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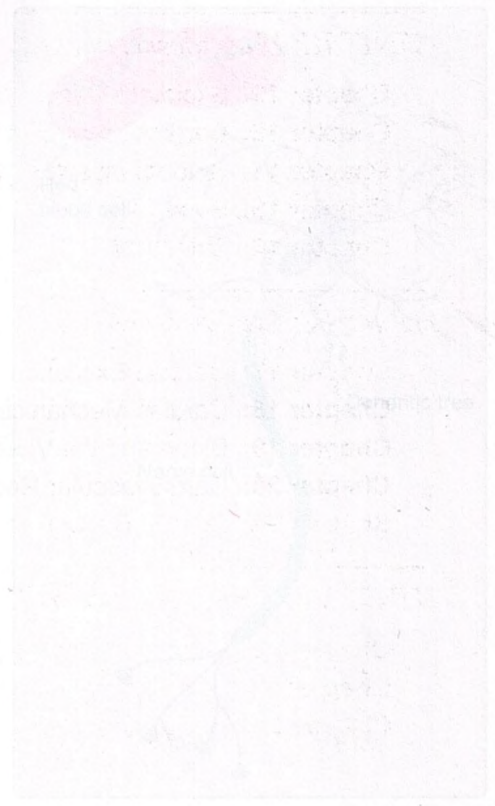
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**II. CELLULAR ENVIRONMENT**

Cells are bathed in an extracellular fluid (ECF) that contains ionized sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), magnesium ( $\text{Mg}^{2+}$ ), chloride ( $\text{Cl}^-$ ), phosphate ( $\text{PO}_4^{3-}$ ), bicarbonate ( $\text{HCO}_3^-$ ), glucose, and small amounts of protein (Table 1.1). It also contains a round 2 mM free calcium ( $\text{Ca}^{2+}$ ).  $\text{Ca}^{2+}$  is essential to life, but many of the biochemical reactions required of cells can only occur if free  $\text{Ca}^{2+}$  concentrations are lowered ten-thousandfold, to around  $10^{-7}$  mol. Thus, cells erect a barrier that is impermeable to ions



**Figure 1.1**  
Differences in cell morphology.