# Lab 17: Introduction to Head and Neck Anatomy
# 11/17/2022

**Students:**

- **Unlike most lab sessions, which are dissection-based, this session is a "prosection lab."**
- Assemble in 5 groups, each having ~16 members.
- There are 5 learning stations situated around the labs. Pick a station to start at.
- Groups will spend about 25 minutes at each station, rotating around the labs until they have visited all the stations.
- Use the checklists provided to make sure you have identified all the relevant structures.

## Goals

1. Identify the small saphenous vein and the sural nerve.
2. Dissect and identify muscles, nerves, and vessels in the posterior compartment of the leg.
3. Dissect and identify muscles, nerves, and vessels on the sole of the foot.
4. Clean and identify the contents of the tarsal tunnel.

# Lab 17, Station 1: The Skull

The skull is divided into two parts: **Neurocranium** and **Viscerocranium**.

**Neurocranium** ("brain case") = Frontal bone, ethmoid, sphenoid, occipital bone, temporal bones (2) and parietal bones (2)

- ☐ The neurocranium has a roof called the **calvaria** ("skull cap").
- ☐ Fibrous joints called **sutures** join the bones. The largest sutures are in the skull cap:
  - ☐ **Frontal suture**
  - ☐ **Sagittal suture**
  - ☐ **Lambdoid suture**
  - ☐ **Squamous sutures** (2)

**Viscerocranium** ("facial skeleton") = Mandible, maxillae (2), zygomatic bones (2), nasal bones (2), lacrimal bones (2), inferior nasal conchae (turbinates) (2), palatine bones (2), vomer

***The Skull is Best Studied from Various Views***:

## Anterior View

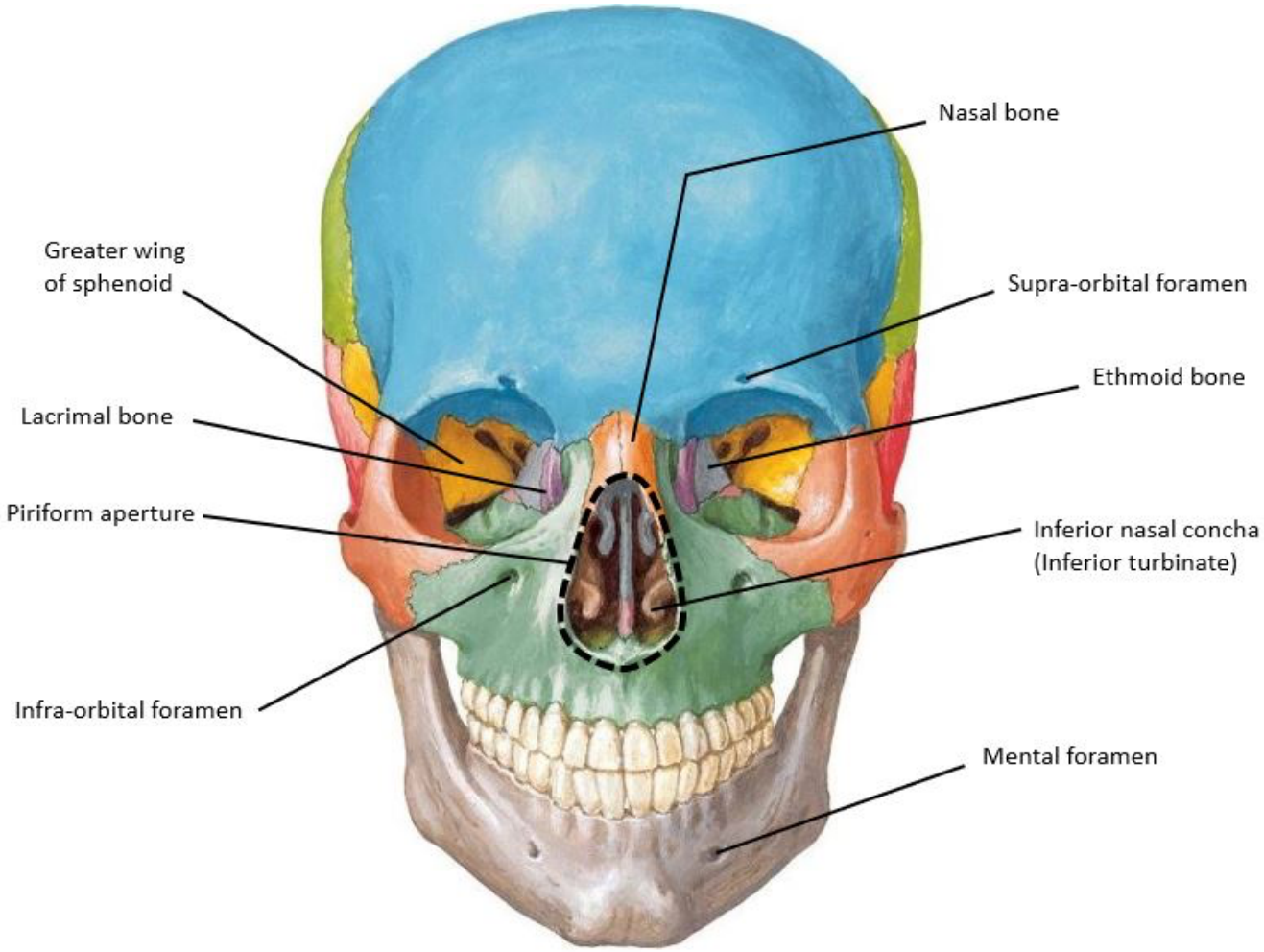


Figure 17.1. Anterior view of skull. Netter, Atlas of Human Anatomy, 7th ed.

- ☐ **Frontal bone**
  - ☐ **Supra-orbital foramen** (or notch)—for supra-orbital nerve and vessels
- ☐ **Nasal bones**
- ☐ **Lacrimal bones**
- ☐ **Zygomatic bones** (cheek bones)
- ☐ **Maxillae**
  - ☐ **Infra-orbital foramen**—for infra-orbital nerve and vessels
  - ☐ **Upper (maxillary) teeth**

- ☐ **Piriform aperture**—the bony opening into the nasal cavities
  - ☐ **Inferior nasal conchae (turbinates)** are visible through the piriform aperture
- ☐ **Mandible**
  - ☐ **Mental foramen**—for mental nerve and vessels
  - ☐ **Lower (mandibular) teeth**
- ☐ **Orbits** ("eye sockets") = 7 bones contribute—can you identify the major ones? Figure 17.1.

## Lateral View

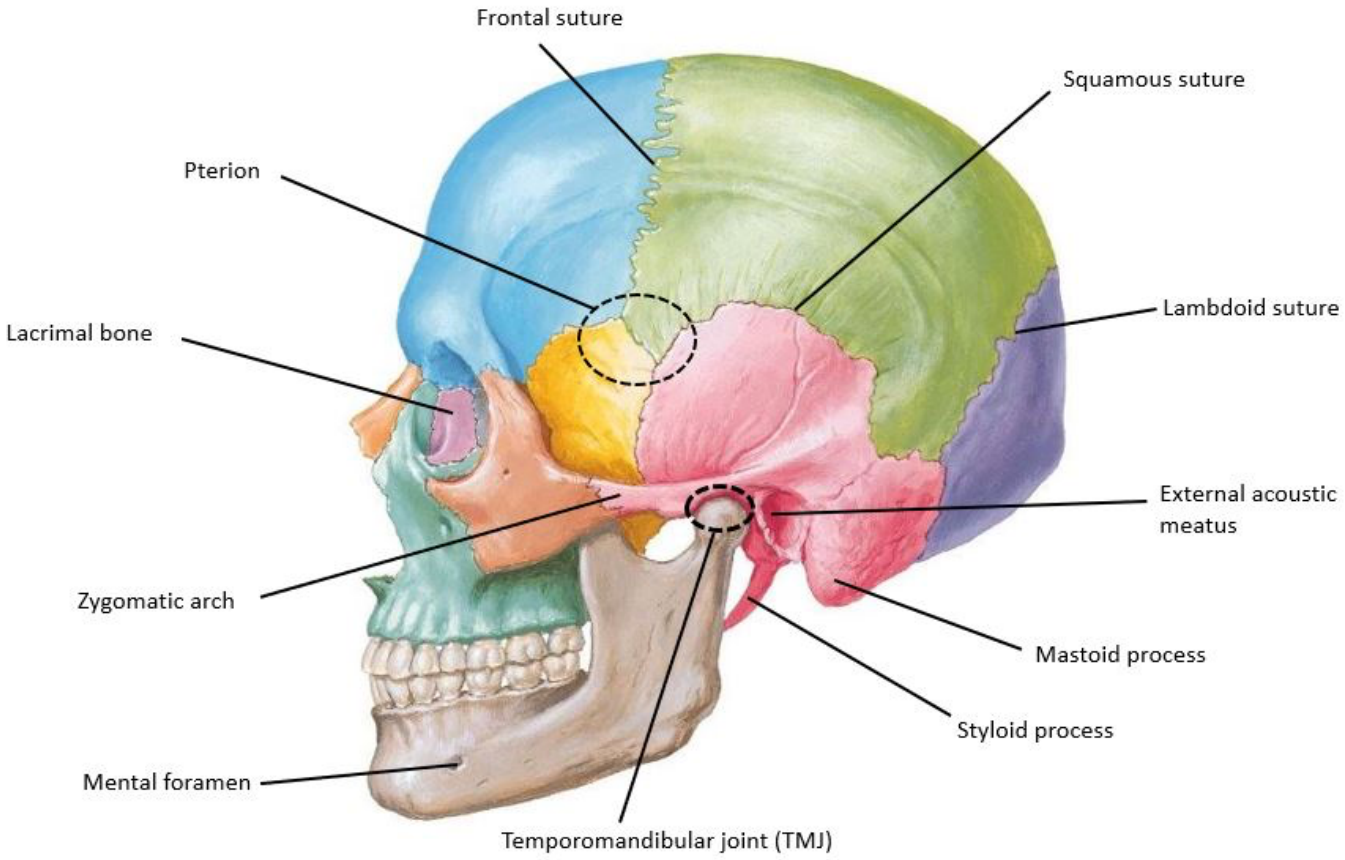


Figure 17.2. Lateral view of skull. Netter, Atlas of Human Anatomy, 7th ed.

- [ ] **Frontal bone**
- [ ] **Parietal bone**
- [ ] **Greater wing of sphenoid bone**
- [ ] **Temporal bone**
  - [ ] **Mastoid process**—for attachment of sternocleidomastoid muscle
  - [ ] **Styloid process**—for muscle attachment
  - [ ] **External acoustic meatus**—leads internally to the tympanic membrane ("eardrum")
- [ ] The region where the frontal, parietal, sphenoid, and temporal bones join is called the **pterion**. The bone is thin here and skull fractures can rupture the underlying middle meningeal artery producing an *epidural hematoma*.
- [ ] **Zygomatic arch**—formed from contributions of both zygomatic and temporal bones
- [ ] **Temporomandibular joint (TMJ)**—opens and closes the mouth

## Posterior View

- [ ] **Parietal bones**
- [ ] **Occipital bone**
  - [ ] **External occipital protuberance**
- [ ] **Sagittal** and **lambdoid sutures**

## Superior View

- ☐ **Frontal bone**
- ☐ **Parietal bones**
- ☐ **Frontal** and **sagittal sutures**

## Inferior View

- ☐ **Hard palate** = the maxillae and palatine bones contribute
- ☐ **Vomer**—"plow-shaped" bone in the midline
- ☐ **Sphenoid bone** (Figure 17.3)
  - ☐ **Greater wings**
  - ☐ **Pterygoid processes**—for muscle attachments
  - ☐ **Foramen ovale**—transmits mandibular nerve (V3)
  - ☐ **Foramen spinosum**—for middle meningeal artery

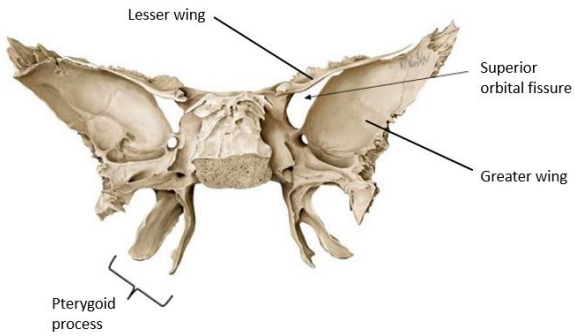


Figure 17.3. Isolated sphenoid bone. Thieme Atlas of Anatomy, 4th ed.

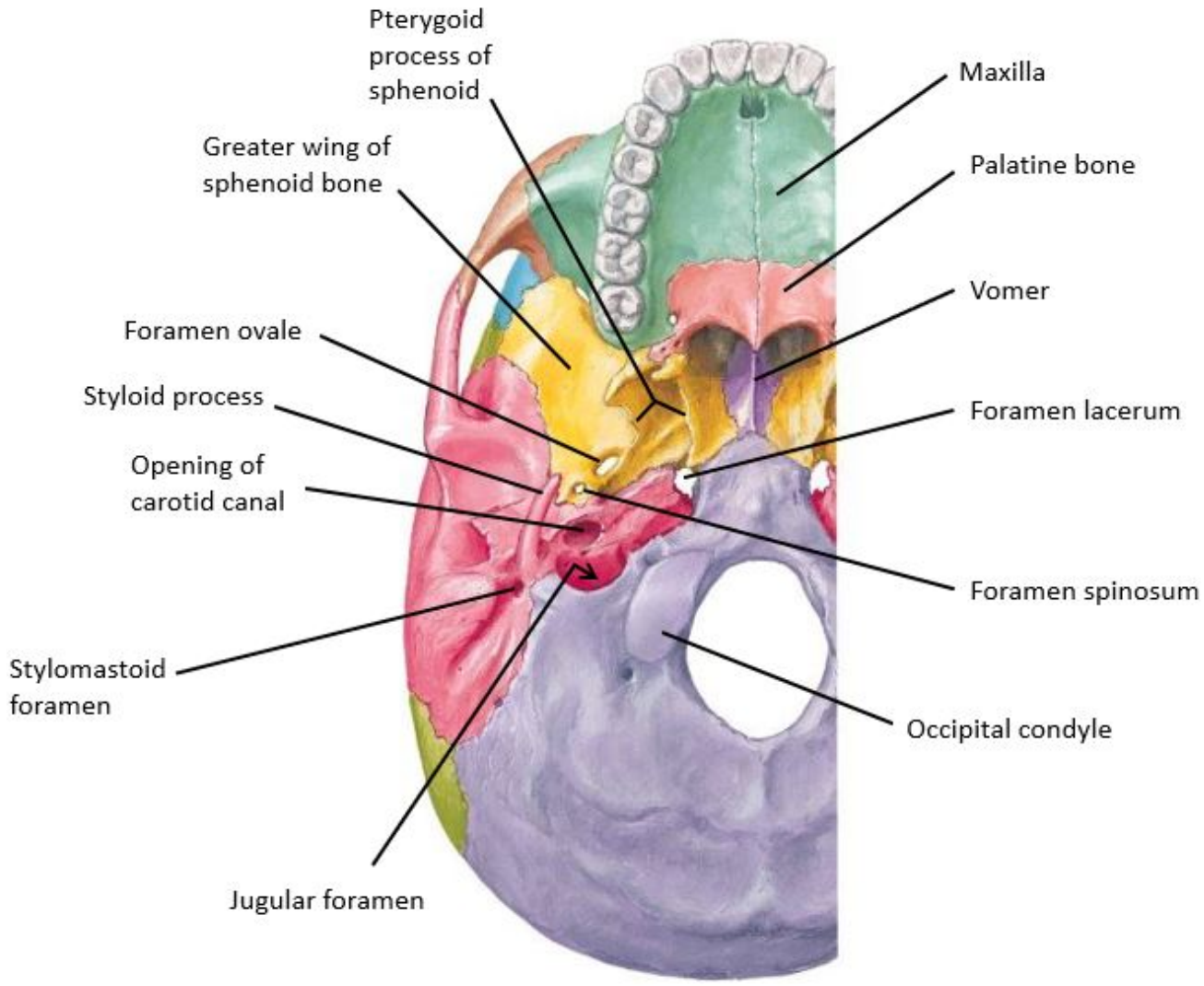


Figure 17.4. Inferior view of skull. Netter, Atlas of Human Anatomy, 7th ed.

- ☐ **Foramen lacerum**—wedged between the temporal, sphenoid, and occipital bones. Transmits the internal carotid artery
- ☐ **Temporal bones**
  - ☐ **Styloid process**—for muscle attachments
  - ☐ **Carotid canal**—internal carotid artery enters here
  - ☐ **Stylomastoid foramen**—facial nerve exits here and enters the face
- ☐ **Jugular foramen**—between the temporal and occipital bones

- [ ] **Occipital bone**
  - [ ] **Occipital condyles**—articulate with C-1 vertebra
  - [ ] **Foramen magnum**—contains spinal cord and vertebral arteries

# Lab 17, Station 2: Cranial Base and Cranial Nerves

## Station 2: Cranial Base and Cranial Nerves

The **cranial cavity** is the space within the neurocranium. It contains the brain, meninges, blood vessels, and the proximal parts of the cranial nerves. The floor is the **cranial base**. Foramina in the cranial base transmit cranial nerves and blood vessels.

- ☐ The cranial base has three parts: **anterior, middle, and posterior cranial fossae**.

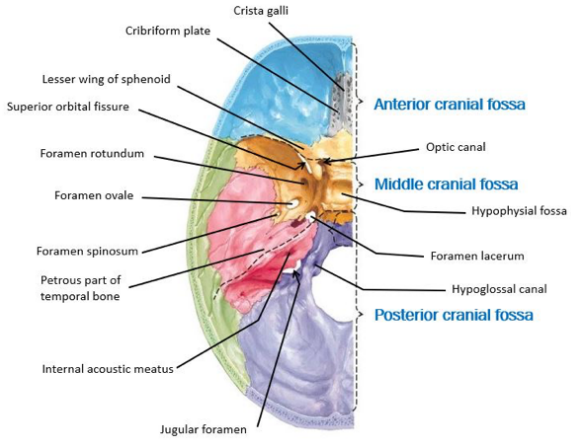


Figure 17.5. Cranial base, superior view. Netter, Atlas of Human Anatomy, 7th ed.

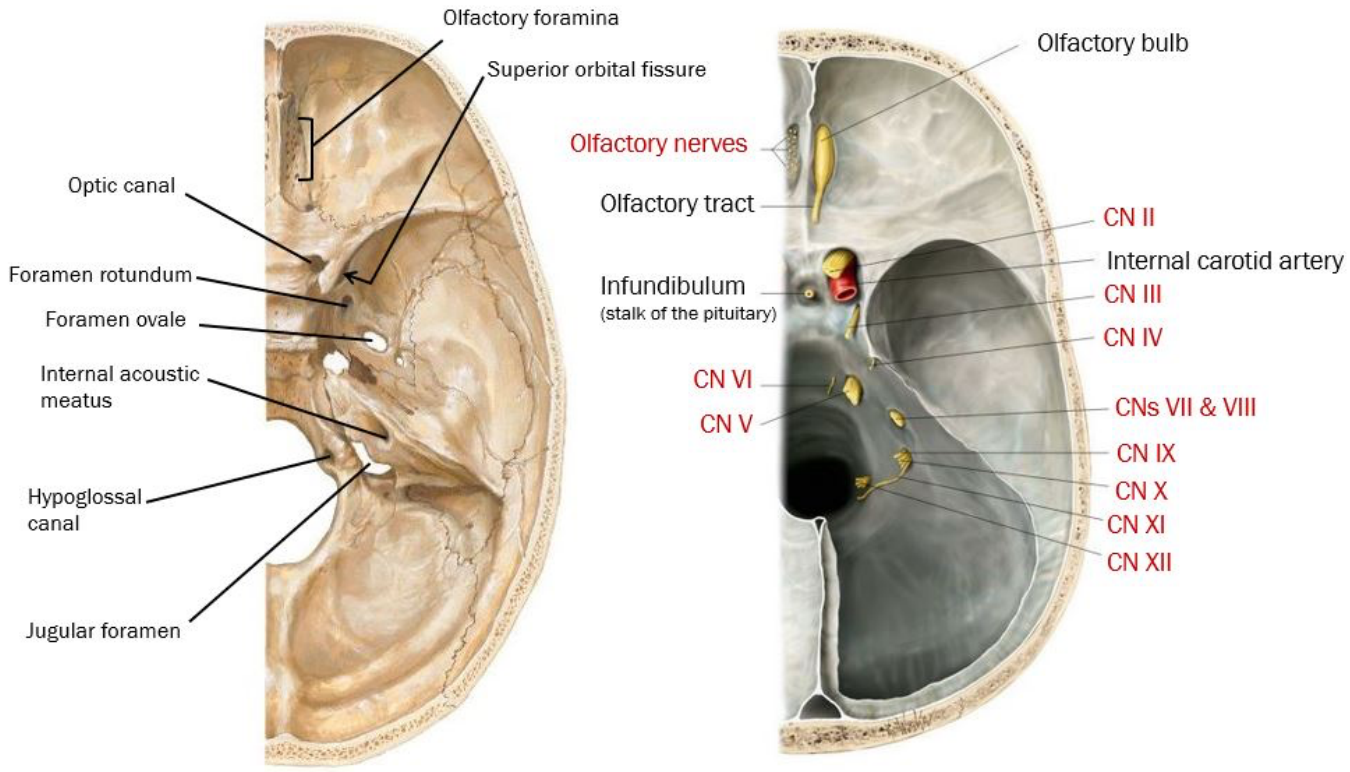


Figure 17.6. Left: Cranial base, superior view. Netter, Atlas of Human Anatomy, 7th ed. Right: Cranial base, superior view with cranial nerves. Thieme, Atlas of Anatomy, 4th ed.

**Note**

As you identify foramina in the base of a dried skull, see if you can correlate these with the cranial nerves that pass through them by examining the skull base of a cadaver or a model. Be systematic and work from anterior to posterior. See Figure 17.6.

## Anterior Cranial Fossa

*Identify these bones and foramina in the anterior cranial fossa (Figures 17.5 and 17.6):*

- ☐ **Frontal bone**
- ☐ **Ethmoid bone**
  - ☐ **Crista galli**—for attachment of the falx cerebri (dura mater)
  - ☐ **Cribriform plate**

- [ ] **Olfactory foramina**—in the cribriform plate, they transmit the **olfactory nerves (CN I)**

- [ ] **Lesser wings of sphenoid bone**

  - [ ] **Optic canals**—transmit the **optic nerves (CN II)**

## Middle Cranial Fossa

*Identify these bones and foramina in the middle cranial fossa (Figures 17.5 and 17.6):*

- [ ] **Greater wings of sphenoid bone**

  - [ ] **Superior orbital fissure**—the gap between the greater and lesser wings

    - [ ] Transmits the **oculomotor (CN III)**, **trochlear (CN IV)**, and **abducens (CN VI) nerves** plus the **ophthalmic branch of the trigeminal nerve (V1)**

  - [ ] **Foramen rotundum**—transmits the **maxillary branch of the trigeminal nerve (V2)**

  - [ ] **Foramen ovale**—for the **mandibular branch of the trigeminal nerve (V3)**

  - [ ] **Foramen spinosum**—transmits the **middle meningeal artery**

  - [ ] **Foramen lacerum**—contains the **internal carotid artery**

- [ ] **Sella turcica** ("Turkish saddle")—includes the **hypophysial fossa** for the **pituitary gland**

- [ ] **Temporal bone**

## Posterior Cranial Fossa

*Identify these bones and foramina in the posterior cranial fossa (Figures 17.5 and 17.6):*

- [ ] **Petrous part of the temporal bones**

  - [ ] **Internal acoustic meatus**—transmits the **facial (CN VII)** and **vestibulocochlear (CN VIII) nerves**

- [ ] **Jugular foramen**—between temporal and occipital bones; contains the **glossopharyngeal (CN IX)**, **vagus (CN X)**, and **spinal accessory (CN XI) nerves**

- [ ] **Occipital bone**
  - [ ] **Hypoglossal canal**—for the **hypoglossal nerve (CN XII)**
  - [ ] **Foramen magnum**—contains **spinal cord** and **vertebral arteries**

# Lab 17, Station 3: Gross Topography of the Brain

## Station 3: Gross Topography of Brain

### Cerebrum

Composed of **left and right hemispheres**.

- ☐ The hemispheres are connected across the midline by a thick tract of nerve fibers called the **corpus callosum**.
- ☐ Each hemisphere contains a cavity called a **lateral ventricle**—filled with cerebrospinal fluid.

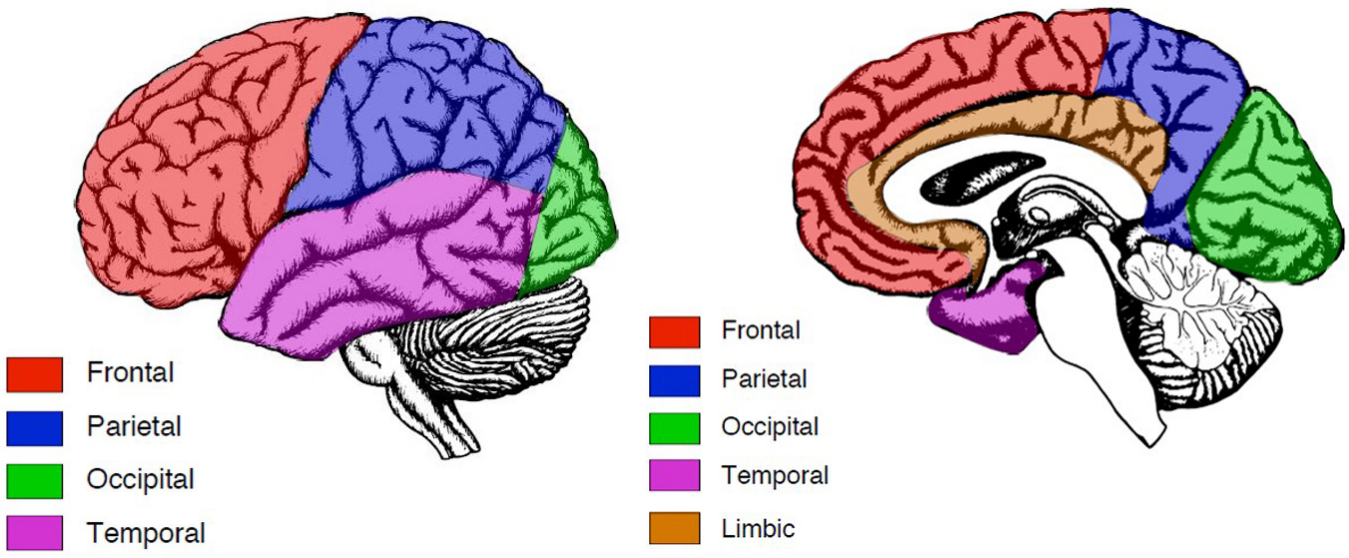


Figure 17.7. Lobes of the cerebrum. Neuroanatomy: A Laboratory Guide (2e); Jansen and Lampa.

- The cerebrum has four anatomic **lobes**. The **limbic lobe** (limbus = *Latin*: a margin or border) is sometimes included as a functional lobe but is in fact comprised of the medial portions of the frontal, parietal, and temporal lobes.
- The surfaces of the cerebral hemispheres, and therefore the lobes, have a distinct topography that is formed by the sulci and gyri.
  - ☐ **Sulcus** (plural: sulci) = *Latin*: a groove or furrow
  - ☐ **Gyrus** (plural: gyri) = *Latin*: a ridge or convolution
  - ☐ Major sulci and Fissures in the Cerebrum
    - ☐ **Longitudinal (Sagittal) Fissure**—separates the two hemispheres
    - ☐ **Lateral sulcus (Sylvian fissure)**—separates the temporal lobe from the parietal and frontal lobes
    - ☐ **Parieto-occipital sulcus**—separates the parietal and occipital lobes (seen medially)
    - ☐ **Central sulcus**—separates parietal and frontal lobes
  - ☐ Identify the **olfactory tracts** and **olfactory bulbs**. These are extensions of the cerebrum. Nerve fibers of the olfactory nerves (CN I) synapse in the olfactory bulbs.

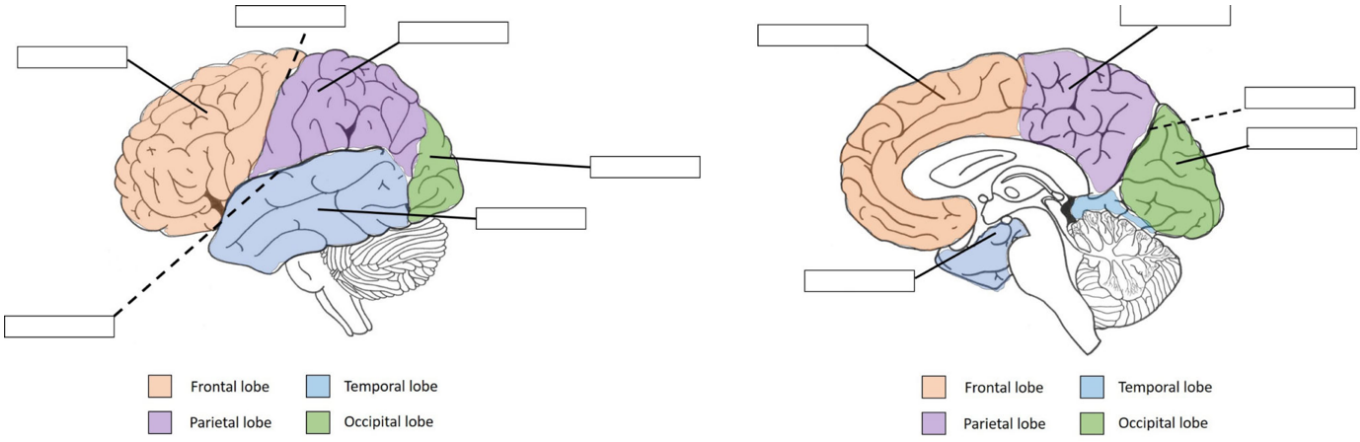


Figure 17.8. Identify the major sulci = the sulci are indicated by dashed lines and lobes by the solid lines. Neuroanatomy: A Laboratory Guide (2e); Jansen and Lampa.

## Brainstem and Cerebellum Topography

Examine the external and sagittal topography of the brainstem and cerebellum and identify the following structures. (See Figures 17.9 and 17.10.)

- ☐ **Midbrain**
  - ☐ **Cerebral aqueduct**
  - ☐ **Superior** and **inferior colliculi**
  - ☐ **Cerebral peduncles** (aka crus cerebri)
  - ☐ **Cranial nerves III and IV**
- ☐ **Pons**
  - ☐ **4th ventricle**
  - ☐ **Basal pons** (aka basis pontis or base of pons)
  - ☐ **Middle cerebellar peduncle**
  - ☐ **Cranial nerve V**
  - ☐ **Pons/Medulla junction**
    - ☐ **Cranial nerves VI, VII, and VIII** (attach at this location)

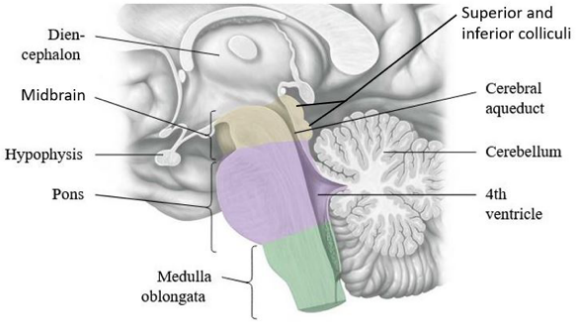


Figure 17.9. Parts of the brainstem. Thieme, Atlas of Anatomy, 4th ed.

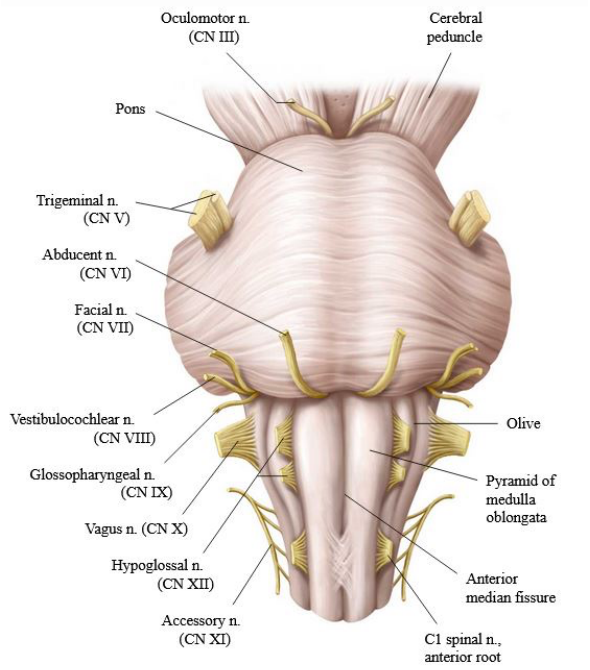


Figure 17.10. Brainstem and cranial nerves. Thieme, Atlas of Anatomy, 4th ed.

- [ ] **Medulla**
  - [ ] **4th ventricle**
  - [ ] **Pyramids**
  - [ ] **Olives** (inferior olivary nucleus)
  - [ ] **Cranial nerves IX, X, XI, XII**

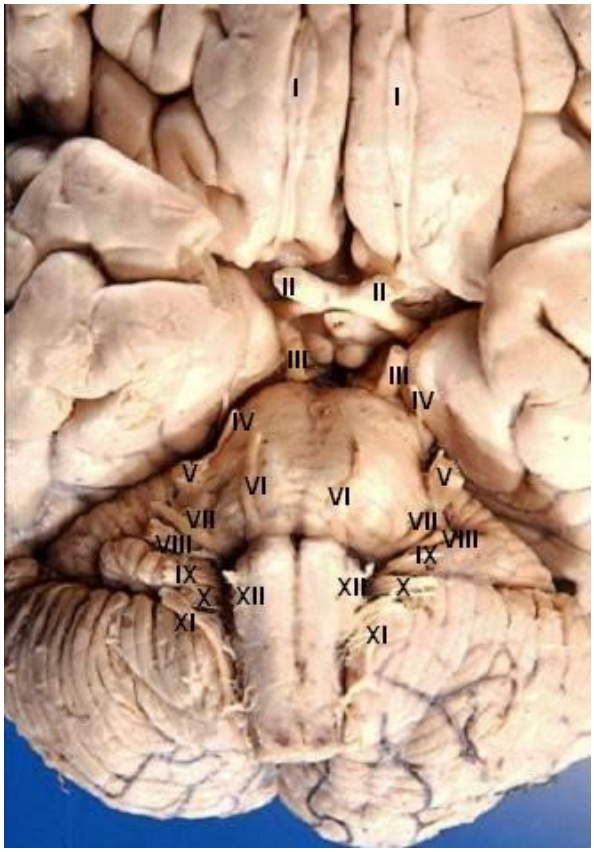


Figure 17.11. Ventral view of brainstem w/ cranial nerves. Note the exit points of the cranial nerve from cranial to caudal. Wikimedia.

- [ ] **Cerebellum** (pictured in figure 17.12)
  - [ ] **Vermis**—separates the two **cerebellar hemispheres**

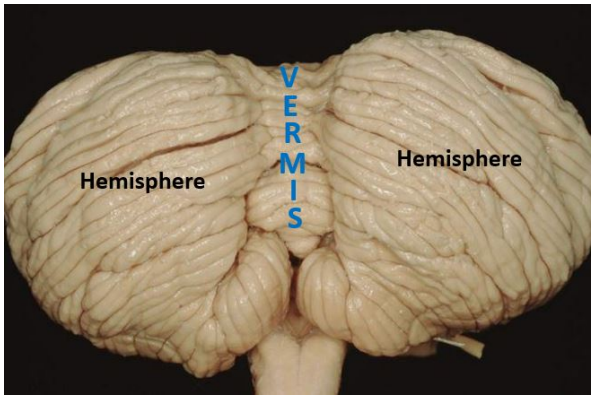


Figure 17.12. The Neurosurgical Atlas.

## The Diencephalon (Figure 17.13)

- ☐ **Hypothalamus** (**A** in the figure)
- ☐ **Thalamus** (**B** in the figure)
- ☐ **Epithalamus** (C), with **pineal gland** (#4 in the figure)
- ☐ **Third ventricle**
- ☐ **Optic nerves (CN II)** are extensions of the diencephalon

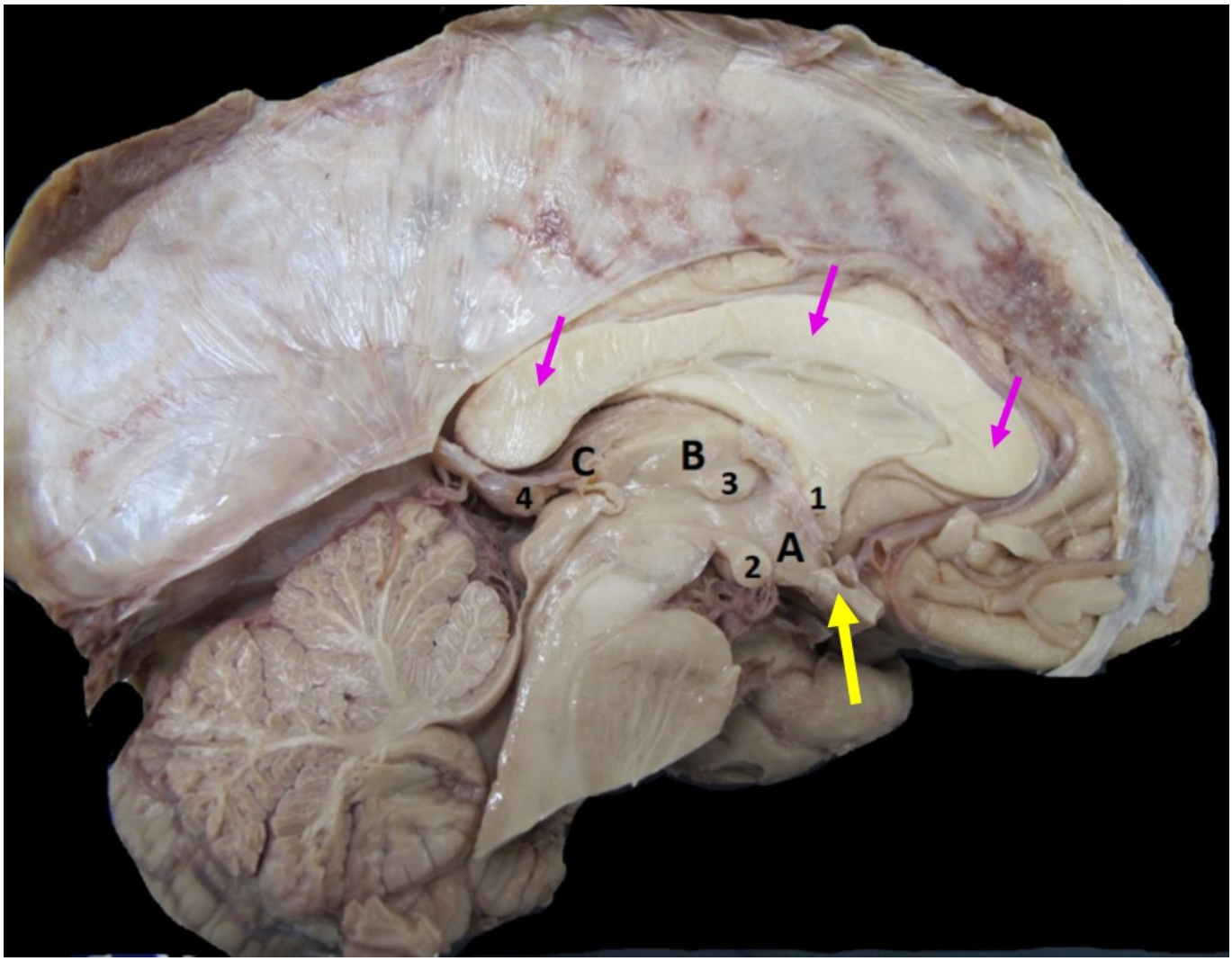


Figure 17.13. Diencephalon and associated structures. A. Hypothalamus; B Thalamus; C Epithalamus w/pineal gland (4) Optic Chiasm (yellow arrow), Corpus Callosum (pink arrows). Specimen from Neuroanatomy Collection, Washington State University College of Veterinary Medicine.

# Lab 17, Station 4: Blood Vessels

## Station 4: Blood Vessels

### Major Arteries

- ☐ **Common carotid artery**
- ☐ **Carotid bifurcation**
  - ☐ **Carotid body**—vascular structure that lies in the "crotch" of the carotid bifurcation—contains chemoreceptors that monitor the status of blood gases (may not be visible in prosection)
- ☐ **Internal carotid artery**
  - ☐ **Carotid sinus**—a swelling of the proximal internal carotid artery—contains baroreceptors that monitor blood pressure

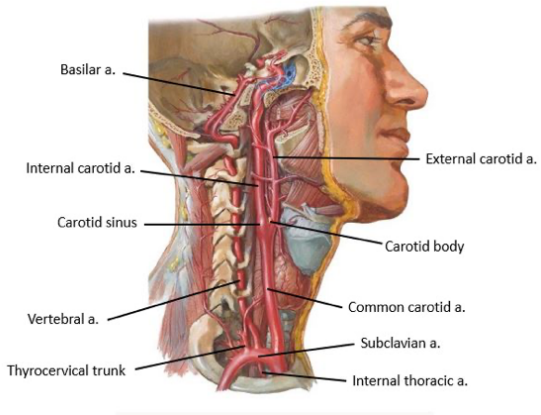


Figure 17.14. Major arteries of the head and neck. Netter, Atlas of Human Anatomy, 7th ed.

- [ ] **External carotid artery** (Figure 17.15)
  - [ ] **Superior thyroid artery**—to thyroid gland
  - [ ] **Lingual artery**—to tongue
  - [ ] **Facial artery**—to face, of course
  - [ ] **Maxillary artery**—to upper and lower jaws, nasal cavity, and palate
    - [ ] **Middle meningeal artery**—a branch of the maxillary, it passes through **foramen spinosum** to supply the skull cap and cranial meninges
  - [ ] **Superficial temporal artery**—to external ear and scalp

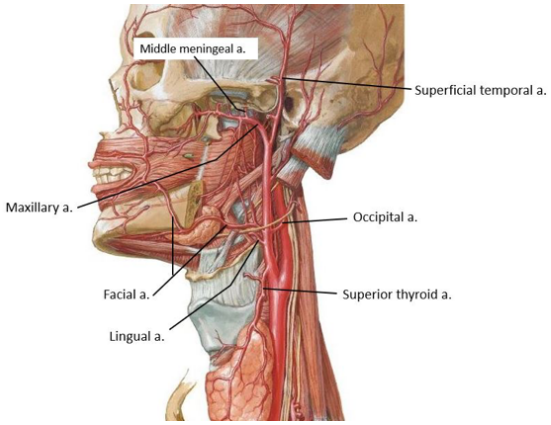


Figure 17.15. Branches of external carotid artery. Netter, Atlas of Human Anatomy, 7th ed.

- [ ] **Cerebral arterial circle (Circle of Willis)**—anastomosis of the internal carotid and vertebral arteries at the base of the brain (see Figure 17.16)
  - [ ] **Vertebral arteries**
  - [ ] **Basilar artery**
  - [ ] **Posterior cerebral arteries**
  - [ ] **Posterior communicating arteries**
  - [ ] **Internal carotid arteries**

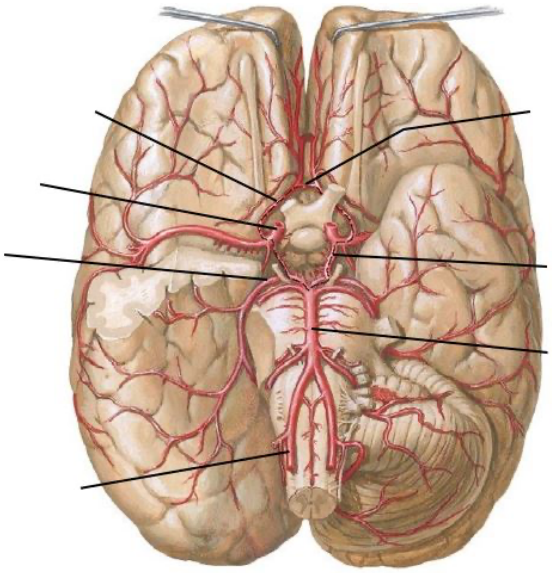

Figure 17.16. Arteries of circle of Willis. Netter, Atlas of Human Anatomy, 7th ed.

- ☐ **Anterior cerebral arteries**
- ☐ **Anterior communicating artery**

☐ **Subclavian artery** (Figure 17.14)

- ☐ **Vertebral artery**—to brain
- ☐ **Thyrocervical trunk**—neck, back, and thyroid gland
  - ☐ **Inferior thyroid artery**—to thyroid and parathyroid glands
- ☐ **Internal thoracic artery**—to chest and abdominal walls

## Major Veins

- ☐ **Internal jugular veins**
- ☐ **Subclavian veins**
  - ☐ **External jugular veins** are tributaries
- ☐ The junctions of the internal jugular and subclavian veins at the base of the neck are called the **left and right venous angles**
  - ☐ The **thoracic duct** drains to the left venous angle
- ☐ **Left and right brachiocephalic veins**

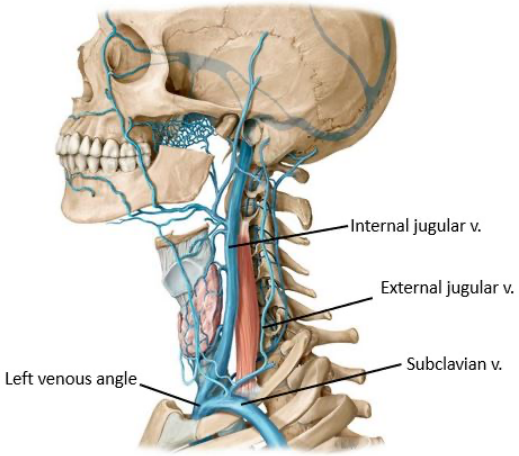


Figure 17.17. Major veins in the neck. Thieme, Atlas of Anatomy, 4th ed.

## Station 5: Head and Neck Anatomy—Sagittal View

***Parts of the CNS seen in midsagittal section*** *(label these in Figure 17.18)*:

- ☐ **Cerebrum**
- ☐ **Corpus callosum**
- ☐ **Diencephalon**
  - ☐ **Pituitary gland (hypophysis)** connects to the **hypothalamus**. It rests in the hypophysial fossa of the sphenoid bone.
- ☐ **Midbrain**, **pons**, and **medulla**
- ☐ **Lateral ventricle**, **third ventricle**, **cerebral aqueduct**, and **fourth ventricle**
- ☐ **Cerebellum**
- ☐ **Spinal cord**—passes through **foramen magnum**

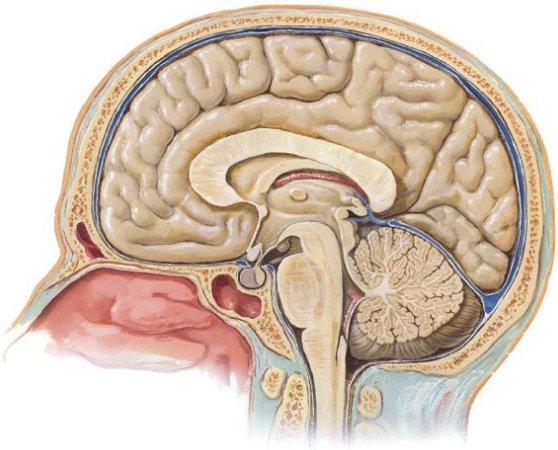

Figure 17.18. Sagittal brain. Netter, Atlas of Human Anatomy, 7th ed.

### *Nasal Cavity* (*Figure 17.19*)

- ☐ **Nasal septum** in midline separates left and right nasal cavities
- ☐ **Nares (nostrils)**
- ☐ **Superior, middle, and inferior nasal conchae (turbinates)**

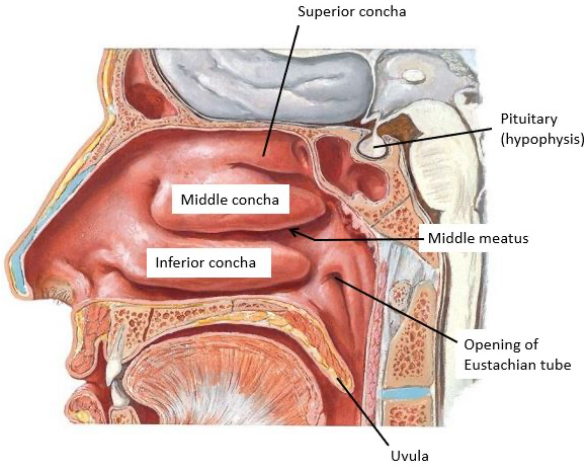


Figure 17.19. Nasal cavity—lateral wall. Netter, Atlas of Human Anatomy, 7th ed.

### *Palate*

- ☐ **Hard palate**
- ☐ **Soft palate** with **uvula**

### *Upper and lower lips*

***Oral cavity*** *(Figure 17.20)*

- ☐ **Oral vestibule**
- ☐ **Oral cavity proper**
- ☐ **Tongue**

***Mandible***

***Hyoid bone***

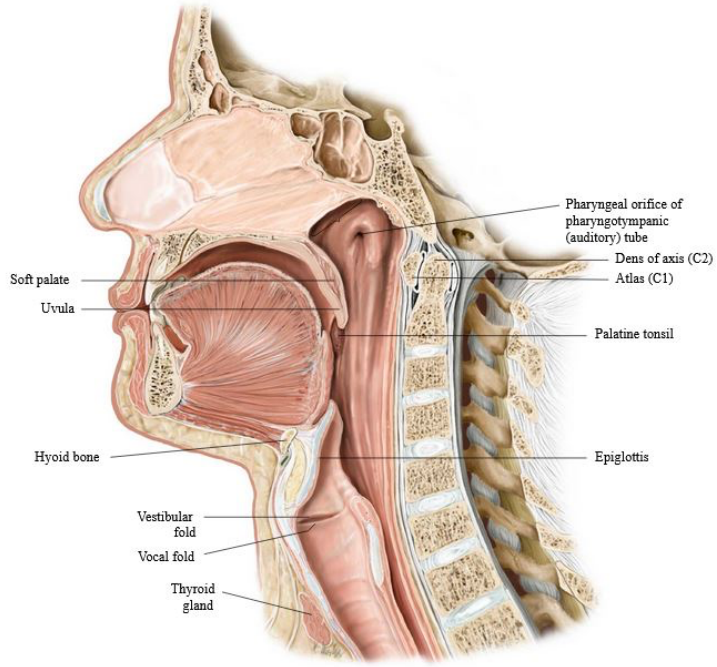


Figure 17.20. Oral cavity and pharynx, sagittal section. Thieme Atlas of Anatomy, 4th ed.

***Pharynx****—three parts (Figure 17.20)*

- ☐ **Nasopharynx** is behind the nasal cavity
  - ☐ Opening of **pharyngotympanic (Eustachian) tube**—connects to middle ear cavity
- ☐ **Oropharynx** is behind the oral cavity
  - ☐ **Tonsillar fossa**—contains the **palatine tonsils**
- ☐ **Laryngopharynx** is behind the larynx

***Larynx*** *(Figure 17.20)*

- ☐ **Epiglottis**—covers the laryngeal inlet during swallowing
- ☐ **Laryngeal inlet**—entrance to the airway
- ☐ **Vestibular folds** (false vocal cords)—protect the airway
- ☐ **Vocal folds** (vocal cords)—vibrate when air is expelled to produce sound

### *Esophagus*

### *Cervical vertebrae*

- [ ] **C-1** is the **atlas**
- [ ] **C-2** is the **axis**