

Education Department
Waikīkī Aquarium
University of Hawai‘i-Mānoa



MARINE LIFE PROFILE: SEA ANEMONES

Hawaiian name: 'okola & other names
Scientific name: Actinarians
Distribution: worldwide, in all seas
Size: variable, from less than 1 inch (2.5 cm) to more than 3 feet (1 m) in diameter
Diet: varies by species, small invertebrates & fishes, plankton & suspended organic matter or nutrients produced by symbiotic algae (zooxanthellae)

Sea anemones are well-recognized members of the Phylum Cnidaria, the animal grouping known as the stinging animals. The cnidarians include the anemones, corals, jellyfish, Portuguese man-of-war and hydroids. They all have a simple soft body with two major tissue layers arranged around a central gut cavity. A ring of tentacles surrounds a central mouth, and the tentacles bear stinging cells which contain nematocysts used in food capture and defense. There are two basic body forms among the cnidarians, the polyp, which looks flower-like and lives attached to the seafloor; and the medusa (jellyfish), which is umbrella-shaped and floats in the water. In some cnidarians, the life cycle includes both the polyp form and the medusa form.

Sea anemones have the polyp body form: they live attached to the seafloor by an adhesive basal disc; a cylindrical body column extends up off the bottom; and the upper surface, bearing the mouth ringed by tentacles, faces up into the water. The tentacles are lined with stinging cells and are used in capturing small animal prey. Depending upon the size and species of the anemone, prey can range from small plankton to larger fishes and invertebrates. The mouth (oral) disc is also lined with microscopic hairs, called cilia, whose beating action creates currents important in sweeping debris from the anemone's surface. In some sea anemones, these ciliary currents are used in suspension feeding, gathering tiny particles of food that drop from the water onto the disc. Some anemones have microscopic algae, called zooxanthellae, living within their tissues. These symbiotic plants perform photosynthesis, and provide their host anemone with additional nutrition in the form of energy-rich compounds like sugars and starches.

The mouth is the only opening to the anemone's sac-like gut (gastrovascular cavity), and any indigestible food (snail shells, etc.) taken in, must be eliminated back out the mouth. In anemones and corals, a muscular gullet leads into the digestive cavity where wall-like septa divide the gut into chambers. These septa provide body support, as well as greater surface area for the digestive layer or gastrodermis. Cilia lining the gut circulate water, delivering nutrients and oxygen, and removing wastes from the cells of the gut lining. Filaments called acontia line the inner edge of the septa, they contain stinging cells that assist in digestion by subduing the prey. Acontia are also used in defense and can be extruded outside the gut either through the mouth or through special pores in the body wall.

Sea anemones are capable of some movement. Muscles in the basal disc allow sea anemones to detach themselves from the bottom and crawl slowly so that they can relocate. Muscle fibers in the body wall and oral disc can modify the anemone's size and shape greatly and change the amount of fluid in the gut cavity by taking in or expelling sea water through the mouth. The water in the gut acts like a water (hyostatic) skeleton. Unlike their close relatives, the corals, sea anemones do not produce a hard skeleton. Sea anemones have no central brain, but a simple network of nerves in the body wall communicates between different parts of the anemone's body.

Sea anemones have great capabilities of regeneration and can reproduce asexually by splitting in half (a process called fission), or by splitting off small pieces of tissue from the basal disc (a process called pedal laceration) - a whole anemone can gradually regenerate from even a fragment of tissue. Sexual reproduction involves the production of eggs and sperm by the anemones themselves, there is no separate medusa (jellyfish) stage that produces eggs and sperm as in the life cycle of hydroids and sea jellies. Depending upon the species, sea anemones may have separate sexes, either male or female (dioecious), or a single individual may contain both male and female reproductive organs (hermaphroditic). And, depending upon species, sperm and eggs may either be released into the seawater in broadcast spawning, or sperm released by the male may fertilize eggs held within the female anemone's body. The anemone larval stage, called the planula, is a solid ball of cells. Hair-like cilia on its surface propel it over the bottom or up into the water. When the planula finds a suitable surface, it adheres to the bottom and changes form to become a young polyp with mouth, tentacles, and gut. Since the adult anemones cannot move very far in their life, the planula is the most important dispersal stage in the life cycle of sea anemones.

Sea anemones are found world-wide in all seas, from polar seas to tropical reefs, from tidepools to deep-sea environments. They range in size from less than one inch to three-feet in diameter. Most are solitary, but many can form large colonies of related individuals.

Classification:

Kingdom Animalia

Phylum Cnidaria

Class Anthozoa, Subclass Zoantharia (Hexacorallia)

Order Actinaria

