Sponges (phylum Porifera: “pore bearer”) are considered to be among the simplest living organisms. Almost all of the 5,000 species are marine, and all operate as filter feeders, collecting small particles of food from the sea water flowing through their bodies.

Begin by coloring the cutaway diagram in the upper right-hand corner, which shows the circulation of water through a generalized sponge. Color the body wall and the ostia. The size of the pores has been exaggerated in the drawing; they are actually microscopic in a living sponge. Next, color the filter chambers, the atrium, and the osculum.

The body wall of the sponge is perforated by many small pores, or ostia (sing. ostium) through which water enters the sponge. The water flows through a series of filter chambers, then passes into the atrium, and finally out a larger opening called the osculum. Sponges rely on this flow of water for feeding, gas exchange, excretion, and often, reproduction.

Note the enlargement of the single filter chamber in the circle and color all the parts labeled. Then color the enlargement of the collar cell. Finally, color the enlargement of spicules.

The heart of the sponge’s water system is the filter chambers, which are lined with collar cells (choanocytes). Each individual collar cell possesses a single whiplike flagellum that beats in a rhythmic fashion. The independent rhythmic beating of many flagella creates a positive pressure within the atrium of the sponge, which forces water out the large osculum and pulls water in through the ostia. As the water flow passes over the collar, small particulate matter becomes trapped where it can be engulfed by the cell body and then digested in the food vacuoles. Larger particles of food may be engulfed by mobile cells at the entrance to the filter chamber.

Sponges vary in size from tiny lumpish forms to massive vase-like structures. Small skeletal elements called spicules are embedded in the body wall of the sponge and support its structure. In most sponges, the spicules are scattered individually in the body wall, as in this illustration. In the glass sponge, however, and some others, the spicules are organized into an elaborate, latticework skeleton. Instead of, or in addition to, the spicules (siliceous or calcareous), some sponges have fibers (not shown) of a protein called spongin.

The morphology of sponges varies from very simple tubular forms, to the filter chamber system (as shown), to complex systems involving more infolding of the body wall and the proliferation of smaller and more numerous filter chambers. The increased number of filter chambers allows more water to be filtered through the sponge; a 10 cubic centimeter sponge is capable of filtering 20 liters of water in 24 hours.

Color the four different types of sponges. The body of each sponge can be colored either the same color as the diagram above them, or the natural color as given in the text.

The form of sponges is influenced greatly by the available space, type of substratum, and the strength of the water movement. Most sponges are attached to hard substrata in relatively shallow water.

The purple encrusting sponge is found low in the rocky intertidal, often in large patches. This sponge may grow to 2.5 centimeters thick, and its oscula are quite large. The encrusting sponge does not grow tall in areas of heavy wave action that would quickly tear and destroy it; in quiet waters, the oscula are raised on elevated crater-like projections of body wall.

Not all encrusting sponges attach to inanimate substrata. The smooth pink pecten sponge is found on the shells of scallops — a mutually beneficial relationship. In exchange for the substratum, the sponge covers the scallop with its porous, yielding body, offering some protection from sea star predators.

In the quiet water of subtidal habitats, such as the coral reef, large sponge forms flourish. The azure blue tubular sponge grows very tall.

The boring sponge burrows into the shells of abalones, oysters, and other molluscs. This yellow sponge lives in the tunnels it chemically etches out of the shell. Its tunneling can be extensive, severely weakening the shell. Some species of boring sponge attack corals and are responsible for much decomposition of coral reefs.
SPONGE MORPHOLOGY.

BODY WALL
SPICULE
OSTIUM
FILTER CHAMBER
ATRIUM
OSCULUM
COLLAR CELL
FLAGELLUM
WATER FLOW
COLLAR
CELL BODY

SPONGE TYPES.

ENCrusting

TUBULAR

PECTEN

BORING
**Marine Sponges: Sponge Morphology Questions**

1. To which phylum do sponges belong? How many species are there? How do they feed?
2. Draw, label, and color the “Sponge Morphology” diagram on the back of the paper (top half).
3. Define the following terms:
   a. Body wall –
   b. Ostia –
   c. Filter chambers –
   d. Atrium –
   e. Osculum –
4. Describe the path of water flow through a sponge.
5. Why is water flow important for sponges?
6. What are collar cells? What function do they perform in a sponge?
7. How much water is a 10 cubic centimeter sponge able to filter in 24 hours?
8. What are substrata? Why are they important to sponges?
9. Draw, label, and color the 4 different sponge types (encrusting, tubular, pectin, boring).
10. Write down 2 unique characteristics of each of the 4 different sponge types (encrusting, tubular, pectin, boring).