**Chapter Overview**

**Chapter 12: Protein Sorting and Transport**

In addition to the presence of a nucleus, eukaryotic cells have a variety of membrane-enclosed organelles within their cytoplasm. These organelles provide discrete compartments in which specific cellular activities take place, and the resulting subdivision of the cytoplasm allows eukaryotic cells to function efficiently in spite of their large size—at least a thousand times the volume of bacteria.

Because of the complex internal organization of eukaryotic cells, the sorting and targeting of proteins to their appropriate destinations are considerable tasks. The first step of protein sorting takes place while translation is still in progress. Proteins destined for the endoplasmic reticulum, the Golgi apparatus, lysosomes, the plasma membrane, and secretion from the cell are synthesized on ribosomes that are bound to the membrane of the endoplasmic reticulum. As translation proceeds, the polypeptide chains are transported into the endoplasmic reticulum where protein folding and processing take place. From the endoplasmic reticulum, proteins are transported in vesicles to the Golgi apparatus where they are further processed and sorted for transport to lysosomes, the plasma membrane, or secretion from the cell. Some of these organelles also participate in the sorting and transport of proteins being taken up from outside the cell (see Chapter 15). The endoplasmic reticulum, Golgi apparatus, and lysosomes are thus distinguished from other cytoplasmic organelles by their common involvement in protein processing and connection by vesicular transport. About one-third of cellular proteins are processed in the endoplasmic reticulum, highlighting the importance of this pathway in cell physiology.