

Name: _____ Homeroom: _____

Introduction to Sponges

Since sponges look like plants, it is understandable why early biologists thought they were plants. Today, we know that sponges are simple, multicellular animals in the Kingdom Animalia, **Phylum Porifera**. This phylum is thought to represent the transition from unicellular animals to multicellular animals. Most (but not all) sponges are asymmetrical and have no definite shape. Sponges, like all animals, are **eukaryotic** - meaning their cells have a nucleus. Porifera in Latin means "pore-bearer" and refers to the many pores or openings in these animals. Because of these pores, a sponge can soak up and release water. At one time, real sponges were used for cleaning and bathing. Today, most are artificially made.

All adult sponges are **sessile**, meaning they are attached to some surface. Since they cannot move, sponges cannot pursue their food. Instead, they are filter feeders, meaning they obtain their food by straining the water for small bits of food like bacteria, algae or protozoans.

Sponges exhibit less specialization (adaptation of a cell for a particular function) of cells than most invertebrates. The primitive structure of a sponge consists of only two layers of cells separated by a non-living jelly like substance. The outer layer of the sponge is the **epidermis** which is made of flat cells called epithelial cells. Color all the epithelial cells (B) of the epidermis peach or pink.

The inner layer consists of **collar cells** (A) whose function is to circulate water through the sponge. They do this by swishing their flagella which pulls water through the **incurrent pore** - water then travels out the **osculum** at the top of the sponge. As water passes through the sponge in this way, cells absorb food and oxygen and waste is excreted. Color the osculum (D) dark blue, the incurrent pores (C) light blue. Color the inside of the sponge where water circulates the same light blue as you colored the incurrent pores. Color all the collar cells (A) red.

In the jelly-like substance between the epidermis and the collar cells are cells called **amebocytes** - because they look like amebas. The job of the amebocytes is to travel around distributing food and oxygen to the cells of the epidermis. Because of the amebocytes, scientists believe that sponges evolved from protists. Color all of the amebocytes (E) green - look for them carefully.

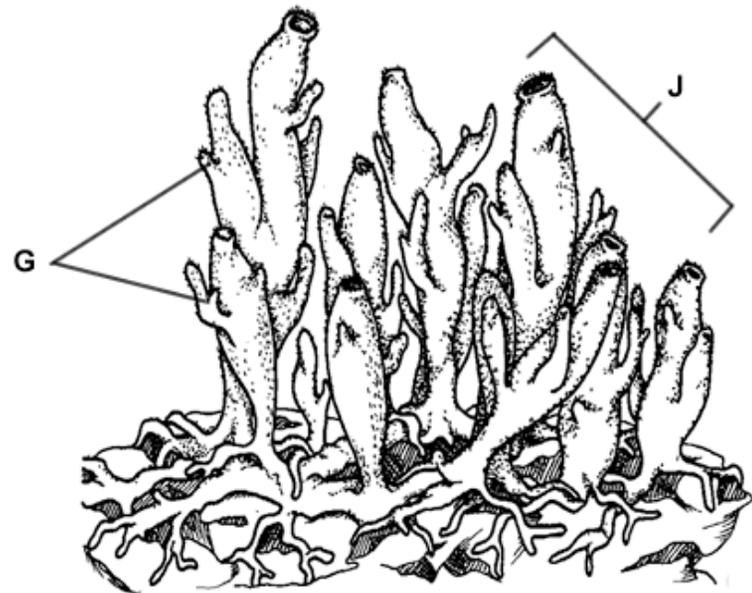
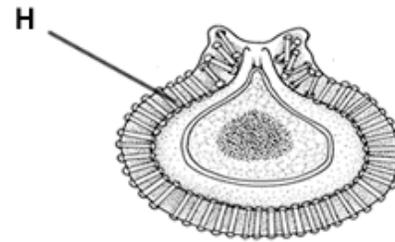
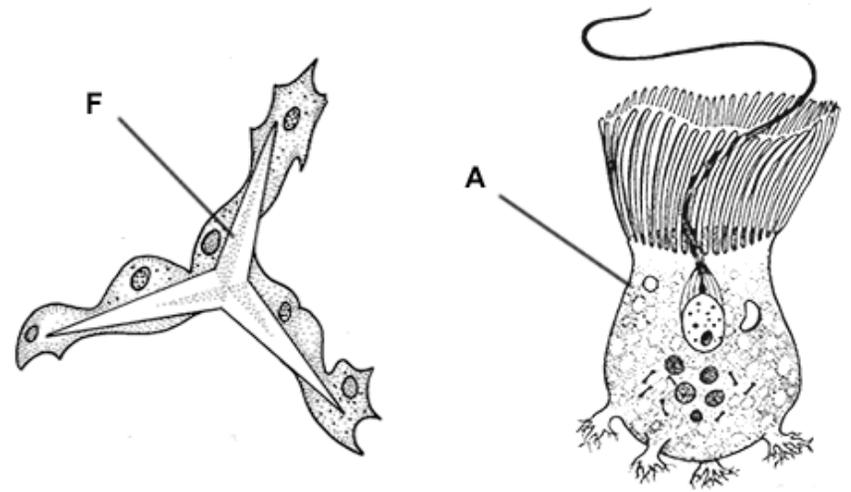
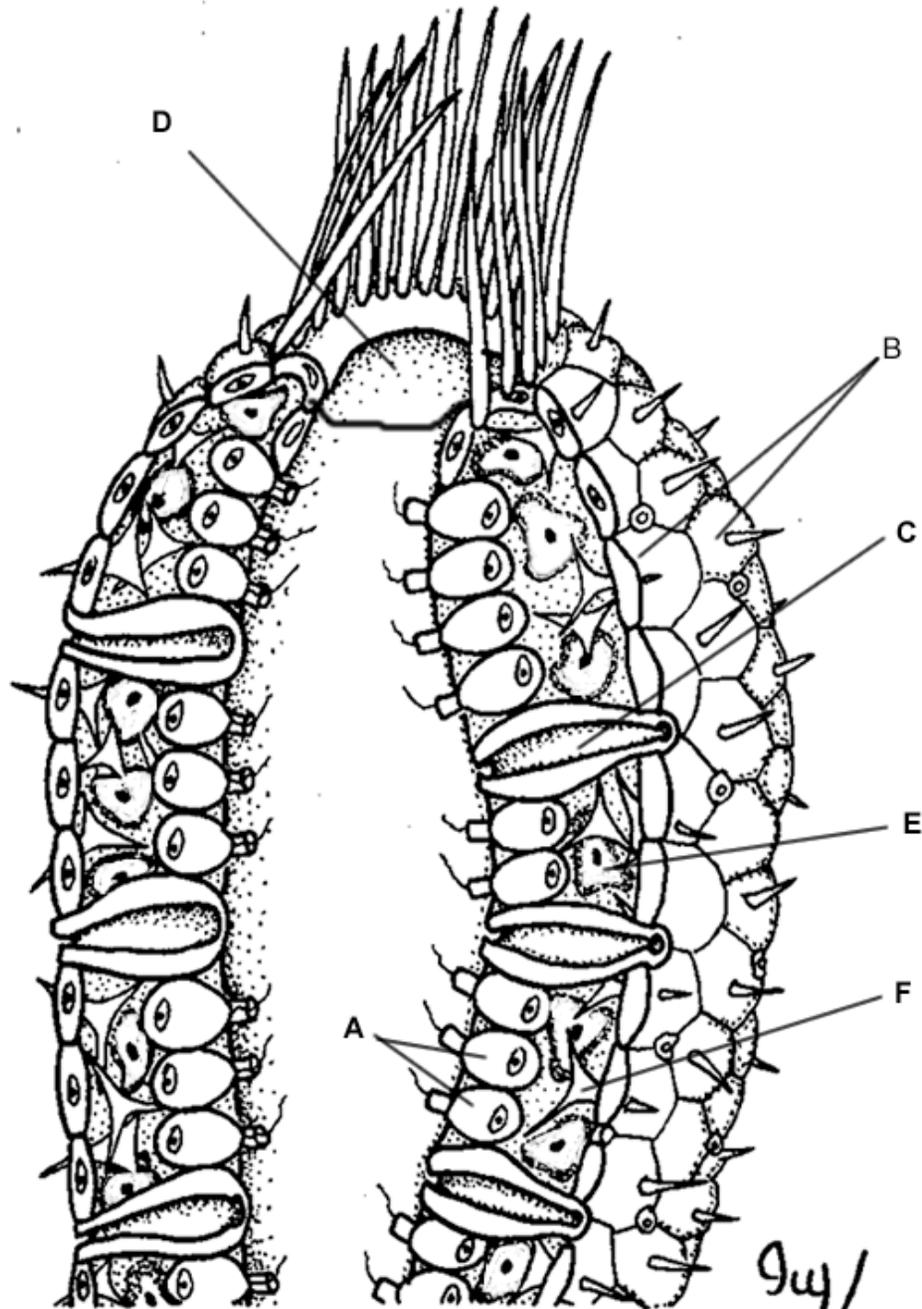
The body of the sponge would collapse if it did not have some type of supporting structure. Some sponges have a soft network of protein fibers called **spongin**. Others have tiny, hard particles called **spicules**. Many of these spicules also stick out of the epidermis and provide the sponge with protection. Most sponges have a combination of spicules and spongin, the ratio often determines how soft or hard the sponge is. Search for and color all the pointy spicules (F) brown.

Reproduction for sponges can be accomplished both sexually and asexually. There are three ways for a sponge to reproduce asexually: budding, gemmules, and regeneration. Sponges can simply reproduce by **budding**, where a new sponge grows from older ones and eventually break off. Color the adult sponge (J) pink and all the buds (G) you can find red. Sponges can also reproduce by regeneration, where missing body parts are regrown. People who harvest sponges often take advantage of this by breaking off pieces of their catch and throwing them back in the water, to be harvested later. Finally, sponges can reproduce by creating **gemmules** - which is a group of amebocytes covered by a hard outer covering. Color the gemmule (H) yellow.

Sexual reproduction occurs when one sponge releases sperm into the water. This sperm travels to another sponge and fertilizes its eggs. The larva form will then swim to another location using its flagella where it will grow into an adult sponge. Most sponge species are **hermaphrodites**, they can produce both eggs and sperm.

Questions:

1. What did early biologists think sponges were? _____
2. Sponges belong to the Kingdom _____ and the Phylum _____
3. Sponges are [unicellular or multicellular] and [prokaryotic or eukaryotic]
4. What type of symmetry do sponges have _____
5. What does it mean to be sessile? _____
6. How do sponges get their food? _____
7. Water enters the sponge through the _____ and leaves through the _____
8. What helps to circulate water through sponge? _____
9. What is the job of the amebocyte? _____
10. What two substances give the sponge support? _____
12. Tiny sponges growing from the main body of the sponge are called _____
13. What is a gemmule? _____
14. What is a hermaphrodite? _____



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