LAB NOTES
Professor Ambron

The following information is to supplement, not replace, the instructions in the Lab dissector . The main purpose is to alert you to deviations from the directions in the manual and to provide hints regarding especially difficult dissections. For the practical exam, you must know the structures in boldface in the dissector

Lab 1: Anterior Skull and Face

Objectives:

1- **to identify the major muscles of facial expression**. Find and define the boundaries of the platysma, obicularis oculi, obicularis oris, zygomaticus major, frontalis and buccinator. Do not spend too much time searching for the muscles that move the lips and the angle of the mouth: they are difficult to dissect. Do NOT dissect the muscles of the ear or nose

2- **to determine the distribution of the branches of the facial nerve (VII)**. Identify the temporal, zygomatic, buccal, manibular, and cervical branches as they emerge from the parotid gland. These nerves extend across the face to innervate the facial muscles.

3- to **identify cutaneous branches of the trigeminal nerve (V).** These transmit afferent information from the facial region and are the terminations of the 3 divisions of V. There are many, but you should find the 3 largest, the supraorbital, infraorbital, and mental. Look also for the buccal nerve, which is afferent from the cheek.

4- **to trace the facial artery and vein.** Become familiar with the major tributaries to the vein.

Note:

Do not search for the lacrimal gland. Be aware of the location of the nasolacrimal duct, but do not dissect it at this time. Also, the tarsal and labial glands are usually difficult to find.

Hints

Many of the muscles of facial expression are extraordinarily thin and are readily torn or cut. They reside immediately below the skin and some have attachments only to the skin. A good place to start is the broad platysma muscle that extends from the neck to above the mandible. Use blunt dissection whenever possible, and when using the scalpel, be sure to cut only parallel to the face, never perpendicular. The scalp is fibrous and dense, and it is very difficult to define the five layers. Nevertheless, you should find the frontalis m. and supraorbital n. Locate the major sutures on your skull model.

Important: The scalp must be removed entirely from the skull before you leave the lab so that the calveria can be cut prior to the next lab. Take a scalpel and cut across the face just above the eyebrows. Extend the cut posteriorly, above the ear on both sides and meet at the back of the head. Forcibly remove the scalp.

Lab 2- Interior of Skull, Cranial Nerves and the Brain

Note: Do not remove the occipital wedge.

Objectives:

1- to explore the meninges, superior dural folds, and venous sinuses. The calvaria has been cut and should be carefully removed to expose the dura mater.

2- to follow the course of each cranial nerve from the brain to the foramina in the skull.

3- to identify the lobes and somatotopic regions on the brain. This is an optional exercise, but is useful preparation for your neuroanatomy course.

After examining the dura mater, superior sagital sinus, etc, make a midsagittal incision and expose the brain. We make an effort to preserve the cranial contents, but are not always successful. Call an instructor to make an evaluation. If the brain is not well fixed, it should be placed in a red bag. If the brain is suitably preserved, the instructor will remove the brain, exposing the tentorium cerebelli and each of the cranial nerves. Once the brain is removed, review where each nerve exits the skull.

Lab 3- The Brain and Cranial fossae

Objectives:

1- To examine the arterial supply to the brain and meninges.

The paired internal carotid and vertebral arteries interconnect within the skull via the Circle of Willis, which provides a potential collateral circulation should one of the main passages become occluded. If the brain was well preserved and most of the arteries are intact, you should identify the main connections of the Circle. This is OPTIONAL, but valuable for your understanding of the vasculature of the brain and will augment information provided in Neuroanatomy.

Identify the foramen spinosum on your skull model and the middle meningeal artery in the cadaver.

2- To observe the origins of the cranial nerves at the base of the brain.

Each cranial nerve emerges from the brain in a stereotypic location, but finding the severed ends of the nerves on the isolated brain is difficult. We have models that can be used for this purpose. The models also show the location of the cranial nuclei, basal ganglia, etc.

This information is OPTIONAL.

3- To examine the cranial fossae and their contents.

a- identify the general bony features that comprise each of the 3 fossae

b- understand the position of each lobe of the brain in the skull

c- identify and open the main venous sinuses (see instructions for cavernous sinus below) and verify their connections.

4- To trace the cranial nerves

Review the entrance/exit of each cranial nerve from the skull. Next identify the cut ends of the oculomotor, trochlear, and abducens nerves and follow each nerve through the cavernous sinus to the superior orbital fissure. The abducens and trochlear are very thin

and difficult to find. You should be able to follow the oculomotor nerve, however. Notice the close proximity between the pituitary gland and the cavernous sinus.

Hints: The dura must be carefully removed with fine forceps and scissors. This is facilitated if the area is kept moist with embalming fluid. Do not lose track of the nerves as you dissect. Remember that the internal carotid artery passes through the sinus and this is a useful landmark to indicate that you are within the sinus.

Next, find the trigeminal ganglion and its 3 branches. The ganglion is surrounded by a sleeve of connective tissue that merges with the dura and arachnoid, which must be removed. Find the cut ends of the motor and sensory roots and carefully peel away the dura above. Keep the area moist. The ganglion is large, but surprisingly flat and featureless. Look for V^1 as it enters the cavernous sinus just below the superior orbital fissure. V^2 and V^3 exit the skull close to the ganglion. If the dura was easily removed, look for the greater and lesser petrosal nerves that emerge from tiny foramina in the petrous bone above and posterior to the ganglion. These convey preganglionic parasympathetic fibers.

Lab 4 The posterior triangle of the neck

Objectives:

1- to identify the cutaneous branches of the cervical plexus-

The supraclavicular, lesser occipital, great auricular, and transverse cervical nerves emerge along the posterior border of the sternocleidomastoid muscle (SCM). This area is difficult to dissect because of dense connective tissue. The transverse cervical nerve crosses the surface of the SCM and may be lost if the skin of the anterior neck was removed in a prior dissection.

Hints: After removing the skin, use blunt dissection (probe or large scissors) to expose the nerves along the border of the SCM before dissecting deeper into the triangle. The connective tissue below the ear is especially dense. Moistening the area may help.

2- To examine the superficial veins.

Trace the facial vein to the retromandibular vein, which is a branch of the internal jugular, and usually has connections to the external jugular vein. As usual, you will find variations.

3- To identify the spinal accessory nerve.

XI traverses the space between the sternocleidomastoid and trapezius muscles. It can be difficult to find and is sometimes absent.

Hints- look for the nerve near the origin of the trapezius or transect the sternocleidomastoid muscle at its midpoint and find the branch that innervates the deep surface of the upper portion of the muscle.

4- **to identify the phrenic nerve and structures in the floor of the triangle.**

Remove the clavicle as described in the dissector and look for the nerve as it descends along the anterior scalene muscle. It can also be traced from the thorax.

Observe, but do not dissect the brachial plexus or the transverse or suprascapular arteries. These will be examined with the upper extremity.

Lab 5- The orbit and its contents

You will dissect one orbit from the superior approach, so examine atlas pictures that depict the contents from this perspective. Once you have chiseled away the roof of the orbit, the main obstacle is to remove the orbital fat that occupies the space between the contents. This is best accomplished using fine forceps, a probe, and patience. The other obit should be dissected from the front (surgical approach) to find the lacrimal gland, the oblique muscles, and the insertion of each rectus muscle.

Objectives:

1- to identify the levator palpebrae superioris, and each of the muscles that move the eyeball. Follow the instructions in the dissector.

2- to identify the efferent and afferent nerves of the orbit.

Hints – if, in the previous lab, you succeed in following III, IV, and VI to the superior orbital fissure, then it is relatively simple to trace these to their muscles. Remember that III divides into 2 divisions. The afferent nerves are all branches of V^1. To find the frontal n., look for its termination as the supraorbital n. To find the nasociliary n, look for its 2 branches that enter the medial ethmoidal air cells. There are many veins and these can be removed if they obscure the other structures.

3- to identify the ciliary ganglion and its branches

The ciliary ganglion, which is slightly larger than the head of a pin, houses the cell bodies of postganglionic parasympathetic neurons. The ganglion lies just lateral to the optic nerve about 1cm from the eyeball.

Hints: The ganglion has 2 or more connections to the nasociliary nerve and multiple short ciliary nerves that enter the posterior surface of the eyeball (see Grants 7.45-46). Thus, find these connections and nerves and trace them to the ganglion.

Note: Enucleation of the eyeball is OPTIONAL. OMIT the section on the dissection of the eyeball.

Lab 6 EAR DISSECTION

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Objectives:

1- to identify the characteristics of the auricle. Examine the auricle and identify the eminences and depressions; helix, antihelix, tragus, antitragus, scapha, concha and, earlobe.

2- to inspect the "S" shape of the external acoustic meatus. Inspect the directionality of the ear canal, which has two parts; The first 1/3 is a continuation of the auricular cartilage that is directed slightly upward and backward. By palpation, verify the continuation of the auricular cartilage. The second 2/3 is the bony canal that is directed slightly anteriorly and downward.

3- to expose the structures in the tympanic cavity. Using a sharp chisel, carefully remove the tegmen tympani above the internal auditory meatus piece by piece. Identify the three ossicles. First, you will see the head of the incus, the intermediate bone in the chain that is located directly under the tegmen tympani (roof). Medial to it is the malleus - notice the attachment of the manubrium of malleus to the eardrum. The most medial and the smallest bone is the stapes which is attached to the oval window on the medial wall of the tympanic cavity. You may also be able to make out the delicate stapedius tendon attached to the stapes.

4- to explore the walls of the tympanic cavity. Become familiar with the walls, and try to identify the following; pay attention to mastoid antrum in the posterior wall. Medial to it you can see the prominence of the facial nerve, and pyramidal eminence. In the medial wall you should identify the promontory. The semicanals of the auditory tube and tensor tympani are in the anterior wall. On the lateral wall try to find the chorda tympani nerve coming from the posterior wall and passing just medially to the manubrium.

5- to identify the facial and vestibulocochlear nerves in the internal acoustic meatus. By very fine chiseling, you can remove the superior wall of the internal acoustic meatus to explore the facial nerve (CN VII) superiorly and the CN VIII inferiorly. Once you explore the facial nerve, follow the nerve in the temporal bone by using a fine probe.

6- to locate the osseous labyrinth. Notice that when you chisel the petrous portion of temporal bone you will be see some fine canals surrounded by denser bony structure. They comprise the osseous labyrinth. Observe the snail-shaped cochlea, just anterolateral to the internal acoustic meatus, and semicircular canals in the posterior portion of petrous part of the temporal bone.

Note

It would be helpful if you bring a simple magnifying glass to inspect the tympanic cavity. You will **NEITHER** dissect the muscles of the ear and **NOR** take the skin out. External ear dissection is just inspection only.

Hints

You should chisel very gently to remove a very fine layer at a time, from the superior surface of the petrous part of temporal bone. Also. it is important to observe the entrance of the facial canal to the bone in the internal acoustic meatus.

Lab 7 The Anterior Neck

The neck is divided into many triangles that are used by surgeons to define discrete areas that contain specific structures. You are NOT responsible for knowing these triangles. The dissection is complicated and you will benefit by reading the dissector carefully prior to entering the lab. Information about the functions of the various structures has been presented in lecture.

Objectives:

1- **To identify the infrahyoid muscles.**

Be careful when exposing these muscles – they are all innervated by the motor branches of the cervical plexus (via the ansa cervicalis). Preserve the nerves that enter these muscles.

2- To identify XII and the ansa cervicalis

Palpate the hyoid bone. XII passes above the bone deep to the posterior belly of the digastric muscle

Hint: It is essential that the sternocleidomastoid be reflected upward as far as possible so that you have access to the area between the hyoid bone and mandible. Once you have located XII, find the branch, which is **the superior root of the ansa.** Trace this to the branches that innervate the infrahyoid muscles and then around the loop that terminates medially above.

3- to identify the vagus and its initial branches

The carotid sheath must be opened completely to expose the vagus. The **superior laryngeal branch of X** divides into the internal and external laryngeal nerves. The **internal laryngeal nerve** pierces the **thyrohyoid membrane** that extends between the hyoid bone and thyroid cartilage of the larynx. To locate the membrane, cut the thyrohyoid muscle. The nerve enters the membrane with the **superior laryngeal artery,** which can be traced directly from the external carotid artery. To find the **external laryngeal nerve,** locate its target, the cricothyroid muscle, and trace the nerve back. It is very thin and easily torn.

4- to identify the branches of the external carotid artery

Follow the directions in the dissector. Be sure that the carotid sheath is removed. The ascending pharyngeal artery is small and may have been cut during the dissection above.

5- to identify the anterior veins

As per the dissector. Expect variations.

6- To find the digastric muscle

The anterior and posterior bellies of the digastric muscle are easily identified because they are joined by a tendon attached to the hyoid bone. The sternocleidomastoid must be reflected all the way to its origin. The **stylohyoid muscle** splits around the tendon. Look for the slender **mylohoid nerve** that pierces the **mylohyoid muscle** (the floor of the mouth) to enter the anterior belly of the digastric muscle.

7- To examine the thyroid gland

Trace the superior thyroid artery to the gland. Follow the dissector.

8-to find the thoracic duct

Follow the directions in the dissector. The duct enters the left subclavian from above, but is often difficult to find. Identify the vertebral artery.

Lab 8 Parotid and Temporal Regions

Objectives

1- to locate VII as it emerges from the skull

This requires that the sternocleidomastoid m be completely retracted and that the area around the posterior belly of the digastric m. be cleared of connective tissue. Use your finger to locate the styloid process: VII emerges through the stylomastoid foramen at the base of the process. Alternatively, dissect the parotid gland to find the trunk of VII and trace it toward the foramen.

2- To identify the contents of the infratemporal and temporal fossae

Follow the dissector. Be sure that the cut across the manidible is superior to the mandibular foramen. **Hints**: The lingual and inferior alveolar nerves are all located lateral to the medial pterygoid m. Follow the lingual nerve toward the foramen ovale to find the delicate chorda tympani n.

3- to identify branches of the maxillary artery.

The artery enters the fossa at a right angle to, and above the angle of the mandible. This area must be cleared of connective tissue to find the maxillary branch. One approach to locating the middle meningeal a. is to pass a pin through the foramen spinosum from above.

4- to examine the TMJ

The function and anatomy of this joint will be discussed at length in the lecture. Follow the directions in the dissector.

Lab 9. The Pharyngeal wall

To expose the pharynx:

1- Place your hand behind the carotid sheath and behind the pharyngeal constrictors. Push through to the other side. Your hand lies in the facia-lined **retropharyngeal space** between the pharynx and the vertebral column.

2- Slide your hand upward as far as you can. Your fingers will be stopped just beneath the **clivus**, which is the sloped portion of the basi-occiput (**A** in the Figure below). The superior constrictor of the pharynx is suspended from the basilar part of the occipital bone by a midline aponeurosis to the **pharyngeal tubercle** (Grants, Fig.8.57). The lateral areas are filled by the **pharyngobasilar fascia**. Slide your hand down, in the same plane, to the clavicle.

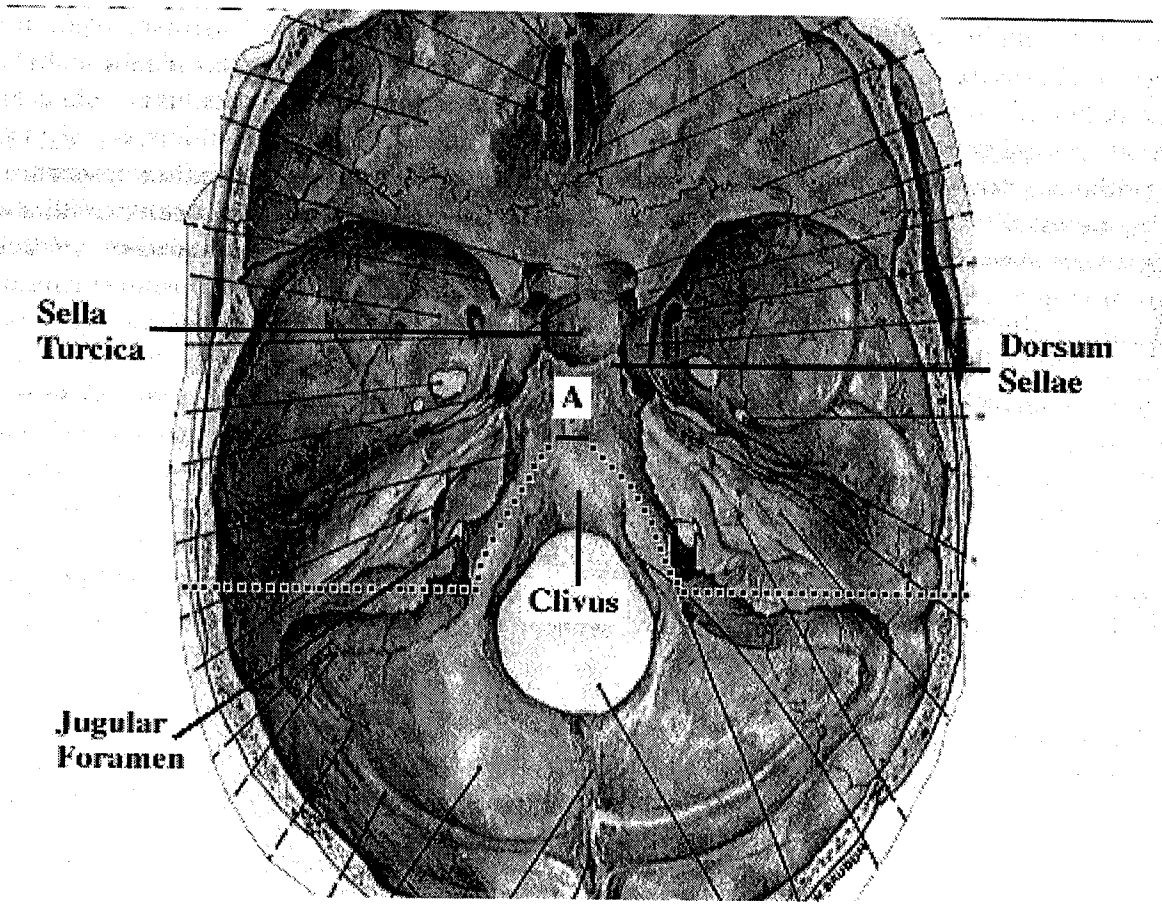
3- Remove your hand. Place the chisel on the clivus about 2 cm below the ridge of the dorsum sellae (point **A** in the Fig.) and make a *vertical* incision. The chisel should emerge in the retropharyngeal space. If not, make an incision more anteriorly.

4- Chisel through the base of the skull from **A** along the dotted lines (Fig.) making sure that you end *behind* the jugular foramen.

5- Using a saw, make a *vertical* cut through the lateral wall of the skull on each side. The cut should connect to the chiseled line behind the jugular foramen.

6-Pull the anterior portion of the skull from the posterior. This may require force. Cut the few intervening muscles with a scapel.

7-Continue the dissection from the "Prevertebral and Lateral vertebral Region"'.



Lab 10 The Nasal Cavities

Bisection of the head.
Follow the procedure in the dissector. Use a saw to cut through the bones, and a scalpel to section the soft tissues. Make sure that the cut is lateral to the septum and that the cut through the mandible is between the geniohyoid muscles. Do NOT bisect the epiglottis or the hyoid bone.

Objectives:
1- To identify the bones and cartilages that comprise the medial and lateral walls and the septum of the nasal cavities.
2- To identify the nerves and arteries in the nasal region.
Most of these are small and difficult to find. You should identify the nasopalatine nerve as it exits through the incisive foramen. This nerve and the greater and lesser palatine

nerves convey sensory information from the palate. You might find the external nasal nerve. This branch of the anterior ethmoidal nerve innervates the skin of the nose.

3- to examine the superior, middle and inferior nasal concha, each associated meatus, and the openings from the sinuses and lacrimal sac.

Hints:

a- The superior meatus is small; look for the ostium from the sphenoidal sinus.

b- If you carefully remove the inferior choncha, you should see the termination of the lacrimal sac opening into the inferior meatus.

c- You must remove the entire lateral wall of the nasal cavity, thereby exposing the maxillary sinus, to locate the maxillary nerve.

Lab 11 Pterygopalatine fossa, Palate, Tonsil and Pharyngeal wall

Follow the dissector carefully.

Objectives:

1- To locate the spheno-(pterygo)-palatine foramen

The maxillary artery enters this foramen to provide blood to the nasal cavity. Thus, it can be located by pushing a probe medially along the maxillary artery in the infratemporal fossa. Alternatively, follow the directions in the dissector.

2- To locate the pterygopalatine ganglion.

Hints- The ganglion is suspended from the maxillary nerve, has branches in the greater and lesser palatine canals, and receives the (vidian) nerve from the pterygoid canal.

Thus:

a- expose the maxillary nerve in the infraorbital fissure and trace it toward the foramen rotundum.

b- trace the palatine nerves superiorly.

c- open the ridge in the floor of the sphenoidal sinus to expose the nerve of the pterygoid canal.

All of these nerves will all converge on the ganglion.

3- to identify the palatine tonsil

Most of the tonsils will have been removed or will have atrophied. If present, the bilateral palatine tonsils are located between the palatoglossal and palatopharyngeal folds (overlying the muscles of the same name).

4- to demonstrate that the superior pharyngeal constrictor and the buccinator meet at the pterygomandibular raphe.

Follow the dissector.

5-to identify the levator and tensor palati muscles.

These muscles insert on the soft palate (Velum) and participate in forming the seal between the nasal and oral cavities during swallowing. The Tensor is readily identified because its tendon passes over the hamulus of the medial pterygoid plate. Locate these landmarks on your skull models before you dissect.

STOP AT THE MOUTH AND TONGUE.

Lab 12 mouth and tongue

Objectives:

1-to identify the salivary glands and their openings into the vestibule.

Follow the dissector. Carefully remove the mucosa. The duct of the submandibular gland can look like a nerve or artery, but characteristically passes over the lingual nerve and terminates adjacent to the frenulum. The sublingual gland is found in a fossa just adjacent to the mandible. Look for multiple ducts that open along the plica sublinguinalis.

2-to identify the nerves to the tongue.

Identify the glossopharyngeal n., lingual n. (and its associated submandibular ganglion), and the hypoglossal n. as they innervate the tongue. Understand the function of the afferent and efferent components in each nerve.

3- to identify the geniohyoid m. and the muscles of the tongue.

Follow the dissector

Hint: the lingual and hypoglossal nerves are lateral to the hyoglossus m. whereas the lingual artery is medial to the muscle. Also, note that the styloglossus m. inserts on the posterior border of the hyoglossus m.