

BIO 295 - THE VERTEBRATES
LAB PREPARATION GUIDE FOR SHARK DISSECTION
LAB SESSIONS A-C, FALL 2005

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This material supplements the lab manual:

Wischnitzer, S. 1993. *Atlas and Dissection Guide for Comparative Anatomy*. Fifth edition. W. H. Freeman.

External Morphology (pg. 31-35; pg 91-92)

pg. 32. Look at placoid scales on demonstration bench. Don't need to consider section on skin and Fig. 1-2.

Skeletal System (pg. 37-43; pg 92-94)

Big picture: What are the major components of the shark (fish) skeleton?

pg. 38. Be able to distinguish chondrocranium but not all of its components. You should know: Foramen magnum, occipital condyles and vagus foramina.

pg. 40-41. Know splanchnocranium, including mandibular arch, hyoid arch and visceral arches three to seven, but not their components.

Vertebral column section: all.

Appendicular skeleton: recognize and name the different fins but not their elements.

pg. 42-43. Don't need to know figs. 2-8, or figs. 2-11 to 2-15; however, note the coracoid bar in fig. 2-13. You will come across this term when studying the musculature.

Muscular System (pg. 45- 48; pg. 94)

Big picture: Know the muscle groups and what they do. Understand how the size and arrangement of muscles is related to the mode of locomotion.

Appendicular: All.

Branchiomic and Hypobranchial musculature: Know mandibular adductor, 1st ventral constrictor, interhyoid, coracohyoid and coracobranchials. Know to what group each of them belong. Table 3-1 use to find the role of the muscles you need to know.

Digestive System (pg. 49-50; pg.94-96)

pg. 50. Don't need to know the names of individual mesenteries, but know to recognize that kind of tissue.

☞ Don't' forget to read the relevant sections of the 'Evolution and Function' chapter (p. 91) as listed for each system.

Respiratory Systems (pg.50-53, pg. 96-97)

All.

Be sure to understand the flow of water.

Circulatory System (pg. 55-63, pg. 96-98)

Your specimens' circulatory system has been injected with coloured silicone to make the study of the blood vessels easier:

Arteries (vessels taking blood away from the heart) are red

Veins (vessels taking blood to the heart) are blue

The hepatic portal system is yellow

Note: The animal's blood, where some remains, is brown and clotted

Usual pattern of blood flow:

heart -> arteries -> arterioles -> capillaries -> venules -> veins -> heart

Portal systems are veins that transport blood between two capillary beds. The shark has two portal systems, the hepatic portal system and the renal portal system. The hepatic portal system brings nutrients from the digestive tract to the liver via the hepatic portal vein. The branches that unite to form the hepatic portal vein are the gastric, lienomesenteric and pancreaticomesenteric veins. Be sure to locate and learn these veins. The renal portal system runs between the tail and the kidneys. Be able to outline this system in your shark.

☞ Keep in mind the bigger picture of the blood flow patterns while doing this section. To help you, draw the direction of blood flow on the figures using coloured arrows: blue for venous, red for arterial blood.

If you cannot find certain vessels in your specimen, look for them in another shark. Keep in mind the variability between individual specimens. Be careful to keep the muscles dissected last week intact for quiz purposes.

Heart (p.55)- as suggested, wait until the systemic veins have been examined before exposing the interior of the heart.

Blood vessels - In the figures of the dissection guide arteries and veins have been illustrated on separate drawings. However, corresponding veins and arteries usually run parallel to each other in the specimen. Large blood vessels branch out into smaller vessels; when they do, they also change names. The text in the dissection guide follows that logic. It will guide you from the large vessels toward the smaller tributaries. This is difficult to do from the figures. So, when you are trying to dissect and identify vessels: **Follow the text** (use the figures as backup; not the other way around). You will also find that the figures do not list all of the smaller vessels.

Fig. 5-3. Don't need to know internal carotid artery, ophthalmic artery, stapedia artery, hyoidean epibranchial artery, efferent spiracular artery, afferent spiracular artery, radix aorta or vertebral artery. The ventral aorta and afferent branchial arteries may not be dyed.(they are difficult to reach with the silicone).

Fig. 5-4. Don't need to know intra-intestinal, duodenal, genital, pyloric, or femoral arteries. The segmental and renal arteries are not illustrated on figure 5-4, but learn their function nonetheless.

Fig. 5-5. These vessels should be yellow in colour. Don't need to know intrainestinal vein.

Fig. 5-7. Don't need to know genital sinus, cloacal vein or femoral vein.

In addition, you are not expected to remember the names of the smaller vessels that are listed in the text but that do not appear on the figures.

Remember to go back and dissect the interior of the heart at this point.

Urogenital System (pg. 65-67, 98-99)

Be sure to take a look at and learn about both the male and female shark.

Fig. 6-3. Don't need to know ostium tubae, shell gland, mesotubarium or mesonephric duct. Be able to

explain how the reproductive systems function.

Sense Organs (pg. 69-74)

Follow the dissection instructions in the lab manual.

Lateral line system: Look at the general layout and be able to locate some of the canals in this system. You aren't required to memorize the names of individual canals. Know that this system sends sensory information to the brain through cranial nerves.

Olfactory: Proceed with the dissection now or wait to complete it at the same time as the brain dissection.

Eye: Locate and recognize ocular muscles (= extrinsic eye muscles) as a group. You do not need to know their individual names. Locate the optic pedicel and optic nerve (fig. 7-2). You do not have to know the other structures listed under "Other Orbital Structures" (p.70). Dissect the eye ball and try to identify as many of its component. Mark the structures that you have seen on fig. 7-3. You will not be quizzed on the shark eye ball but those structures are part of the final exam material.

Ear: dissect so that you can see what the membranous labyrinth (internal ear) looks like. Follow instructions given at the beginning of the lab. You will not have to locate and identify all of the ear canals.

Nervous System (pg. 75-80, 98-100)

On the dorsal surface, remove the skin from the snout region to the anterior gill region. Make thin horizontal slices through the cartilage and muscle. Start between the eyes and from there expose the rest of the brain. You may find the semicircular canals (ears) in the cartilage behind the eyes. At the forward end of the brain, locate the olfactory tracts and follow them to expose the olfactory bulb and sac.

Fig. 8-2. Locate and learn the features of the telencephalon, diencephalon (except tela choroidea), mesencephalon, metencephalon (cerebellum) and myelencephalon (including medulla oblongata).

Correction to lab manual: the auricles are part of the metencephalon (not myelencephalon). We will not be studying the cranial, occipital and spinal nerves, or Fig. 8-3 and 8-4.