Fig. 2.5. The external membrane is made of a phospholipid bilayer with proteins embedded in the lipid matrix. The mitochondria contain a complex system of inner membranes called *cristae*. A gellike matrix containing large amounts of protein fills the space inside the cristae. Some enzymes of oxidative respiration are bound to the cristae. A mitochondrion has its own DNA and protein-synthesizing machinery and reproduces independently.

The *endoplasmic reticulum* is a complex, convoluted membrane system leading from the cell membrane into the cell. The rough endoplasmic reticulum contains ribosomes on the inner surfaces and is the site of protein synthesis and modifications of protein structure after synthesis. The smooth endoplasmic reticulum is more involved with lipid synthesis.

Lysosomes are very small membrane-bound particles that contain and release digestive enzymes. Lysosomes contribute to the digestion of nutrients and invading substances.

Peroxisomes are similar to lysosomes in their structure, but not in function. Peroxisomes carry out oxidative reactions that produce hydrogen peroxide.

Glyoxysomes are also very small membrane-bound particles that contain the enzymes of the glyoxylate cycle.

Golgi bodies are very small particles composed of membrane aggregates and are responsible for the secretion of certain proteins. Golgi bodies are sites where proteins are modified by the addition of various sugars in a process called *glycosylation*. Such modifications are important to protein function in the body.

Vacuoles are membrane-bound organelles of low density and are responsible for food digestion, osmotic regulation, and waste-product storage. Vacuoles may occupy a large fraction of cell volume (up to 90% in plant cells).

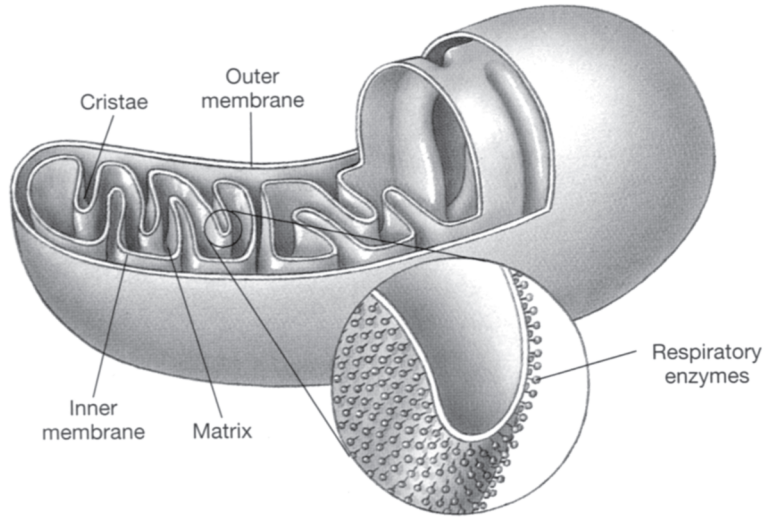

Figure 2.5. Diagram of a mitochondrion. Respiratory enzymes that make ATP are located on the surfaces of the inner membrane and the cristae, which are infoldings of the inner membrane. (With permission, from J. G. Black, *Microbiology Principles and Applications*, 3d ed., 1996, p. 94. This material is used by permission of John Wiley & Sons, Inc.)