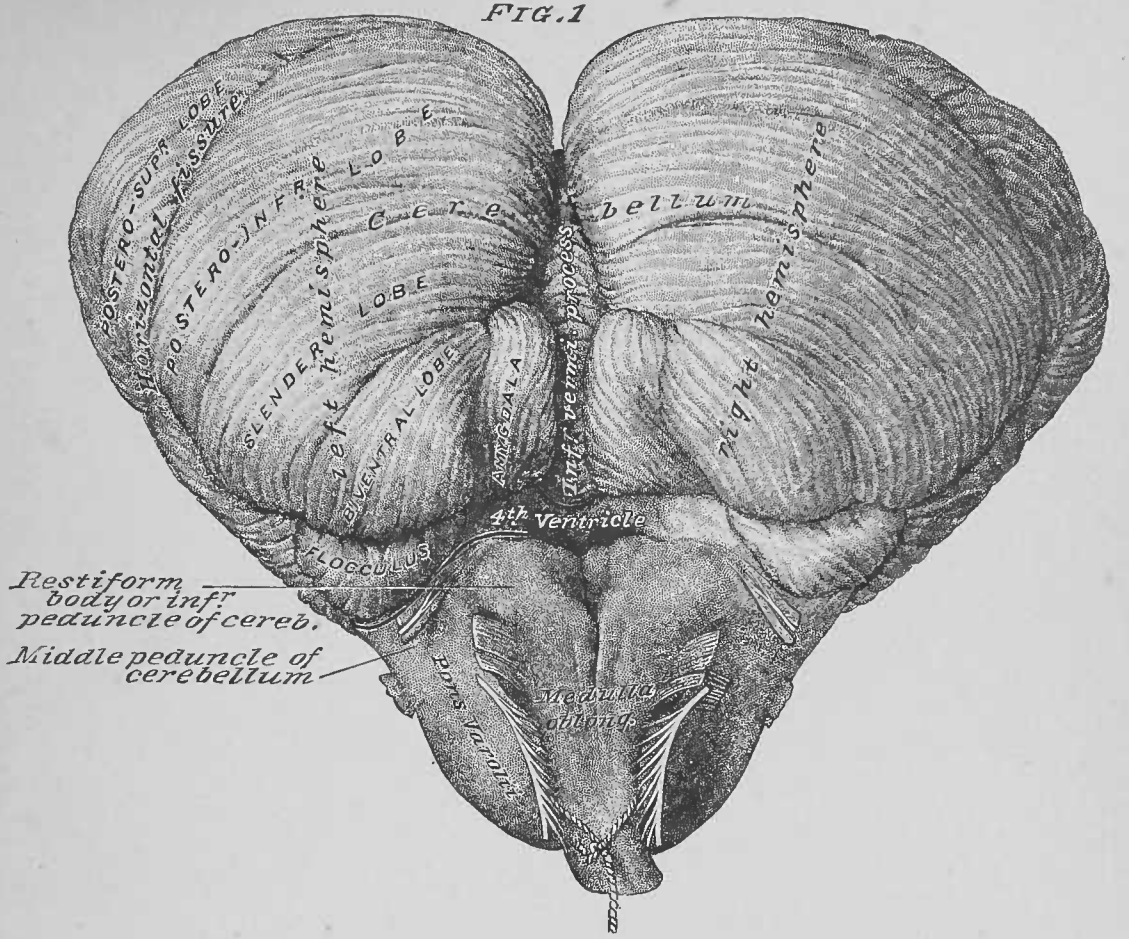

Postero-supra lobe
Horizontal fissure
Postero-inf.r lobe
Slender lobe
Left hemisphere
Cerebellum
Biventral lobe
Amygdala
Inf.r vermi. process
Right hemisphere
4th Ventricle
Flocculus
Restiform body or inf.r peduncle of cereb.
Middle peduncle of cerebellum
Pons Varolii
Medulla oblong.

FIG. 2

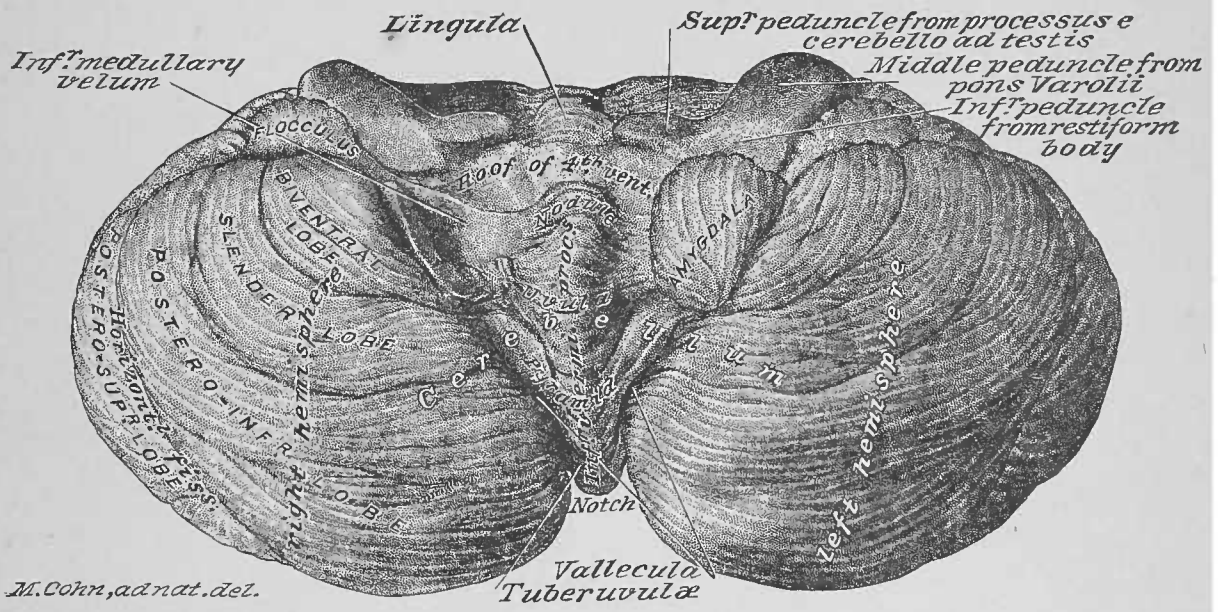

Lingula
Sup.r peduncle from processus e cerebello ad testis
Inf.r medullary velum
Middle peduncle from pons Varolii
Inf.r peduncle from restiform body
Flocculus
Roof of 4th vent.
Biventral lobe
Slender lobe
Amygdala
Postero-inf.r lobe
Horizontal fissure
Postero-supr. lobe
Cerebellum
Left hemi. sphere
Notch
Vallecula
Tuber uvulæ
M. Cohn, ad nat. del.

FIG. 1

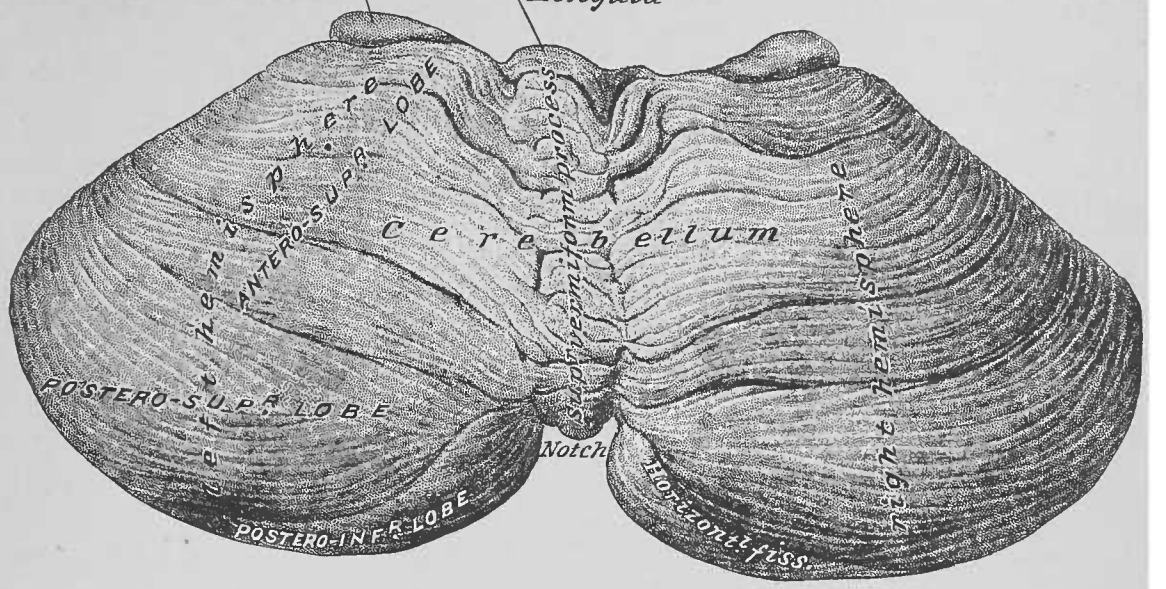
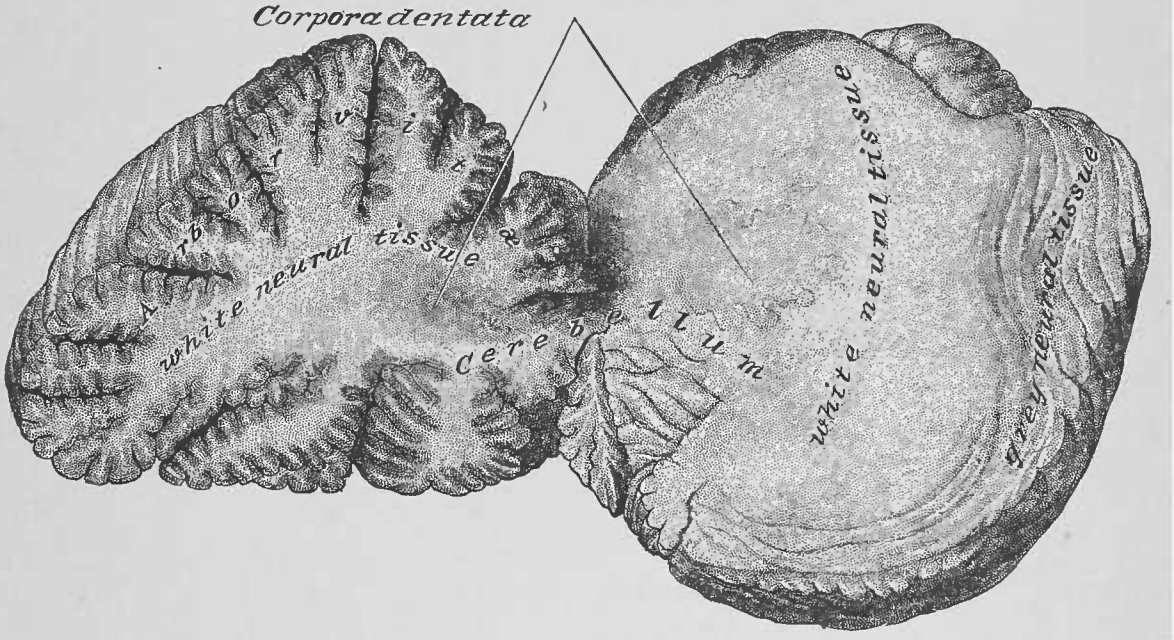


FIG. 2



M. Cohn, ad nat. del.

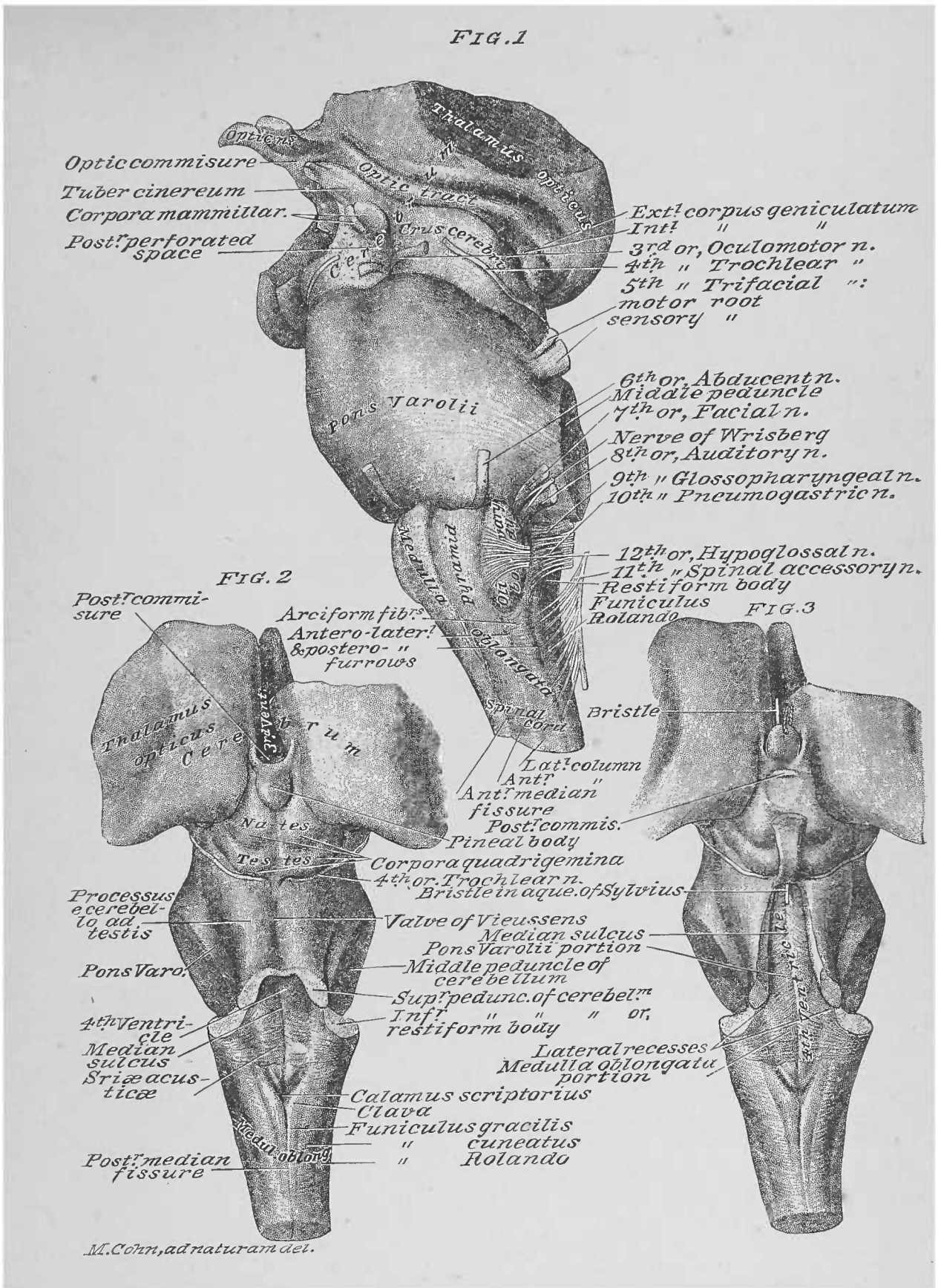


FIG. 1
Optic commisure
Tuber cinereum
Corpora mammillar.
Post.r perforated space
Thalamus opticus
Optic tract
Crus cerebri
Ext.l corpus geniculatum
Int.l " "
3rd or, Oculomotor n.
4th " Trochlear "
5th " Trifacial ":
motor root
sensory "
Pons Varolii
6th or, Abducent n.
Middle peduncle
7th or, Facial n.
Nerve of Wrisberg
8th or, Auditory n.
9th " Glossopharyngeal n.
10th " Pneumogastric n.
Medulla oblongata
12th or, Hypoglossal n.
11th " Spinal accessory n.
Restiform body
Funiculus Rolando
Spinal cord
Ant.r median fissure
Lat.l column
Ant.r "
FIG. 2
Post.r commi-sure
Arciform fib.rs
Antero-later.l & postero- " furrows
Thalamus opticus
Cerebrum
3rd Vent.
Nates
Testes
Pineal body
Corpora quadrigemina
4th or. Trochlear n.
Processus e cerebel-lo ad testis
Valve of Vieussens
Pons Varo.
Middle peduncle of cerebellum
Sup.r pedunc. of cerebel.m
Inf.r " " " or, restiform body
4th Ventri-cle
Median sulcus
Striæ acus-ticæ
Calamus scriptorius
Clava
Funiculus gracilis
" cuneatus
" Rolando
Medul. oblong.
Post.r median fissure
FIG. 3
Bristle
Post.r commis.
Bristle in aque. of Sylvius
Median sulcus
Pons Varolii portion
Lateral recesses
Medulla oblongata portion
Ant. fissure
M. Conn, ad naturam del.

APPENDIX.

1. Page 160.

53a. Posterior Tibial Recurrent Artery, Plates 88 and 90.—This is a small branch of the anterior tibial artery, which is given off close to the origin of the latter from the popliteal artery. It runs to the proximal tibio-fibular joint, distributing to it and to the popliteus muscle.

53b. Superior Fibular Artery (wanting in the dissection from which Plates 88 and 90 were drawn).—This, when present, is a small branch from the anterior tibial artery, as the latter passes through the proximal deficiency in the tibio-fibular interosseous ligament. It distributes to the contiguous muscles.

2. Page 204.

Dissection.—Clear the axillary artery, from the inferior border of the first rib to the external border of the pectoralis minor muscle; also, the outer and inner cords of the axillary portion of the brachial plexus. Note the stumps of the short thoracic and the acromio-thoracic arteries. Free the inner cord of the plexus and its branches from the axillary artery, and trace the long thoracic artery to its origin from the axillary.

60a. First and Second Portions of the Axillary Artery, Plate 119.—The *first portion* of the artery extends from the inferior border of the first rib—where the third portion of the subclavian artery ends (page 369)—to the internal border of the pectoralis minor muscle. It is covered, anteriorly, by the costo-coracoid membrane (Plate 117). The *second portion* extends from the internal to the external border of the pectoralis minor muscle, the muscle lying anteriorly to it. These portions of the artery have: the inner cord of the axillary

portion of the brachial plexus, with its branches, and the axillary vein, inferiorly; the outer cord of the plexus, superiorly; and the posterior cord of the plexus, posteriorly (Plate 120).

60b. Short Thoracic Artery, Plates 117 and 119.—This is the first branch of the first portion of the axillary artery. It is projected anteriorly, perforating the costo-coracoid membrane (Plate 117), and distributes to the contiguous muscle.

60c. Acromio-Thoracic Artery.—This is the second branch of the first portion of the axillary artery; it is given off from the anterior face of the latter vessel, close to the border of the pectoralis minor muscle. Its branches, which perforate the costo-coracoid membrane (Plate 117), distribute to contiguous muscles—subclavius, pectoralis major and minor, and deltoid—and to the region of the shoulder—*acromial* and *humeral* (page 197).

60d. Long Thoracic Artery, Plates 116, 117, 119, and 120.—This artery, before described for the inferior part of its course (page 200), is a branch from the second portion of the axillary artery. It is projected, inferiorly, into the external part of the anterior wall of the axilla.

60e. Alar-Thoracic Artery.—This small branch of the second portion of the axillary artery distributes to the lymphatic glands and connective tissue in the axilla. It is often a branch of the long thoracic artery.

3. Page 238.

Dissection.—Expose a costo-chondral articulation by dissecting off the periosteum from its bone and the perichondrium from its cartilage elements, respectively. Note the construction of an interchondral articulation and the intercostal ligaments.

1a. Costo-Chondral Articulations, Plates 113 and 120.—The elements of one of these articulations—the anterior ends of the seven superior ribs with the external ends of the costo-sternal cartilages—are: a contiguous rib and cartilage held in apposition by the continuity of the periosteum and perichondrium investing each, respectively.

1b. Interchondral Articulations, Plates 42 and 113.—One of these articulations—of the internal end of the eighth costal cartilage with the inferior border of the seventh, of the internal end of the ninth with the inferior border of the eighth, of the internal end of the tenth with the inferior border of the ninth—is formed by the apposed cartilages held together by a small *capsular ligament*, and by bands of fibrous tissue—*intercostal ligaments*—which pass between the contiguous cartilage borders (Plate 42).

4. Page 348.

(Before entering the foramen, this branch gives off the *mylohyoid* artery (page 352), which runs upon the internal face of the ramus of the inferior maxillary bone, to reach the inferior surface of the muscles which form the floor of the buccal cavity.)

5. Page 351.

6a. Internal Pterygoid Muscle, Plates 187, 188, 190, and 199.—This muscle presents its external surface upon the removal of the external pterygoid muscle. It is attached: superiorly and internally, to the internal surface of the external pterygoid plate of the sphenoid bone (Plate 190), and the external surfaces of the tuberosities of the palate and superior maxillary bones; inferiorly and externally, to the internal surface of the inferior portion of the ramus of the inferior maxillary bone (Plates 190 and 199).

6. Page 361.

Right Lymphatic Duct (should present in Plates 194 and 195).—When a single trunk it is a small vessel, about one-quarter to half an inch in length, which enters the right subclavian vein near its junction with the right internal jugular vein.

7. Page 367.

External Laryngeal Nerve, Plates 196, 197, 201, 204; Fig. 1, Plate 207.—This nerve is a branch of the superior laryngeal nerve, close to the origin of the latter from the pneumogastric nerve (Plate 197, right side). It has an anterior and inferior

course upon the external surface of the inferior portion of the inferior constrictor muscle of the pharynx. It runs internally to the internal carotid, common carotid, and superior thyroid arteries, and the superior portions of the omo-hyoid and thyro-hyoid muscles. It distributes a branch to the inferior constrictor muscle of the pharynx (Plates 196, 197, 201, and 202), and ends in the crico-thyroid muscle.

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. App.* 1, 2, *etc., refer to paragraphs of the Appendix.*

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