8. Direct hydrolysis of the phosphoanhydride bond would result in release of the bond energy as heat, which would thus be "lost." By first transferring the phosphate bond to an aspartate (D) residue, the P-class ATPase uses the released bond energy to drive a conformational change in the protein from the E1 to the E2 state.

9. A rise in cytosolic Ca^{2+} concentration causes activation of calmodulin. Some Ca^{2+}-ATPase pumps are activated by Ca^{2+}-calmodulin, which lowers the cytosolic Ca^{2+} concentration by pumping Ca^{2+} either into the sarcoplasmic reticulum/endoplasmic reticulum or out of the cell. An anti-calmodulin drug would inhibit this negative feedback mechanism, leaving higher Ca^{2+} concentration in the cytosol for a longer period of time. In skeletal muscle cells, the result would be to prolong the length and/or strength of muscle contraction.

10. These drugs irreversibly inhibit the H^+/K^+ ATPase in the apical membrane of stomach parietal cells. Although the inhibition of a given H^+/K^+ ATPase is irreversible, the cells eventually make more of the pump.

11. Membrane potential refers to the voltage gradient across a biological membrane. The generation of this voltage gradient involves three fundamental elements: a membrane to separate charge, a Na^+/K^+ ATPase to achieve charge separation across the membrane, and nongated K^+ channels to selectively conduct current. The major ionic movement across the plasma membrane is that of K^+ from inside to outside the cell. Movement of K^+ outward, powered by the K^+ concentration gradient generated by Na^+/K^+ ATPase, leaves an excess of negative charges on the inside and creates an excess of positive charges on the outside of the membrane. Thus, an inside-negative membrane potential is generated. These potassium channels are referred to as resting K^+ channels. This is because these channels, although they alternate between an open and closed state, are not affected by membrane potential or by small signaling molecules. Their opening and closing are nonregulated; hence, the channels are called nongated. K^+ channels achieve selectivity for K^+, versus, say, Na^+, through coordination of the nonhydrated ion with carbonyl groups carried by amino acids within the channel protein. The ion enters the channel as a hydrated ion, the water of hydration is exchanged for interaction with carbonyl residues within the channel, and then as the ion exits the channel it is rehydrated. Within the confines of the channel protein structure, Na^+, unlike K^+, is too small to replace fully the interactions of water with those with amino acid–carried carbonyl groups. Because of this, the energetic situation is highly unfavorable for Na^+ versus K^+.

12. Expression of a channel protein in a normally nonexpressing cell permits the patch clamp assessment of channel properties. Typically, the cell used is a frog oocyte. Frog oocytes do not normally express plasma membrane channel proteins. Channel protein expression may be induced by microinjection of in vitro–transcribed mRNA encoding the protein. Frog oocytes are large and hence technically easier to inject and to patch clamp than other cells. One can then vary the ionic composition of the medium and determine whether the presence of Na^+ or of K^+ supports ionic movement through the channel.