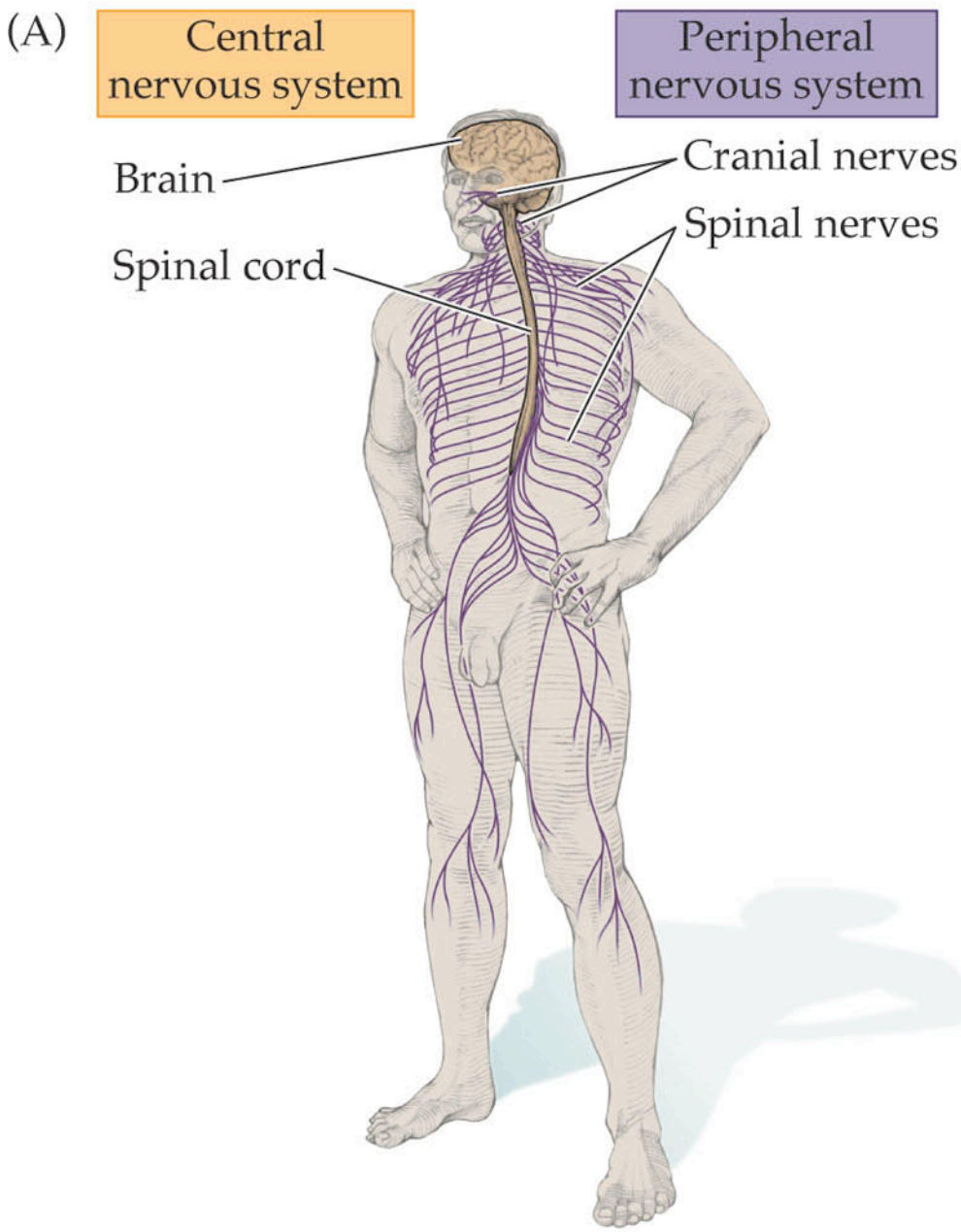
Action Potential Generation and Conduction in the Frog Sciatic Nerve

- Threshold
- Shapes and timing of the action potentials
- Conduction of the action potential
- Components within the compound action potential
- Refractory period/Faithfulness of conduction

Diagram the experiment

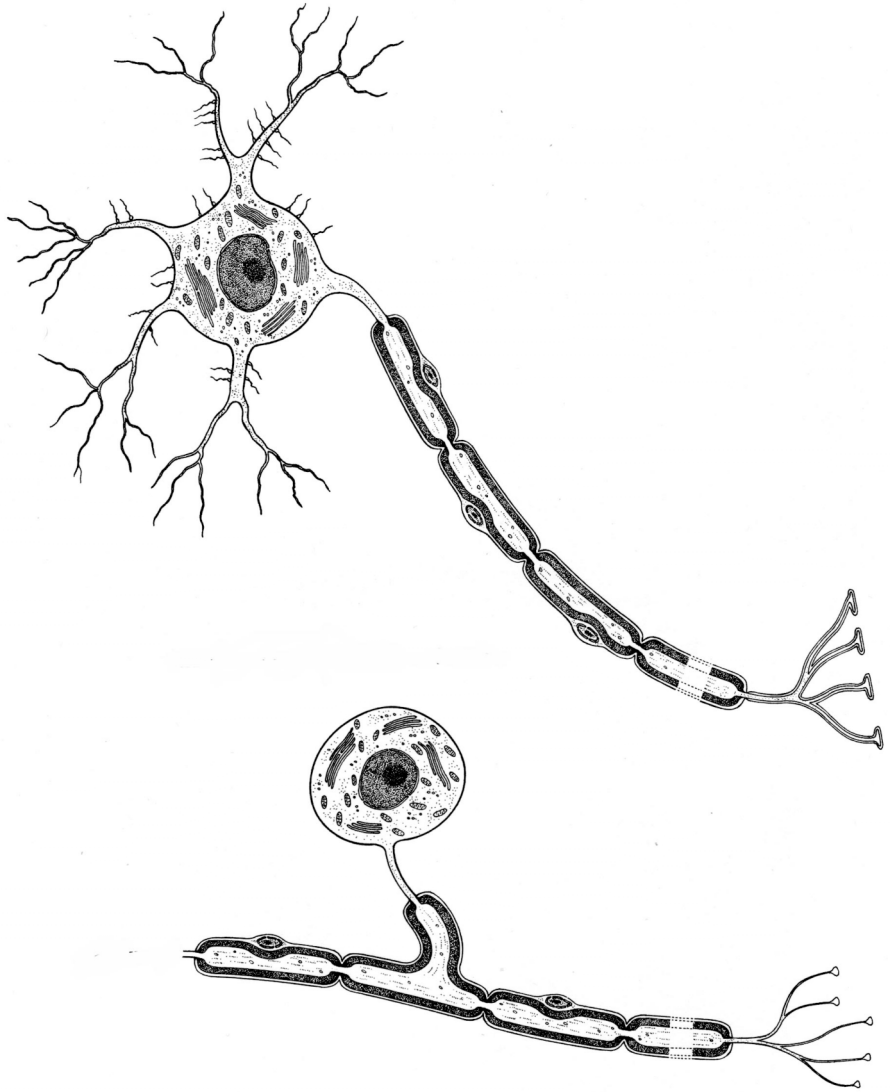
What is a “nerve”?

A NERVE is a bundle of axons. Most commonly they extend from the brain or spinal cord to the periphery.



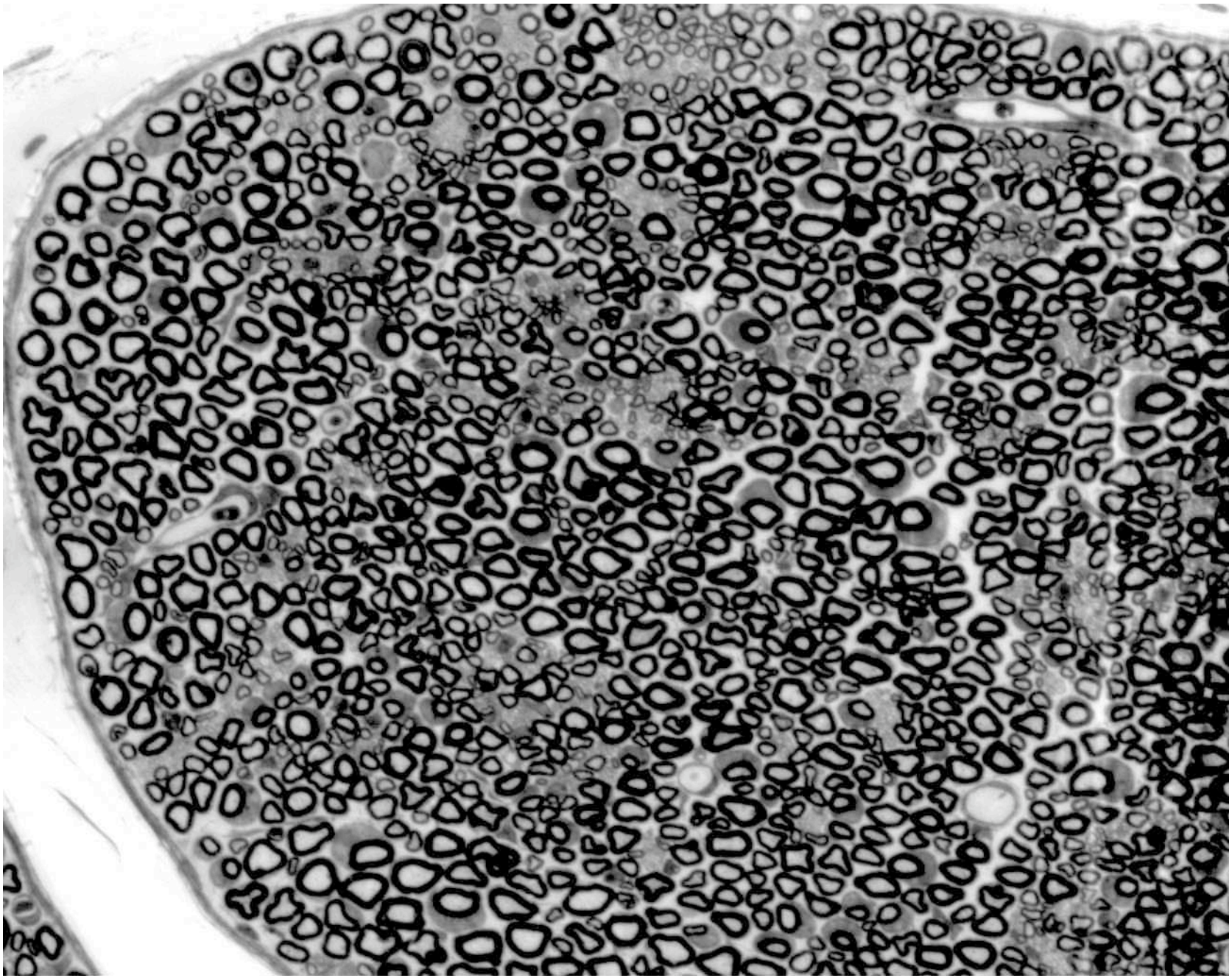
NEUROSCIENCE, Third Edition, **Figure 1.10 (Part 1)**

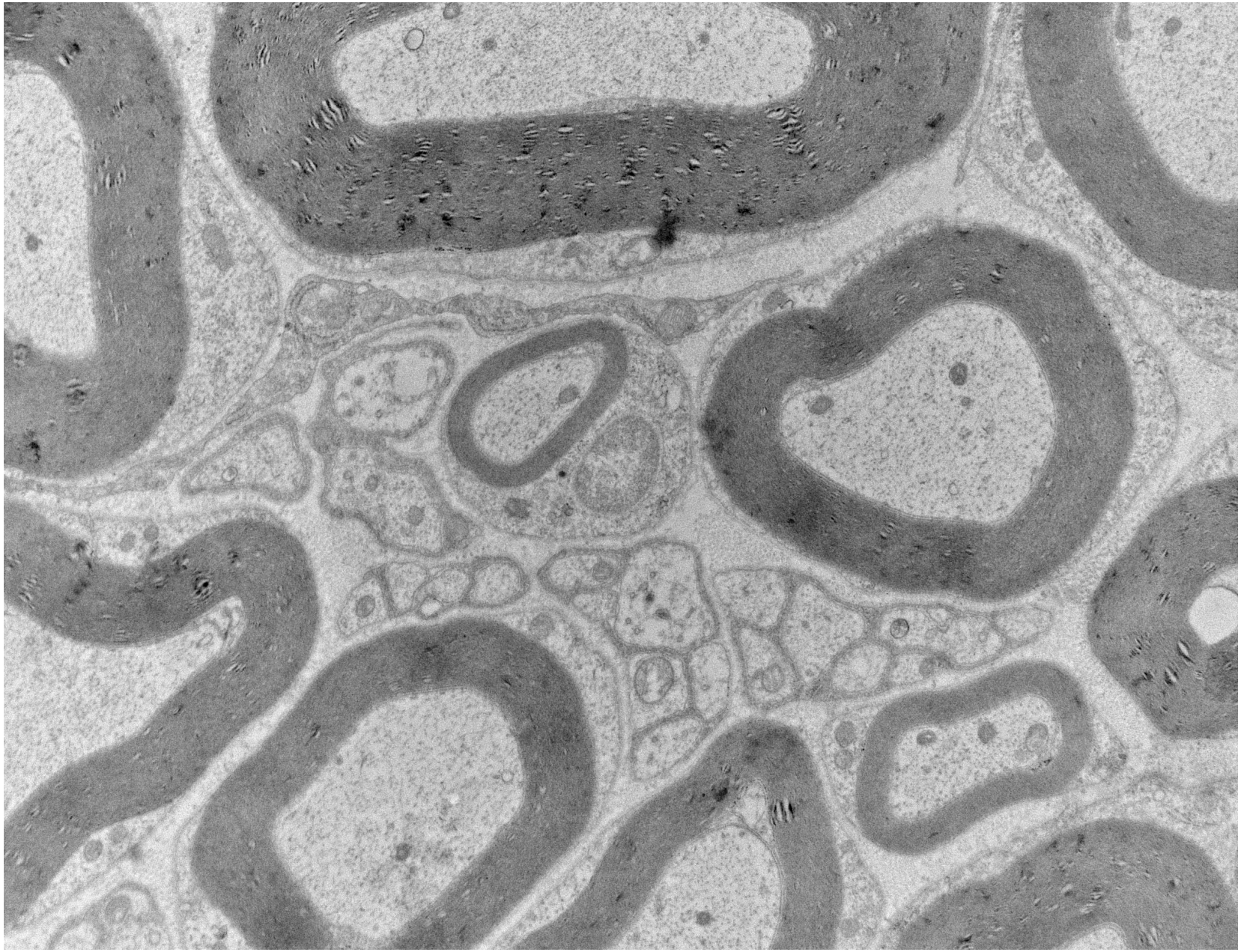
Axons are the long, cylindrical processes extended by neurons



A Motor Neuron

A Sensory Neuron





Where are the neurons that contribute axons to our nerves?

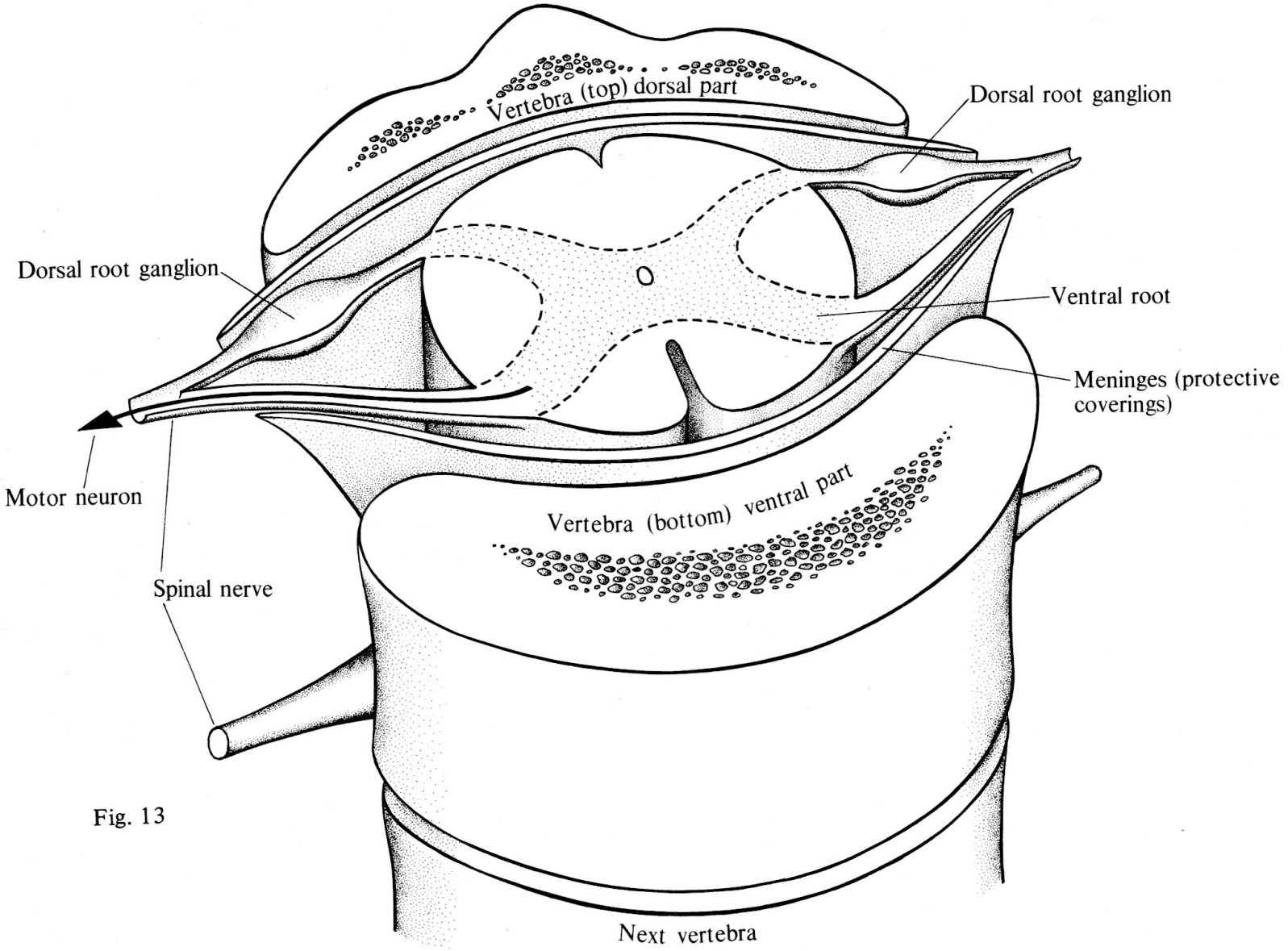

Vertebra (top) dorsal part
Dorsal root ganglion
Dorsal root ganglion
Ventral root
Meninges (protective coverings)
Motor neuron
Vertebra (bottom) ventral part
Spinal nerve
Next vertebra

Fig. 13

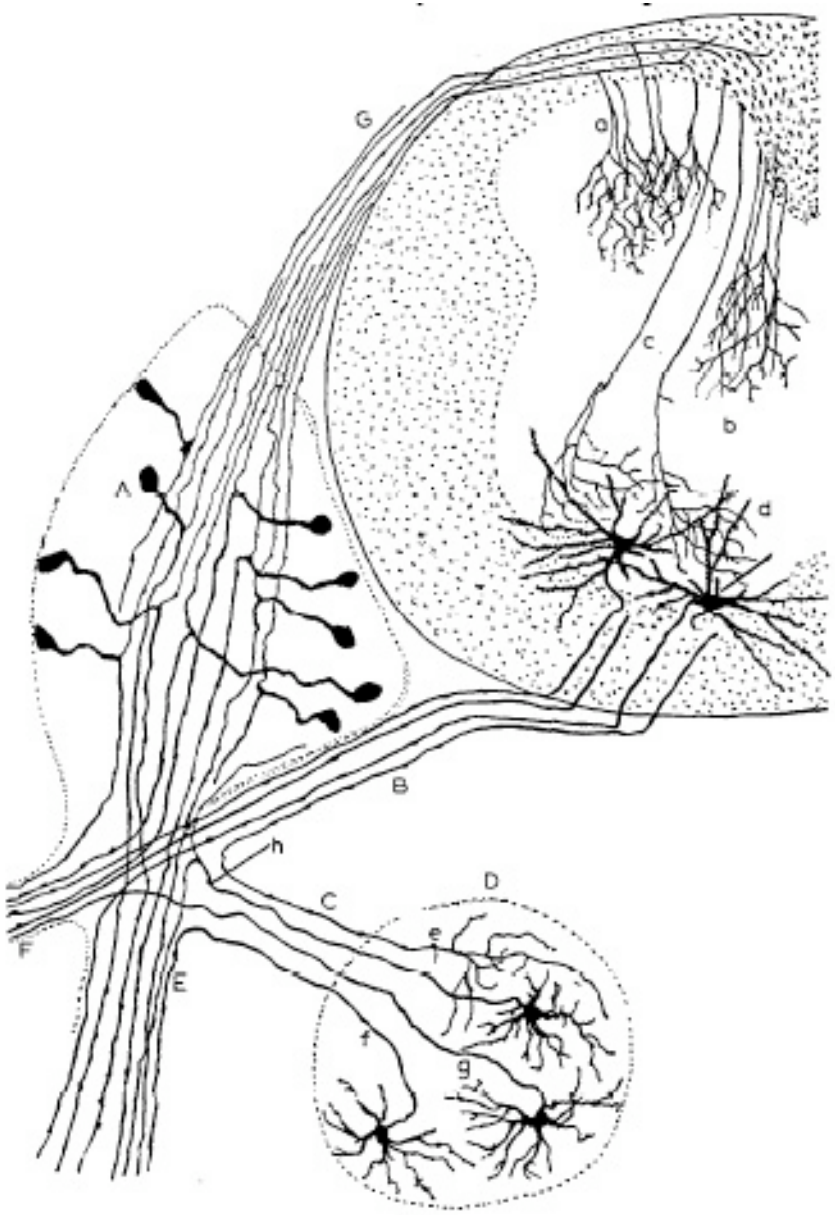


Fig.2

Action potential (nerve impulse): the brief regenerative signal conducted along axons that is the basis of communication within the nervous system.

What is the cause of the change in membrane potential during an action potential?

A. An entry of K followed by an exit of Na.
B. An entry of - ions followed by an exit of + ions.
C. An entry of Na followed by an exit of K.
D. Activation of a Na-K pump.

Discuss events at the surface of the nerve.

What would happen to the potential we record if we reversed the inputs to the differential amplifier?

A. The potential would disappear
B. The potential would be shifted to the right in time
C. The potential would be flipped in polarity
D. The potential would be conducted more rapidly down the nerve

What would happen if we crushed the nerve between the two RECORDING electrodes?

A. The potential would be abolished
B. The potential would be shifted to the right in time
C. The potential would be flipped in polarity
D. The second phase of the potential would disappear

What would happen if we crushed the nerve between the STIMULATING and RECORDING electrodes?

A. The potential would be abolished
B. The potential would be shifted to the right in time
C. The potential would be flipped in polarity
D. The second phase of the potential would disappear

How could one determine the velocity of an action potential?

A. Attach a speedometer to the action potential.
B. Measure how long it takes an action potential to travel a given distance.
C. Measure the speed at which the action potential reaches its peak
D. Measure the duration of the action potential.

You saw that your stimulator could produce “twin” pulses; the interval between the pulses was controlled by the delay control.

How could you use this to determine the refractory period of the axons?

The method you use to study the frog sciatic nerve is the basis of most common investigations of the nervous system:
“extracelluar recording”