The coral reef is one of the most complex of underwater seascapes. Warm, clear water, ranging from 20° to 23°C, is required for coral reef formation. This condition is found only in tropical and semitropical waters between 30° North and 30° South latitudes of the Indian Ocean, the tropical Pacific, and the Caribbean Sea. In these areas, three main types of coral reef may form: the fringing reef, the barrier reef, and the atoll.

Our discussion here centers on the most common type of reef, the fringing reef. This reef extends seaward from shore, and is found surrounding islands and bordering continents. The fringing reef displays a zonation pattern corresponding to the depth and the turbulence of the water. The illustration represents a wide range of depth.

Begin by coloring in the upper picture as each organism is mentioned in the text. The upper picture represents the animals found on the coral reef in the daytime; the bottom represents the same setting at night.

Coral reefs are constructed by corals, which are primitive animals belonging to the coelenterate group that also includes jellyfishes and sea anemones. The individual coral animal, or polyp, looks very much like a sea anemone and feeds on zooplankton in the water. Coral polyps exist in a mutually beneficial relationship with single-celled plants called zooxanthellae (see Plate 76). The zooxanthellae live within the coral tissue and facilitate the coral polyp’s secretion of a calcium carbonate (lime) skeleton. It is this skeleton that forms the basis of the coral reef. The zooxanthellae also provide the coral polyp with nutrients to supplement its diet of zooplankton, while the coral supplies the alga with certain essentials for photosynthesis, as well as a place to live. Only the surface of the reef harbors live cortical polyps. The layers beneath are the skeletal remains of dead corals, which have become compacted and fused together.

In the uppermost level of the reef, the large elkhorn coral predominates. Each coral formation is an entire coral colony that may be many meters across, the product of hundreds of years of coral growth. Coral branches often grow in the direction of the prevailing water current.

Deeper beneath the water surface, massive corals like the mound-forming star coral and the brain coral are found. In areas of decreased light penetration, the plate coral grows, spreading out flat to maximize exposure to remaining light, which is needed by the zooxanthellae for photosynthesis.

The reef supports a great many species of corals, each competing for attachment space and maximum light exposure. This tangle of growth results in a maze of crevices, caves, and ledges, which harbor other marine animals, including sponges and soft corals like the sea fans.

The coral reef supports both daytime and nighttime inhabitants. During the day, the polyps of the brain coral and star coral are retracted, but at night they extend to trap small zooplankton. During the day, groupers, butterflyfish, damselfish, parrotfish, and others swim busily about the reef. Cleaner shrimps are found waving their long antennae, waiting for the fishes to visit their “cleaning stations.”

As night approaches, the daytime feeders take refuge in holes or crevices in the reef; the parrotfish secretes a protective thin mucous coating around its body. Out from their daytime refuge come the big-eyed squirrelfishes and the brightly striped grunts to begin their nocturnal foraging. The moray eels also come out to feed.

Some large invertebrates also emerge at night: the feather stars climb to a suitable perch and unfurl their many arms to begin filter feeding. The spiny lobster crawls out from under a deep crevice or overhang and scavenges about the reef for food. The long-spined sea urchin, visible by day only as a phalanx of formidable spines protruding from a crevice, moves with surprising speed towards the small algae that it feeds on.

As daylight appears, the nocturnal animals return to their daytime retreats; the coral polyps once again retract; and the coral reef recommences its daytime activity.