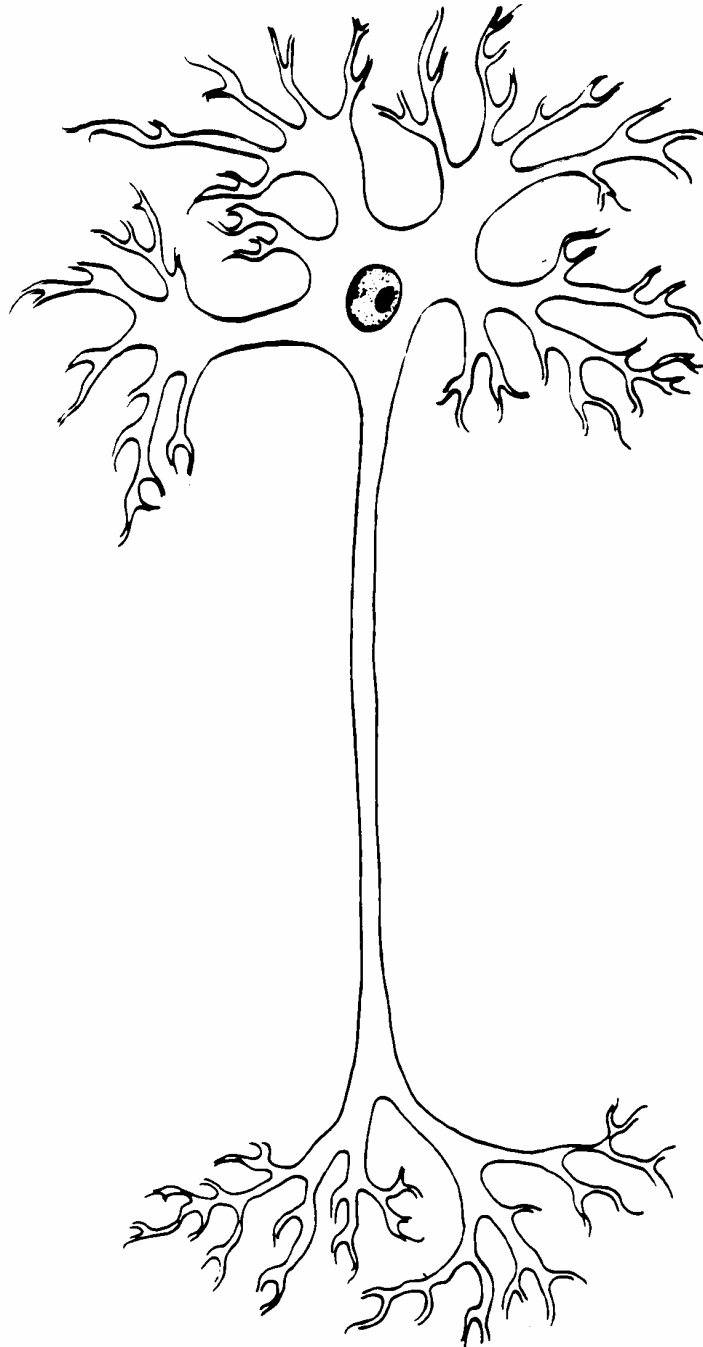
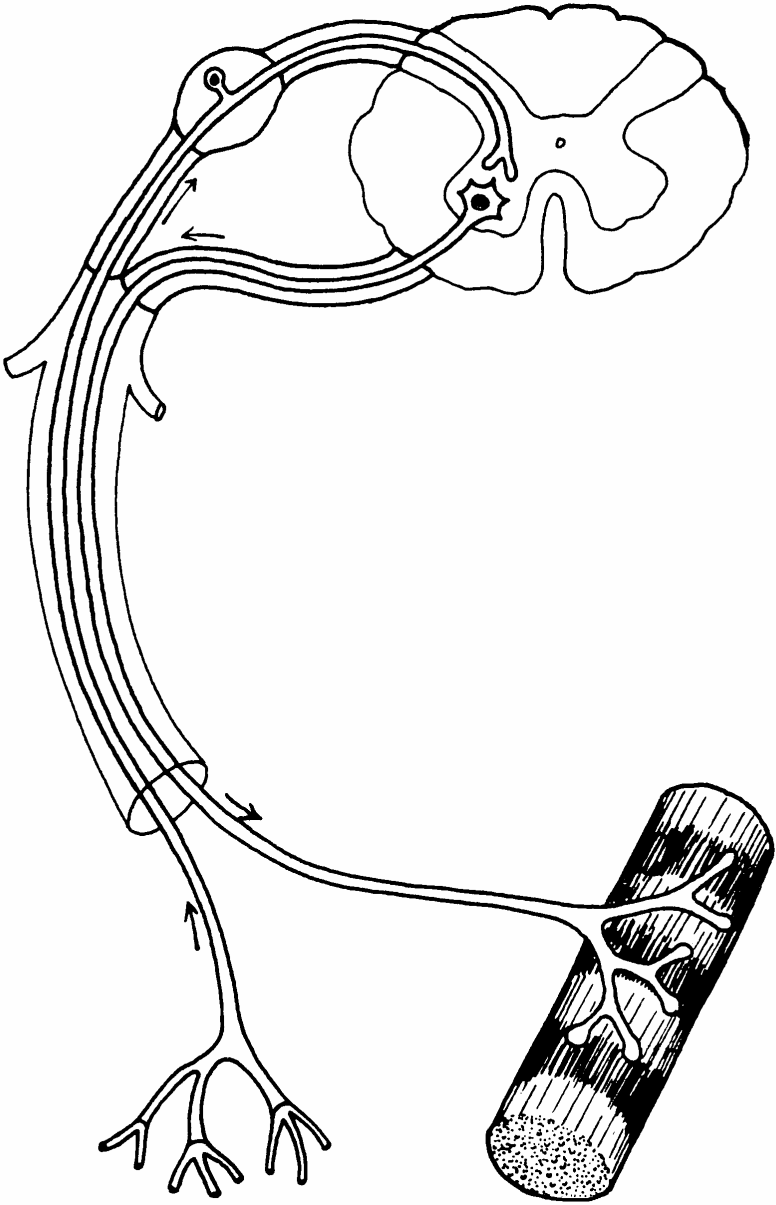


NERVOUS SYSTEMS

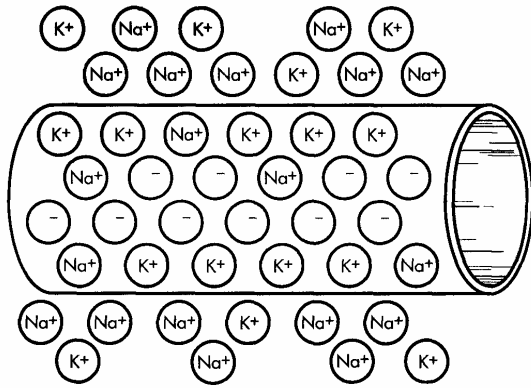
NEURON



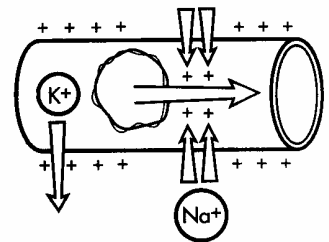
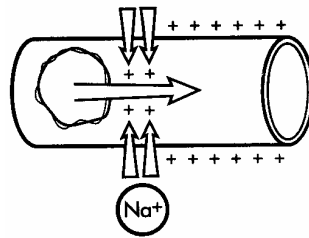
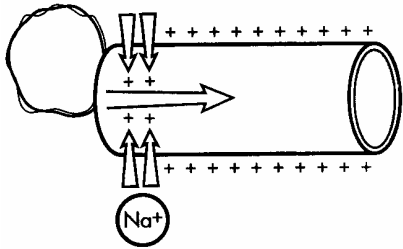
SIMPLE REFLEX



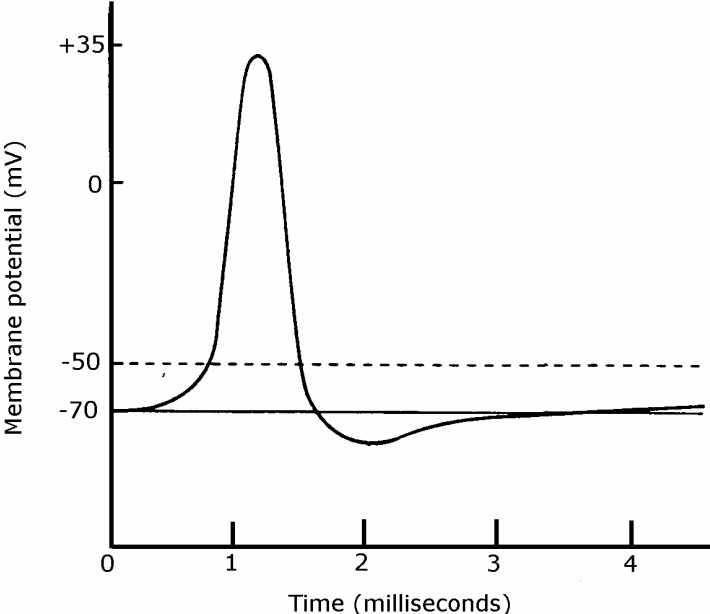
RESTING POTENTIAL



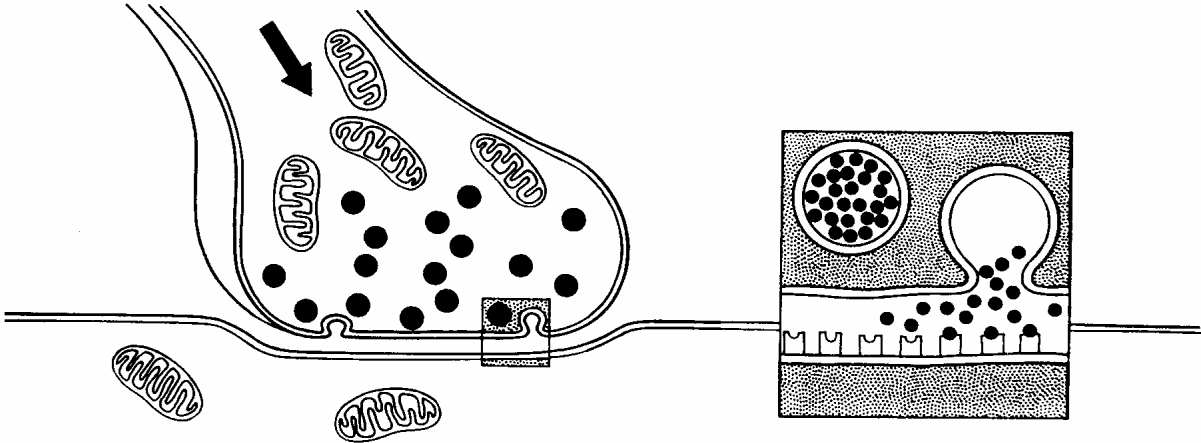
ACTION POTENTIAL



ACTION POTENTIAL – GRAPH



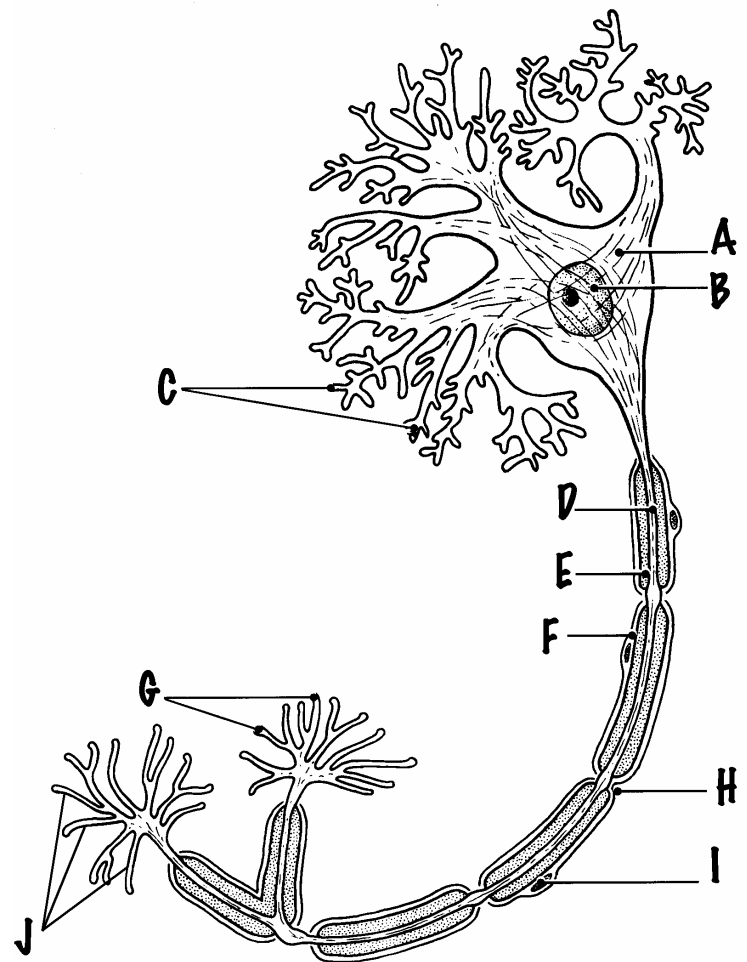
TRANSMISSION ACROSS A SYNAPSE



QUESTIONS:

1. Match the structure with the correct letter from the diagram below.

- _____ Dendrites
- _____ Schwann cell nucleus
- _____ Axon
- _____ Node of Ranvier
- _____ Cell body
- _____ Myelin sheath
- _____ Nucleus
- _____ Axon terminals
- _____ Neurilemma
- _____ End bulbs

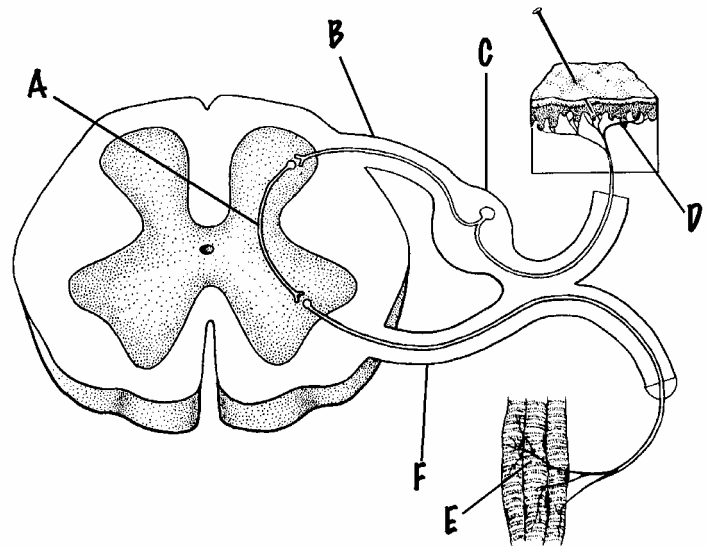


2. Identify each of the following as true of the sensory neuron (**SN**) or the motor neuron (**MN**)

- | | |
|---|---|
| _____ anterior root | _____ posterior root |
| _____ has a ganglion | _____ lacks a ganglion |
| _____ carries impulses from receptor to spinal cord | _____ carries impulses from spinal cord to effector |
| _____ has a relatively long dendrite & short axon | _____ has relatively short dendrites & a long axon |
| _____ enters spinal cord | _____ exits spinal cord |

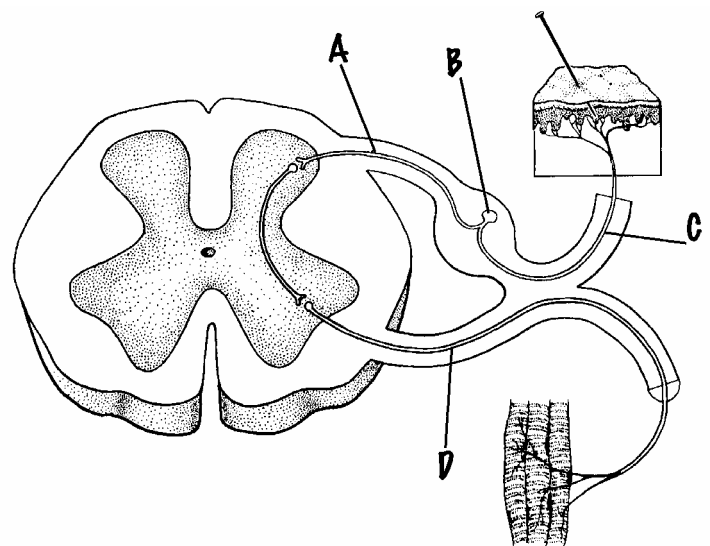
3. Match the following parts with the correct letter from the diagram.

- _____ Dorsal Root
- _____ Dorsal Root Ganglion
- _____ Effector
- _____ Interneuron
- _____ Receptor
- _____ Ventral Root



4. Match the following parts with the correct letter from the diagram.

- _____ Motor neuron axon
- _____ Sensory neuron axon
- _____ Sensory neuron cell body
- _____ Sensory neuron dendrite



5. Match the description with the correct event.

- | | |
|--|----------------------|
| _____ More Na ⁺ outside cell
More K ⁺ inside cell | A. Depolarization |
| _____ Na ⁺ ion gates open and Na ⁺
rush into cell | B. Hyperpolarization |
| _____ K ⁺ gates open & Na ⁺ gates close;
K ⁺ rush out of cell | C. Refractory Period |
| _____ More K ⁺ moved out of cell than
necessary to reestablish charge
across membrane | D. Repolarization |
| _____ Na ⁺ pumped out of cell & K ⁺
pumped into cell | E. Resting potential |

6. How is the resting potential different from repolarization?

7. Answer the following questions regarding the transmission of a nerve impulse.

a. What maintains the excess of Na^+ outside the cell and an excess of K^+ inside the cell during the resting potential stage?

b. The resting potential of a neuron (-70mV) indicates that the inside of the cell is more negative than the outside. What two factors cause this negative charge?

c. What causes Na^+ channels (gates) to open?

d. What causes Na^+ to rush into the neuron during depolarization?

e. What causes K^+ to rush out of the neuron during repolarization?

f. What causes the neuron to be hyperpolarized?

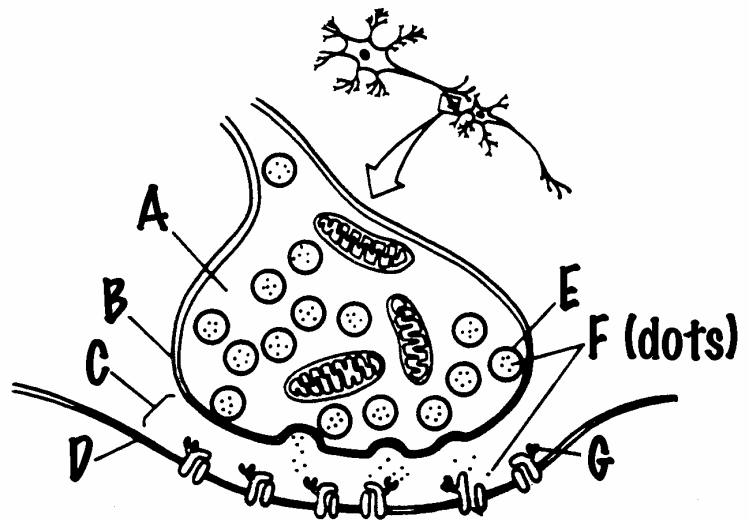
g. What reestablishes the original distribution of K^+ and Na^+ during the refractory period?

8. Listed below is the distribution / movement of Na⁺ and K⁺ during the transmission of a nerve impulse. Put the following in the correct order.

- ___1___ More Na⁺ outside the neuron; more K⁺ inside the neuron
- _____ Na⁺ gates open
- _____ Na⁺ gates close & K⁺ gates open
- _____ Na⁺ rushes into the neuron
- _____ K⁺ rushes out of the neuron
- _____ More K⁺ is outside the neuron; more Na⁺ is inside the neuron
- _____ Na⁺ is pumped out of the cell & K⁺ is pumped into the cell

9. Match the structure with the correct letter from the diagram below.

- _____ Neurotransmitter
- _____ Postsynaptic membrane
- _____ Presynaptic membrane
- _____ Receptor site (protein)
- _____ Synaptic cleft
- _____ Synaptic end bulb
- _____ Synaptic vesicle



10. Nervous system organization tends to correlate with body symmetry. Explain this statement providing examples from the animal kingdom.

11. Define cephalization.

12. Why was cephalization important in the evolution of the animal kingdom?

13. Complete the following chart comparing the two major divisions of the vertebrate nervous system.

Division	Central Nervous System	Peripheral Nervous System
Components/ Parts		
Function		

14. What are the two divisions of the peripheral nervous system? Provide a general function for each.

Division	Function

15. What are the two divisions of the autonomic nervous system?

16. Use Figure 48.16 page 979 to identify the autonomic nervous system division (**P**arasympathetic or **S**ympathetic) describe in each of the following.

_____ Long preganglionic fibers

_____ Short preganglionic fibers

_____ Long postganglionic fibers

_____ Short postganglionic fibers

_____ Ganglia near the CNS

_____ Ganglia near the effector

_____ Originate from the thoracic and lumbar regions of the spine

_____ Originate from the brain and sacrum

_____ Constricts the pupil

_____ Dilates the pupil

_____ Increases activity of the digestive system

_____ Decreases the activity of the digestive system

_____ Stimulates defecation and urination

_____ Constricts respiratory passageways

_____ Dilates respiratory passageways

_____ Reduces heart rate and the force of cardiac contractions

_____ Increases heart rate and the force of cardiac contractions

_____ Centers on relaxation, food processing, and energy absorption

_____ Prepares the body for emergencies; triggers the fight or flight response

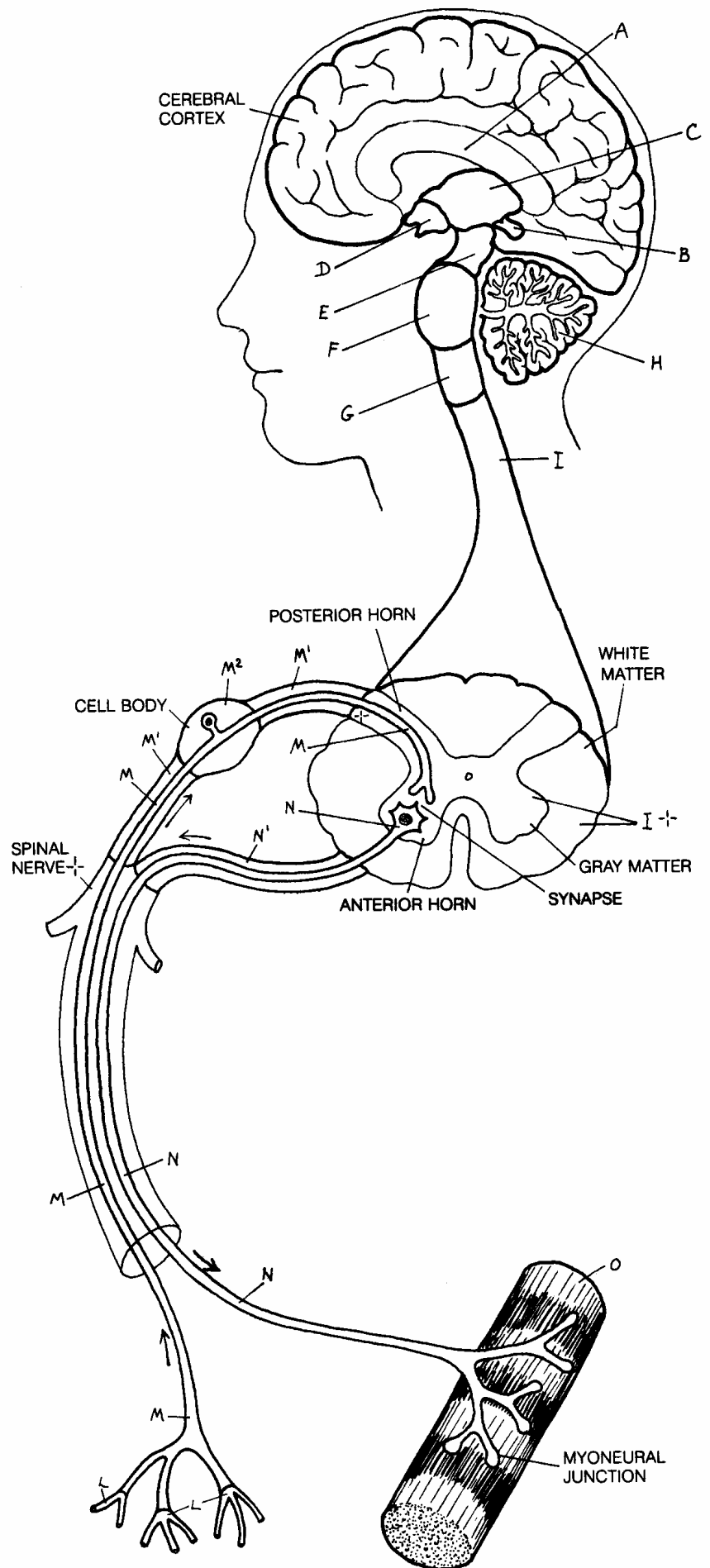
17. Color the following parts on the diagram.

Central Nervous System

- Cerebral hemisphere (A)
- Epithalamus (B)
- Thalamus (C)
- Hypothalamus (D)
- Midbrain (E)
- Pons (F)
- Medulla (G)
- Cerebellum (H)
- Spinal cord (I)

Simple Spinal Reflex

- Receptor (L)
- Sensory neuron (M)
- Posterior root (M^1)
- Posterior root ganglion (M^2)
- Motor neuron (N)
- Anterior root (N^1)
- Effector (O)



18. Match the structure with the correct function.

A. Brainstem

B. Cerebellum

C. Cerebral hemispheres

D. Epithalamus

E. Hypothalamus

F. Thalamus

_____ Contains centers that control breathing, heart and blood vessel activity, swallowing, vomiting, digesting

_____ Helps coordinate large-scale body movements such as walking

_____ Contains centers for receipt and integration of several types of sensory information

_____ Most of descending axons cross from one side to CNS to the other; results in right side of brain controlling left side of body

_____ Medulla, pons, midbrain

_____ Coordination of movement

_____ Receives information about position of joints, length of muscles, information from auditory and visual systems, and information from motor pathways; uses information to provide automatic coordination of movements and balance

_____ Contains the pineal body and choroid plexus

_____ Major integration center; major input center for sensory information going to cerebrum; main output center for motor information leaving cerebrum

_____ Produces hormones; contains centers that regulate body temperature, hunger, thirst, fight-or-flight response, sexual responses, pleasure

_____ Center for higher thought processes; thinking, speech, vision, hearing