

Sponges Fact Sheet

Trailblazing Sponges

- Scientists believe that sponges are the oldest animal phylum. They first appeared about 600 billion years ago! This belief is based on fossil evidence, genetic analysis, and sponges' simple body structures.
- Sponges were the first multicellular animals with cell-to-cell communication. This was an important step in the creation of multicellular animals.
- All sponges are aquatic animals. Most live in saltwater, with one freshwater family.
- The name of the sponge phylum is **Porifera**, which means "pore bearer" in Latin.



A giant barrel sponge, *Xestospongia muta*, which provides habitat for many creatures including a brittle star (left) and squat lobster (right).

Photo and caption courtesy NOAA

Why a Body Full of Holes?

Sponges come in many colors, shapes, and sizes. But all sponge bodies are made up of tiny holes (pores), tunnels, and chambers. They pump a current of water through these chambers to filter out **plankton** (tiny food). This unique group of organisms also shares the following characteristics:

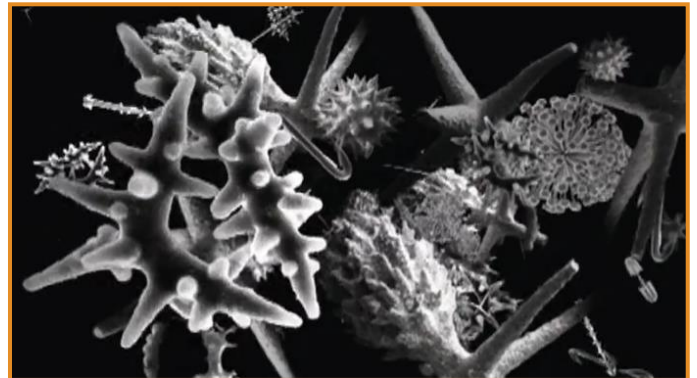
- **A Collagen + Spicules Skeleton**

Sponge bodies are a loose collection of cells held together by a special protein called **collagen**. Collagen is present in all animals and forms strong fibers. It makes sponges flexible. In humans it is found in skin, muscles, tendons, and bones.

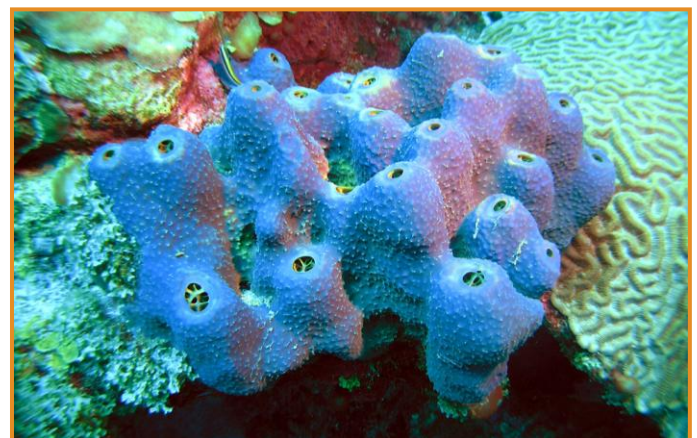
Many sponges also have tiny, brittle, crystalline **spicules**. Spicules are made of silica or calcium carbonate and make some sponge species rigid. Spicules have beautiful shapes that differ between species. They are like a fingerprint that helps scientists identify certain sponges.

- **An Asymmetrical Body**

Although an individual sponge may look symmetrical, most species have an **asymmetrical** body. (They do not have a regular shape.) They may be tube- or vase-shaped, branched, or follow the shape of the surface on which they are attached.



Magnified view of some of the many types of spicules that act as a sponge skeleton



Branching tube sponge (*Aiolochroia crassa*) with asymmetrical body

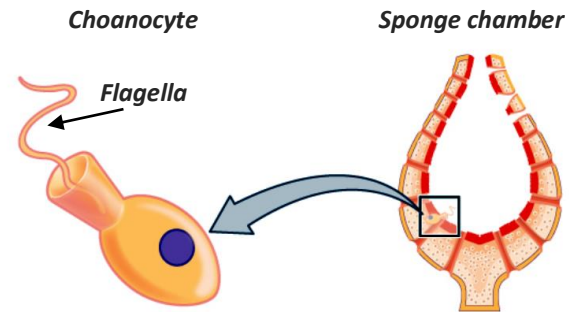
NOAA

• Loose Cellular Organization

Sponges are multicellular organisms, with several cell types. But they do not have tissues, nervous or digestive systems, or organs. Instead, cells carry out all the functions that organs carry out in more complex animals. All the processes of growth, repair, feeding, and reproduction are at the cellular level. Sponges are the only animals that can reassemble themselves from a small group of cells.

• Choanocytes

The most common type of sponge cell is a collared cell, called a **choanocyte**. Choanocytes line the sponge's chambers. They have tail-like **flagella** that constantly whip and produce a current. The current draws water past their collars, where food gets captured. The constant motion of thousands of choanocytes creates the pumping that moves water through the sponge's body.



Sponge chambers contain choanocytes with tail-like flagella that whip to produce a current. This pumps water and food through the sponge.

Clark, M.A., Choi, J., and Douglas, M., Wikimedia Commons

Life Cycle

Sponges begin life as a free-swimming larva, hatched from a fertilized egg. The larva is released into the water from a parent sponge. After swimming for a few days, the larva sinks and crawls until it finds a place to settle. It then grows into an adult form. All adult sponges are **sessile**, meaning that they attach to an underwater surface and stay fixed in place.



Scene from "Sponges: Filter Feeding Made Visible" video from Shape of Life:

shapeoflife.org/video/sponges-filter-feeding-made-visible

Reproduction

Sponges were the first animals to reproduce sexually. But they can also reproduce asexually. During asexual reproduction, a piece may come off of an individual sponge. The piece can re-attach itself to a suitable surface and then rebuild its form.

Most sponges are **hermaphrodites**. That means they can function as both male and female. During sexual reproduction, sperm is released into the water. It is then sucked into an individual of the same species and delivered to the eggs where fertilization takes place inside the sponge's body.



Scientists were amused to discover a real-life "SpongeBob SquarePants" and "Patrick Star" during a recent deep-water dive! Learn more:

oceanexplorer.noaa.gov/oceanos/explorations/ex2104/features/spongebob/spongebob.html

Critical to Their Communities

Sponges live in a wide range of ocean habitats, from the polar regions to the tropics. They are found from shallow water to the deep ocean. Sponges function as **foundation species** in some areas. This means they support many other organisms in an ecosystem. They provide shelter for other species, such as shrimp and crabs, as solitary sponges or in sponge reefs. They are a food source for starfish, many fishes, particularly parrotfishes, and sea turtles.

Learn More with Shape of Life Videos

- "Sponges: Filter Feeding Made Visible": shapeoflife.org/video/sponges-filter-feeding-made-visible
- "Sponges: Origins": shapeoflife.org/video/sponges-origins
- "Sponges: Time-lapse of Sponge Cells Recombining": shapeoflife.org/video/sponges-time-lapse-sponge-cells-recombining
- "Sponge Animation: Spicules": shapeoflife.org/video/sponge-animation-spicules
- "Sponge Animation: Wild Ride Through a Sponge": shapeoflife.org/video/sponge-animation-wild-ride-through-sponge