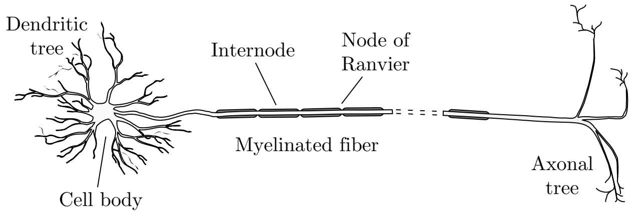
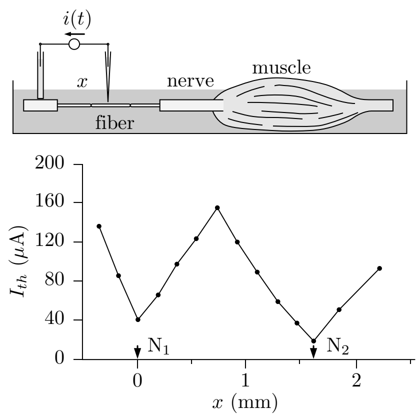


Figure 5.1



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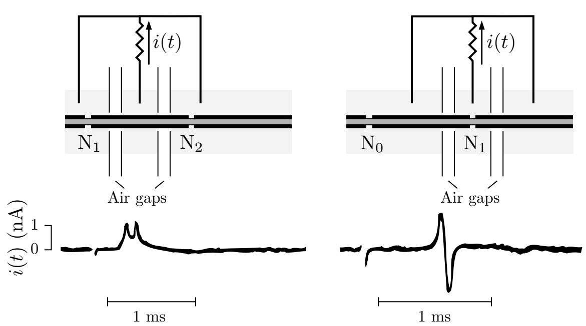

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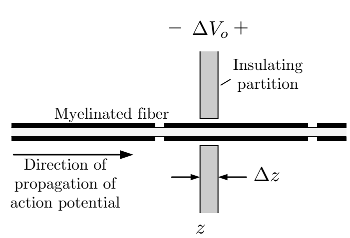

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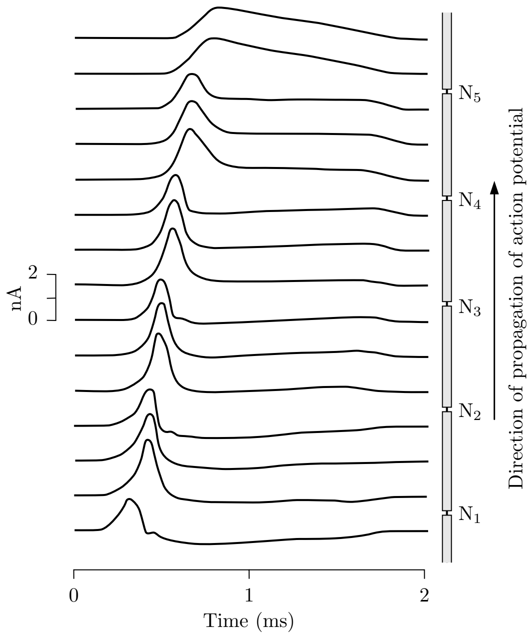

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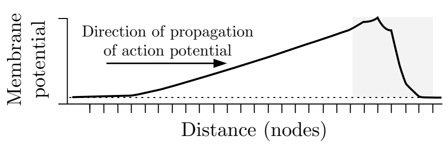

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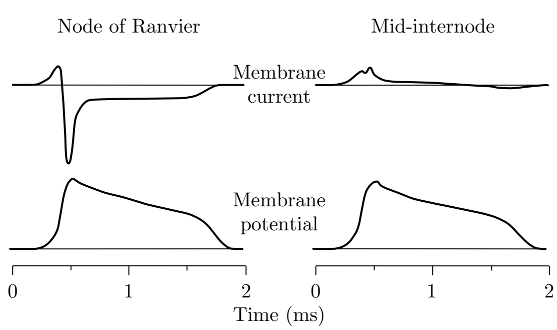

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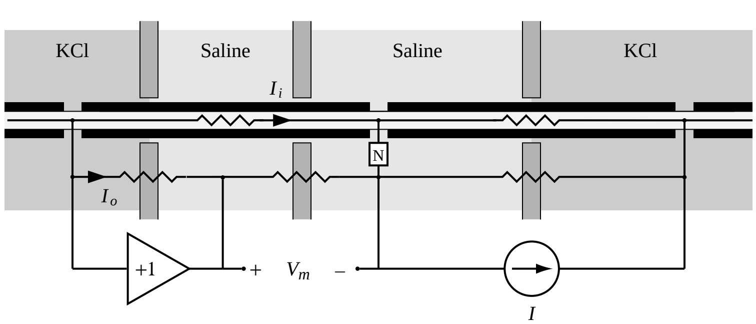


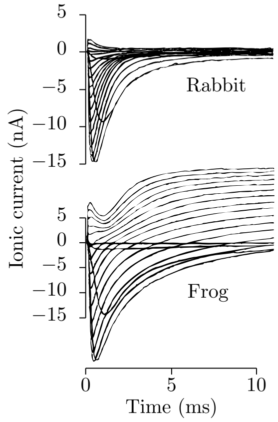


Figure 5.27

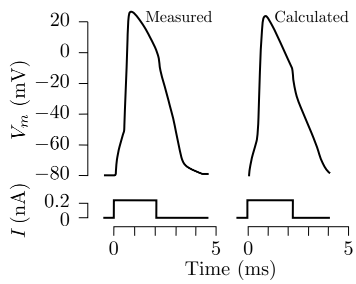


Figure 5.28

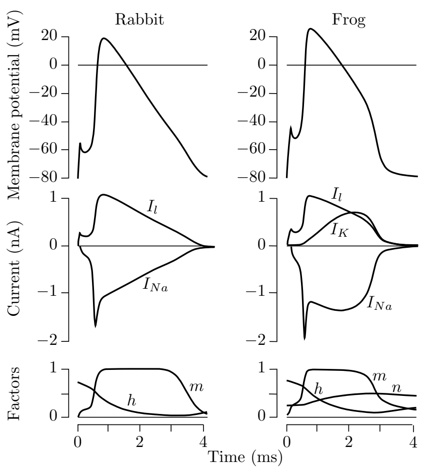
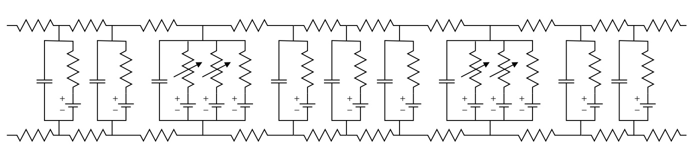


Figure 5.29

Model of myelinated nerve fiber



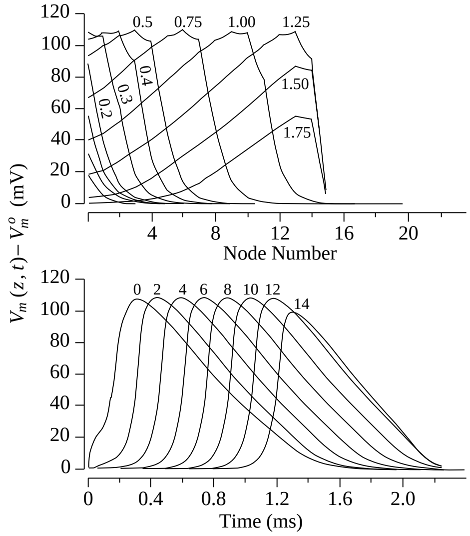


Figure 5.31

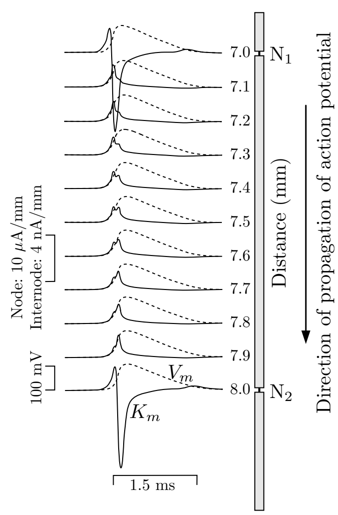


Figure 5.32

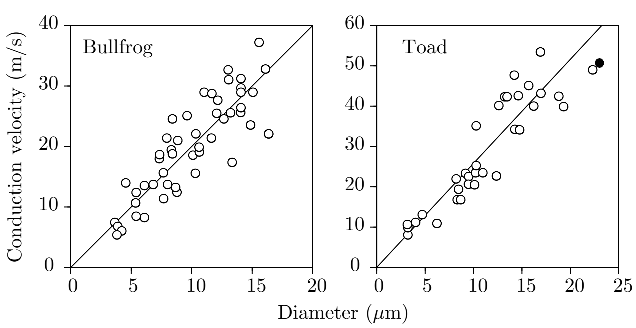


Figure 5.33

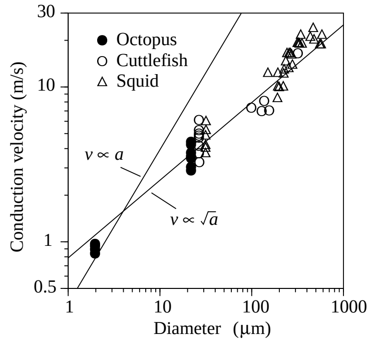


Figure 2.16

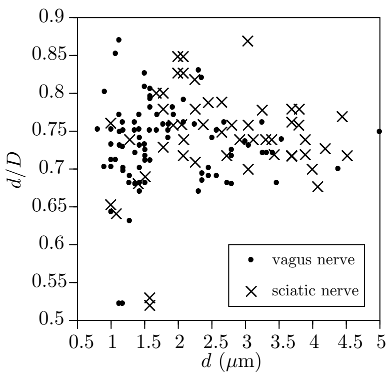


Figure 5.9

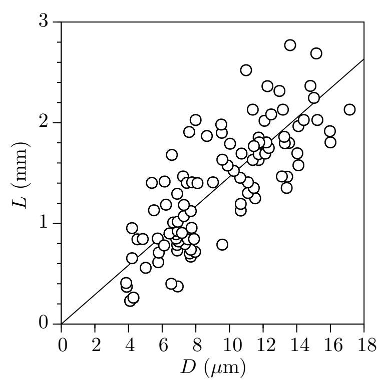


Figure 5.10

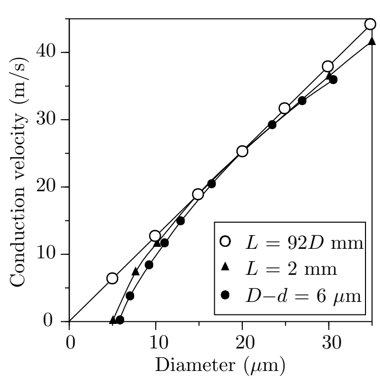


Figure 5.35

Effect of Internode Geometry

Solutions to the cable equations depend on only two constants.

$$\tau_M = \text{membrane time constant} = \frac{c_{IN}}{g_{IN}}$$

$$\lambda_C = \text{cell space constant} = \sqrt{\frac{1}{g_{IN}(r_o + r_i)}}$$

We can express the parameters of the cable model in terms of material properties (ρ_i, ρ_m, ϵ_m) and geometrical parameters of the cable (d, D, L).

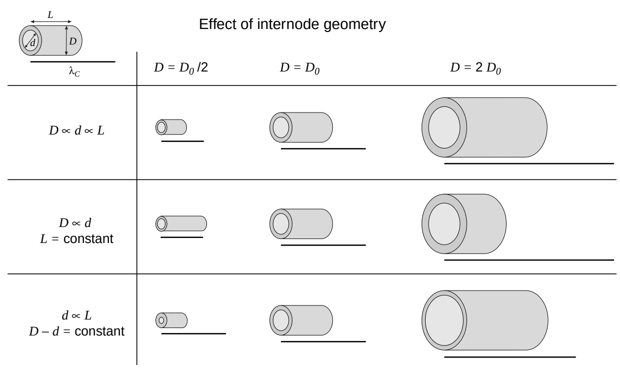
$$c_{IN} \approx \frac{\epsilon_m \pi d}{(D-d)/2} \qquad g_{IN} \approx \frac{\pi d}{\rho_m (D-d)/2}$$

$$r_i = \frac{\rho_i}{\pi d^2/4} \qquad r_o << r_i$$

Substitution of these expressions into the definitions of the cable constants shows how the cable constants depend on cable geometry.

$$\tau_M = \frac{c_{IN}}{g_{IN}} \approx \epsilon_m \rho_m \text{ (independent of geometry)}$$

$$\lambda_C^2 = \frac{1}{g_{IN}(r_0 + r_i)} \approx \frac{\rho_m (D-d)/2}{\pi d} \times \frac{\pi d^2/4}{\rho_i} = \frac{\rho_m}{8\rho_i}(D-d)d$$



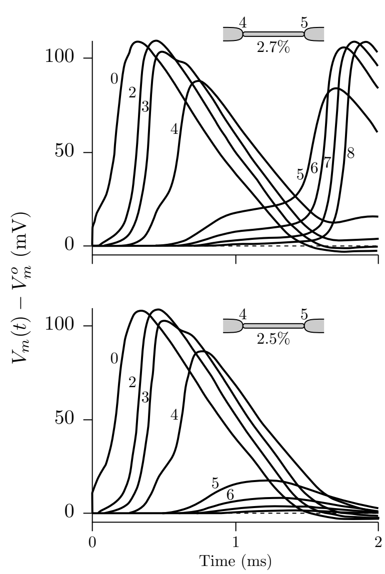


Figure 5.38