



## The 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. Sponges have **specialized cells**, but no tissues or organs. 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. Cells around the pores are called **porocytes**. Color the **porocytes** red. 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 called **mesophyll**. Color the mesophyll light purple. 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 pink.

The inner layer, or **gastrodermis**, consists of **choanocytes** or **collar cells** (A) whose function is to circulate water through the sponge. They do this by rotating in a circular motion 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, **Mesohyl**, 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. **Gemmules** are released from the osculum after an adult sponge dies. 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?
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2. Sponges are in what kingdom and phylum?

Kingdom \_\_\_\_\_ Phylum \_\_\_\_\_

3. Are sponges unicellular or multicellular?

4. Are sponges prokaryotes or eukaryotes?

5. Name the two body layers of sponges.

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6. What type of symmetry do sponges have?

\_\_\_\_\_

7. Why are adult sponges said to be sessile animals?

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8. What do sponges eat?

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9. How do sponges get their food?

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7. How does water enter a sponge?

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8. What is the job of the amebocyte?

\_\_\_\_\_

9. What two substances give the sponge support?

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10. Tiny sponges growing from the main body of the sponge are called

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11. What is a gemmule?

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12. What is a hermaphrodite?

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13. What is the jellylike layer called between the gastrodermis and epidermis?

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14. What cells move around in the Mesohyl delivering food and oxygen to other cells?

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15. What part of a collar cell helps pull in water?

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16. What is another name for collar cells?

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17. What level(s) of organization is missing in sponges?

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18. Name two methods of asexual reproduction in sponges.

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19. Since sponges are hermaphrodites, do they fertilize their own eggs?

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20. When do sponges release gemmules?

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*Color and label the Drawing!*

