

Chapter 13

Use with Section 3

ENRICHMENT**• Stars and Galaxies****Life in other worlds?**

Read the following information. Then answer the questions.

For centuries, people have wondered if we were alone in the universe. Many people once thought there might be life on Mars. We know now that at best, bacteria may have lived there once. But another place offers more hope than Mars does.

Conditions for Life

People used to think that life required two things: water and sunlight. In 1977, though, a discovery on Earth changed everything. Life was found on the bottom of the ocean, far from any sunlight. All along the seafloor, volcanoes and vents send heat and certain chemicals into the water. Microbes, fish, and even giant clams thrive there.

If life can exist without sunlight on Earth, it might exist somewhere else, too. Are there any places in the solar system that might have a heated ocean?

Discovering Europa

The best bet right now seems to be Europa, one of Jupiter's moons. Europa is about the size of Earth's moon, and it's covered with ice. Scientists used to think it was made of solid ice, but recently they learned it was not.

The spacecraft *Galileo* orbiting Jupiter has sent back information about the planet. When it passed Europa, it took pictures of the moon. Those pictures show a crust of cracked ice. The patterns of cracks look as if the ice is floating on liquid water. The surface temperature of Europa is -145°C . If there is water below the surface, it might have been melted by volcanic heat. Io, the moon nearest Europa, is full of volcanoes. Europa may be, too.

It is still too early to say anything for sure. Europa may have an ocean beneath its ice. In that ocean, conditions may be right for life to exist. Some scientists think that brownish areas around some of Europa's cracks may be made of carbon-bearing molecules. On Earth, life is based on such molecules.

1. Scientists used to think two conditions were necessary for life as we know it. What were they?

2. What changed their minds?

3. Europa is far from the sun and its surface is very cold. How could there be liquid water there?
