

**Ecosystems and Biomes** ▪ *Enrich*

## Hydrothermal Vent Communities

There are many ecosystems within the marine environment including estuaries, the intertidal zone, and the open ocean. Within each of these ecosystems, life is rich and diverse. The open ocean can be divided into two main zones, the surface zone, where light penetrates water to a depth of a few hundred meters, and the deep zone, where there is little to no light. In the surface zone, algae are the producers, using light energy from the sun to undergo photosynthesis and produce glucose, an energy-rich compound. In the deepest areas of the ocean, where there is no light, photosynthesis cannot take place. Although vast areas of the deep-ocean floor are empty of life, one unique community of organisms exists in some of the deepest areas of the ocean.

*Hydrothermal vent communities* form where super-heated water from the Earth's crust rises to the ocean floor and is released into the surrounding seawater through cracks in the ocean floor. The super-heated water is rich in minerals, including sulfur compounds. Certain types of bacteria can produce glucose from the sulfur compounds through a process called *chemosynthesis*. These bacteria are producers. Like algae in the surface zone that use light energy to produce glucose, the bacteria use the energy in the sulfur compounds to do the same.

These communities have been found as deep as 2.2 km below the ocean surface. The bacteria in a hydrothermal vent community can live on rocks that are heated to temperatures of 110° C from the water gushing out of cracks in the ocean floor. They coat the hot rocks and are grazed on by shrimp. The shrimp and other grazers are eaten by crabs and fishes.

*Answer the following questions on a separate sheet of paper.*

1. What process do producers in the surface zone undergo to produce glucose?
2. What are hydrothermal vent communities?
3. Which organisms are the producers in a hydrothermal vent community? What process do these organisms undergo to produce glucose?
4. How can these bacteria produce glucose without light energy from the sun?
5. Predict what would happen if the super-heated, sulfur-containing water stopped entering the surrounding ocean water.