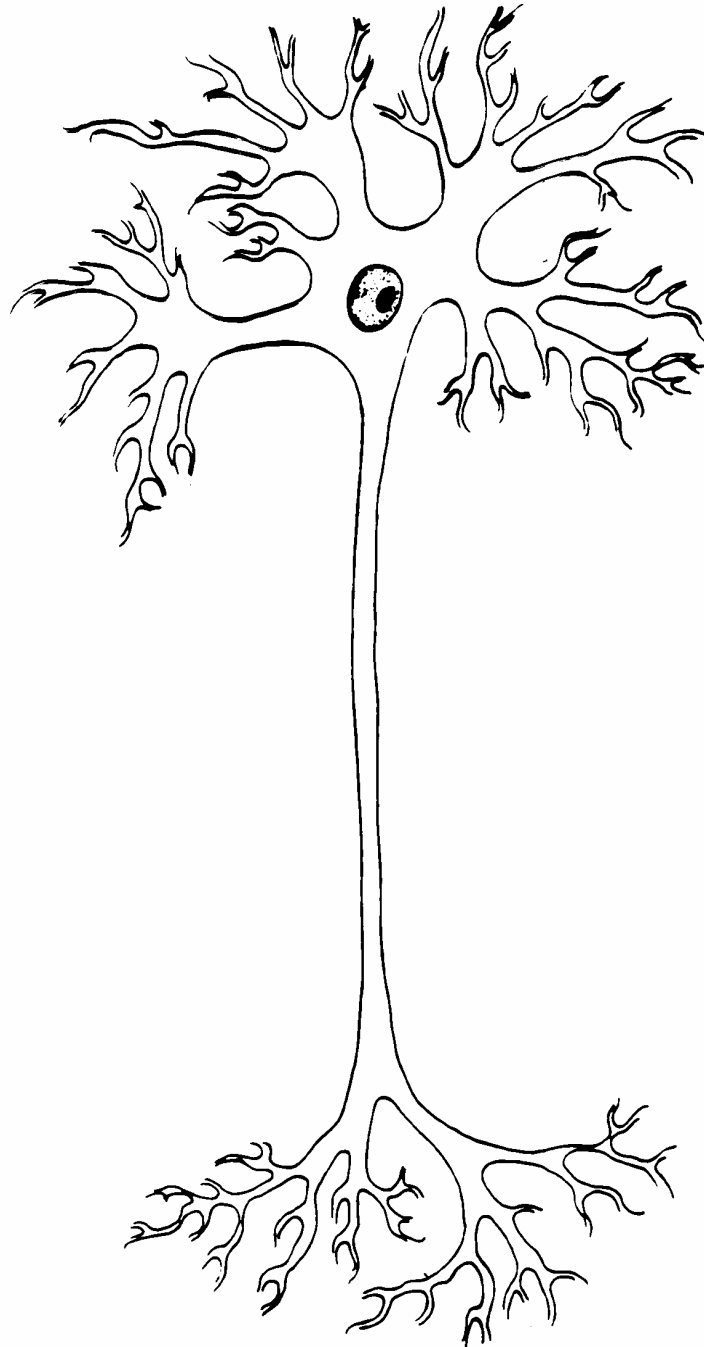
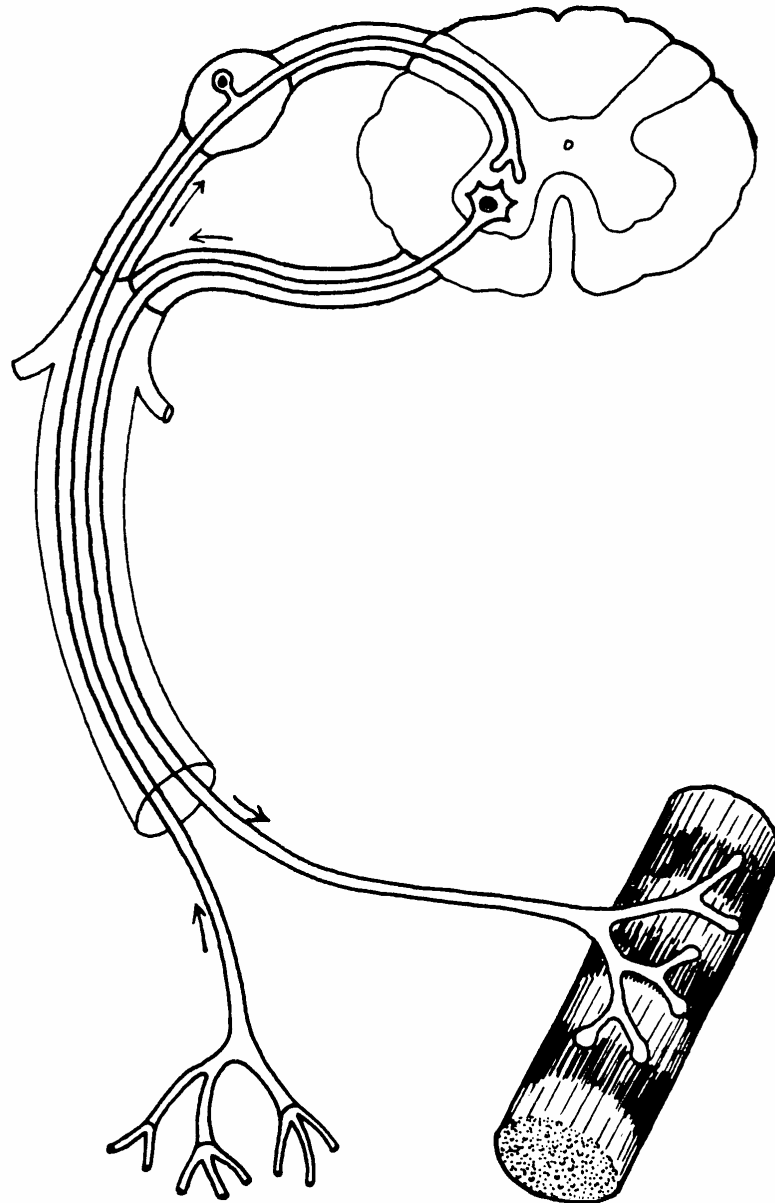


NERVOUS SYSTEMS

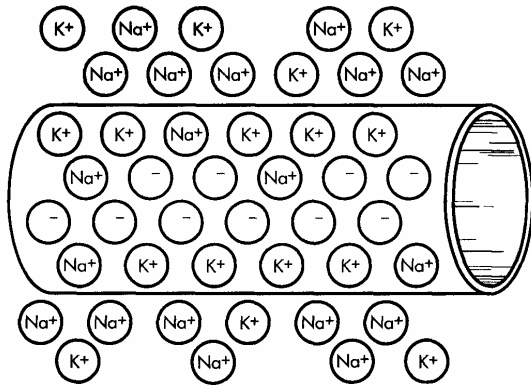
NEURON



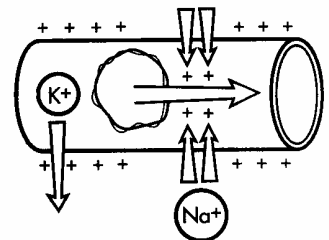
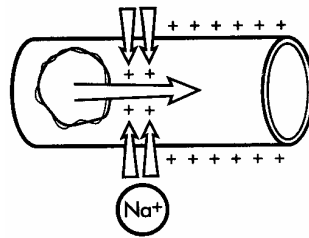
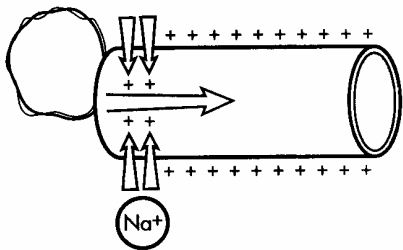
SIMPLE REFLEX



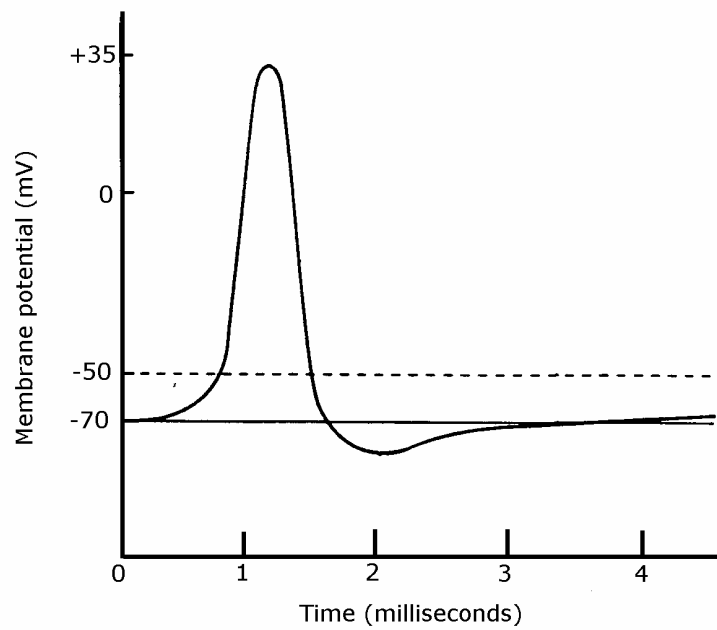
RESTING POTENTIAL



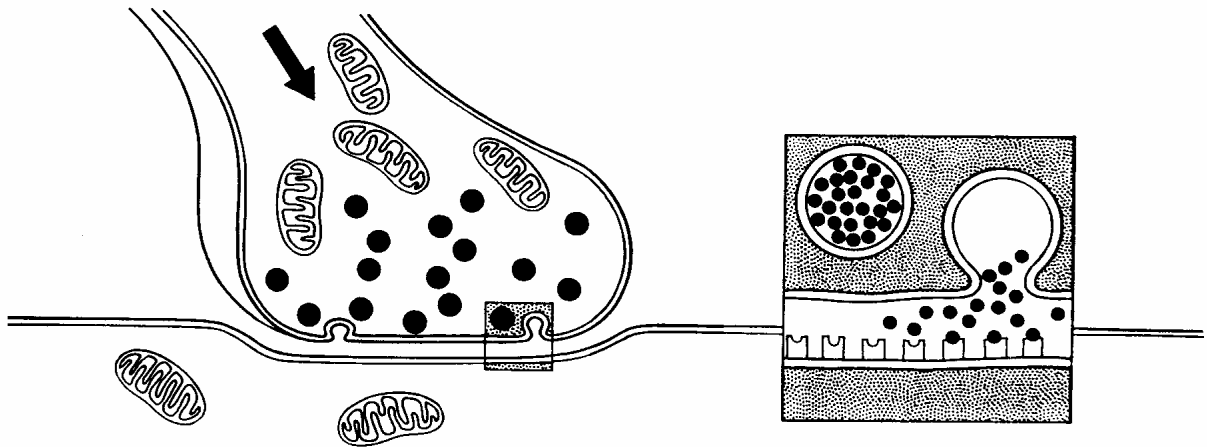
ACTION POTENTIAL



ACTION POTENTIAL – GRAPH



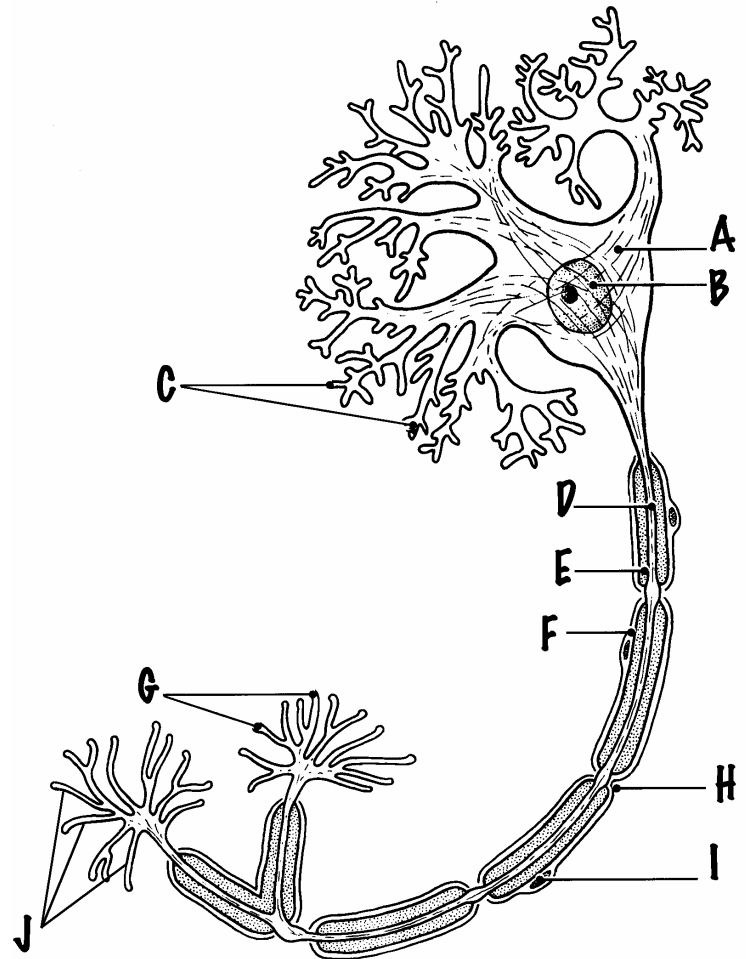
TRANSMISSION ACROSS A SYNAPSE



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

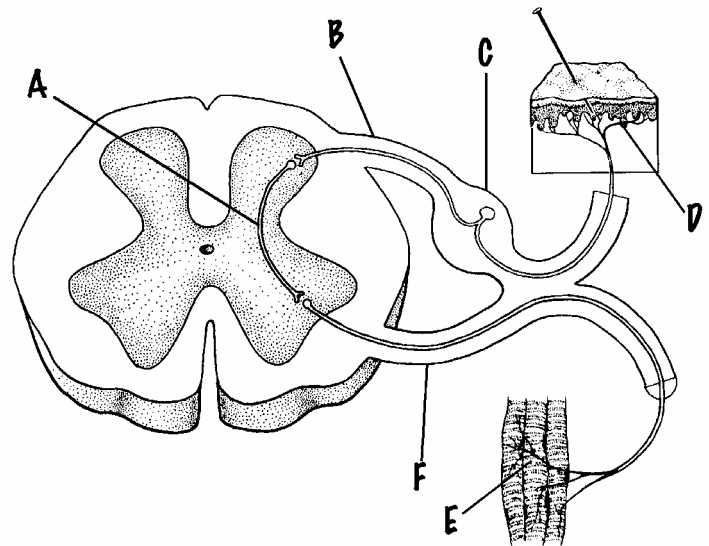


2. Identify each of the following as true of the sensory neuron (**SN**) or the motor neuron (**MN**)

_____ 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

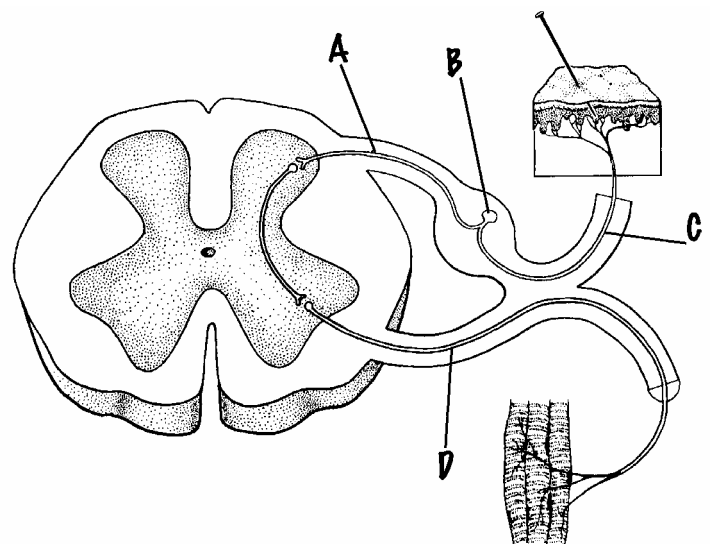
3. Match the following parts with the correct letter from the diagram.

_____ 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
 _____ Na⁺ ion gates open and Na⁺
 rush into cell
 _____ K⁺ gates open & Na⁺ gates close;
 K⁺ rush out of cell
 _____ More K⁺ moved out of cell than
 necessary to reestablish charge
 across membrane
 _____ Na⁺ pumped out of cell & K⁺
 pumped into cell

A. Depolarization
 B. Hyperpolarization
 C. Refractory Period
 D. Repolarization
 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

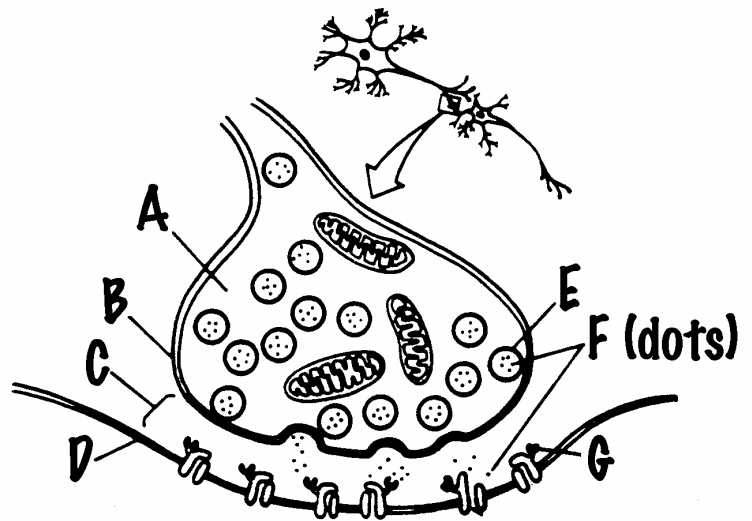
_____ Presynaptic membrane

_____ 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

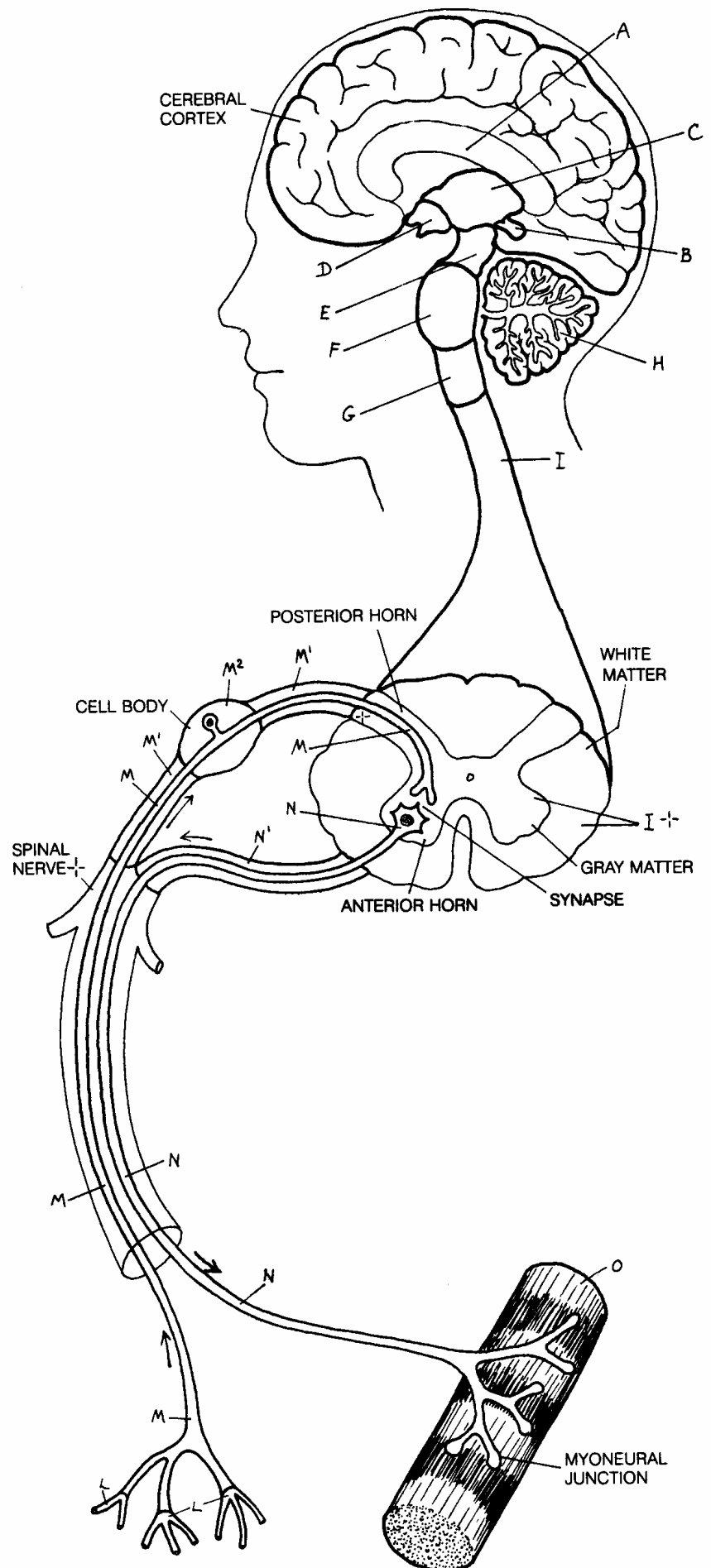
17. Color the following parts on the diagram.

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