

Teaching Tips

Life on the Edge: Exploring the Inter-Tidal Zone

Sea creatures thrive in one of the earth's most stressful environments. These organisms withstand pounding surf, gusting winds, dramatic temperature fluctuations, predators, grinding winter ice, and parching summer sun. The animals of the intertidal zone have developed remarkable adaptations that allow them not only to survive their habitat of extremes, but to thrive in it as well.

Protection

Creatures that live at the sea's edge must protect themselves from crashing waves of the returning tide. The only creatures to withstand this powerful surf are those that can stick, cling, or root themselves to slick, impenetrable rock, or those that can find shelter in rock crevices or plant life.

Seaweeds, for example, anchor themselves on or around rocky surfaces by means of a "holdfast" that physically resembles the roots of a land plant. Species such as rockweed and kelp are further adapted with long, narrow strands that allow water to flow through, thus preventing damage from waves.

Activity: If you find seaweeds washed up on the shore, look carefully through the holdfast; you may find very small starfish, shrimp, clams, or other creatures seeking protection there from the waves and predators.

Moisture Retention

It is vital for intertidal creatures, which are exposed to the drying effects of ocean breezes, beating sun, and fluctuating temperatures, to have means for retaining moisture. Periwinkles, a small snail species, have a trap door called an opercula that closes moisture within the shell. Limpets adhere to rocks using a flat, muscular foot around which they press their shell to effectively trap water between the foot and the shell's margin. Barnacles have doors on top of their conical shells that securely seal in water until the high tide returns.

Activity: Compare how intertidal organisms appear and behave when exposed at low tide and when submerged at high tide (consult local newspapers for a tide table). Look for differences in



movement, changes in the animal's location, changes in extending appendages, and changes in orifices. Barnacles, for example, can often be watched feeding under water with their feathery tentacles.

For Further Information

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Gosner, Kenneth. *A Field Guide to the Atlantic Seashore*. 1978. Houghton Mifflin Co., Boston.

Scheid, Margaret. *Discovering Acadia: A Guide for Young Naturalists*. 1987. Beaver Tale Productions, Mount Desert, Maine.

Feeding

The carnivorous sea creatures of the intertidal zone are remarkable predators. A starfish typically feeds on clams or mussels by wrapping its arms around its victim and pulling the shell apart with its tubed feet. By protruding its stomach through its mouth and into its victim's shell, it digests the soft body parts of its victim externally. Afterwards, all that remains is an empty shell. Sea anemones, though sedentary, have tentacles with sting cells that paralyze living prey. The tentacles then draw the prey into the anemone's mouth. Dog whelks, which prey upon barnacles, blue mussels, and occasionally, other dog whelks, actually drill holes into their victims' shells with a structure known as a proboscis, and then consume the soft parts within. Voracious feeders, dog whelks can markedly alter species composition in an intertidal zone.

Herbivores along the sea's edge feed primarily on various algal species, such as limpets, periwinkles and chitons. Filter feeders, although harder to observe, use delicate devices which are fascinating. These shore animals are generally sedentary, straining plankton brought in with each tide. Barnacles are the most evident filter feeders along the rocky shore. While underwater, their cover doors open to reveal six pairs of feather-like appendages. The featured net sweeps rhythmically in and out of the door, catching plankton.

Activity: Where are the different kinds of feeders located relative to other creatures in the tidepool or on the rocks? Do some animals appear to feed only underwater? What might they eat? Examine mussel beds, barnacle zones, or lower tidepools for evidence of predatory behavior. These might include empty sea shells with small holes in them, half-open empty shells, or smashed sea urchin, clam, or mussel shells. What creatures might have eaten these animals?

Adapted from an article by Catherine Kiorpes-Elk and illustrated by Meg Scheid in Habitat: Journal of The Maine Audubon Society.

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