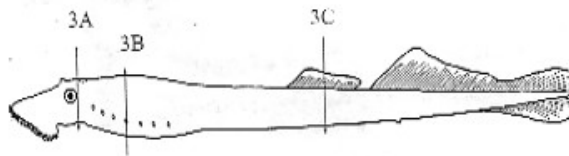


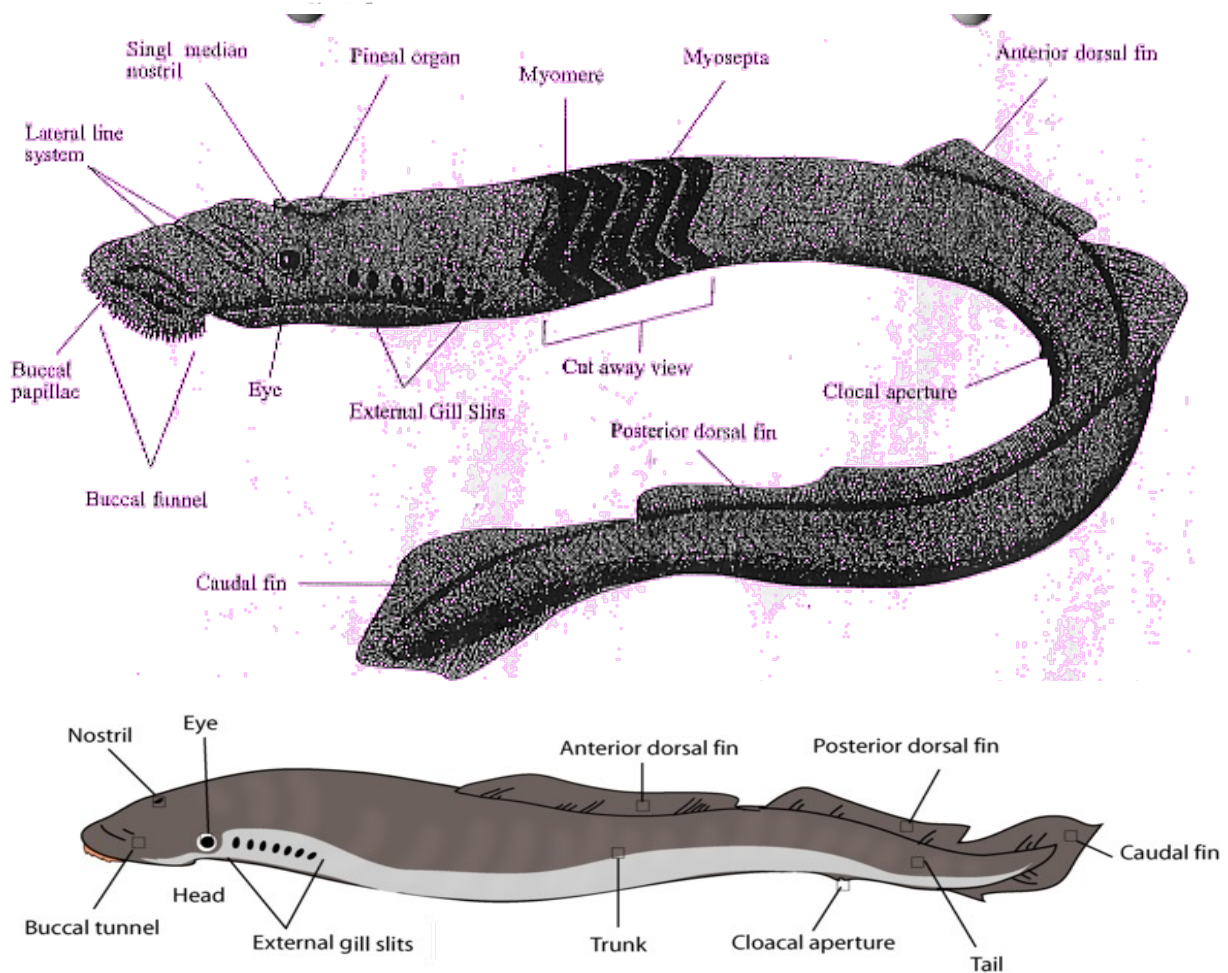
## Dissecting your lamprey:

### External Anatomy:

Become familiar with the organism. Use these diagrams to become more aware of where things are and where to cut. Make a plan of what you hope to do, answer our questions, and use our guide to move through the organism.



← This is a good plan for if you want make cross section cuts



Before you begin, be sure to evaluate where you want to cut. It might be a good idea to make marks on your cutting board of where you plan to make any cuts, especially cross section cuts.

What does the organism look like?

Are there any areas you want to make note of or places you'll need to remember in the future?

Where do you think it will be the most difficult to cut? Why?

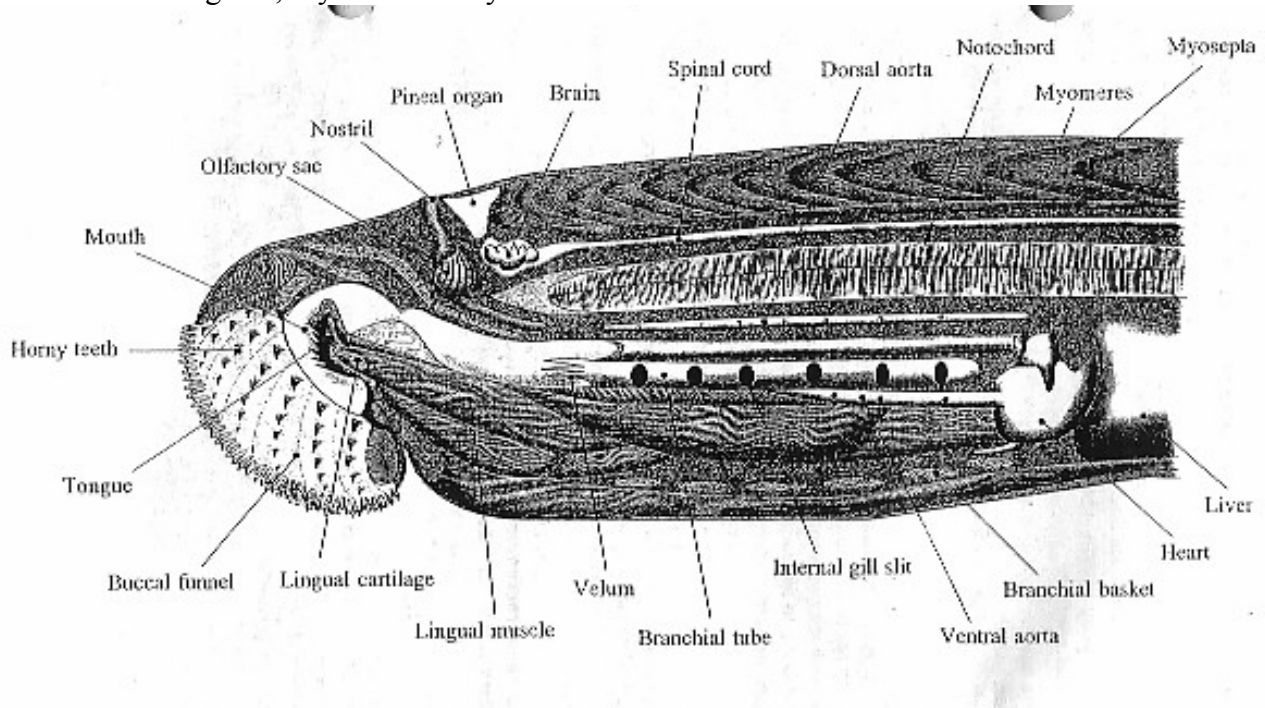
What do you predict the organism will look like on the inside?

Where do you think things are, looking from the outside?

**Internal Anatomy:**

These are a few good diagrams which give you an idea of where you're going from here. They give you an idea of the shape and size of each organ. You'll notice that the liver is quite large and the heart is fair sized. The brain and kidneys are the most difficult to find because they are very small.

Examine these diagrams and begin the dissection. Follow your own plan and use our guide as a reference or guide, if you find that your own does not work.




1. Begin by making an incision about 10.16cm from the end of the caudal fin, along the ventral side of the lamprey. This cut should follow the notochord, on the underside of the lamprey. This is the beginning attempt to skin your lamprey. Be sure to start out lightly.



**\*\*Tip:** Cutting farther down is a good place to start testing how hard you should cut up toward the top. Cutting lower on the body means that you'll get a feel for how hard to

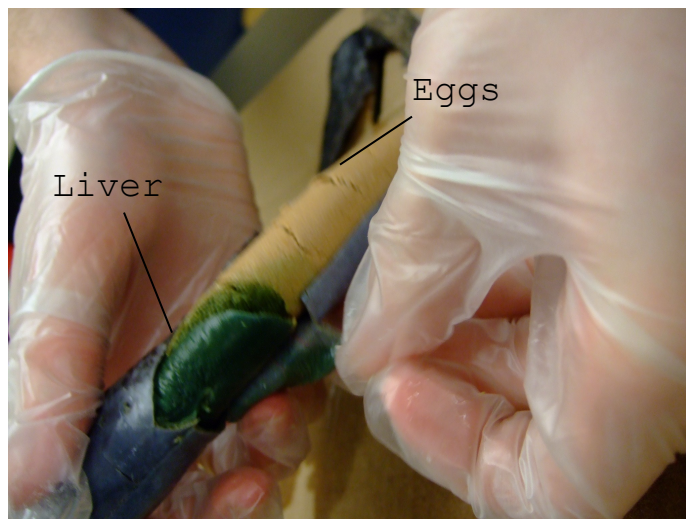
cut, how deep and where to cut. You should be able to reach the eggs by cutting in the middle or lower half of the lamprey, meaning less damage will be made toward its vital organs. Be sure to recognize that the dorsal side of the lamprey has more muscle mass, making it more difficult to get through.

2. From there, make two 2-3cm medial incisions down the side of the lamprey. This will act as your starting square where you will be able to branch out from.
3. Before moving on, you should have made a box-like cut which looks like this:  This should be along the ventral side.
4. Now remove the skin and muscle from your square, using scissors. This will reveal a small patch of eggs – which will continue on for about another 20.32cm. These eggs take up about 65% of the lamprey's body cavity.



**\*\*Tip:** Scissors and tweezers are essential to skin and muscle removal. These will be very useful throughout the dissection.

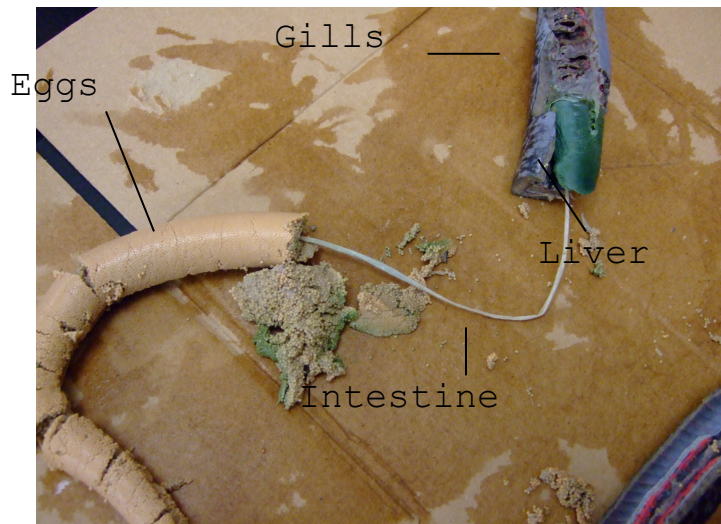
5. Continue to cut in these box-like sections. You will want to cut to the end of the caudal fin, up until the end of the flesh and muscle. You will also want to cut toward the head up until you reach the liver, around 9cm.





**\*\*Tip:** You will begin to notice a green tint in the innermost muscle layer as you come upon the liver. This will inform you that you are getting close to the internal organs and you can now sever the eggs (if you choose to).

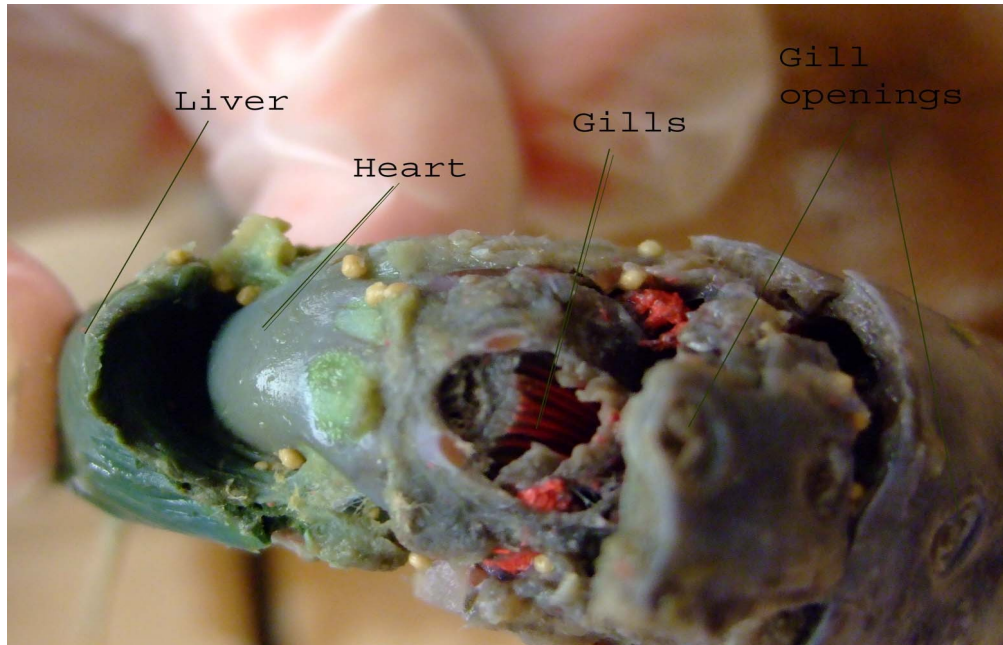
6. Taking a minute to deal with the eggs:
  1. Cutting off the eggs: If you choose to sever the eggs, you can continue on the step seven. Be sure to keep them for the last step!
  2. Keeping the eggs: If you choose to keep the eggs, you'll need to cut off the remaining skin and muscle. To do this, use your scissors and dispose of the excess skin and muscle.
7. The liver is well attached to the innermost muscle. With the box-like incisions, you should be able to slowly pull the muscle away from the liver. Have your partner gently "saw" the membrane which connects the muscle to the liver. This will allow you to pull the skin and muscle back.



8. Pull the skin and muscle away from the liver. Detach the skin and muscle from the lamprey, exposing the liver. Continue to cut toward the head for another 3cm and remove the skin and muscle, as you did with the liver.

**\*\*Tip:** Cutting the skin and muscle away from liver may be difficult because there is a membrane which attaches the liver to the muscle. It acts like a web which connects the top of the liver to the innermost muscle – for the whole length of the liver. Try to cut "the web" using scissors.

9. Now both the liver and the heart should be exposed. The two organs are connected to be sure to cut out both the liver and heart, carefully. Keep both the organs connected.



**\*\*Tip:** The heart is a round and ball-like, comparable to a marble, and is roughly 1cm in diameter. The liver is nearly 7cm and is gourd shaped.

10. Once you've removed the two organs from the body cavity, sever the two. They should be fairly distinct and you should easily be able to see where they connect –where you are going to separate them.
11. After separating the two organs, you may choose to cut them in half, laterally, in order to look inside! Can you find the different chambers in the heart?
12. Now look for the seven hole-like structures running along each side of the lamprey's "head". These are the seven gills allowing the lamprey to breath. Your objective is to cut the skin and muscle covering the gills until you get to their inner structure. Begin by cutting laterally along the side of the gills. Use a sawing motion to cut off around 1-2cm of muscle. Think of cutting an onion and pretend that your first few slices are the skin and muscle.



13. Continue cutting the around the gills until you've exposed the gills. You should be able to pull apart two small pieces of skin. Underneath each piece, should be highlighted, pink veins which form a shell-like structure. Each pair of these pieces of skin makes up one gill. Once you see a gill, don't focus on finding the rest of them, but be sure to continue skinning the lamprey so you can see the veins, arteries, and eventually more organs.
14. Now you will want to sever the head by cutting 1-2cm before the first gill – the first gill being the closest to the eyes and mouth. There is the Pineal organ on the top of the lamprey's head which appears as a big bump. You want to make sure to make your cut at least .5cm before that organ. That way you'll be less likely to sever the brain.

**\*\*Tip:** To cut the head, *don't* use scalpel because they are very flimsy and break very easily. It's best to pick up the lamprey, and cut the head off using scissors. This can be tricky so be careful.

15. Now with a severed head, try to open it up. Using your scalpel cut along the ventral side from the mouth to end of the severed section. Don't be afraid to cut too hard in the mouth, but ease up once you've moved out of the mouth and on to the body.



Lamprey Cross-Section

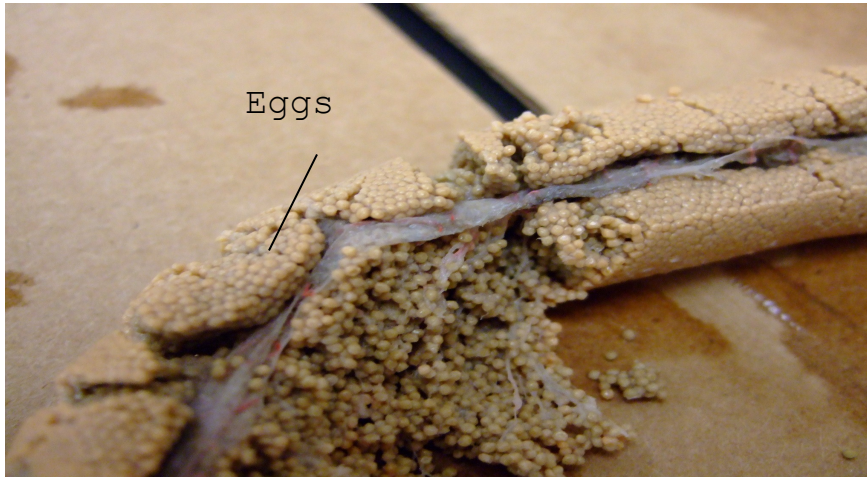


Lamprey Head + Teeth

16. Once you've got your primary cut, your goal is to continue and bisect the head. This is best completed with a scalpel but scissors may work as well. There is a slight risk in cutting the brain, but finding it is worth the risk.
17. Now you're going to want to find the brain. It's *very* small and divided into three sections, but the three sections remain connected. It can be no larger than .5cm and it's probably a gray or light tan color. If you don't find it, it may have been severed which makes finding it even more difficult. If, after looking for 3-5 minutes, you can't find the brain, then move on to your last few steps.
18. This is now your last step of handling the head. You are now going to look for the eyes and remove the hard, bouncy eye ball. The eyes are a dark, purple-like color and rest on the exterior side of the head. Use your scalpel to puncture the eye and maneuver the knife around until you can feel a hard ball under the eye. From here keep moving your knife around until you can see a small, white ball – the eye ball.



19. One last step is to go back and look for the kidneys in the eggs. The kidney should be located near to where you cut the eggs from the rest of the body. It's a small raisin-like organ which should be intertwined in with the rest of the eggs. This could be difficult to find so just move the eggs around. Who knows, you may not have one!



20. Good Job! Clean up and you'll be done.

**Questions + Comments:**

Is there anything you'd like to reflect on?

Where was it the most difficult to cut?

Was there anything you didn't expect? Anything that you had difficulty with?

How easy was it to locate and identify each organ?

1    2    3    4    5