

Chapter 58

Evolutionary Aside 58.2--A Most Unusual Ecosystem

In the late 1980s, scientists discovered an entirely new ecosystem full of unusual creatures: whale carcasses on the deep-sea ocean floor. Exploring in a submersible research vehicle at a depth of more than 1000 m, oceanographers observed mats of bacteria and large numbers of clams surrounding the remains of a dead whale. Since then, researchers have discovered many more such carcasses and have discovered a rich and complex ecosystem composed of a diversity of species including giant isopods, shrimp, tubeworms, sea cucumbers, bone-eating worms and many others. A large proportion of these species were new to science and appear to represent evolved adaptations to this rare, but rich, deep-sea resource.

Because whale carcasses represent a highly unpredictable resource in both space and time, one outstanding question is how these organisms, most of which are quite small, manage to locate and travel to newly arrived bodies on the seafloor. At least in some localities, colonization progresses in three waves. First to arrive are the highly mobile scavengers, such as sleeper sharks and hagfish, which pick most of the meat off the bones. The next wave includes smaller scavengers that can make a meal of the remaining scraps, and the third wave are the sulfur-oxidizing bacteria (just as in deep sea vents). Clams, mussels, snails, and other animals feed on these bacteria and the mats they produce. In this way, whale carcass communities share similarities to those seen near hydrothermal vents, and one hypothesis is that communities are able to move from one vent to another by using whale carcasses as stepping stones.

One particularly interesting type of newly discovered scavengers on these carcasses is the so-called “bone-eating” worms in the genus *Osedax*. These polychaete worms lack both a mouth and a stomach and feed by inserting rootlike structures into decaying whale bones, where they absorb fats and proteins, which they then digest with the aid of symbiotic bacteria. Another unusual aspect of the biology of these worms is that the males are not only substantially smaller than the females (males are about 1 mm in length, females can be several centimeters in length), but never progress past the larval stage—even as larvae, they produce sperm which are used to inseminate the much larger females.

Scientists have recently taken an experimental approach to studying these communities by dragging dead whale carcasses to specific locations and sinking them, and then revisiting periodically to monitor the ecological succession.