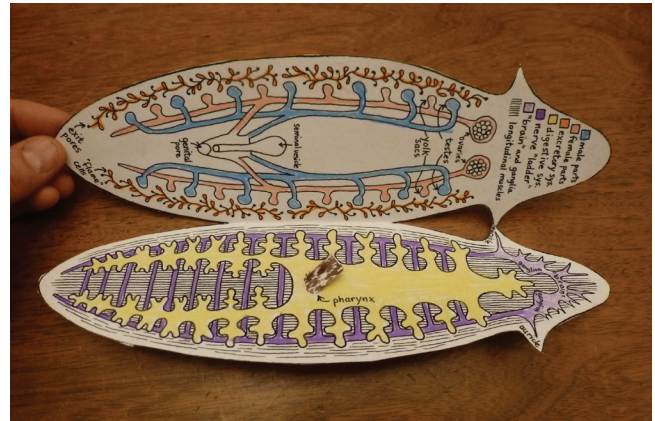
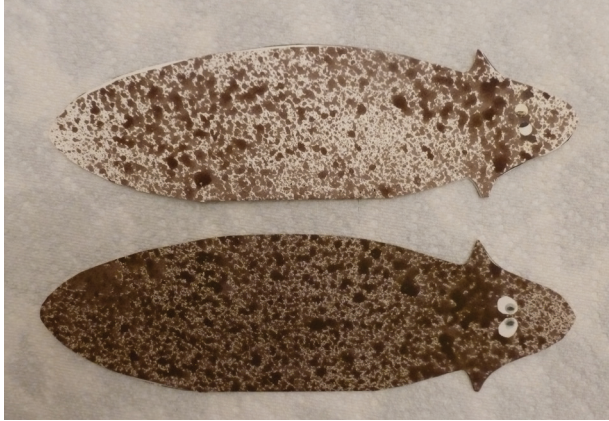


PLANARIA ANATOMY CRAFT



Purpose of project: To learn about the anatomy and physiology of planarians (genus *Dugesia*, specifically)

Target age group: ages 10-16

Time needed: About an hour, with the biggest time factor being how fast the students color.

Materials needed: the planaria pattern printed onto heavy card stock, colored pencils, fine tip pen, scissors, pencil, glue or tape, large pin (or small nail, or compass point) for poking holes, optional: watered-down brown paint put into a spray bottle (for spraying pattern on reverse side)

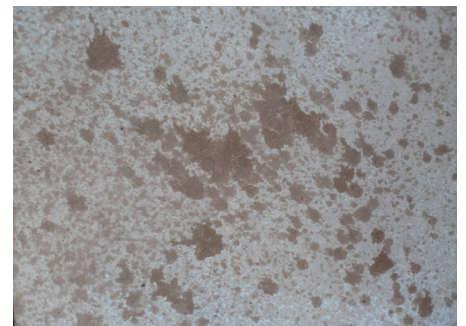
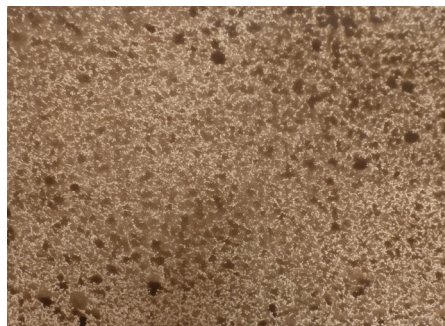
NOTE: If you'd like to have real planaria to observe, they are easily obtainable by going to www.carolina.com. They are not that expensive and are easy to keep. (You can cut them in half and watch them regenerate!)

How to prepare:

1) Make a copy of the pattern page (one per student) on heavy card stock. Notice that there are two different patterns. One has all the words filled in and the other is blank. Use the blank pattern if you have older students and would like them to do all the writing themselves.

2) You might want to consider preparing the reverse side ahead of time if you have limited class time. I took an empty pump spray bottle, filled it halfway with water and then added a small amount of brown acrylic paint. (Watercolor paint might also be used, although it will be less waterproof when dry.) I took the pattern pages outside and turned them face down then sprayed them with this brown water. The result was a brown splotchy pattern, very similar to spots we observed on many of the planarians in our classroom lab. Some of our planarians were a fairly dark brown, and some were lighter. If the papers are wrinkly after they dry, you can flatten them with an iron.

You can let the students to spray or paint the reverse sides themselves, if you are able to let the pages sit and dry for a few hours. (Drying time can be reduced by using a fan or hair dryer on the papers.)



How to assemble:

1) Color the inside anatomy of the planarian. You can make the features any color you wish, you don't have to use the colors shown on this sample. Just make sure you put the correct color in the key at the top.

NOTE: The excretory system is shown in orange here. You don't have to color the entire system. You can just color those things that look like leaves. The leafy things are the flame cells that draw the wastes out of the surrounding fluid.

ALSO NOTE: You can leave the striped muscles white. It is tricky to color in all those little spaces. You can just

2) Find out what each part does as you color it. An information page is included as part of this download.

3) Use a large needle or a small nail to poke holes in the dots along the excretory system. These dots represent actual holes (pores) that lead to the outside. The wastes leave through these pores.

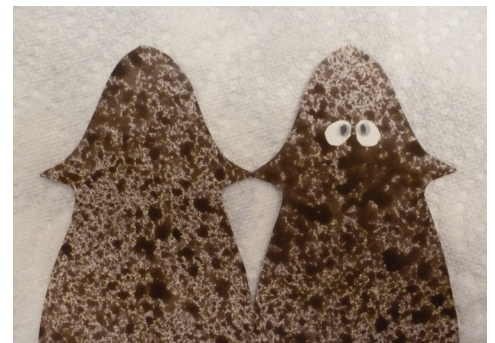
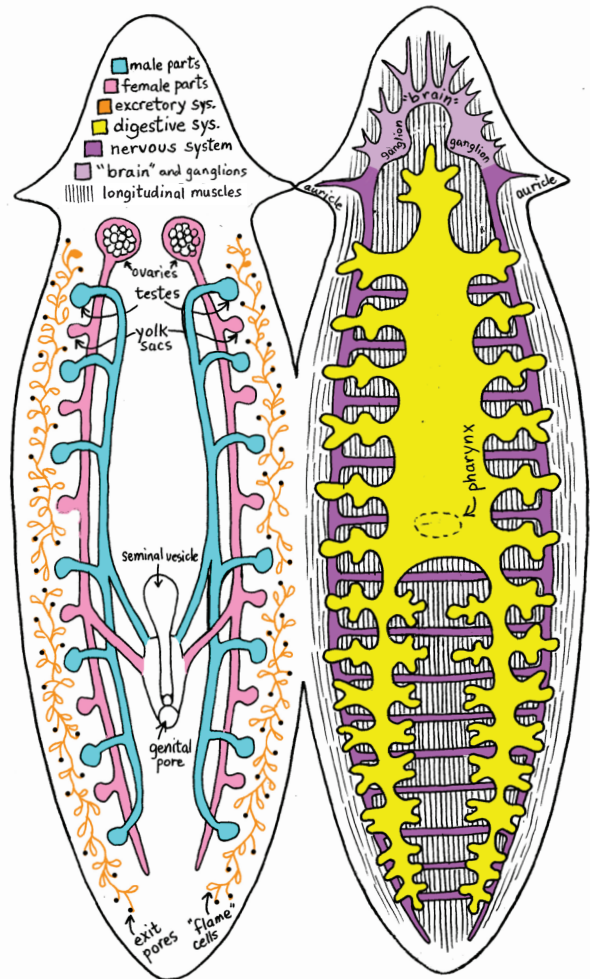
4) Cut the hole for the pharynx, shown as a dotted line circle in the middle of the digestive system. (An X-acto knife works well.)

5) Cut out the planaria. You can cut out both auricles (ear things). Just don't cut it completely in half. It should fold in half nicely, right along the center.

6) Cut two small circles of white paper, put dots on them, and glue on for the eyes. You can use the reverse side of your scrap paper (after cutting out planaria) assuming one side is white. NOTE: Remember, the planaria can't really see. Those eyes are just eye spots and can only sense light and dark. The planaria relies on its auricles for sensing its environment.

7) Cut out the rectangle on the pattern page and wrap it around a pencil to form a tube. Secure the edge with white glue. Slide the tube off the pencil when the glue is dry. Push the tube through the pharynx hole, leaving most of the pharynx on the outside of the planaria. Secure with a little bit of glue or tape so that the pharynx doesn't fall out. It's okay if the pharynx gets flattened a little.

In my classroom, I sent the planaria home in an "envelope" made from the info page. I folded the info page in half the long way and put a few pieces of tape on it to make it into a long pocket, then slid the planaria down inside.



BROWN PLANARIA

CLASSIFICATION: The planaria is a member of the phylum *Platyhelminthes*, the flatworms. Other flatworms include colorful marine flatworms found in the ocean, and parasitic tapeworms and flukes.

Dugesia is a genus of planaria that is commonly used in labs and classrooms.

You can call them "planaria" or "planarians."

DIET: The planaria eats animals smaller than itself, plus bits of debris it finds as it slides along the bottom surfaces of shallow ponds.

DIGESTIVE SYSTEM: The planaria takes in food through a tube called the **pharynx**. (In humans, the pharynx is the throat.) The food goes into a large sac with many small side pockets. Cells on the inside of this sac make enzymes that digest the food. There isn't any exit to the digestive system. (In other words, planaria don't "poop.") Food that can't be digested must be pushed back out through the pharynx.

NERVOUS SYSTEM: Planarians have a simple ladder-shaped nervous system. Their nerve cells are similar to those found in mammals. The spiky parts around the head are used for touch sensation. There are two lumps, called **ganglia**, approximately under the eye spots. The top arch and the ganglia are considered to be the "brain." (The quote marks indicate that it isn't really a brain in the proper sense.)

SENSES: The things that look like ears are called auricles and are more like noses because they can sense chemicals in the water. They also are slightly touch-sensitive. The eye spots on the top only sense light and dark and can't really see.

MOVEMENT: There are two types of muscles, **circular** and **longitudinal**. (Only the longitudinal muscles are shown.) When the circular muscles contract, the animal is squeezed around the middle and becomes longer. When the longitudinal muscles contract, the animal becomes shorter. The interaction between these two types of muscles causes coordinated movement. The planaria also uses tiny hairs called cilia on its underside. The cilia beat in a backward or forward motion to move the planaria along. The planaria also secretes a slimy mucus on its underside to help it glide along.

EXCRETORY SYSTEM: For a simple worm, the planaria has a relatively complicated-looking waste removal system. It has **flame cells** that gather wastes (especially ammonia) and push them outside through tiny pores. (In vertebrates, the kidneys perform this waste removal function.)

RESPIRATION and CIRCULATION: There aren't any respiratory or circulatory organs. (No lungs, no heart, no blood vessels, no blood.) Oxygen from the surrounding water simply diffuses right in, and carbon dioxide diffuses out.

REPRODUCTION: The planaria has both male and female parts. Animals like this are called **hermaphrodites**. (This word is from a Greek myth and is the name of the son of Hermes and Aphrodite.) Earthworms and garden slugs are also hermaphrodites. Eggs are put into gooey cocoons that stick to things like leaves or rocks.

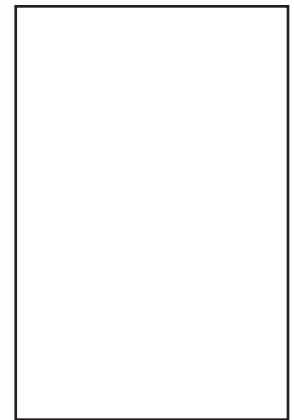
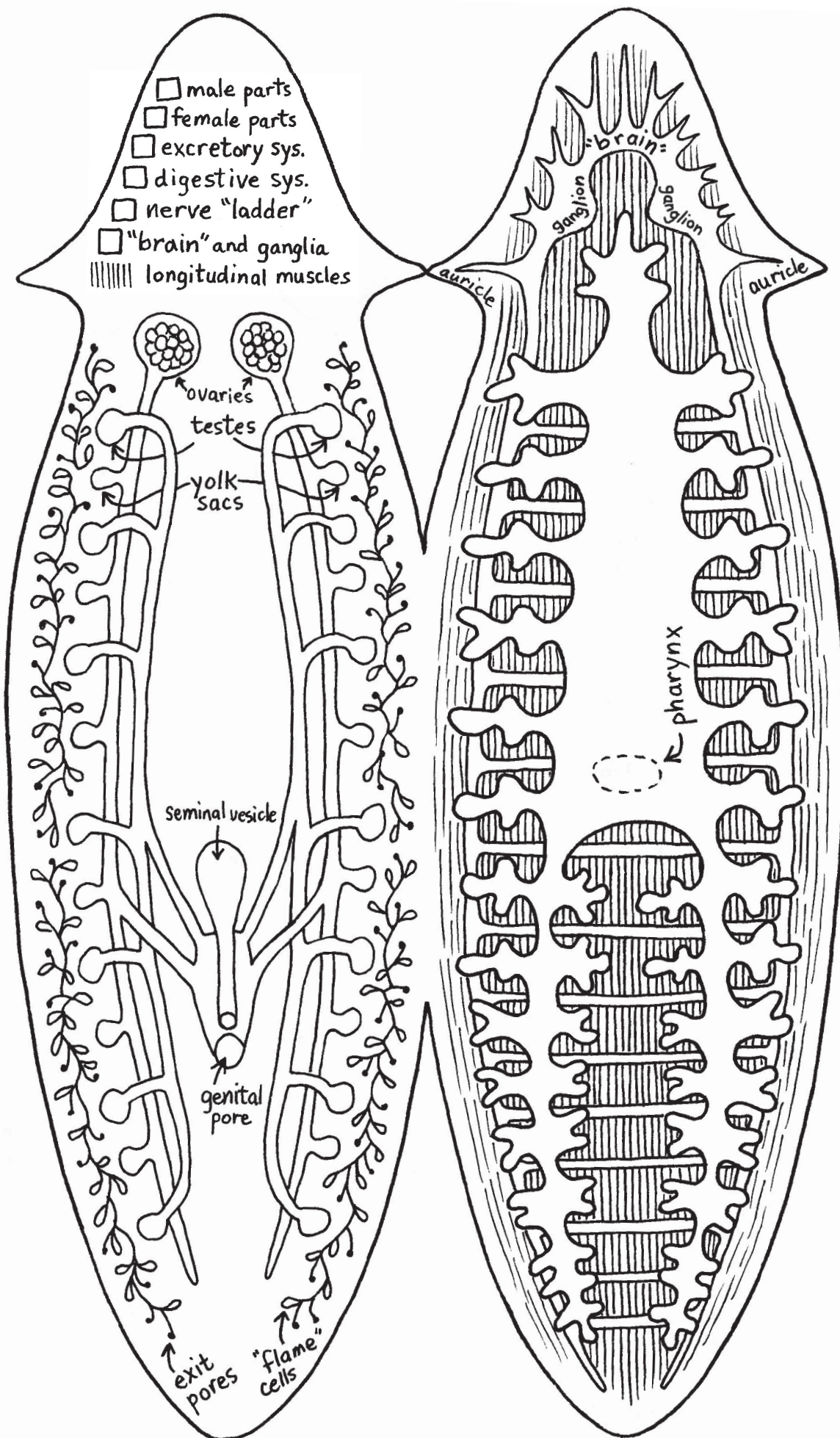
--The **ovaries** are where eggs are produced.

--The **testes** are where sperm is produced.

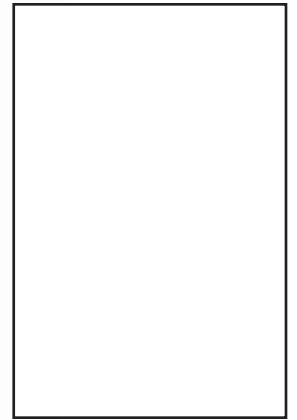
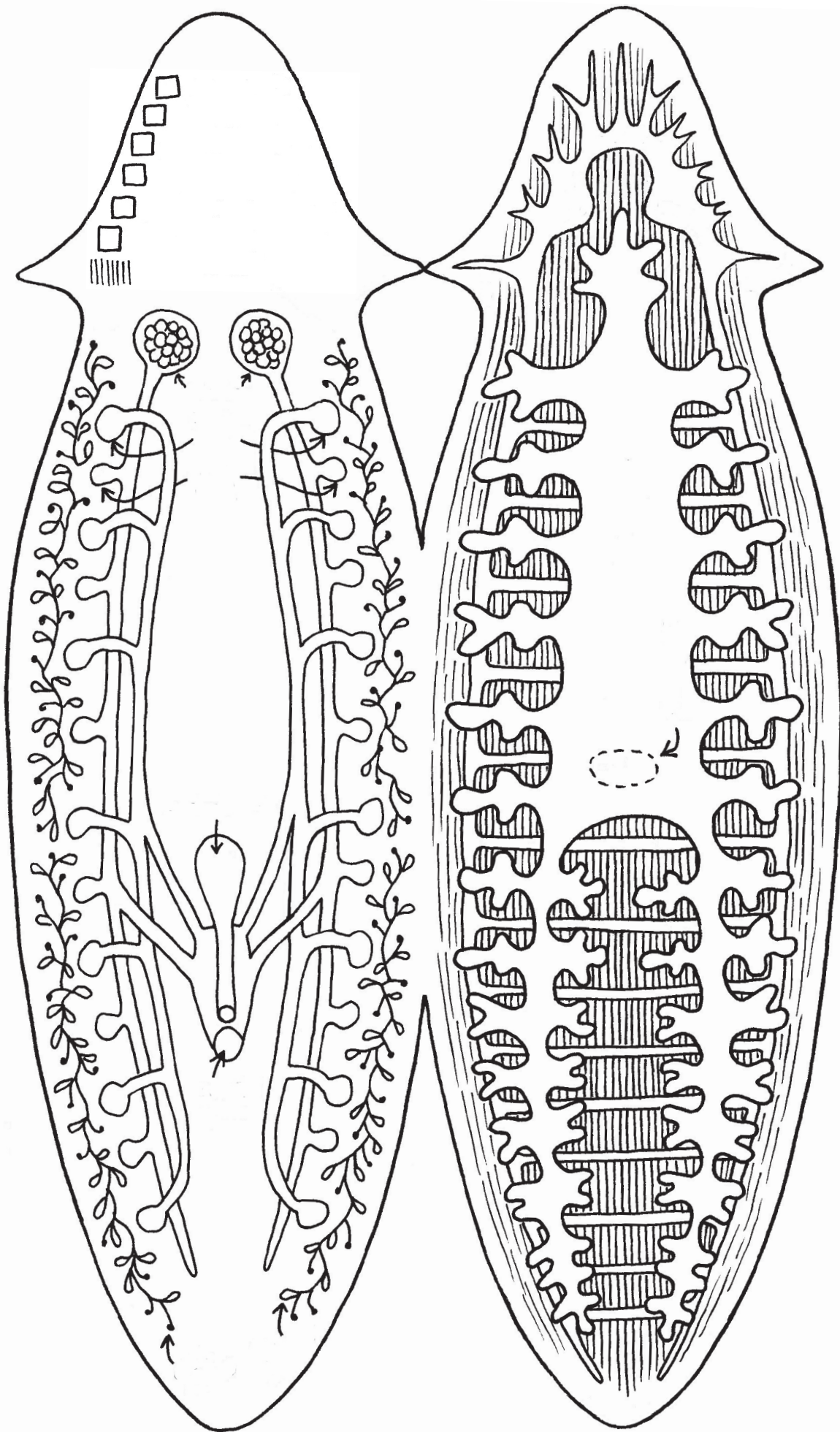
--The **genital pore** is where the eggs and sperm come out.

--The **seminal vesicle** is for storing sperm received from the other planaria.

REGENERATION: Planarians are famous for their ability to regenerate. This means that if you cut one in half, each half will grow into a new planaria. Almost 20% of a planaria's body cells are **stem cells**. Stem cells have the ability to turn into any type of body cell. New research suggests that it is the planaria's muscle cells that are in charge of telling the stem cells where to go and what to do. Even a tiny piece of planaria (as small as 1/250th of the body) can grow back into a full planaria.



This is for the pharynx.



This is for the pharynx.