

Section 21.4

Objectives

- **Explain** methods by which fossils are preserved.
- **Describe** how scientists use index fossils.
- **Discuss** how fossils are used to interpret Earth's past physical and environmental history.

Review Vocabulary

groundwater: water beneath Earth's surface

New Vocabulary

evolution
original preservation
altered hard part
mineral replacement
mold
cast
trace fossil
index fossil

Fossil Remains

MAIN Idea Fossils provide scientists with a record of the history of life on Earth.

Real-World Reading Link Think about the last time you bought souvenirs while on a vacation or at an event. You might have brought back pictures of the places you saw or the people you visited, or you might have brought back objects with inscribed names and dates. Like souvenirs, fossils are a record of the past.

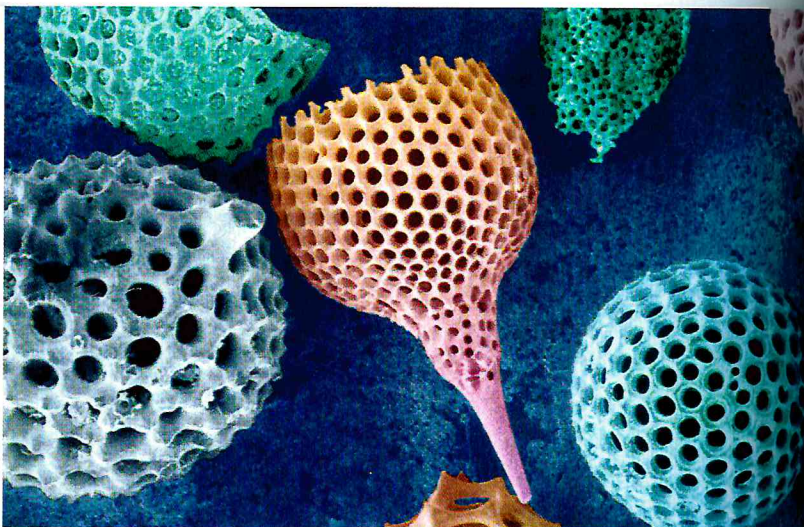
The Fossil Record

Fossils are the preserved remains or traces of once-living organisms. They provide evidence of the past existence of a wide variety of life-forms, most of which are now extinct. The diverse fossil record also provides evidence that species—groups of closely related organisms—have evolved. **Evolution** (eh vuh LEW shun) is the change in species over time.

When geologists find fossils in rocks, they know that the rocks are about the same age as the fossils, and they can infer that the same fossils found elsewhere are also of the same age. Some fossils, such as the radiolarian microfossils shown in **Figure 21.20**, also provide information about past climates and environments. Radiolarians are unicellular organisms with hard shells that have populated the oceans since the Cambrian Period. When they die, their shells are deposited in large quantities in ocean sediment called radiolarian ooze.

Petroleum geologists use radiolarians and other microfossils to determine the age of rocks that might produce oil. Microfossils provide information about the ages of rocks and can indicate whether the rocks had ever been subjected to the temperatures and pressures necessary to form oil or gas.

■ **Figure 21.20** These tiny radiolarian microfossils—each no bigger than 1 mm in diameter—provide clues to geologists about ancient marine environments. This photograph is a color-enhanced SEM magnification at 80×.



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✓ Reading

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