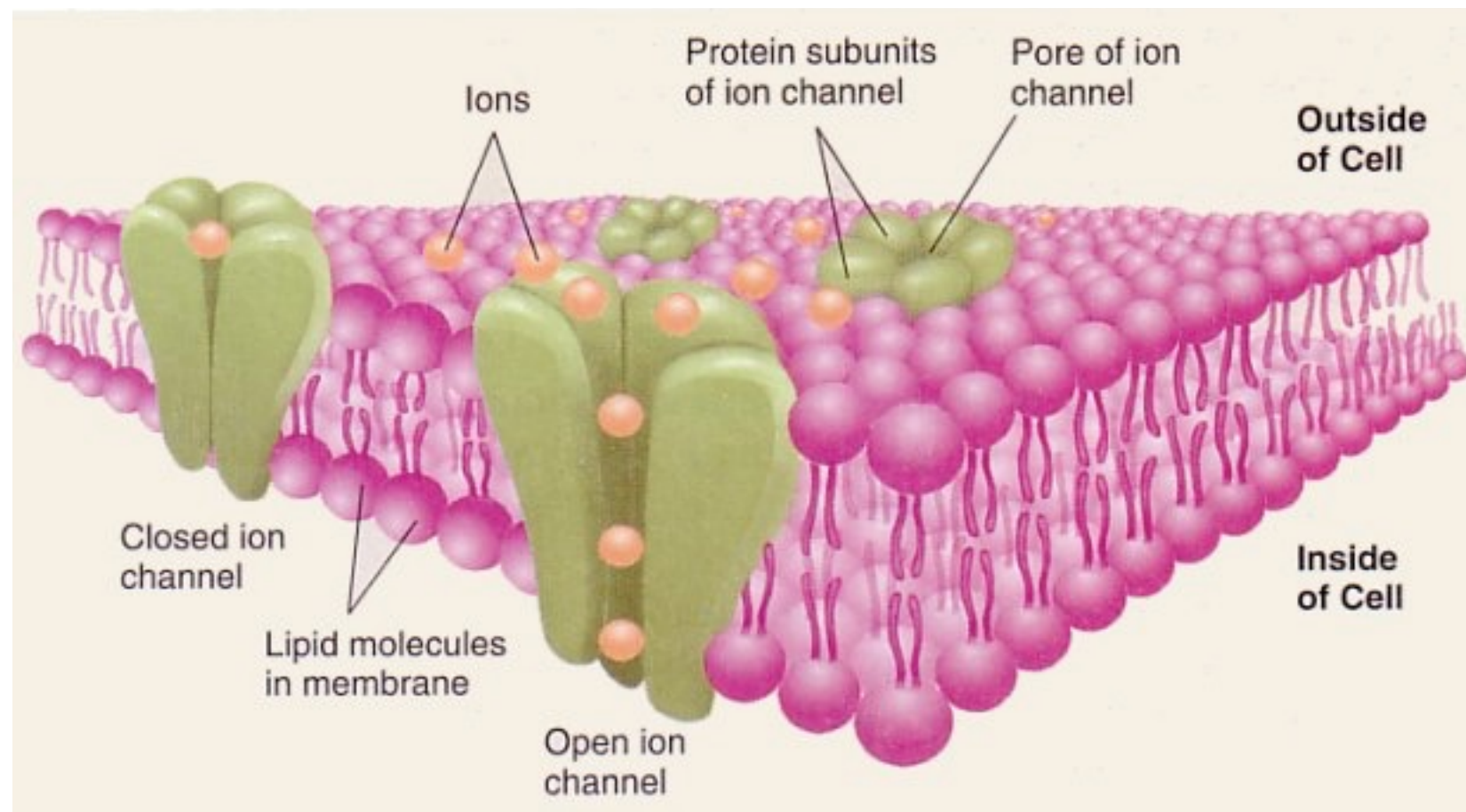
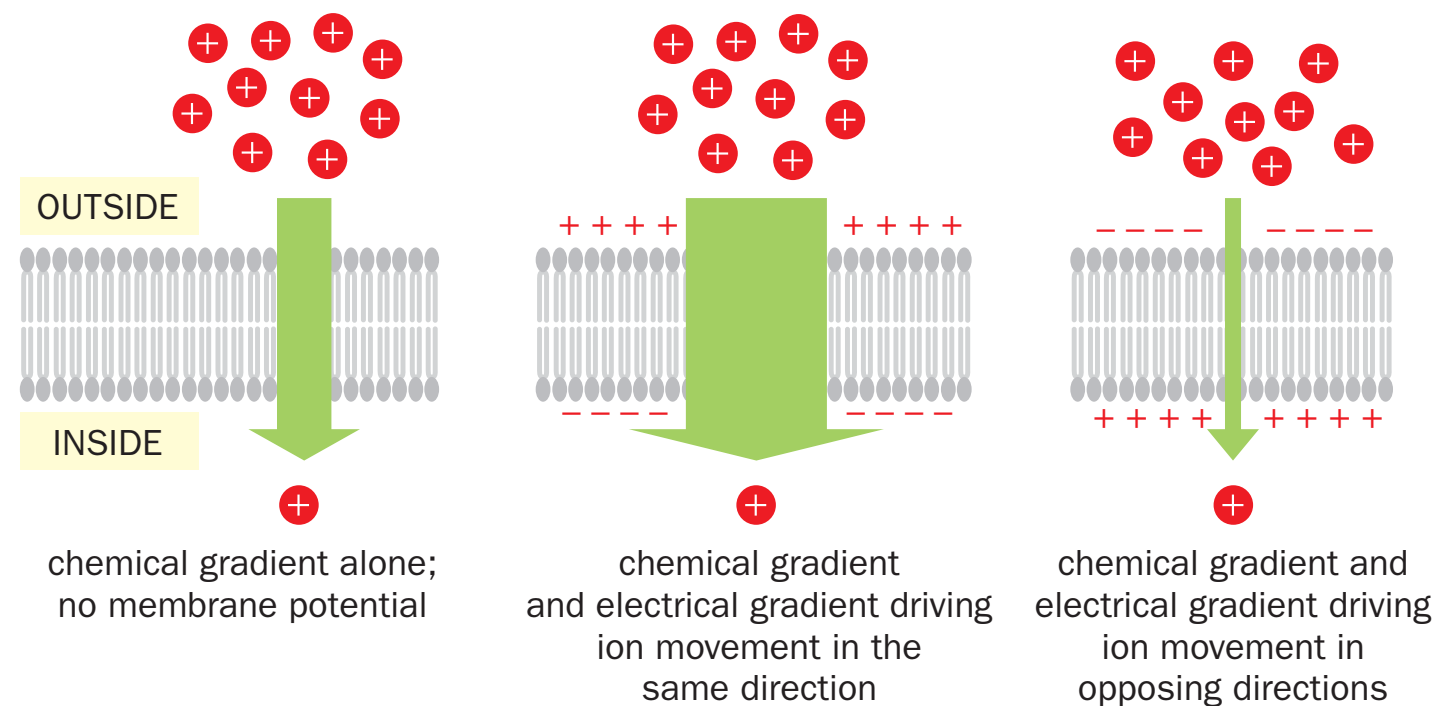


Single Neuron Dynamics

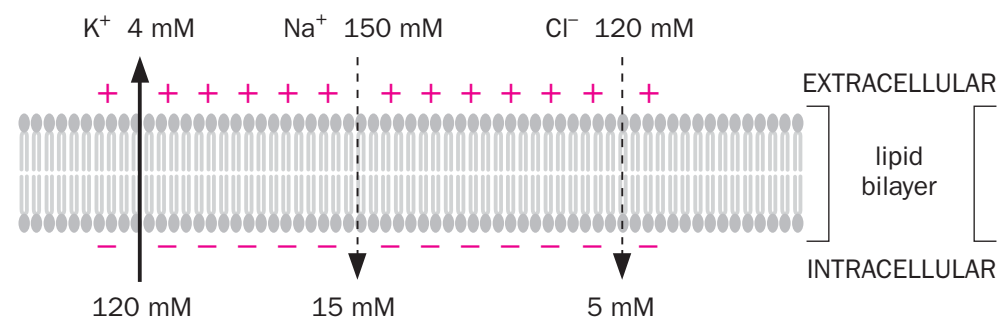


What determines the resting potential of a neuron?

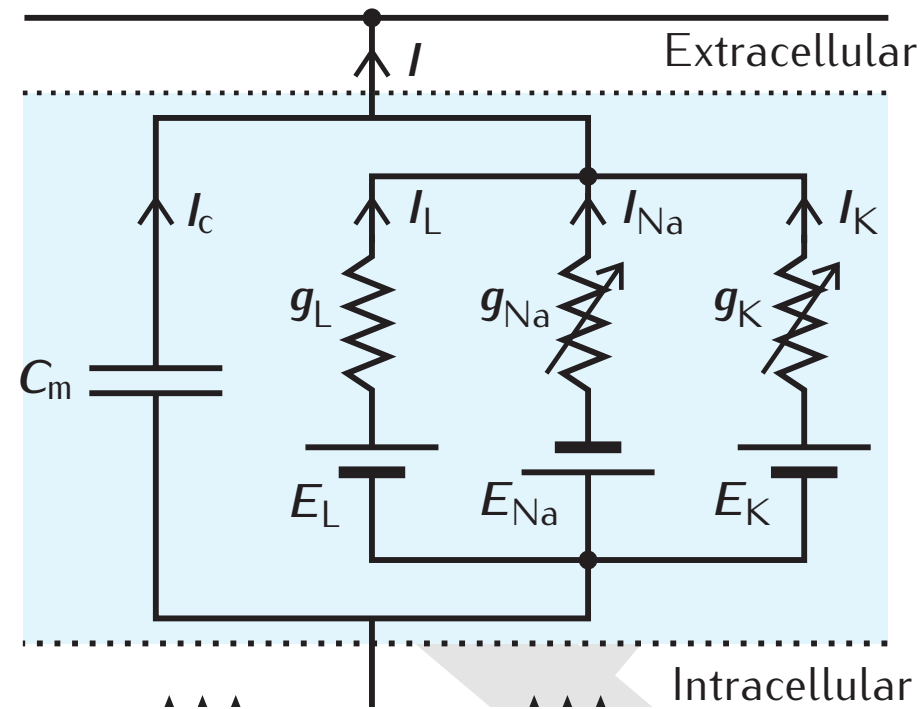


Ion pump

(A)

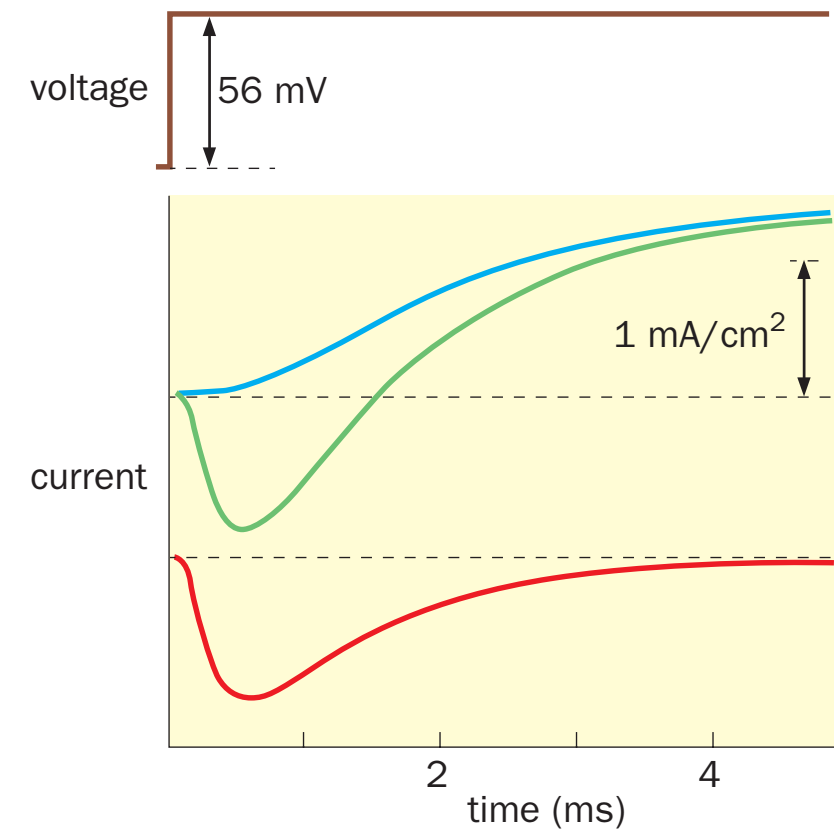
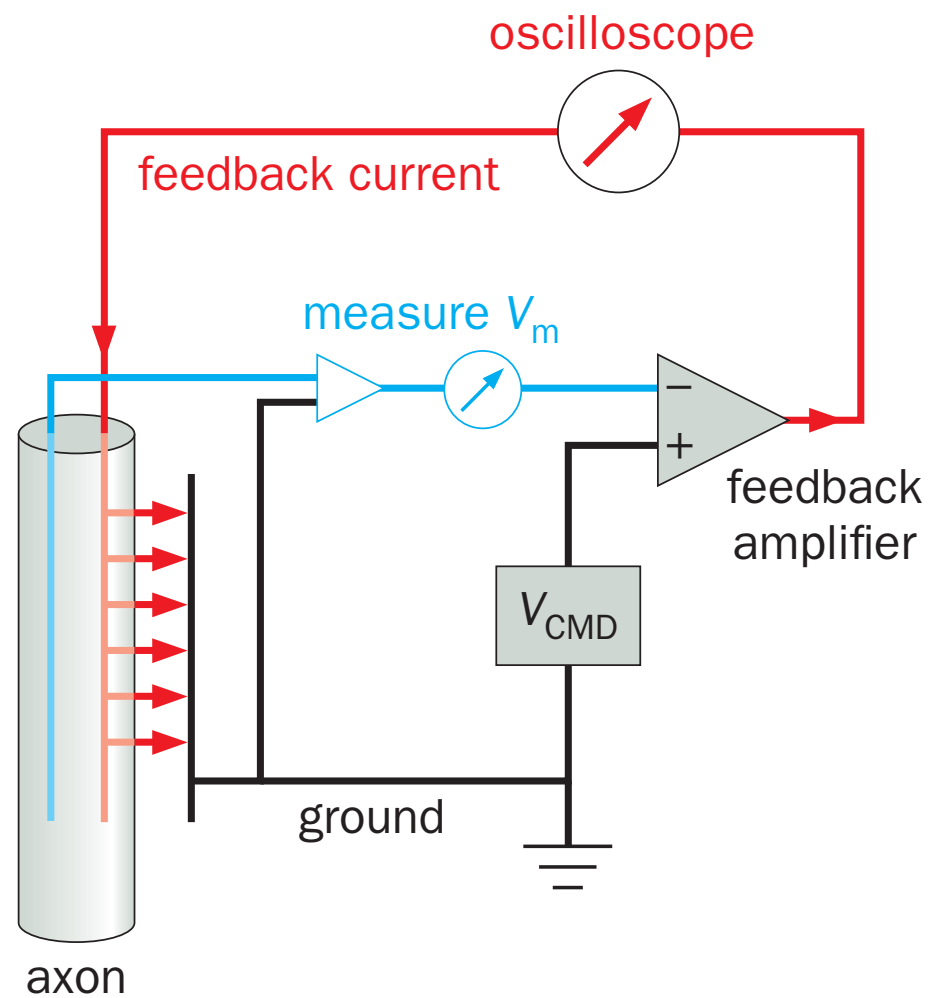


The Equivalent Electronic Circuit of a Neuron

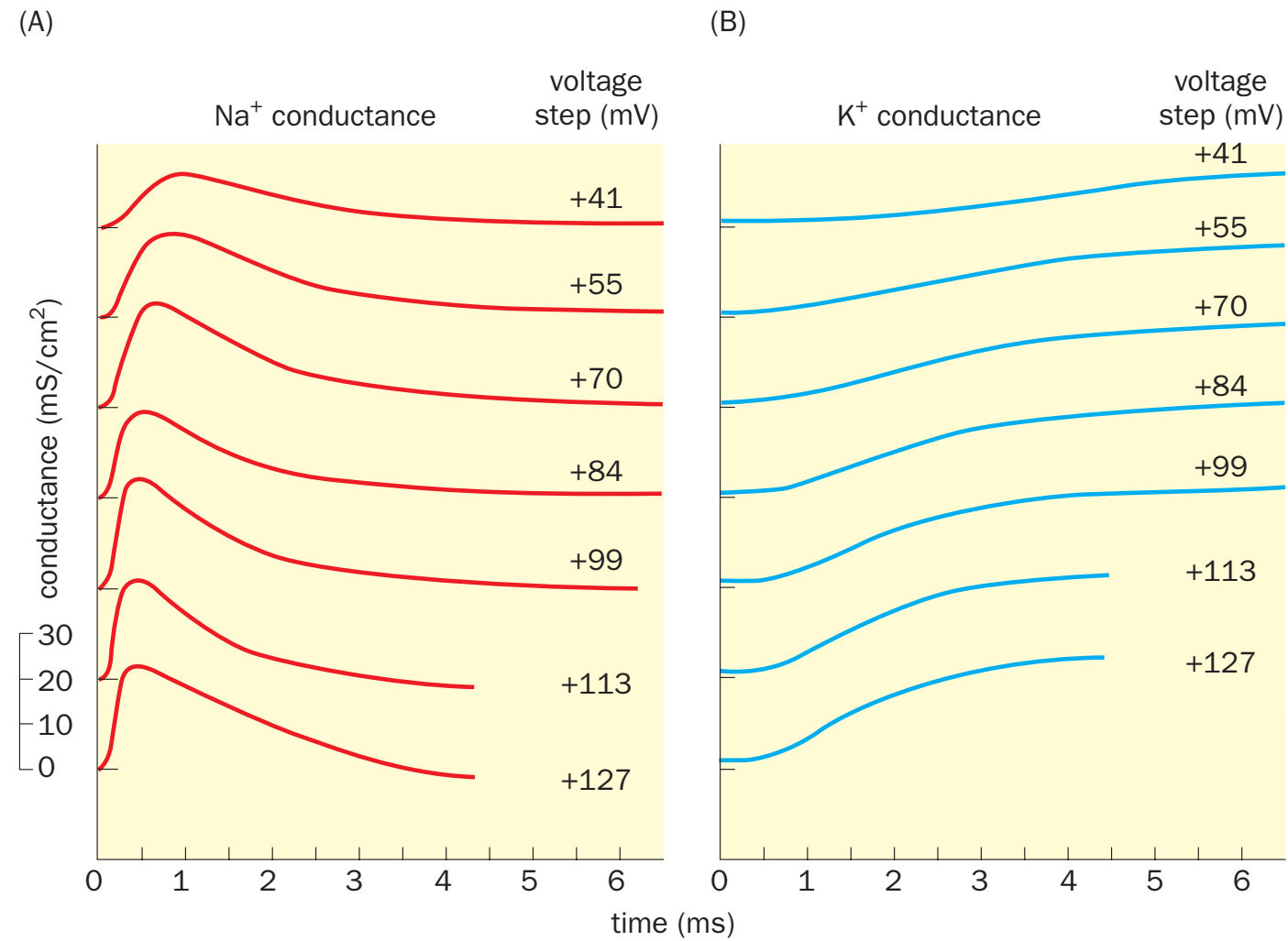


$$C_m \frac{dV}{dt} = - \sum_i g_i(V)(V - E_i) - \bar{g}_L(V - E_L) + I_e$$

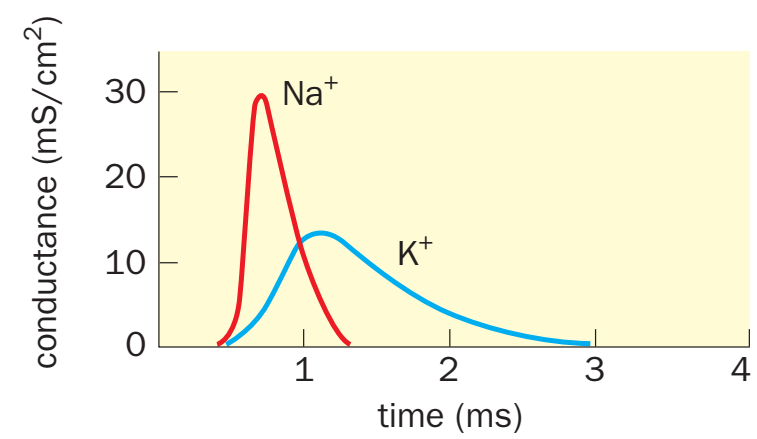
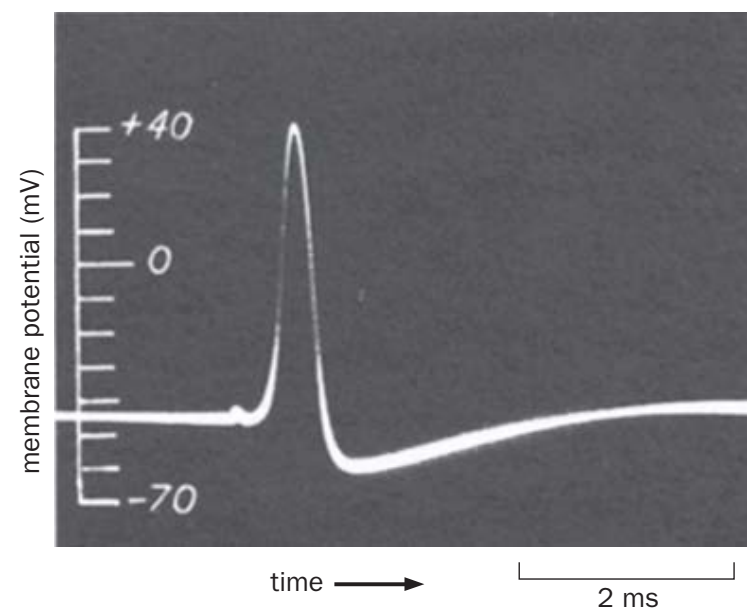
Voltage Clamp Recording



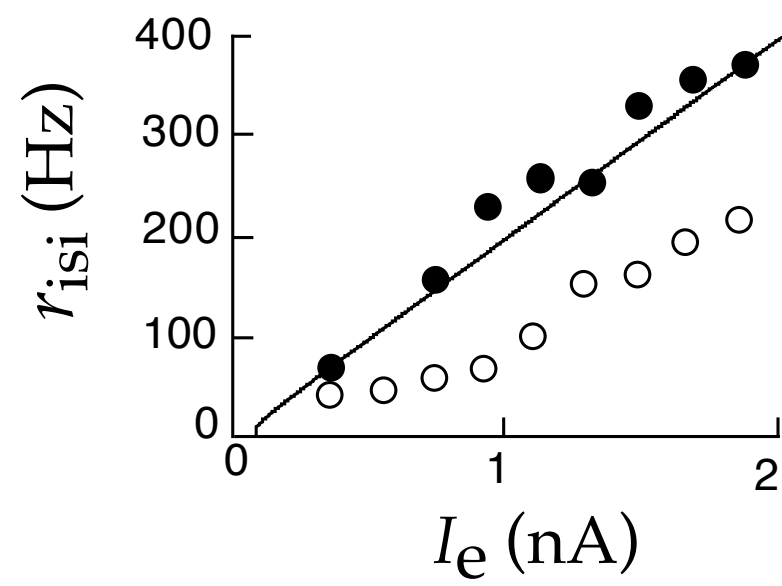
Voltage-gated Conductance



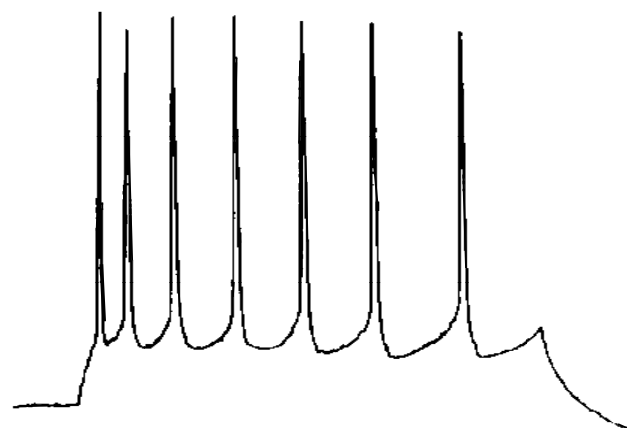
(c)



A



B



Squid Giant Axon

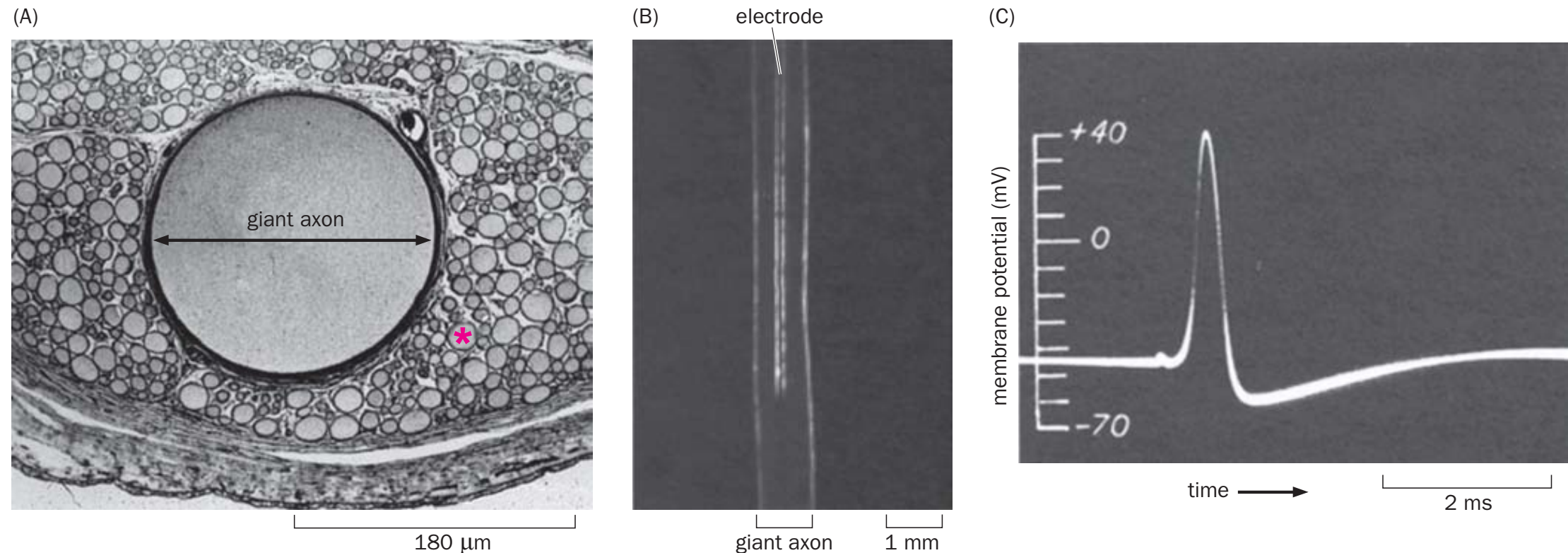
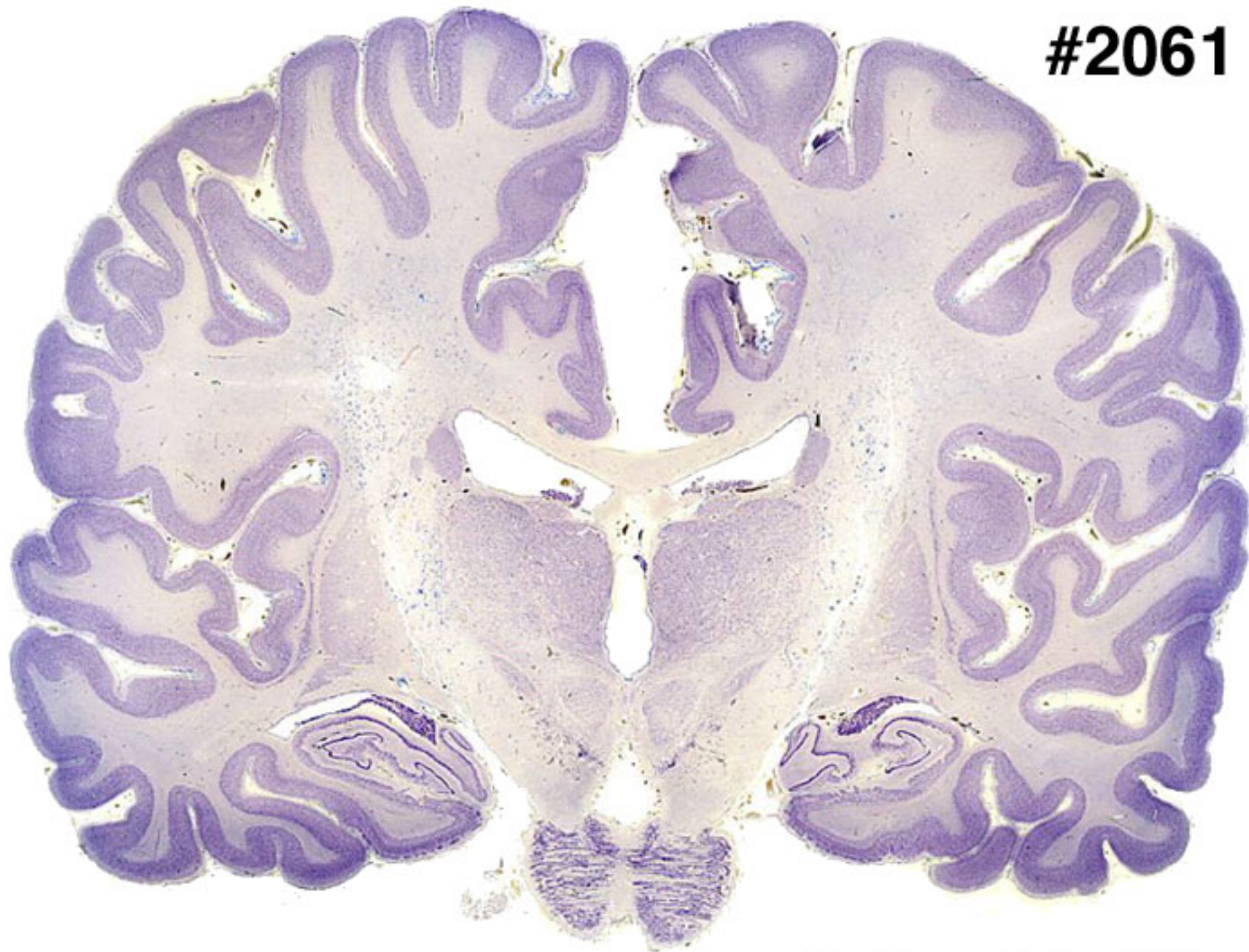


Figure 2-19 Studying action potentials in the squid giant axon. (A) Electron micrograph of a cross section of a squid giant axon showing its large diameter (~180 μm for this sample) as compared to neighboring axons (for example, the axon indicated by *). (B) Photograph of an electrode inserted inside a squid giant axon whose diameter is close to 1 mm. (C) An action potential recorded from the squid giant axon. (A, courtesy of Kay Cooper and Roger Hanlon; B, from Hodgkin AL & Keyes RD [1956] *J Physiol* 131:592–616; C, from Hodgkin AL & Huxley AF [1939] *Nature* 144:710–711. With permission from Macmillan Publishers Ltd.)

Gray and White Matter



Myelinated axons

