Chapter 8 – Temperate Coastal Seas

Chapter Summary

More than 90% of marine animals are benthic, living in close association with the sea floor, at the interface with the overlying water, dependent on the characteristics of each and the exchange of substances between the two. These benthic animals are either epifaunal, living on the sediment, or infaunal, living within the sediment. Infaunal species include large macrofauna that plow through the sediments as they move, interstitial meiofauna that travel between the particles of sediment, and microfaunal creatures that are so small that they are able to live on a single sediment particle. The composition of these sediments is determined by the items that it accumulates (such as plankton, wastes, and detritus), the activities of organisms that live on it and within it, and, at least in shallow water, by the amount of energy available in waves and currents.

The intertidal is a unique habitat that represents the interface between the marine and terrestrial environments. Because the intertidal is exposed to both air and water, the organisms are sometimes subjected to extreme conditions in terms of sediment fluctuations, namely sand being moved in and out of the area. Other harsh conditions may exist such as temperature and salinity fluctuations and wave impact.

Benthic animals in the intertidal have a specific relationship with the sediment type with which they are associated. The animals that burrow into or live associated with soft bottoms are generally deposit feeders. Those animals that are sessile on rocky substrates are usually suspension or filter feeders. The specialized feeding habits that are found in the intertidal are largely due to sediment size and available organic matter.

Because most intertidal animals are restricted in terms of their mobility, broadcast spawning is common. The larvae are subsequently dispersed as part of the meroplankton. When a suitable substrate is encountered (the criteria used during this evaluation and selection are very poorly understood), the larva will settle and metamorphose into its adult morphology.

Distance from mean low water on any shoreline is correlated with tremendous variations in temperature, duration of exposure, wave shock, light intensity, predation pressure, competition for space, wetness, and other factors. Therefore, because characteristic organisms tend to live at preferred distances from mean low water, distinct, horizontal bands of zonation of often observed. Thus, intertidal communities are shaped by both physical and physiologic parameters, and one can divide the intertidal, or littoral zone, into upper, middle, and lower intertidal regions. Characteristic organisms are predictably found in each of these regions. In the upper intertidal conditions are nearly terrestrial and may be represented by a splash zone. Cyanobacteria, lichens, green algae, and a few species of snails and limpets are found in this region. The middle intertidal is periodically exposed to both air and seawater. There is a tremendous diversity of both invertebrates and algae that occupy the middle intertidal including sea anemones, barnacles, crabs, and mussels, as well as brown, red, and green algae. In the middle intertidal biotic factors such as predation and competition also begin to play an important role. The lower intertidal merges with the subtidal and is represented by diverse plant and animal species.

Sandy beaches and muddy shores are significantly different from rocky intertidal regions because of the differences in sediment composition. Other than numerous, small interstitial animals, many species of bacteria and fungi also occupy these areas. It is common for inhabitants of these soft-sediment intertidal areas to be arranged in horizontal zones.
Because oil is less dense than seawater, when it is spilled (intentionally or not), most of it needs up in intertidal regions. Oil can enter the ocean in three common ways: (1) from natural oil seeps, (2) from human activities such as improper disposal of motor oil or runoff from streets and parking lots, and (3) from drilling activities such as platform and tanker spills. Oil can be extremely devastating to many different marine organisms and, when large spills occur, virtually everything is adversely affected.

Subtidal communities are very different from the familiar intertidal environment that lines our shores. Below the tidal lines, muddy and sandy deposits dominate and marine plants are restricted to the occasional rocky reef on the continental shelf. Kelp forests line the coasts of southern California and the Atlantic coast of North America. Kelp forests represent unique ecosystems that are based on the large macroalgal plants. In general, the kelp beds off the west coast are much more diverse in terms of species composition as compared with the kelp beds of the Atlantic coast. On both coasts, these dynamic ecosystems are heavily dependent on the balance between the kelp plants and their herbivorous grazers, the sea urchins.

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