

process in changing the atmosphere and preparing the way for subsequent life will be covered in chapter 7.) For much of the first 2 billion years of the history of life, mats of blue-green algae may have floated like rafts in the oceans of the world. Until slightly more than 1 billion years ago, blue-green algae and other forms of bacteria-like microscopic cells were the dominant and virtually exclusive life forms on Earth. These life forms are called *prokaryotes*.

Biologists make a major distinction at the cellular level between life forms. Cells such as bacteria and blue-green algae that lack an organized nucleus are known as *prokaryotes*. Prokaryotes reproduce by simple asexual division wherein the cell simply divides into two new identical cells (binary fission). This process is also known as vegetative reproduction.

The other biological classification at the cellular level is known as *eukaryotes*. Other than the plant-like blue-green algae, all plants and animals are eukaryotes. Their cells contain an organized and well-defined nucleus. Organisms classified as eukaryotes generally contain many cells (multicellular), which may be different in both form and function. Our own bodies, for example, contain billions of diverse and complex cells.

Eukaryotes are generally both larger and vastly more complex than simple prokaryotes. The cells of eukaryotes also contain chromosomes which make them capable of sexual reproduction with the potential to provide more varied life forms through genetic interchanges. Eukaryotes made their appearance in the form of red, green, and brown algae about one billion years ago.

## LAND-DWELLING PLANTS

The fossil record indicates that land-dwelling plants appeared about 400 million years ago in the form of horsetails, club mosses, and ferns. These plants were restricted to moist wetland environments and reproduced through spores rather than seeds. Lush tree ferns and giant palm-like evergreens formed a rich swampy vegetation whose remains have benefited mankind in rich deposits of coal. The first seed-bearing plants appeared shortly thereafter in the form of seed ferns and conifers familiar to us today as pine, cedar, and fir trees.

Until 130 million years ago the Earth's landscape was a leafy vastness of monotonous and drab greenery. Not a single flower blossomed. Then, in an incredibly brief span of 10 million years, the *Big*

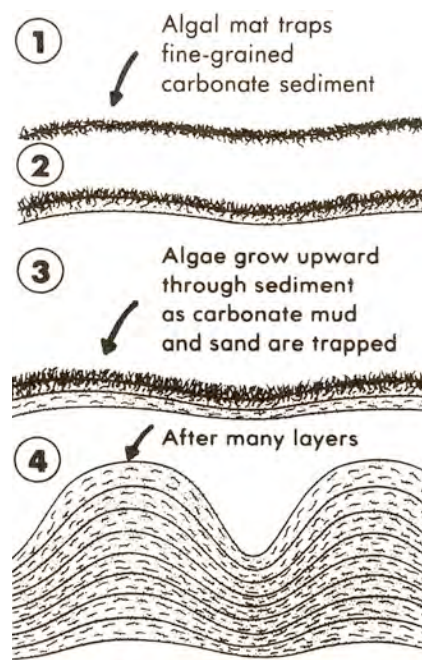


FIGURE 6.3

Stages in the growth of stromatolite formed by the sediment-trapping action of algae. As the sediment accumulates, the previously deposited layers become cemented and lithified. The convex upward structures range in size from a few centimeters to more than a meter in diameter. The laminae are typically a few millimeters thick. (From *Earth*, 3rd ed., by F. Press and R. Siever. Copyright © 1982 by W.H. Freeman and Co. All rights reserved.)