

Chapter 26 Sponges and Cnidarians**Summary****26–1 Introduction to the Animal Kingdom**

All members of kingdom Animalia share certain characteristics. Animals are multicellular, eukaryotic heterotrophs whose cells lack cell walls. The bodies of most animals contain tissues. Over 95 percent of all animal species are often grouped in a single, informal category: invertebrates. Invertebrates are animals that have no backbone, or vertebral column. The other 5 percent of animals are called vertebrates, because they have a backbone.

Animals carry out the following essential functions: feeding, respiration, circulation, excretion, response, movement, and reproduction. The study of the functions of organisms is called physiology. The structure, or anatomy, of an animal's body enables it to carry out physiological functions. Many body functions help animals maintain homeostasis. Homeostasis is often maintained by internal feedback mechanisms. Most of these mechanisms involve feedback inhibition, in which the product or result of a process stops or limits the process. Complex animals tend to have high levels of cell specialization and internal body organization, bilateral symmetry, a front end or head with sense organs, and a body cavity.

Animals that reproduce sexually begin life as a zygote. The zygote undergoes a series of divisions to form a blastula, a hollow ball of cells. The blastula folds in on itself, forming a single opening called a blastopore. The blastopore leads to a central tube that becomes the digestive tract. A protostome is an animal whose mouth is formed from the blastopore. A deuterostome is an animal whose anus is formed from the blastopore. The anus is the opening through which wastes leave the digestive tract.

During early development, the cells of most animal embryos differentiate into three layers, called germ layers. The endoderm is the innermost germ layer. The mesoderm is the middle germ layer. And the ectoderm is the outermost germ layer.

With the exception of sponges, every kind of animal exhibits some type of body symmetry. Some animals exhibit radial symmetry, in which any number of imaginary planes can be drawn through the center, each dividing the body into equal halves. More complex animals have bilateral symmetry, in which only a single imaginary plane can divide the body into two equal halves. Animals with bilateral symmetry usually exhibit cephalization, which is the concentration of sense organs and nerve cells at the front of the body. Most animals have a body cavity, which is a fluid-filled space that lies between the digestive tract and the body wall.

26–2 Sponges

Sponges make up the phylum Porifera. Sponges are sessile, meaning that they live their entire adult lives attached to a single spot. Sponges are classified as animals because they are multicellular and heterotrophic, have no cell walls, and contain a few specialized cells.

Sponges are asymmetrical—they have no front or back ends. Sponges have specialized cells, called choanocytes, that move a steady current of water through the body. This water enters through pores in the body wall and leaves through the osculum, a large hole at the top of the central cavity. The movement of water through the sponge provides a simple mechanism for feeding, respiration, circulation, and excretion. Sponges are filter feeders that sift microscopic food particles from the water.

Digestion is intracellular, meaning that it takes place inside cells. Sponges can reproduce either sexually or asexually. In sexual reproduction, eggs are fertilized inside the sponge's body, a process called internal fertilization. After fertilization occurs, the resulting zygote develops into a larva. A larva is an immature stage of an organism that looks different from the adult form.

Sponges provide habitats for marine animals such as snails and sea stars. Sponges also form partnerships with photosynthetic organisms.

26–3 Cnidarians

The phylum Cnidaria includes hydras, jellyfishes, sea anemones, and corals. Cnidarians are soft-bodied, carnivorous animals. They have stinging tentacles arranged around their mouths. Cnidarians are the simplest animals to have body symmetry and specialized tissues. Cnidarians get their name from cnidocytes, which are stinging cells on their tentacles.

Cnidarians exhibit radial symmetry. They have a central mouth surrounded by numerous tentacles. Cnidarians typically have a life cycle that includes two different-looking stages: a polyp and a medusa. A polyp has a cylindrical body with armlike tentacles. In a polyp, the mouth is upward. A medusa has a bell-shaped body with the mouth at the bottom. Polyps are usually sessile, while medusas are motile.

A cnidarian has a gastrovascular cavity, which is a digestive chamber with one opening. Food enters and wastes leave the same opening. Digestion is extracellular, meaning that it takes place outside of cells. For gathering information from the environment, cnidarians have a nerve net. A nerve net is a loosely organized network of nerve cells that together allow cnidarians to detect stimuli. Some cnidarians have a hydrostatic skeleton. In most cnidarians, sexual reproduction takes place with external fertilization in the water. External fertilization takes place outside the female's body.

Cnidarians include jellyfishes, hydras and their relatives, and sea anemones and corals. The class Scyphozoa contains the jellyfishes. Scyphozoans live their lives primarily as medusas. The class Hydrozoa contains hydras and related animals. The polyps of most hydrozoans grow in branching colonies. The Portuguese man-of-war is a colonial hydrozoan composed of many specialized polyps. The class Anthozoa contains sea anemones and corals. Anthozoans have only the polyp stage in their life cycles. Most corals are colonial, and their polyps grow together in large numbers. As the colonies grow, they secrete an underlying skeleton of calcium carbonate (limestone). Coral colonies produce the structures called coral reefs. Many coral reefs are now suffering from human activity.