

7.2: Biochemistry and the Cells

For the most part, biochemical processes occur within cells, the very small units of which living organism are composed.³ Cells are discussed in more detail as basic units of life in Chapter 12, Section 12.3; here they are regarded as what chemical engineers would call “unit operations” for carrying out biochemical processes. Many organisms consist of single cells or individual cells growing together in colonies. Bacteria, yeasts, protozoa, and some algae consist of single cells. Other than these microorganisms, organisms are composed of many cells that have different functions. Liver cells, muscle cells, brain cells, and skin cells in the human body are quite different from each other and do different things. Two major kinds of cells are **eukaryotic** cells which have a nucleus and **prokaryotic** cells which do not. Prokaryotic cells are found predominately in single-celled bacteria. Eukaryotic cells occur in multicellular plants and animals — higher life forms.

Cell structure has an important influence on determining the nature of biomaterials. Muscle cells consist largely of strong structural proteins capable of contracting and movement. Bone cells secrete a protein mixture that then mineralizes with calcium and phosphate to produce solid bone. The walls of cells in plants are largely composed of strong cellulose, which makes up the sturdy structure of wood.

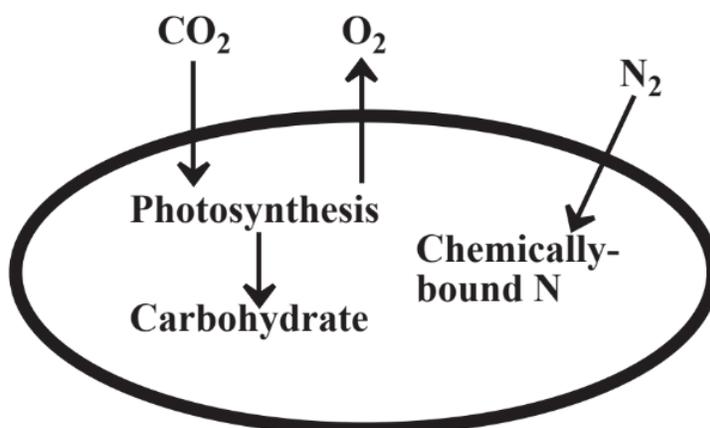


Figure 7.1. Cyanobacteria are remarkable organisms that within a single “simple” prokaryotic cell carry out all the biochemical processes needed to convert atmospheric carbon dioxide to carbohydrate and biomass and that can split the chemically very stable atmospheric nitrogen molecule and convert the nitrogen to chemically and biochemically bound nitrogen

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