



**Figure 12.1.** Generalized animal cell. The cytosol, endoplasmic reticulum, Golgi apparatus, endosome, nucleus, lysosome, mitochondrion, and peroxisome are distinct compartments isolated from the rest of the cell by selectively permeable membranes.

membrane. The surface of an animal cell is negatively charged, and cells tend to grow on positively charged surfaces, such as Sephadex or collagen (anchorage-dependent cells). Many cells possess specific cell surface receptors that adhere to ligands on the surface. For example, the binding to collagen may be nonspecific or may be mediated by specific cell surface receptors. The degree of cell adhesiveness is usually greater if attachment is receptor mediated. Some animal cells such as hybridomas are nonanchorage dependent and grow in suspension culture.

Inside the cytoplasm of most animal cells is an extensive network of membrane-bounded channels called the *endoplasmic reticulum* (ER). The membranes of the ER divide the cytoplasm into two phases: the *luminal* phase (inside the endoplasmic reticulum) and the *cytosol* (outside the rough endoplasmic membrane). Ribosomes are usually located on the outer surface of the endoplasmic reticulum. Some ribosomes are located in cytoplasm and may be interconnected by fine filaments. The ER is critical in protein synthesis and initial stages of posttranslational processing (see Chapter 4).

*Mitochondria* are the powerhouse of cells where respiration takes place and the bulk of the ATPs are produced. Mitochondria are independent organelles in the cytoplasm containing DNA and are capable of independent reproduction. Each mitochondrion is surrounded by a double membrane: a smooth outer membrane and a highly folded inner membrane called the *cristae*. The mitochondrial matrix often contains crystallike inclusions.

*Lysosomes* are rather small cytoplasmic organelles bound by a single membrane, and they contain various hydrolytic enzymes, such as proteases, nucleases, and esterases. Lysosomes are responsible for the digestion of certain food particles ingested by the cell.

The *Golgi body* is a cytoplasmic organelle surrounded by a rather irregularly shaped membrane called the *cisternae*. The cisternae of a Golgi body are often stacked together in parallel rows, called *dictyosome*. The Golgi apparatus is responsible for the completion of complex glycosylation and for collecting and secreting extracellular proteins or directing intracellular protein traffic to other organelles.

Some cells contain small cytoplasmic organelles called *peroxisomes* and *glyoxysomes*. These organelles are bounded by a single membrane and contain a number of enzymes, including peroxidases (hydrolysis of  $\text{H}_2\text{O}_2$ ) and glyoxalases (glyoxylic acid metabolism).