LOCOMOTORY AND MEDIAL FIN MUSCULATURE & MUSCLE TYPES

PURPOSE

This lab is meant to teach you the important muscles associated with the main portion of a fish's body that are related to locomotion and medial fin movement. During the lab, you'll make observations of these muscles and connect their placement and muscle type with different forms of locomotion in fishes.

OVERVIEW

Muscle types
- *Red versus white*

Swimming mode
Swimming muscles
- *Lateral observation of muscles*
- *Cross-sectional view of muscles*
- *Dorsal muscles*
- *Muscle type ratios in caudal muscles*

MUSCLE TYPES

Fill in the table as your instructor discusses the differences between red and white muscle. Try to think about how these differences might relate to the different types of swimming (i.e., those related to duration and stamina).

> NOTE: When it comes time to study for the exam, do not worry so much about knowing the exact size of muscle fibers or the exact proportion. Instead, know that one is larger than the other, and there is more of one than another.

	Red	White
Capillaries		
Myoglobin		
Mitochondria		
Structure		
Location		
Fiber diameter		
Proportion		

SWIMMING MODE

1-Using your dissected and cleaned fish from the last lab, place the fish on its right side so that the left (i.e., uncut) side faces you. Before you begin cutting your fish, take a few minutes to examine the fish as a whole. Hypothesize what mode of swimming this fish most likely

employs. Support your hypothesis with evidence from its external morphology, i.e., fin shape, body shape, etc.

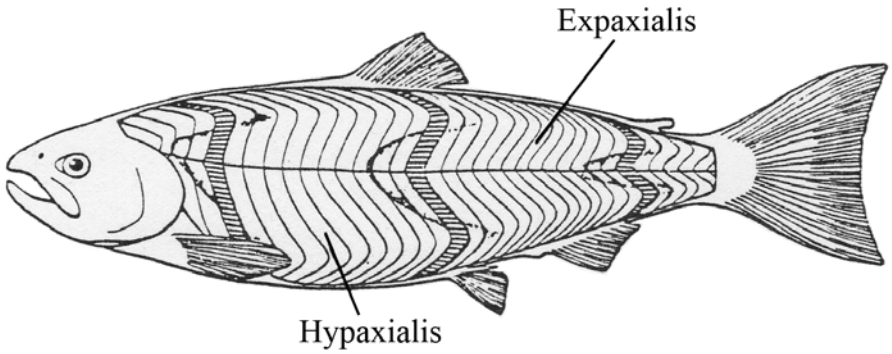
SWIMMING MUSCLES

Dissection 1

Remove the skin from the left side of your fish, taking care to avoid damage to the body musculature. Make a *very shallow* cut along the dorsal profile of the fish, starting above the operculum and working your way posteriorly to the end of the caudle peduncle. Try to cut slightly down from the dorsal fin(s) to avoid causing damage to the fin musculature that we will examine later in this lab. Grab the skin near the head and peeling it slowly, cutting away any muscle tissue that is attached to it. Stop when you are able to see the muscles shown in Figure 1 (*below)*.

2-Sketch your fish at this point, identifying the *epaxial and hypaxial muscles*, as well as the locations of red and white muscles.

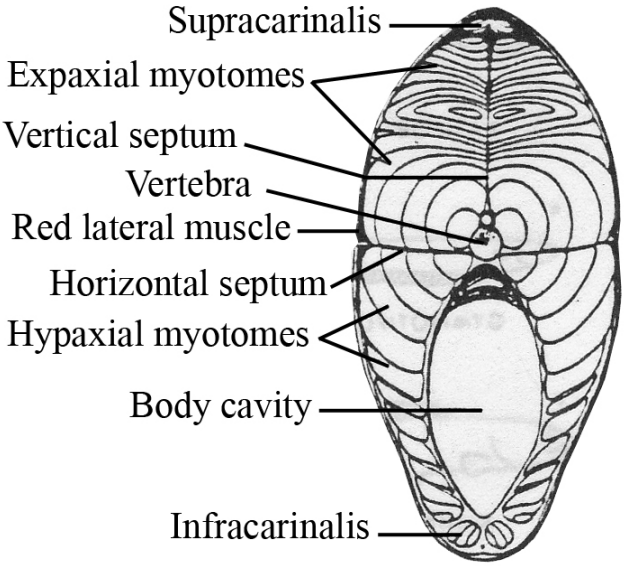
Figure 1.



-Now cut a cross-section through your fish just anterior to the dorsal fin. This will allow you to see the muscles shown in Figure 2.

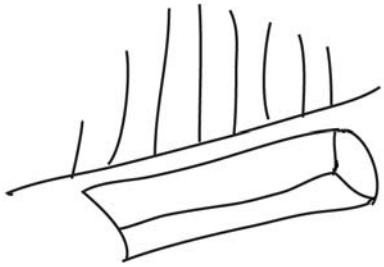
3-Sketch what you see in the observed cross-section (i.e., not figure 2!), locating and labeling the *vertical and horizontal septa*, the *epaxial and hypaxial musculature*, the *red lateral muscle*, and the *supracarinalis and infracarinalis*. Try to be as accurate as possible in depicting each muscle's relative size (i.e., How high on the body is the horizontal septum? How deep into the fish does the lateral red muscle penetrate?, etc.).

Figure 2.



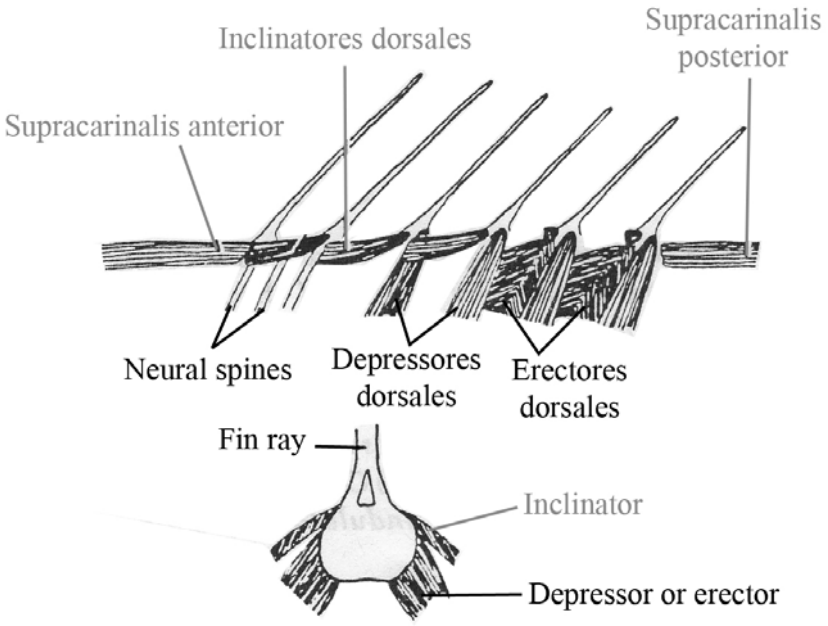
Dissection 2

Starting approximately a quarter inch from the base of the dorsal fin, make a half-inch deep incision running parallel to the base for roughly three inches (enough so that you can see the musculature associated with a few spines and/or rays in series). Inserting your scalpel perpendicular to the fish at the extent of your incision depth, cut along the length of the incision so that you remove a long, thin chunk of muscle away from the base of the dorsal fin. The incision should run along the left side of the dorsal fin. You should be left with a cut that looks something like this:



4-Sketch the lateral cross-section view (the same view as in Figure 3). Label the *depressores and erectores dorsales*.

Figure 3.



Dissection 3

-Cut out a section of right side hypaxial and epaxial musculature just posterior to the anal fin. Carefully separate the red muscle from the white muscle. Save both pieces. Weigh them together, as well as individually. Determine the proportion of red to white muscle and then compare this result with your earlier prediction of swimming ability. Also record this on the whiteboard next to your species.

5-Examine the swimming musculature of other species represented in the lab and note any obvious differences you observe. Try to explain them.

6-Compare the proportion of red muscle to white muscle among the different species of fishes. Could you have predicted the differences based on what you know about fish form and function? Explain.