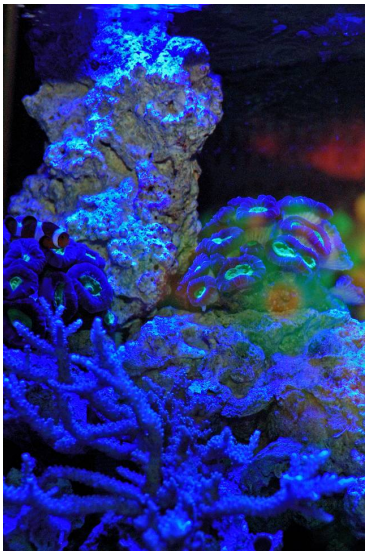

Corals

Phylum Cnidaria

Appearance: Corals are among the most beautiful groups of animals on our planet, as well as being one of the most structurally diverse. All coral polyps have a basic shape. They are much like anemones with a cylindrical body attached to a substrate on one end, with the mouth in the center facing outwards. The mouth is surrounded by small tentacles. They extend these tentacles, generally at night, to feed.

Most corals are found in reefs, which are basically large congregations of coral colonies. Corals are commonly identified by the shape and structure of their calcium carbonate skeletons. Some colonies look like trees, with a central "shoot" that has systems of branches coming out. Some forms are flat and spread laterally, much like a dinner plate. Some forms grow in spherical formations. Some form tubes, some simply encrust on rocks, and some live solitary lives in the deep sea in the absence of a reef.

The magnificent color that corals have does not come from the polyps themselves, but from single-celled algae, called zooxanthellae, that live inside the polyp tissue. Coral polyps themselves are transparent, but the diversity of the zooxanthellae produces the radiant colors of coral reefs. For more about the relationship between coral polyps and zooxanthellae, see the "Feeding" section below!

Size: Reef-building coral polyps range in size from 1-3 mm in diameter. However, the largest coral polyps can be up to 10 inches across. Coral reefs, which are essentially a large string of different coral colonies, can stretch for hundreds and hundreds of miles.

Feeding: Most corals have single-celled algae, called zooxanthellae, living inside of its body, and they need this alga in order to survive. The two organisms have a mutualistic relationship,

meaning both organisms benefit by living together. The zooxanthellae receive carbon dioxide from the coral in order to photosynthesize while the coral receives oxygen and various nutrients as byproducts of the zooxanthellae's photosynthesis. Coral receives the majority of its nutritional and metabolic needs from the zooxanthellae. The fact that corals have algae inside them that photosynthesize is why they often inhabit the clear water near the surface, where there is plenty of sunlight.

In addition, many corals also feed on live prey from the water column. They are related to sea jellies because they possess the same stinging cells, called nematocysts, which sea jellies (and all Cnidarians) do. Coral polyps dangle their small tentacles in the water and wait for passing zooplankton to touch their stinging cells, at which point the coral can paralyze and ingest its prey.

Habitat/Distribution: Because of the relationship corals have with algae, the habitat for reef-building corals includes clear, shallow, warm waters – optimal photosynthetic conditions for the zooxanthellae. Lush coral reefs thrive at 60-90 feet deep, but can extend as deep as 200 feet. Deep-sea corals can be found at depths up to 9,000 feet!

In general, corals can be found all over the globe, from Arctic and Antarctic waters to the tropics. The most familiar types of coral, which build tropical coral reefs, require a very specific set of conditions in order to thrive. Reef-building corals, also known as hermatypic corals, thrive at depths less than 150 feet; these depths allow for maximum light penetration. They also need a specific temperature range (68°-82° F). These conditions allow for most coral reefs to be found worldwide in the tropics, up to 30° N and 30°S of the equator. Aside from the well-known Great Barrier Reef off the coast of Australia, extensive coral reef systems are found in the Caribbean Sea, Red Sea, Indo-Pacific Ocean, Hawaiian Islands, and Strait of Mozambique.

Predators: Ironically, corals build habitat that houses and supports their predators. This shows how productive and diverse coral reefs really are. Many different animals will graze on coral, including various types of worms, sea slugs, sea stars, triggerfish, filefish, parrotfish, and butterfly fish.

Reproduction: The majority of corals perform broadcast spawning. Male and female polyps release massive quantities of sperm and egg into the water, where fertilization takes place externally. The new coral larvae, called planula larvae, possess cilia which allow them to move freely throughout the water. They feed, grow, and eventually find a hard surface to settle on and grow into a polyp. Broadcast spawning must be synchronized; corals cannot move or visually communicate, so various environmental cues (lunar cycles, tides, temperature) are used to coordinate spawning events, with spawning usually happening at sunset. Many corals only broadcast spawn on one or two nights per year.

Some corals reproduce in different ways. Some reproduce asexually by budding off from parent polyps, while others perform brooding. In this method, only male polyps release gametes into the water. The sperm sinks, is taken up by females, and the larvae is produced inside the female. The female then spits the larvae out, and the larvae will eventually settle and grow.

Threats: Corals around the world are subject to a number of threats. Corals are very sensitive to environmental conditions, and climate change can induce extreme stress on them. When water temperatures increase beyond normal levels, zooxanthellae begin to produce toxic substances, causing the coral to expel them. Without the algae, the corals are turned transparent, and all that can be seen is the white calcium carbonate skeleton (a process called coral bleaching). The polyps will die soon after bleaching if the algae is not replenished. Scientists have also demonstrated that bleaching can be caused by changing ocean pH and salinity.

Corals are very delicate animals. Entire colonies can be destroyed by storms, waves, or contact with a SCUBA diver. Pollution of their waters can cause water clarity to go down, diminishing the amount of photosynthesis that zooxanthellae can perform.

Conservation Status: Because of these threats, worldwide coral reefs are, and have been, on the decline. The Status of Coral Reef Ecosystems of the World in 2008 reported that the world has lost 19% of worldwide coral cover, with an additional 20% in danger of being lost in the next 40 years. In the United States, 50% of coral reefs are considered in "fair" or "poor" condition.

What's being done? Many organizations have programs that help encourage the conservation of corals worldwide. These organizations include governmental bodies, non-profit environmental groups, and proactive citizens.

Marine protected areas (MPAs) are another tool used for coral conservation. MPAs can, among other things, place regulations on the contact that people can and cannot have with live corals in certain areas. Diving and snorkeling operations worldwide stress that those that enter the water do not touch corals, as the slightest contact can destroy their flesh and/or give the colony an infection.

For one example of how an ordinary person can assist in coral conservation, look at the Coral Restoration Foundation. Founded by a former commercial fisherman, Ken Nedimyer, the CRF grows coral in underwater nurseries off the coast of Key Largo and then "plants" them in the wild. It is efforts like this, by ordinary people, that help to conserve corals, some of the most important animals in the marine ecosystem.

Fun Facts:

- Although coral reefs take up only 0.015% of the ocean floor by area, they play host to 25% of all oceanic biodiversity.
- Many coral polyps share a stomach with their neighbors within a colony.
- Most established reefs today are anywhere between 5,000 and 10,000 years old.
- The magnificent color of corals comes from the zooxanthellae living inside them. Coral polyps themselves are transparent.
- You can see the Great Barrier Reef from outer space.
- Beautiful tropical sand on white-sand beaches comes from coral skeletons. Parrotfish graze on the coral and ingest some of the calcified coral skeleton. Parrotfish then excrete the dissolved skeleton as sand. One parrotfish can produce 200 pounds of sand each year!