

### **LIFE IS BACTERIA**

One legitimate answer to the question “What is life?” is “bacteria.” Any organism, if not itself a live bacterium, is then a descendant—one way or another—of a bacterium or, more likely, mergers of several kinds of bacteria. Bacteria initially populated the planet and have never relinquished their hold.

Bacteria may be Earth’s tiniest life forms, but they took giant steps in evolution. Bacteria even invented multicellularity. Most bacteria in nature, in spite of popular belief, are multicellular (see plate 6). In these multicellular bacterial beings, each unit cell itself is a bacterial cell.

Some lineages of bacteria went on to evolve into many different kinds of beings, including ourselves. Inside the cells of all of us right now are former bacteria, using oxygen to generate energy. These are the mitochondria. The photosynthetic blue-green beings and their descendants (plastids of plants) remove carbon dioxide from the atmosphere, using carbon for their bodies and eliminating as waste the oxygen of fresh air—only a small portion of which is used by the mitochondria that cohabit with what were once photosynthetic bacteria in all plant cells.

Our neighbor planets, Mars and Venus, both have atmospheres more than 90 percent carbon dioxide. Yet Earth’s air is a reactive mixture, with its huge portion of oxygen and less than 0.1 percent carbon dioxide. It was bacteria that removed the carbon dioxide and produced the oxygen. Bacteria, truly, have made the planetary environment what it is today. All larger beings contain mitochondria within their cells, living descendants of bacteria that lived on Earth before oxygen had accumulated in the air. Life on Earth is a holarchy, a nested fractal network of interdependent beings.

The fear of bacteria is, in a way, a fear of life, of ourselves at an earlier stage of evolution. It is not surprising that microbes now find us so attractive. Because the carbon-hydrogen compounds of all organisms are already in an ordered state, the human body (like that