

closing within them and assisting in forming the optic foramina. A process seen jutting backward from the foramen is called the anterior clinoid process; to it is attached the common tendon of the recti muscles.

The legs, or pterygoid processes, seen falling from the point of union of the great wings with the body, consist of two plates, separated behind by a deep notch, but united almost fully in front. The external plate is broad and curved; it forms part of the zygomatic fossa: to it is attached the external pterygoid muscle. The internal face forms part of the pterygoid fossa, and gives origin to the internal pterygoid. The internal plate is possessed of particular interest; it ends in a tubercle, or hook-like process, which is felt in the mouth just back of the maxillary tuberosity,—the hamular process; around it turns the tendon of the tensor palati muscle,—a tendon to be divided in the Fergusson operation for cleft palate. The base of this internal plate forms a fossa, the scaphoid, from which originates the tensor muscle just alluded to. The outer surface of the plate forms the pterygoid fossa; the inner assists in marking the outer posterior boundary of the nares.

The base of the pterygoid process is quite broad, and in front gives support to Meckel's ganglion. The vidian canal passes through it.

The sphenoid articulates with all the bones of the cranium, with the two malar, the vomer, and the two palate bones of the face.

The muscles to which it gives origin are the temporal, external and internal pterygoid, tensor palati, laxator tympani, levator palpebræ, the recti of the eye, and superior oblique of eye.

THE NASAL BONE.

The figure exhibits the faces of a left nasal bone articulating with its fellow, which is its counterpart. The two occupy the quadrilateral space existing between the two maxillary bones and the frontal, and form the prominence known as the nasal bridge. That these bones vary considerably in shape would be inferred from variations in the shape of the bridge so frequently seen. Looked at from above downward, each bone is observed to be concave, while viewed from side to side it is convex; several light grooves are commonly noticed on the surface for the accommodation of vessels; the foramen seen about the centre transmits a small vein.

FIG. 15.
NASAL BONE.



ANTERIOR VIEW OF
THE LEFT NASAL BONE.
1, frontal border; 2,
nasal border; 3, max-
illary border; 4, lower
border; 5, nasal fora-
men.

The inner surface reverses relations with the outer,—being convex from above below, concave from side to side. Its only feature of interest is a groove for the lodgment of the nasal nerve.

The borders of the bone are three articular and one free. The superior, serrated and somewhat narrow, fits in the frontal notch, forming the fronto-nasal articulation. The lateral border is bevelled, at the expense, above, of the internal plate, below,

of the external, and fits with corresponding bevellings of the nasal processes of the maxillary bone. Internally, or mesially, the bone articulates with its fellow of the opposite side, being prolonged below into a crest, which forms a part of the nasal septum, and articulates with the nasal spine of the frontal above, and the ethmoidal perpendicular plate below. The lower border is free, at least so far as any bony articulation is concerned; it gives attachment by a thin, sharp edge to the lateral cartilage of the nose. A notch, seen at the centre of this border, transmits the nerve occupying the groove on the inner surface.

THE MALAR BONE.

The malar, or cheek bones, are to be likened to two bony pads laid on either lateral aspect of the face for the purpose of influencing a general convexity.

Each bone is irregularly quadrilateral, supported above by articulation with the frontal, sphenoid, and superior maxillary bones; in front by the malar process of the maxillary; posteriorly by the zygomatic process of the temporal.

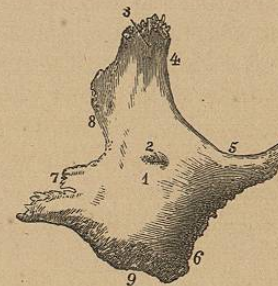
The bone presents two surfaces, four processes, and four borders. The external surface, convex and smooth, presents little of interest; the foramen, seen upon this face, is sometimes replaced by two or more; they are simply the orifices of canals, transmitting unimportant vessels. The surface, in relationship, is mostly covered by the orbicularis palpebrarum muscle, while the zygomatici have origin from the lower and inner aspect.

The internal face is concave, and assists in forming, above, the temporal fossa, below, the zygomatic. It yields partial origin to both the temporal and masseter muscles.

Of the four processes, the orbital is the most important; turning at right angles with the external face of the body, it assists in forming a portion of the outer wall of the orbit and orbital ridge. The frontal is thick and serrated, and articulates with the external angular process of the frontal bone. The maxillary is rough, and triangular in shape, and attaches the bone in front. The zygomatic is sharp and flat, and forms part of the yoke overlying the ridge separating the zygomatic from the temporal fossa.

The four borders are the orbital, the maxillary, zygomatic, and temporal. These borders correspond with the relations named, but have no interest apart from the processes.

FIG. 16.—MALAR BONE.



OUTER VIEW OF THE RIGHT MALAR BONE.
1, external or facial surface; 2, malar foramen; 3, frontal process; 4, 5, orbital border; 6, maxillary border; 7, zygomatic process; 8, temporal border; 9, inferior border.

THE LACHRYMAL BONE.

Looking at the diagram, or, much better, at an articulated skull, the lachrymal bone is seen to occupy a position of some prominence in the composition of the orbit. A ridge on its anterior surface divides the bone into two parts: one part, called its orbital face (bounded above by the orbital plane of the horizontal plate of the frontal bone; laterally, by the os planum of the ethmoid; below, by the orbital surface of the maxillary bone), enters into the composition of the orbital cavity. The face, to the inner side of the ridge, is smooth and concave, and articulates with the nasal process of the maxillary bone, internally, and with the lachrymal process of the turbinated below; these three bones in their union form the ductus ad nasum, or lachrymal canal, transmitting the tears to the inferior meatus.

FIG. 17.—LACHRYMAL BONE.



EXTERNAL VIEW OF THE RIGHT LACHRYMAL BONE. 1, orbital surface; 2, lachrymal fossa; 3, small process bounding the latter inferiorly; 4, frontal border; 5, ethmoidal border; 6, maxillary border; 7, process articulating with the turbinated bone.

The bone, by its internal, or nasal surface, enters into the composition of the middle meatus, and assists in closing in the anterior ethmoidal cells. Like the external surface, it is divided into two faces, the line of division being a depression corresponding with the ridge on the opposite surface.

Only one muscle has its attachment to this bone,—the tensor tarsi.

THE HYOID BONE.

The os hyoides is the bone situated on the anterior part of the neck between the chin and sternum. In shape it somewhat resembles an ordinary horseshoe, being held in place entirely by a series of antagonizing muscles, of which it gives attachment to some ten pairs. A glance at the bone naturally divides it into a body and four cornuæ, or horns; the greater pair of these cornuæ

FIG. 18.—HYOID BONE.

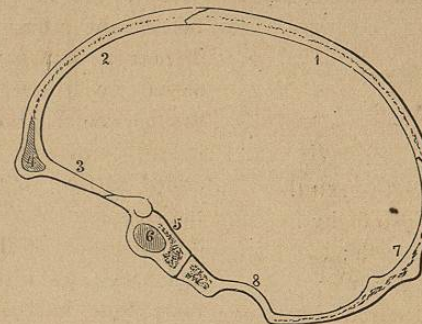


1, body; 2, greater horn; 3, lesser horn.

extend widely over the lateral aspect of the neck, giving attachment, on each side, to the hyoglossus, middle constrictor of the pharynx, and thyro-hyoid muscles, and by a bulb constituting the extremity, to the thyro-hyoid ligament; they also serve as a guide to the surgeon in seeking the position of the lingualis artery. The lesser cornuæ are simply two conical eminences, more or less prominent on different specimens; starting out at the point of junction of the great horns with the body, these look upward toward the chin, and serve to afford attachment to the stylo-hyoid ligaments.

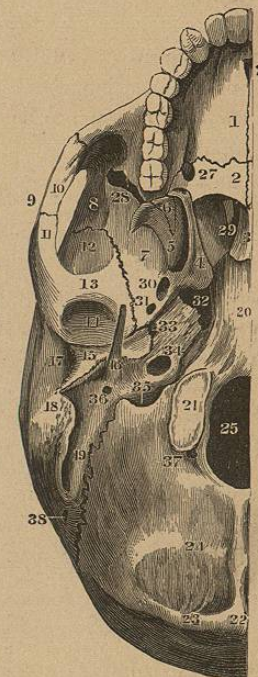
The body of the bone is irregularly quadrilateral in shape, convex in front, concave behind. A crucial ridge, the intermuscular, divides the front face into four fossæ. This surface is devoted exclusively to the attachment of muscles; above, to the genio-hyoid and the genio-hyoglossus; below, to the stylo-hyoid, mylo-hyoid, and digastricus. The posterior surface is smooth and concave, and occupies a position just in front of the epiglottis, being separated from it above by some cellular tissue and a membrane called, because of its relationship, the thyro-hyoid.

FIG. 19.



ANTERO-POSTERIOR SECTION OF THE CRANIUM, exhibiting the mode by which the connection of the different bones contributes to preserve its integrity. 1, parietal bone; 2, frontal bone; 3, its orbital plate; 4, frontal sinus; 5, body of sphenoid bone; 6, sphenoidal sinus; 7, occipital bone; 8, marginal ridge of the occipital foramen.

FIG. 20.



VIEW OF THE RIGHT HALF OF THE BASE OF THE SKULL. 1, palate plate of the superior maxillary bone; 2, palate plate of the palate bone; 3, vomer; 4, internal pterygoid process; 5, external pterygoid process; 6, pyramidal process of the palate bone; 7, under surface of the great wing of the sphenoid bone; 8, its temporal surface; 9, zygomatic arch; 10, zygomatic process of the malar bone; 11, zygomatic process of the temporal bone; 12, squamous portion of the temporal bone; 13, glenoid tubercle; 14, glenoid cavity; 15, vaginal process, its outer border constituting the auditory process; 16, styloid process; 17, external auditory meatus; 18, mastoid process; 19, digastric groove; 20, basilar process of the occipital bone co-ossified with the body of the sphenoid bone; 21, condyle; 22, occipital protuberance; 23, superior, and 24, inferior semicircular ridges; 25, occipital foramen; 26, incisive foramen; 27, posterior palatine foramen; 28, sphenomaxillary foramen; 29, posterior palatine foramen; 30, oval foramen; 31, spinous foramen; 32, lacerated foramen; 33, Eustachian tube; 34, carotid canal; 35, jugular foramen; 36, stylo-mastoid foramen; 37, 38, foramina for veins.

CHAPTER II.

THE MOUTH.

STUDYING the mouth from the living subject, we remark, first, an entrance of two fleshy folds, the lips; separating these, we are met by a second portal, the teeth; the space existing between these two entrances is called the hall, or vestibule; opening this inner gateway, by depressing the lower jaw, we are introduced into the oral cavity proper.

The mouth is the commencement of the alimentary canal. It has as offices, the reception of food, gustation, mastication, insalivation, and expression in sound; consequently must possess organs and agencies pertinent to these ends.

Looking into the cavity, it is observed to be an oval archway, bounded posteriorly by a veil, or curtain. This curtain falls obliquely into the pharynx; it has a central pendulum, and terminates laterally in curves. We can see beneath this veil, or between it and the base, and thereby recognize the part being viewed as simply the commencement of a canal. Every part of the cavity is seen to be covered by a common membrane, which membrane is found to associate externally on the lips with the skin; internally with the throat,—this is mucous membrane; examination reveals it to be continuous from the lips to the outlet of the rectum. The teeth, thirty-two in number in the adult, are placed in two harmonizing, or articulating arches, and are, in shape and character, correspondent with omnivorous habits. Thus certain of their number, the incisors, are so arranged as to cut, or incise. Certain others, the cuspidati, or canines, are spear-shaped; these tear, or lacerate. Still others, the bicuspidati and molars, have broad and roughened surfaces; they act the part of grinders. The tongue, a muscular body, rests within the lower dental arch; it evidently is fitted and suited to preside over the labor of the teeth, to receive or reject articles to be comminuted, to place and retain articles in a position to be masticated, and, when ready to be swallowed, to roll up masses into a bolus, and pass this into the pharynx.

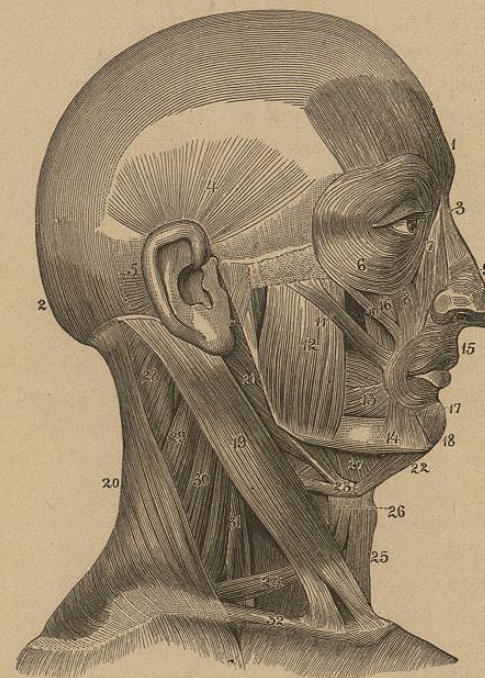
The roof of the mouth, beginning with the palatal faces of the teeth, is made up of hard and soft tissues. The hard portion is the flesh-colored alveolar and palate processes of the superior maxillary bones and the palate processes of the palate bones. The soft part dissection reveals to be a simple attached basement tissue covered with the common membrane.

The uvula, the central pendulous termination of the soft palate, consists of two symmetrical muscles enclosed in a common envelope of mucous mem-

brane. The office of this body is to act as an agent excitve of the act of deglutition. It draws the veil against the upper wall of the pharynx, thus closing the posterior nares during the process of swallowing. In the production of loud declamation and in the guttural forms of language, it is supposed to modify speech by lessening the pharyngo-nasal passage when it acts as an elevator; this elevating force being most exhibited in the highest ranges of the singing voice, and least in the lower keys.

Looking for a short period into the mouth, it is observed that jets of fluid

FIG. 21.—MUSCLES OF THE FACE.



MUSCLES OF THE HEAD AND NECK. 1, 2, occipito-frontal muscle; 1, its frontal belly; 2, its occipital belly; 3, nasal pyramidal muscle; 4, superior, and 5, posterior auricular muscles; 6, palpebral orbicular muscle; 7, labio-nasal elevator; 8, elevator of the upper lip; 9, nasal compressor; 10, 11, zygomatic muscles; 12, masseter muscle; 13, buccinator; 14, depressor of the oral angle; 15, oral orbicular muscle; 16, elevator of the oral angle; 17, 18, depressor of the lower lip; 19, sterno-mastoid muscle; 20, trapezius; 21, posterior belly of the digastric and the stylo-hyoid muscle; 22, anterior belly of the former; 23, loop of fibrous tissue attaching the tendon of the digastric muscle to the hyoid bone; 24, omo-hyoid muscle; 25, sterno-hyoid; 26, sterno-thyroid, seen to the outer side and behind the anterior belly of the omo-hyoid; 27, mylo-hyoid; 28, splenius; 29, elevator of the scapular angle; 30, 31, middle and anterior scalene muscles; 32, clavicle.

are occasionally sent up from the anterior floor just back of the lower central teeth. We also see drops constantly issuing from an orifice situated on the cheek by the side of the superior second molar tooth. This fluid is the salivary secretion, and comes from glands situated in the immediate neighbor-