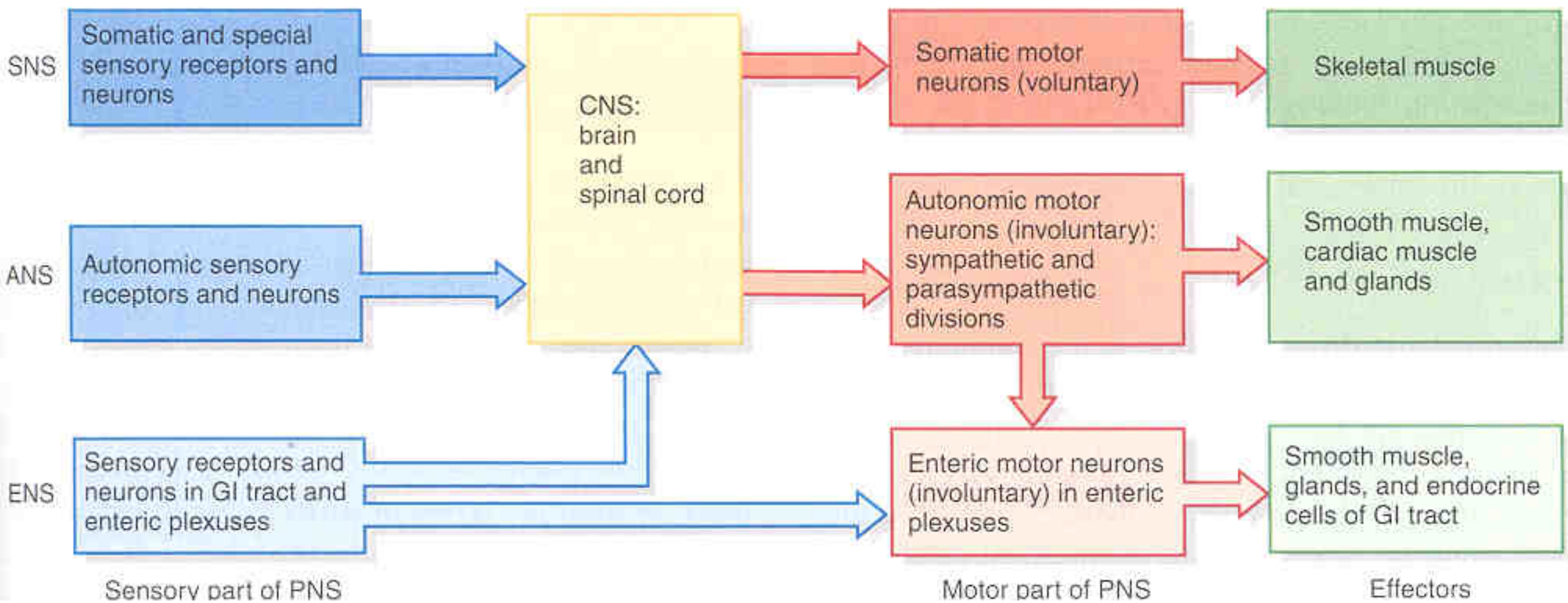
Figure 9.2 Organization of the nervous system. Subdivisions of the PNS are the somatic nervous system (SNS), the autonomic nervous system (ANS), and the enteric nervous system (ENS).

Tortora

The SNS is under voluntary control; the ANS and ENS are involuntary.



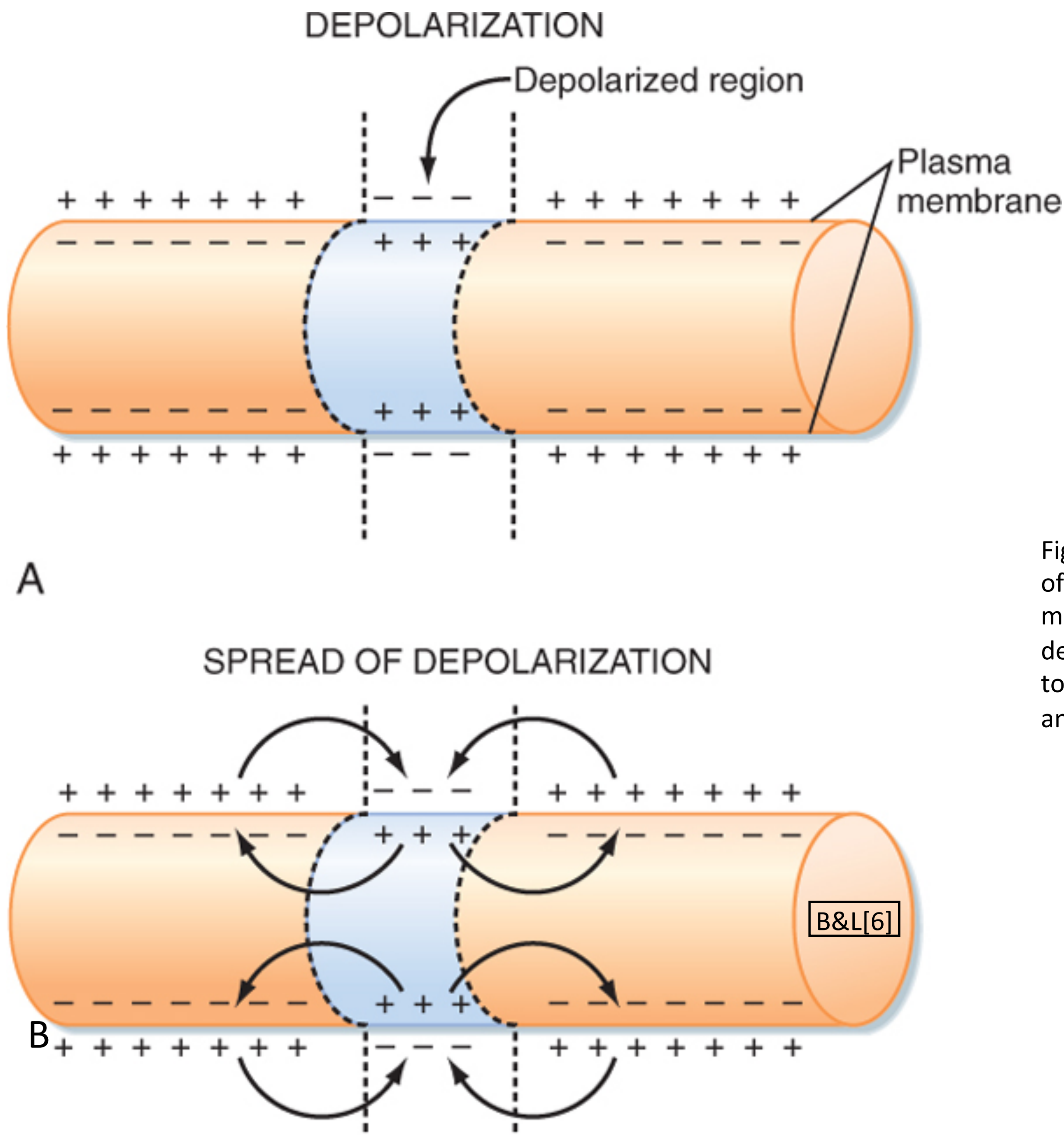
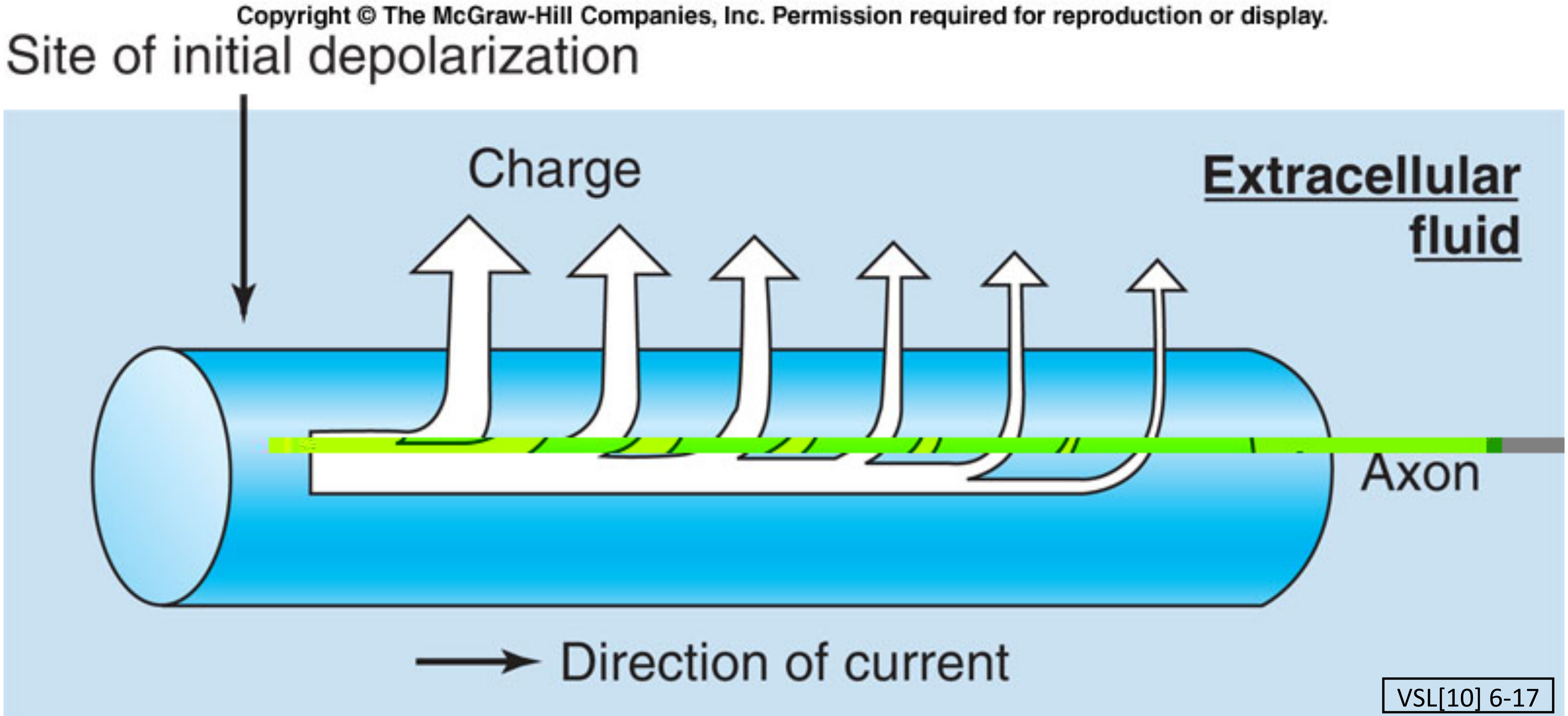
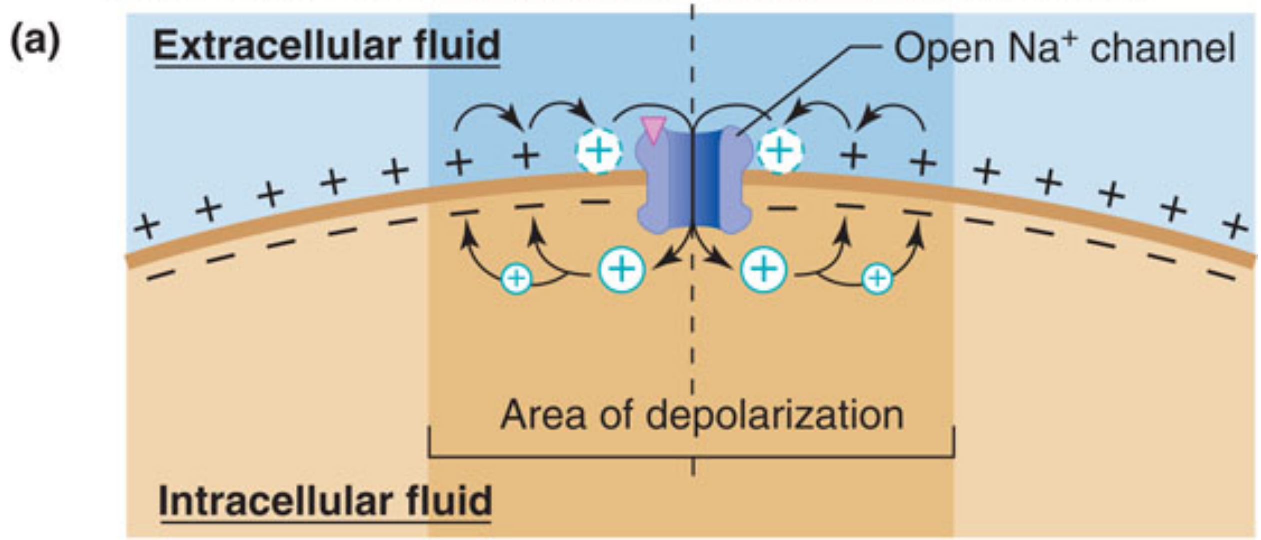


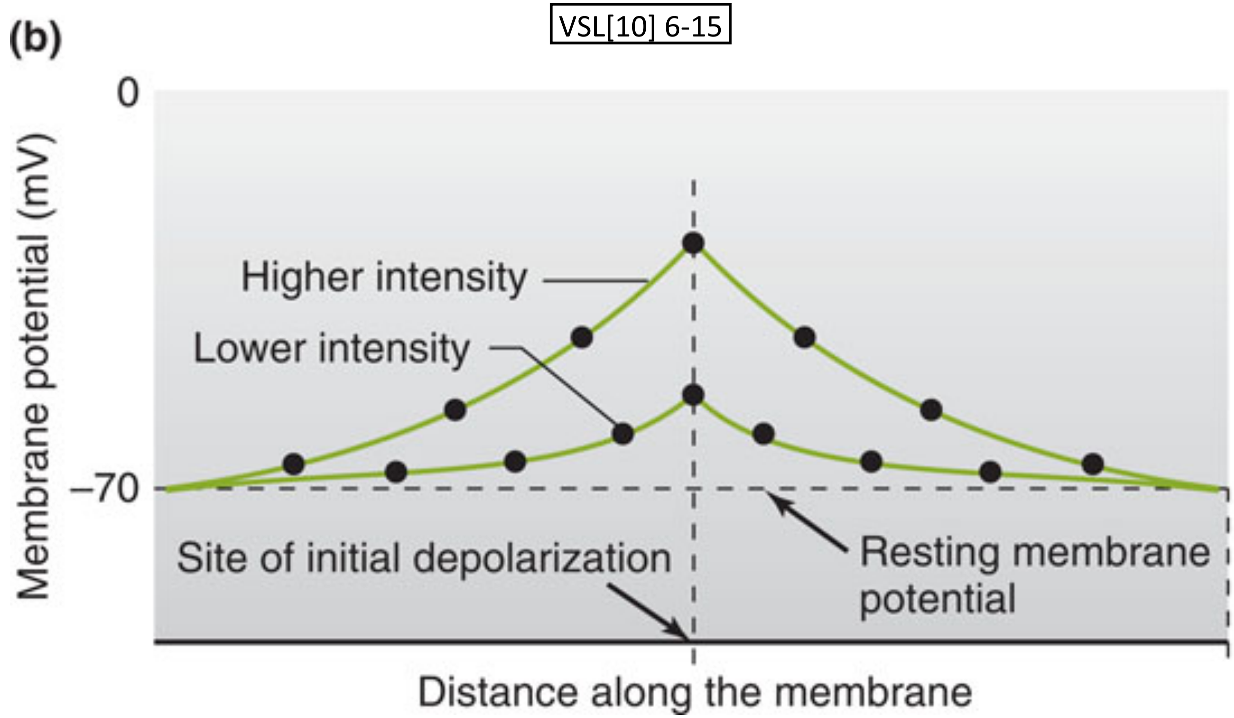
Figure 5-4 Mechanism of electrotonic spread of depolarization. A, The reversal of membrane polarity that occurs with local depolarization. B, The local currents that flow to depolarize adjacent areas of the membrane and allow conduction of the depolarization.

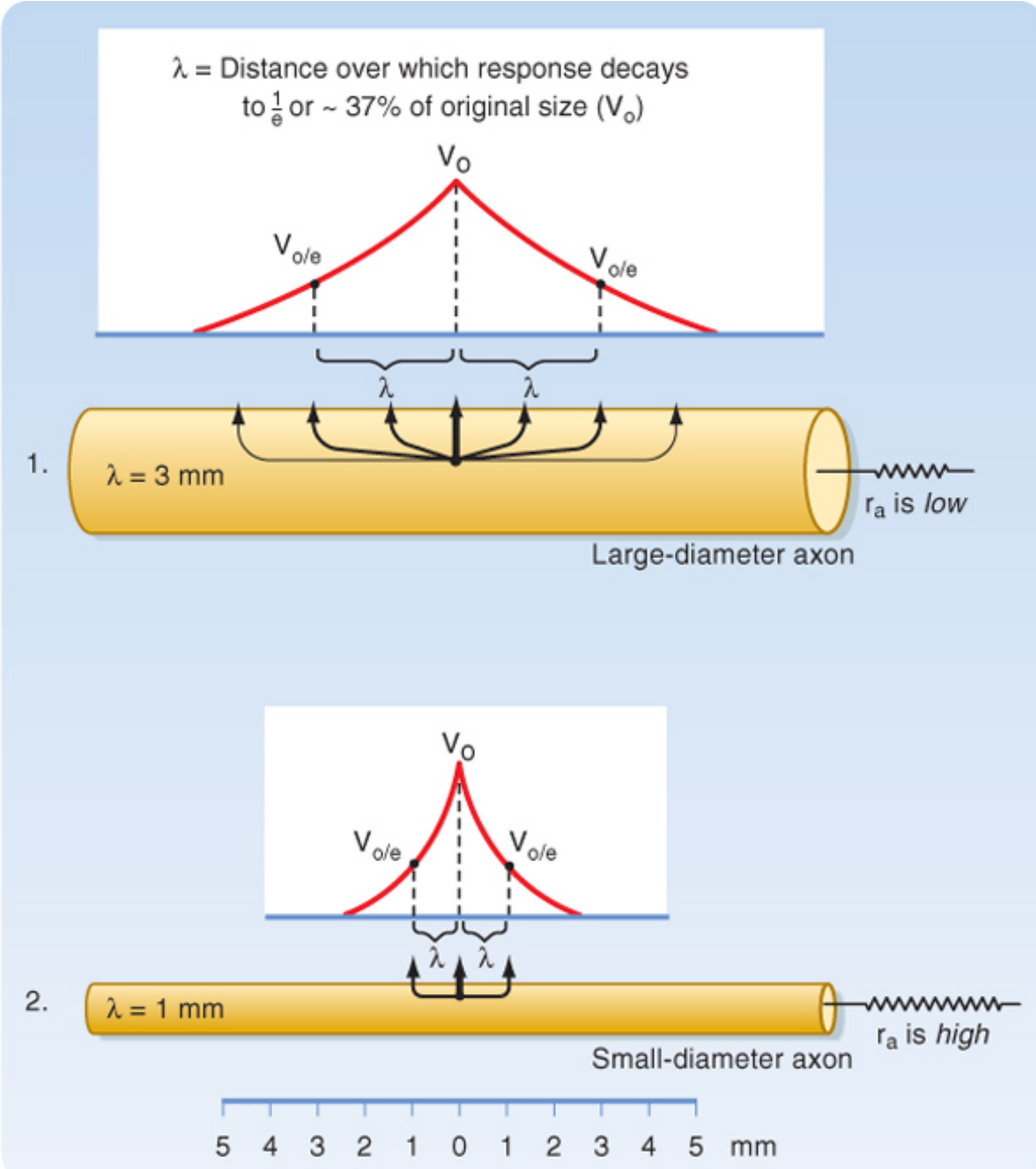


Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.
Site of initial depolarization
Charge
Extracellular fluid
Axon
Direction of current
VSL[10] 6-17


(a)
Extracellular fluid
Open Na+ channel
Area of depolarization
Intracellular fluid

VSL[10] 6-15


(b)
0
Membrane potential (mV)
Higher intensity
Lower intensity
–70
Site of initial depolarization
Resting membrane potential
Distance along the membrane



Koeppen & Stanton: Berne and Levy Physiology, 6th Edition.

Figure 5-3 Comparison of the length constant, λ, in relation to axon diameter. Note that the increase in diameter is associated with a decrease in r_a and an increase in the length constant. (Redrawn from Blankenship J: Neurophysiology. Philadelphia, Mosby, 2002.)

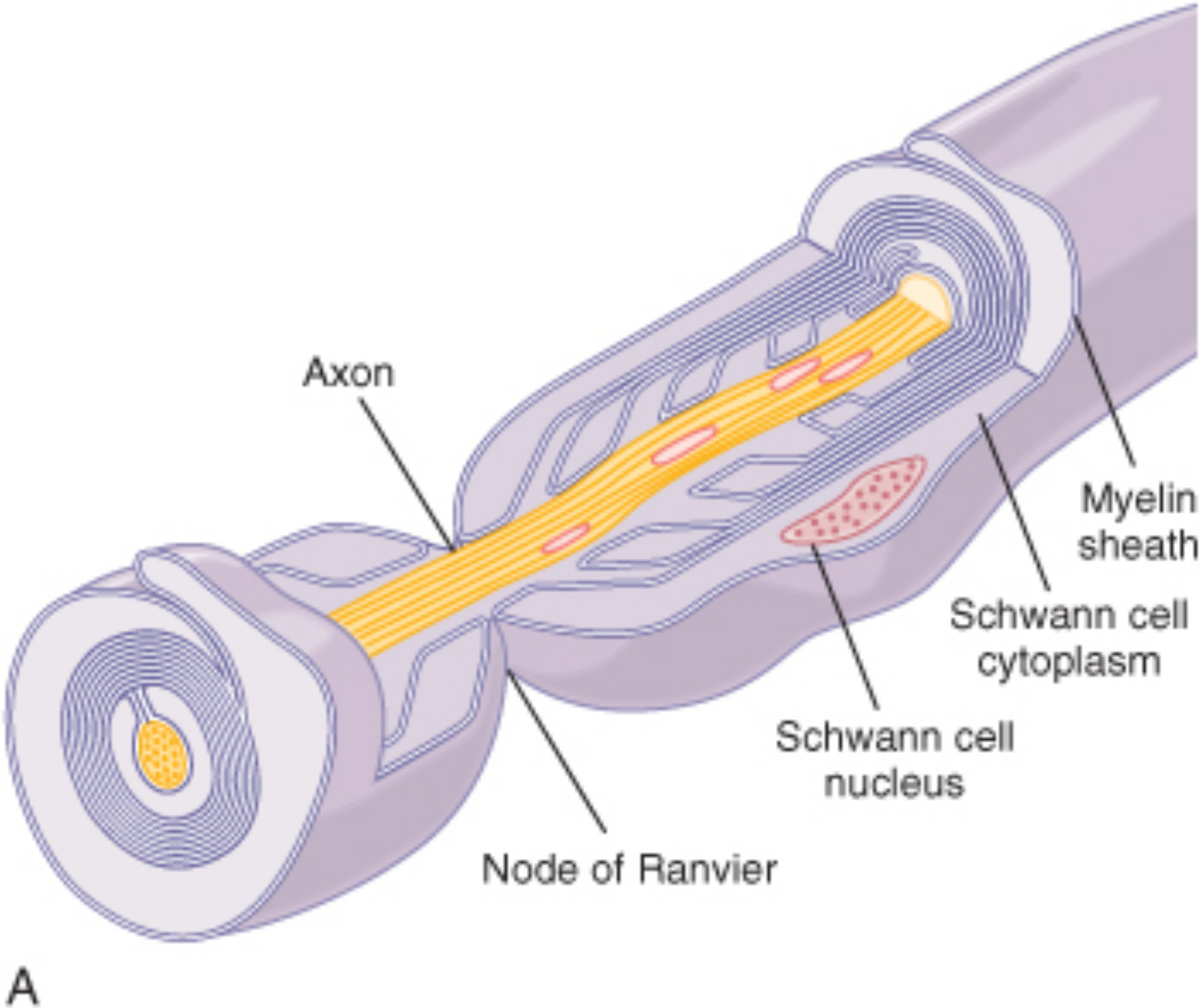


Figure 5-16 Function of the Schwann cell to insulate nerve fibers. A, Wrapping of a Schwann cell membrane around a large axon to form the myelin sheath of the myelinated nerve fiber. A, Modified from Leeson TS, Leeson R: Histology. Philadelphia: WB Saunders, 1979.)

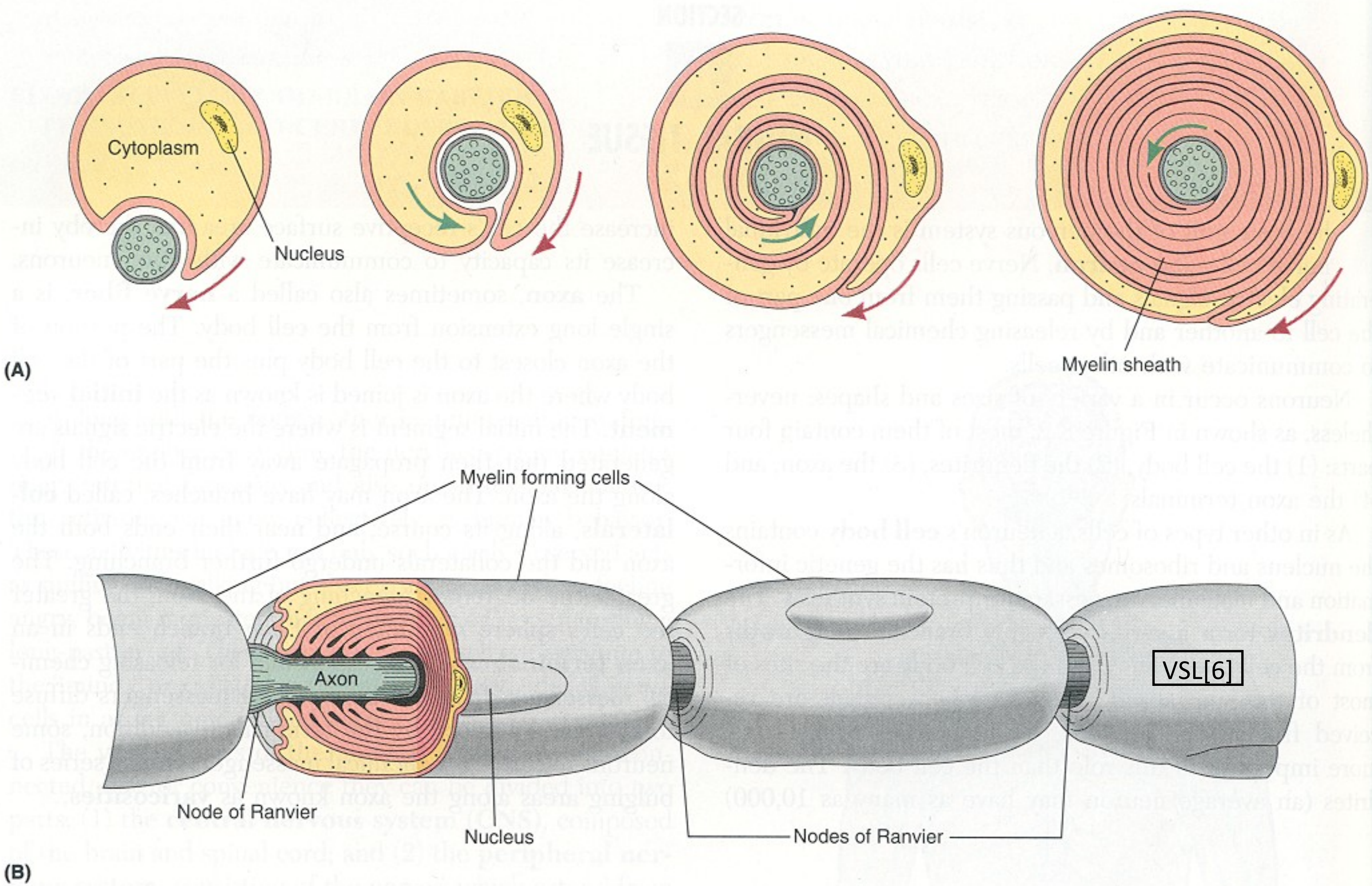


FIGURE 8-3

(A) Cross section of an axon in successive stages of myelinization. The myelin-forming cell may migrate around the axon, trailing successive layers of its plasma membrane (red arrows). Alternatively, it may add to its tip, which lies against the axon, so that the tip is pushed around the axon, burrowing under the layers of myelin that are already formed (green arrows). The latter process must be used in the central nervous system where each myelin-forming cell may send branches to as many as 40 axons. (B) The myelin-forming cells are separated by a small space, the node of Ranvier (also called neurofibril node).

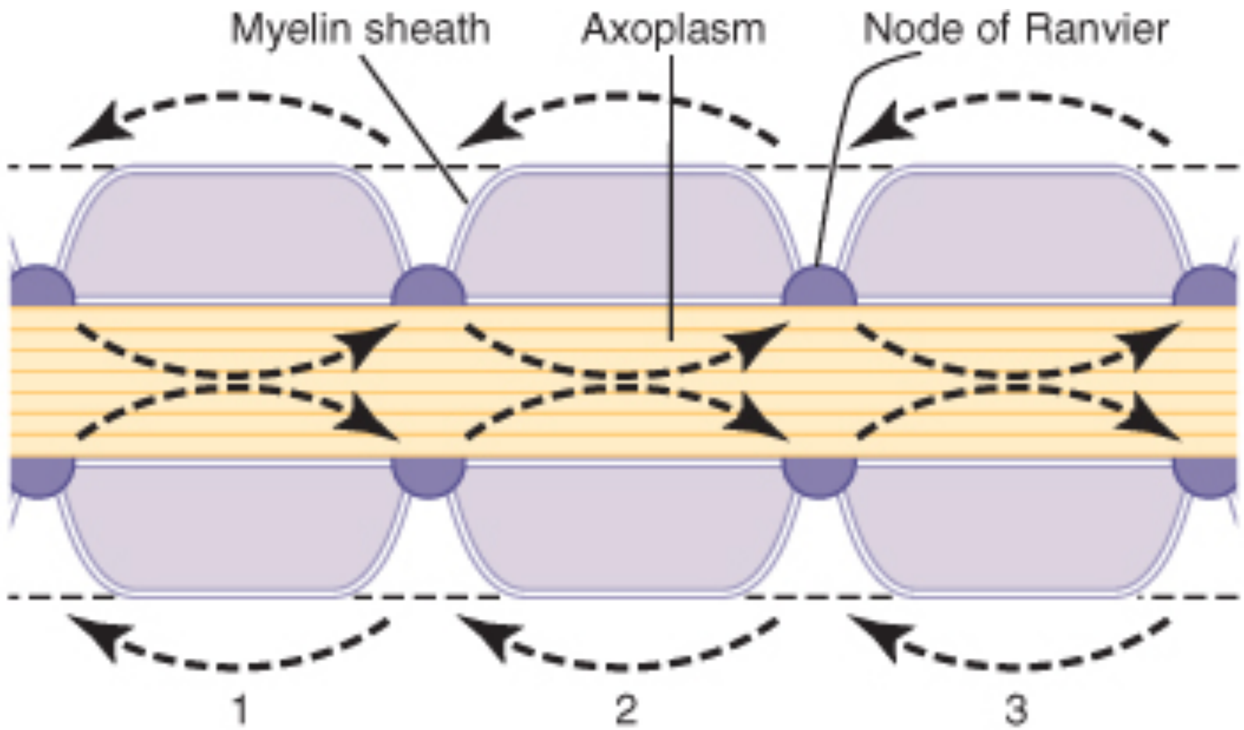


Figure 5-17 Saltatory conduction along a myelinated axon. Flow of electrical current from node to node is illustrated by the arrows.

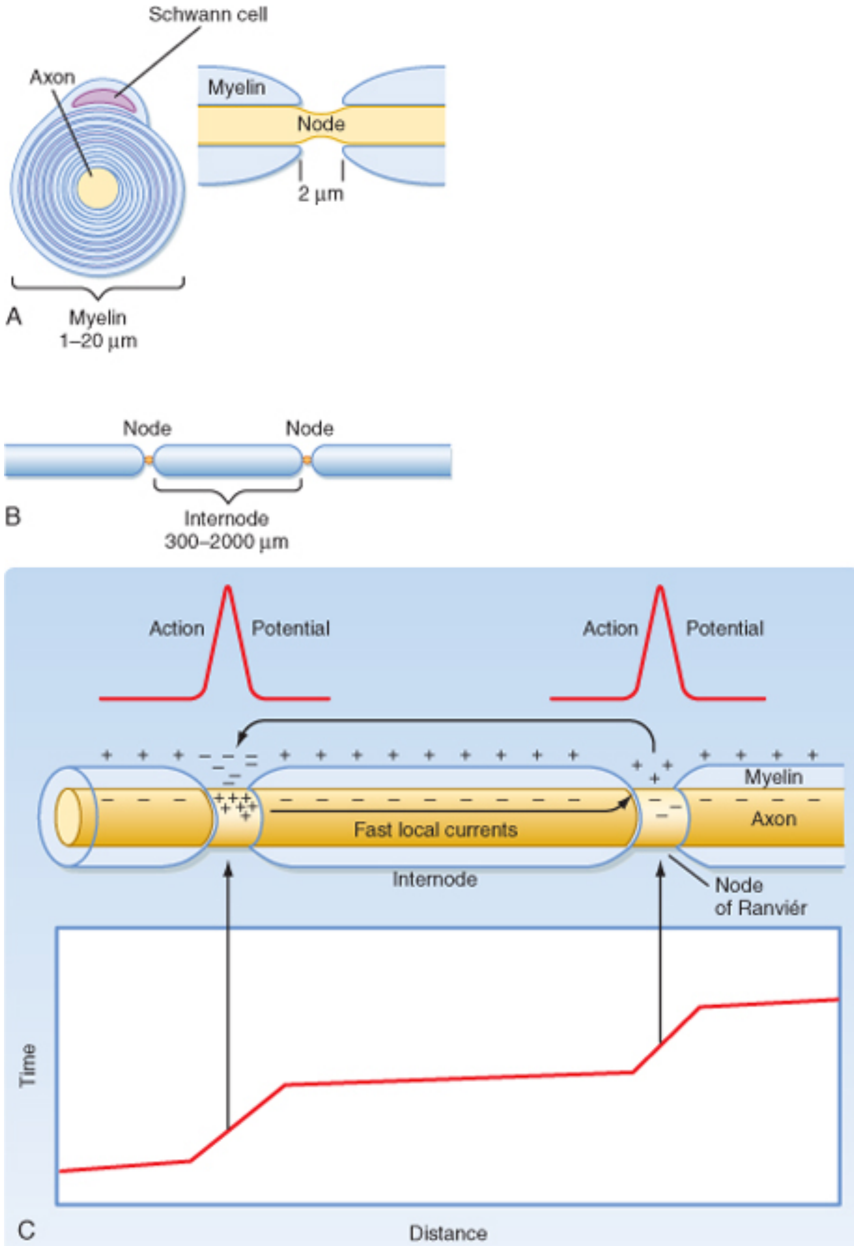


Figure 5-11 A, Schematic drawings, in cross section and longitudinal section through a node of Ranvier, of a Schwann cell wrapped around an axon to form myelin. Note that the axon is exposed to the extracellular space only at the node of Ranvier. B, View of two nodes and the intervening internode of myelin. (Redrawn from Squires LR et al: Fundamental Neuroscience, 2nd ed. San Diego, CA, Academic Press, 2002.) C, Saltatory conduction in a myelinated axon with a plot of the action potential location along the axon vs. time. Note the short time taken for the action potential to traverse the large distance between nodes (shallow sloped lines on the plot) due to the high resistance and low capacitance of the internodal region. In contrast, the action potential slows as it crosses each node (steep sloped line segments). (Redrawn from Blankenship J: Neurophysiology. Philadelphia, Mosby, 2002.)

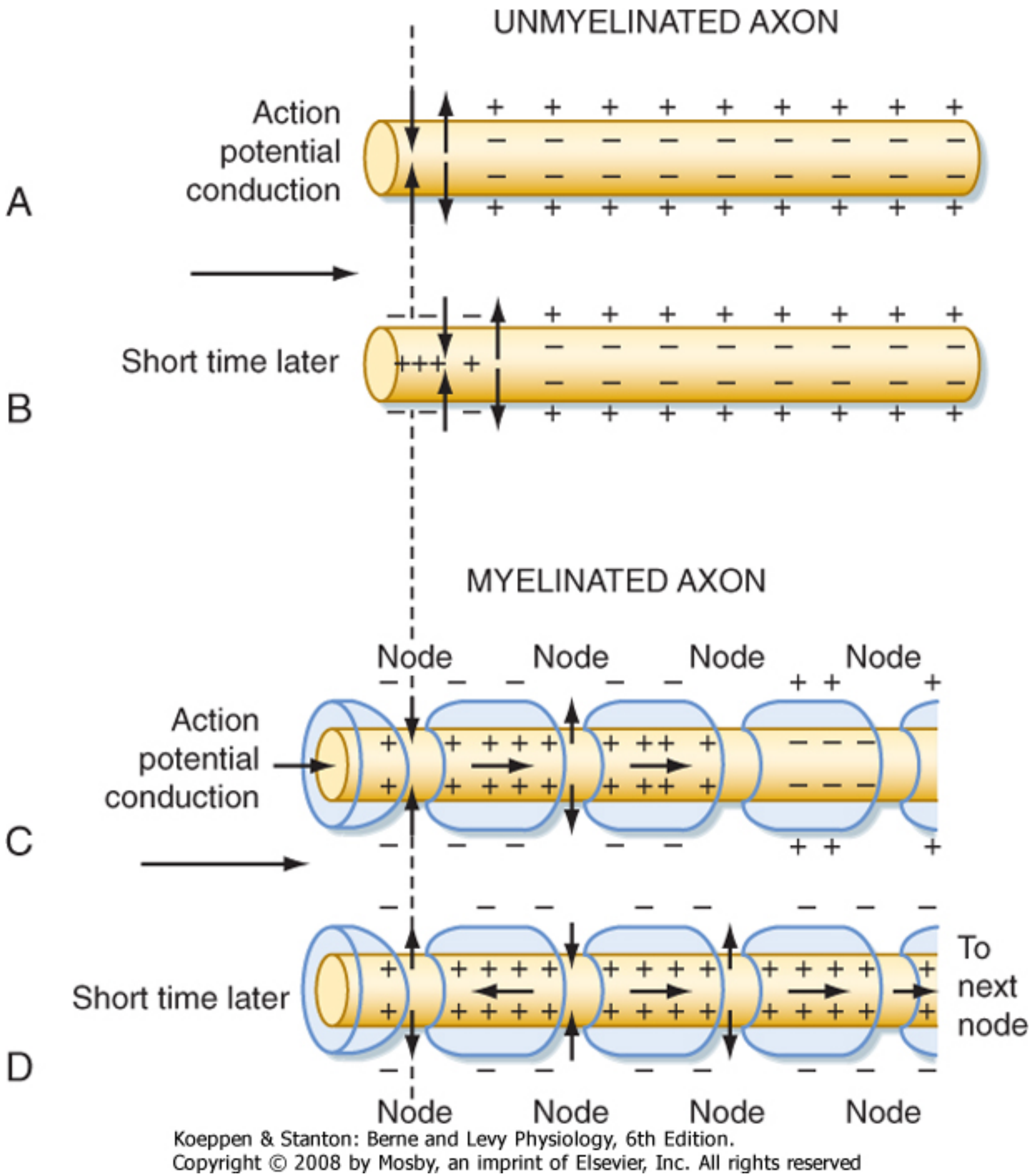


Figure 5-12 Comparison of action potential conduction in an unmyelinated axon and a myelinated axon. At the initial time (A and C), an action potential is being generated at the left side of each axon. Note that the inward current in the unmyelinated axon (A) is depolarizing an adjacent portion, whereas the inward current in the myelinated axon (C) is depolarizing the next node. At the second instant in time (B and D), the action potential in the unmyelinated axon has been generated in the adjacent portion while the action potential in the myelinated axon (D) has been generated at subsequent nodes and is already depolarizing the last node to the right. (Redrawn from Castro A et al: Neuroscience: An Outline Approach. Philadelphia, Mosby, 2002.)

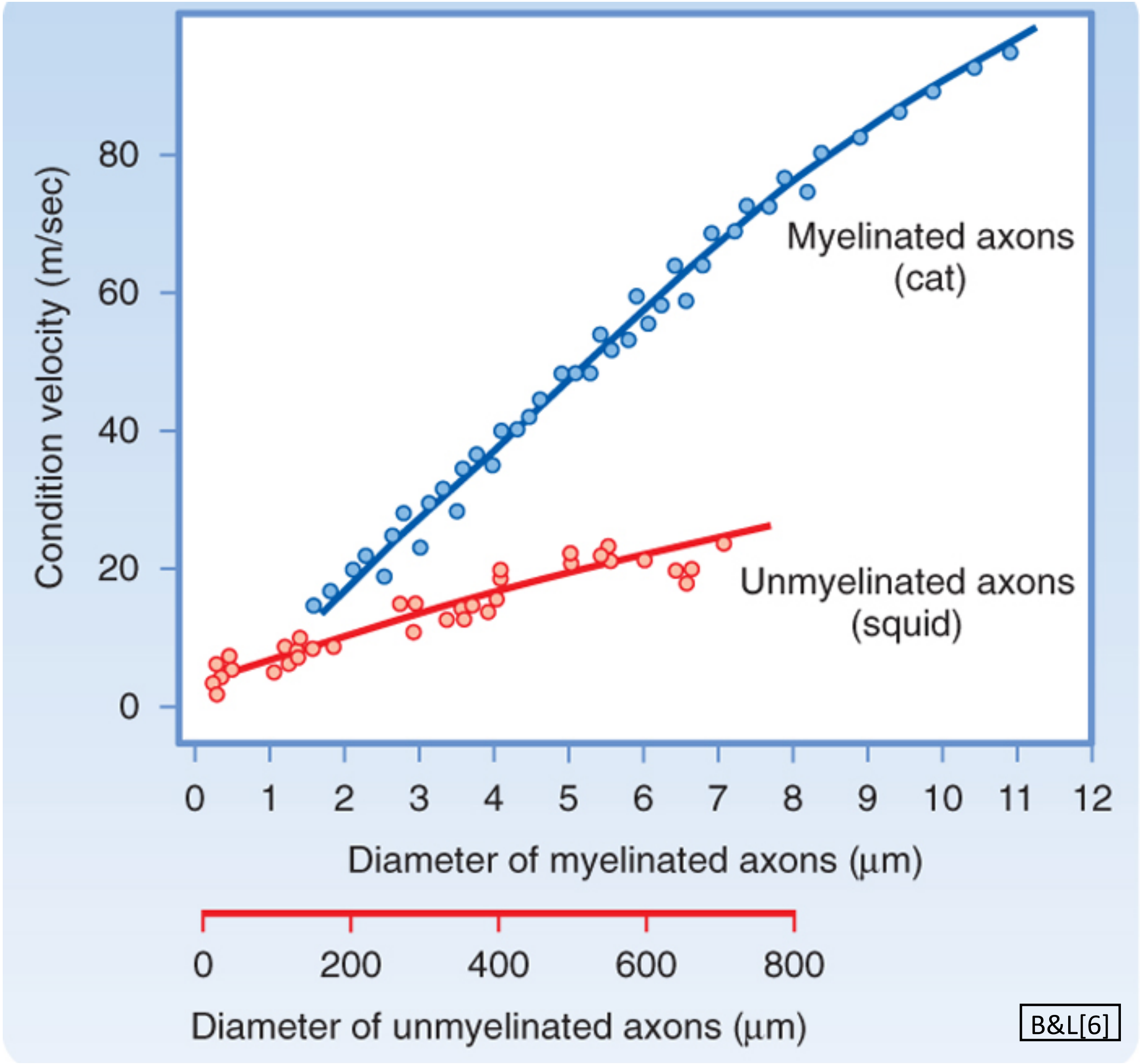


Figure 5-10 Conduction velocities of myelinated and unmyelinated axons as functions of axon diameter. Myelinated axons are from cat saphenous nerve at 38° C. Unmyelinated axons are from squid at 20° C to 22° C. Note that myelinated axons have greater conduction velocities than unmyelinated axons that are 100 times greater in diameter. (Based on data from Gasser HS, Grundfest H: Am J Physiol 127:393, 1939 [myelinated axons]; and Pumphrey RJ, Young JZ: J Exp Biol 15:453, 1938 [unmyelinated axons].)

END

Video 3, Module 2