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## TIDAL ZONATION PATTERNS

The intertidal zone, also called the littoral zone, is the most readily accessible of marine habitats. The intertidal zone is that portion of the ocean shore that is periodically covered by the highest spring tides and exposed by the lowest spring tides. It is the meeting place of the marine and the terrestrial (land) environments and is exposed, at least a portion of it, to elements of both during each tidal cycle. During high tide, the water temperature is relatively even, although the intertidal inhabitants may be pounded by waves and wave-borne debris. When the tide is out (low tide), the intertidal zone is exposed to extremes in temperature, variations in light, and to fresh water; snow and ice may occur in the intertidal zones in some areas.

The degree to which a given intertidal area is influenced by the marine or terrestrial conditions is governed by the amount of time the area is exposed to the air and the frequency with which such exposures occur. Conditions are more terrestrial in the upper intertidal and correspondingly more marine in the lower intertidal. The wide range of physical conditions encountered in the intertidal environment influences where different kinds of organisms can live, and contributes to the creation of intertidal zonation patterns that correspond to particular tidal levels.

The intertidal zonation phenomenon is most visible at low tide on protected shores, where obvious horizontal stripes or zones are often apparent. These zones reflect the distinct texture or color of the spatially dominant organisms present. There is a remarkable similarity in rocky intertidal zonation patterns around the world. After studying world intertidal zonation for thirty years, Anne and T.A. Stephenson devised a general scheme by which to describe this zonation. Using their scheme, we will look at the zonation pattern found at one rocky intertidal area (in Coos Bay, Oregon), with the understanding that this scheme could be applied almost anywhere in the world, although it would include different organisms.

**A representative dominant resident of each tidal zone is pictured on the right side of the plate. As each zone is**

**introduced in the text, color the resident and its corresponding zone shades of the same color. If you wish to use realistic colors, color (a) light green, (b) gray, (c) light gray, (d) medium green, and (e) dark green.**

The *supralittoral zone* is the area above the high tide mark that receives both wave splash and sea-water mist. Here live terrestrial organisms, such as lichens, that can tolerate some sea water, and marine animals that are becoming less dependent on, or less tolerant of, the ocean than those living lower in the intertidal. (An example is the large isopod in Plate 35.) The small *green alga* (seaweed), is found in the supralittoral zone: fresh water seeping down the cliff face and sea water splashing upwards provide conditions uniquely suited to this plant.

Below the supralittoral zone is the *supralittoral fringe* or "splash zone." This is the upper level of the high tide zone and receives a regular splash of waves when the tide is in. Here, the marine *periwinkle* snail is found. It can tolerate long periods of exposure to air and needs only an occasional wetting.

The lower limit of the supralittoral fringe is marked by the beginning of a barnacle zone. This area is called the *midlittoral zone* and encompasses the majority of the intertidal area. It extends down to the upper limits of the habitat of the large brown algae, which characterize the next zones. The midlittoral zone supports a great variety of marine animals, including *barnacles* and mussels (Plate 5).

The *brown alga, Alaria*, marks the *infralittoral fringe*, which includes the lowest level exposed by extreme spring tides. This area is often occupied by the brown alga, *Laminaria*, which extends from the infralittoral fringe into the *infralittoral zone*, or subtidal area, marking the beginning of the marine environment that is below the tides. Although *Alaria* and *Laminaria* are in the brown algae division (Plate 21), they are green in color. Sponges, sea urchins, and abalone are also found in the infralittoral zone and fringe.

Low spring tides reveal most of the shore and are the best times to venture into the intertidal zone.

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1. What is another name for the intertidal zone?
2. Explain why this area is stressful for organisms.
3. Describe the supralittoral zone.
4. List five organisms that live in the tidal zone.
5. Color!

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