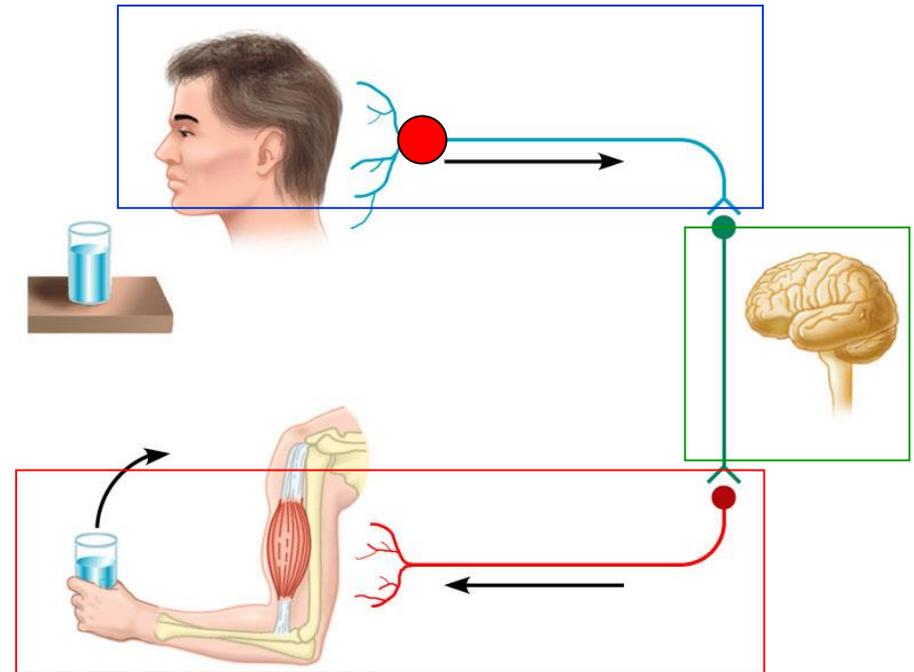


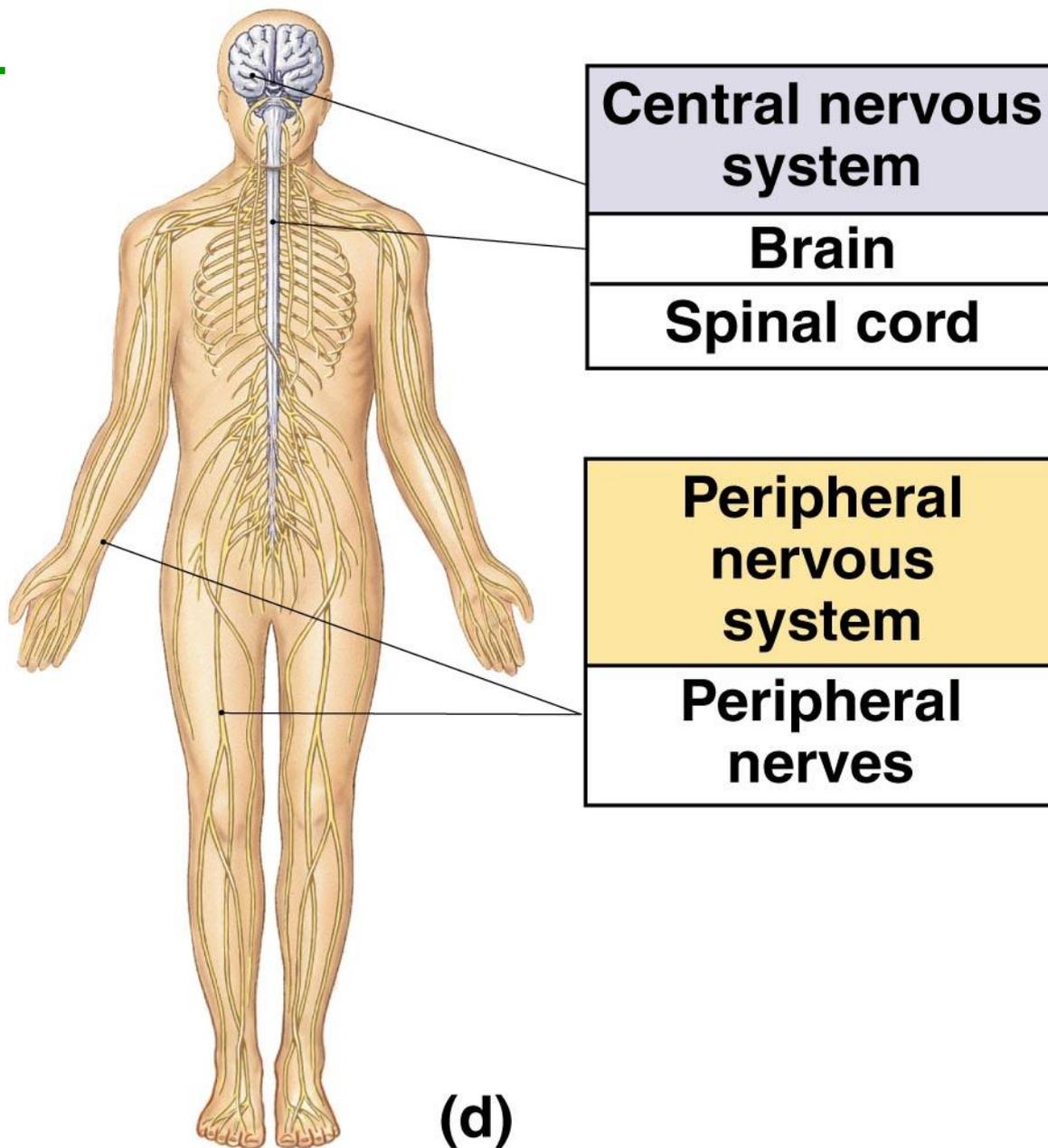
# Introduction to Nervous Tissue



# Nervous Tissue

- Controls and integrates all body activities within limits that maintain life
  
- Three basic functions
  1. sensing changes with **sensory receptors**
  2. **interpreting** and remembering those changes
  3. **reacting** to those changes with effectors (motor function)

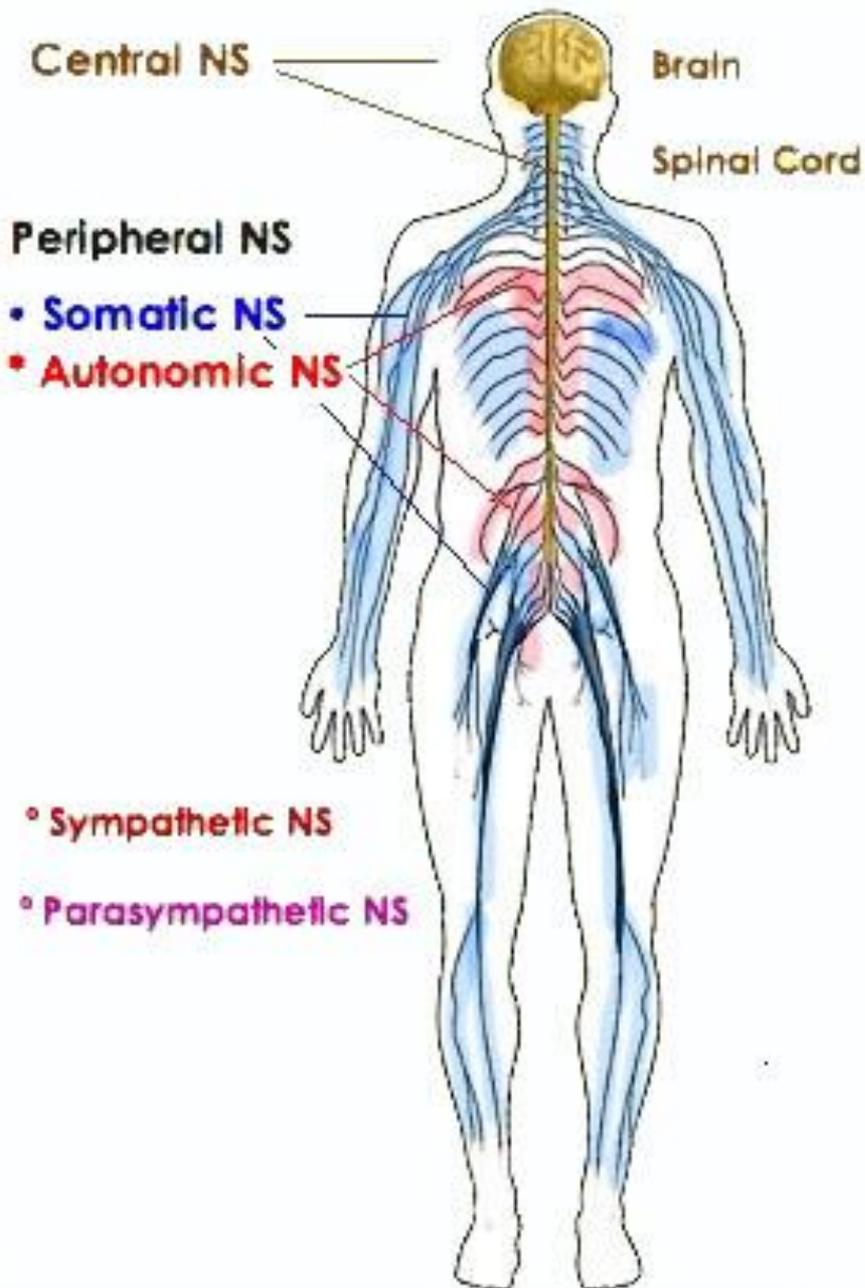






The PNS is divided into :

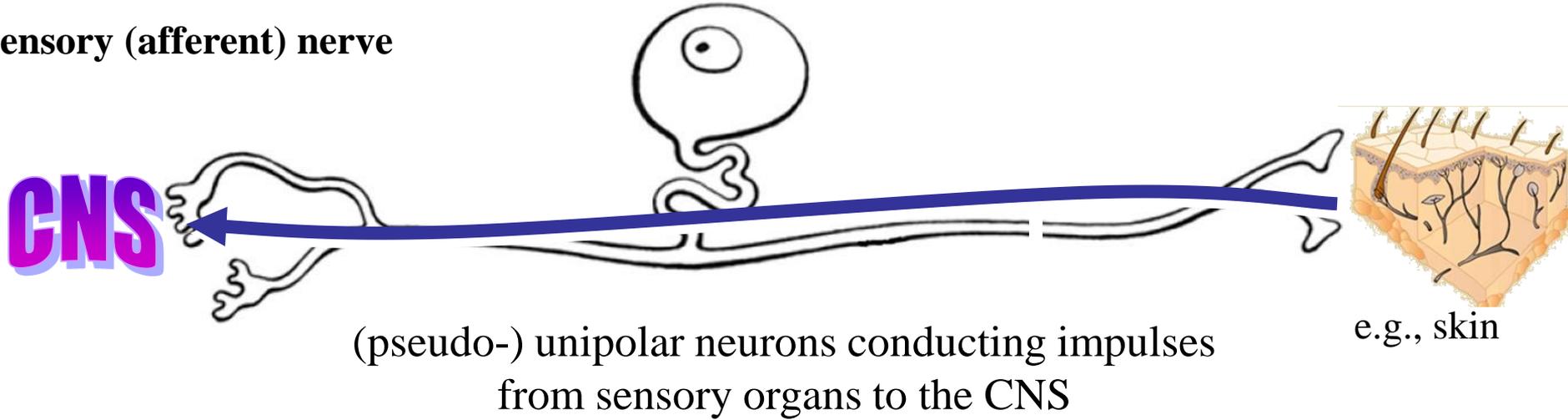
- 1- a **somatic nervous system (SNS)**
- 2- an **autonomic nervous system (ANS)**



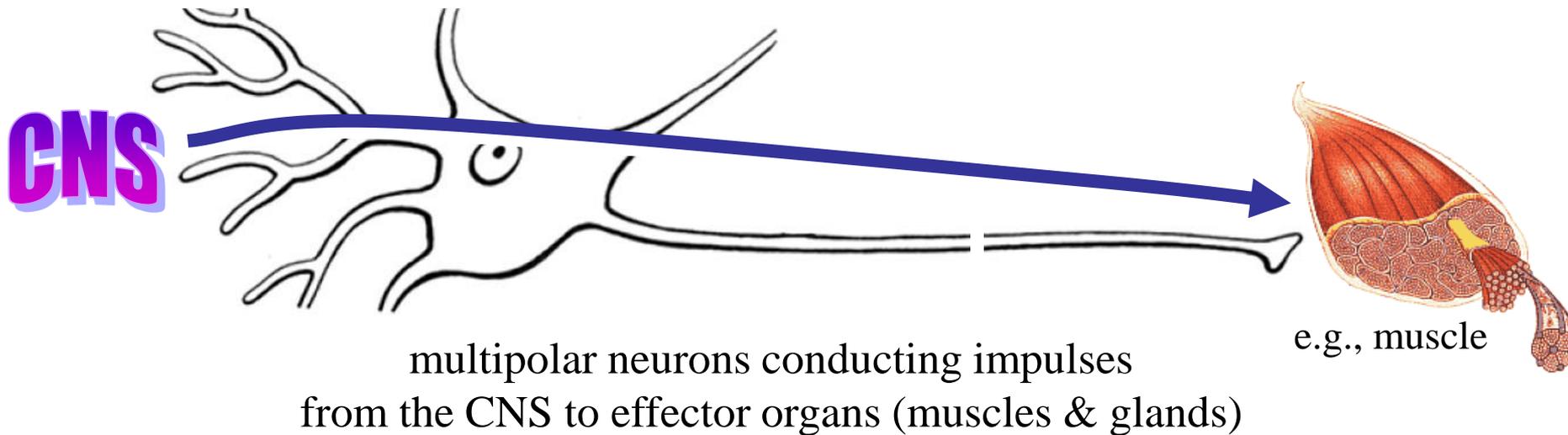


# Sensory (Afferent) vs. Motor (Efferent)

sensory (afferent) nerve

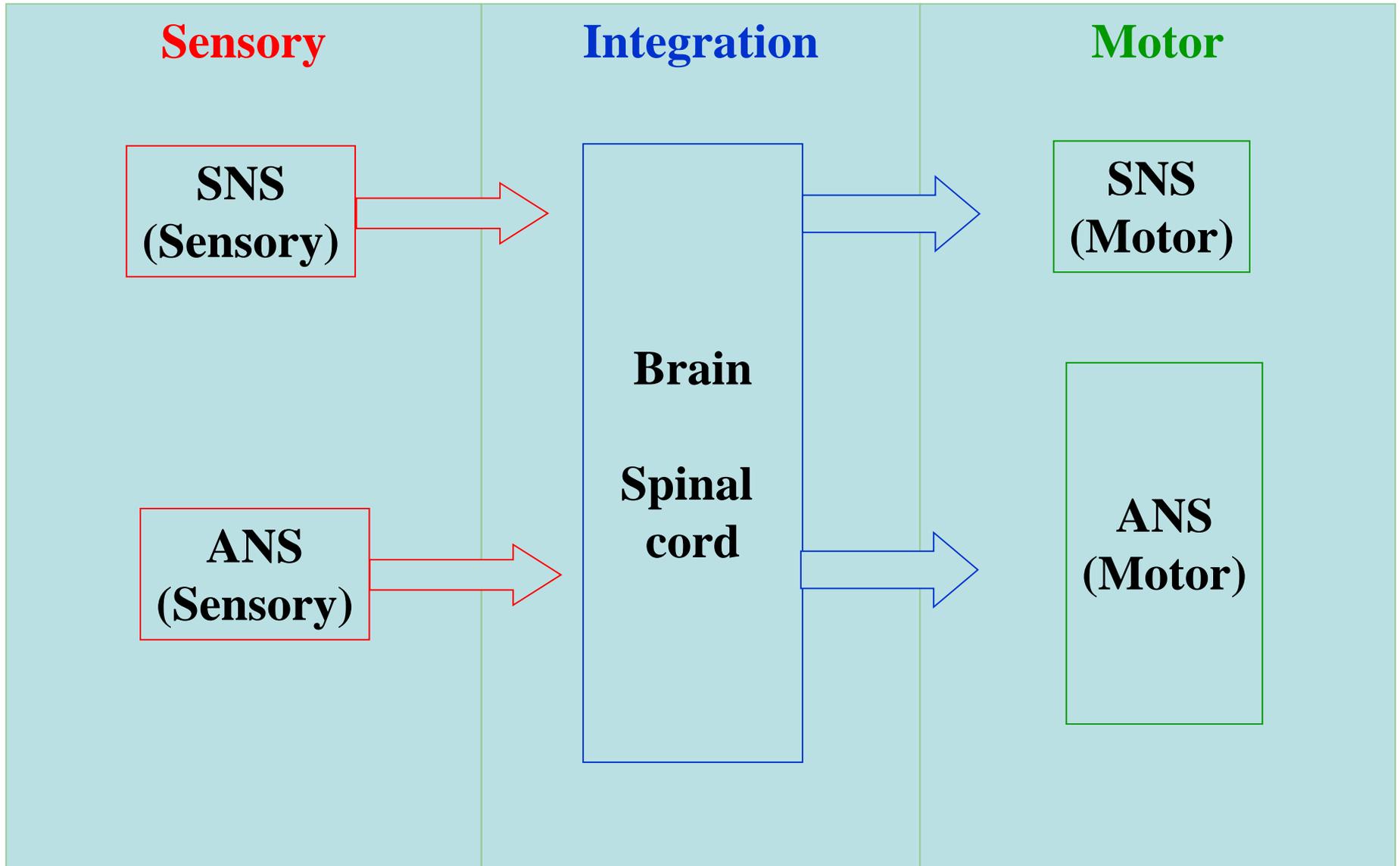


motor (efferent) nerve





# Organization

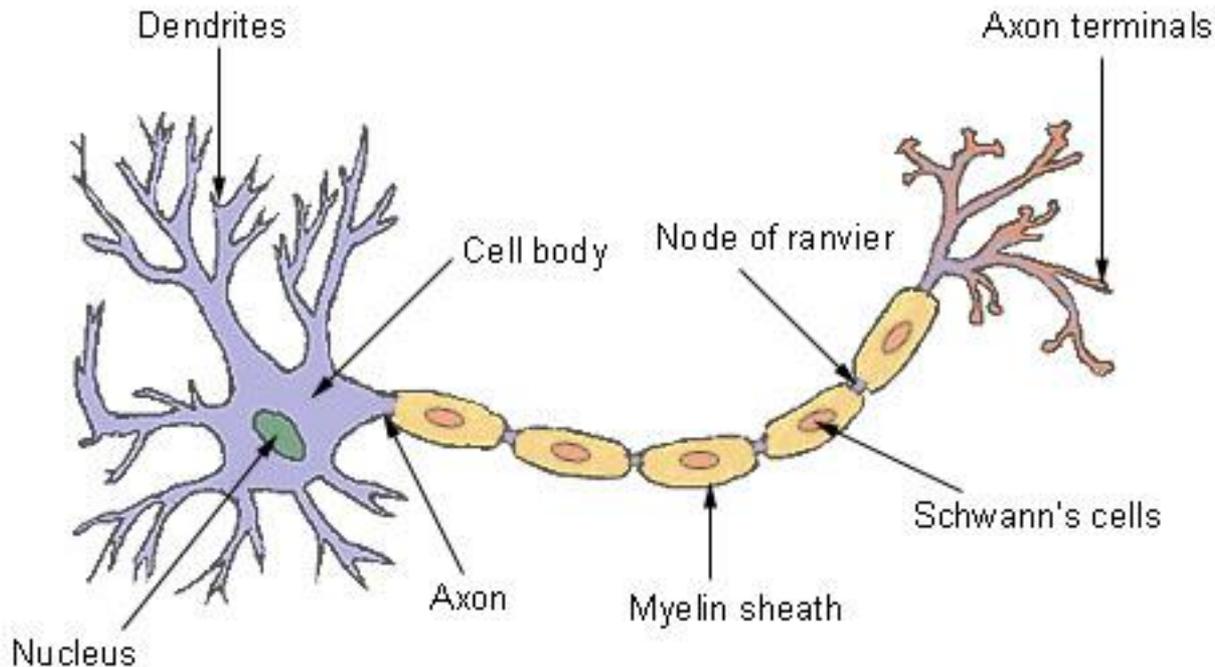




Neuron has three parts:

- (1) a cell body: *perikaryon or soma*
- (2) dendrites
- (3) an axon

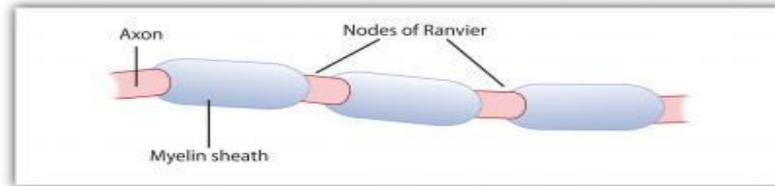
### Structure of a Typical Neuron





# Neurons

- Dendrites: carry nerve impulses toward cell body
- Axon: carries impulses away from cell body
- Synapses: site of communication between neurons using chemical neurotransmitters
- Myelin & myelin sheath: lipoprotein covering produced by glial cells that increases axonal conduction velocity



dendrites

axon with  
myelin sheath

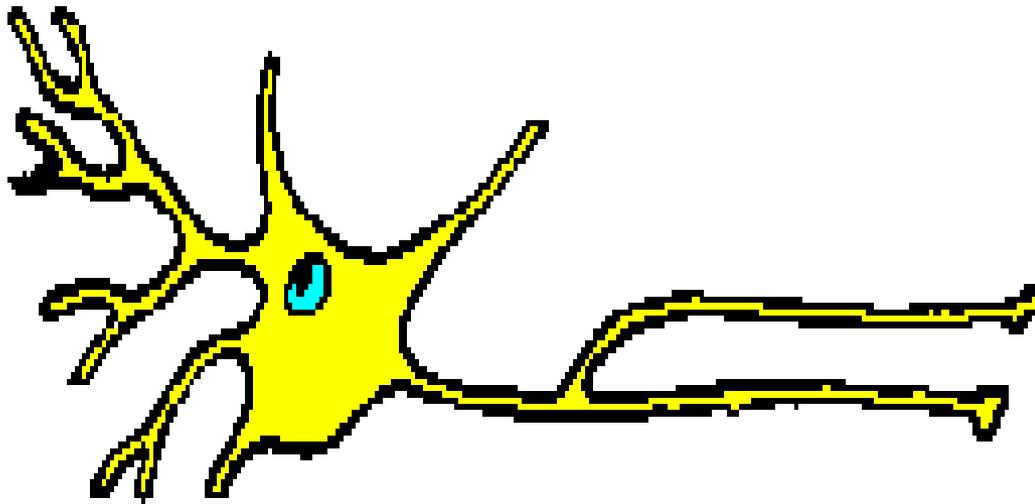
cell  
body

Schwann  
cell

synapses



*Notice that action potential propagation is unidirectional*

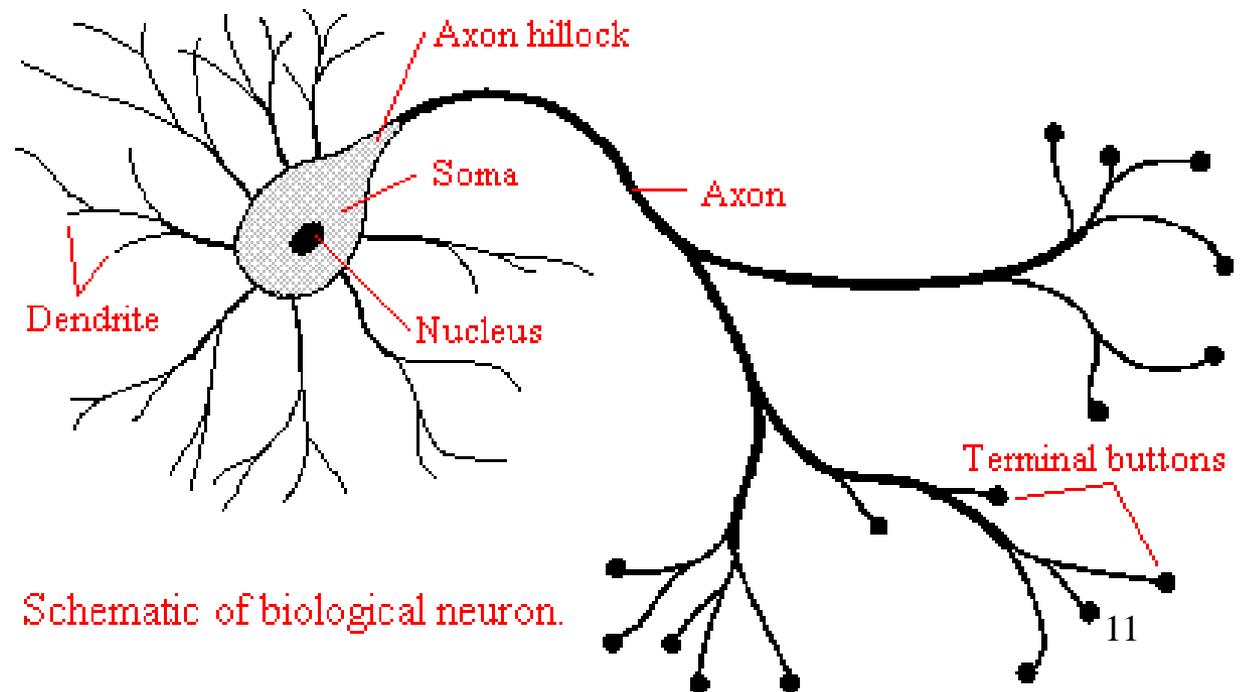


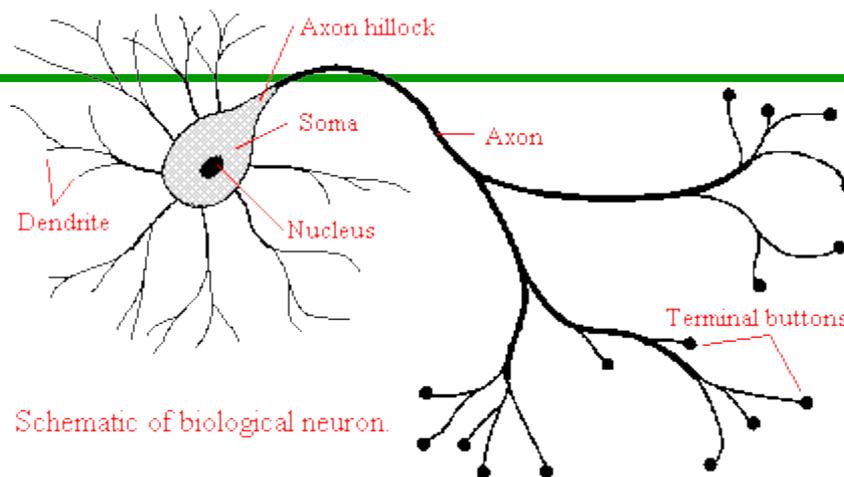




# Structure of neurons

- **Axoplasm:** cytoplasm of axon
- **Axolemma:** cell membrane of axon
- **Axon hillock:** where axon originates from soma
- **Synaptic boutons:** swelling of axon terminal
- **Synapse:** junction axon makes with cell acting upon
- Synaptic vesicles





## Axon

- Nearly constant diameter
- Much Longer
- Branches less profusely
- Distal end forms terminal arborization and terminal boutons
- Mostly myelinated, could be unmyelinated
- Axoplasm contains mitochondria, microtubules, neurofilaments and SER but not RER and ribosomes
- Bidirectional transport along the axon

## Dendrite

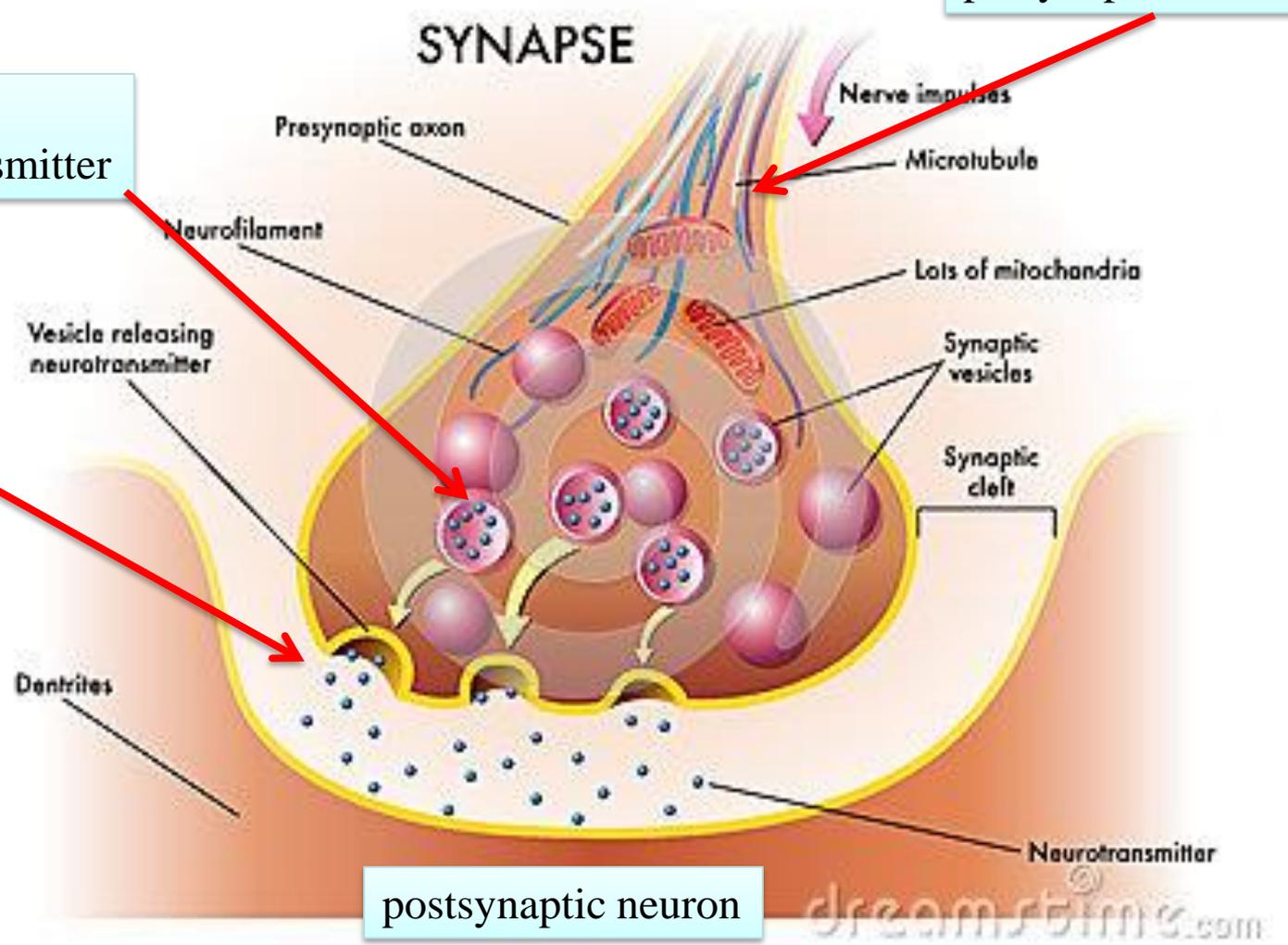
- Becomes much thinner (tapering)
- short
- Branches profusely
- The cytoplasm of its base is similar to cell body
- Dendritic spines (points of synapse with other neurons)
- Typically unmyelinated

# SYNAPSE

presynaptic neuron

Synaptic vesicles contain the neurotransmitter

synaptic cleft



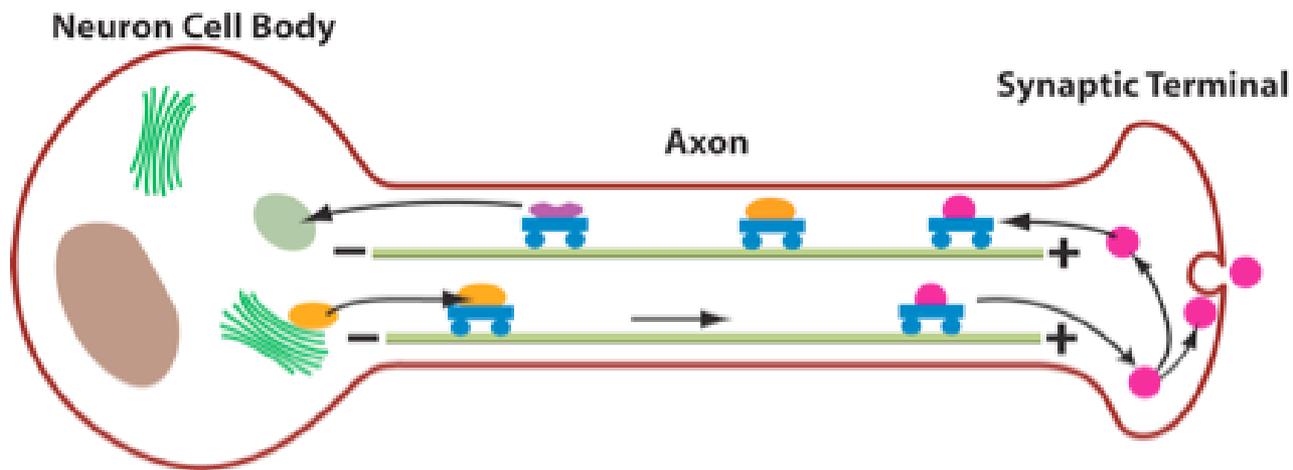
postsynaptic neuron



## Axonal transport

Anterograde: movement away from soma

Retrograde: movement up toward soma





## Neurons:

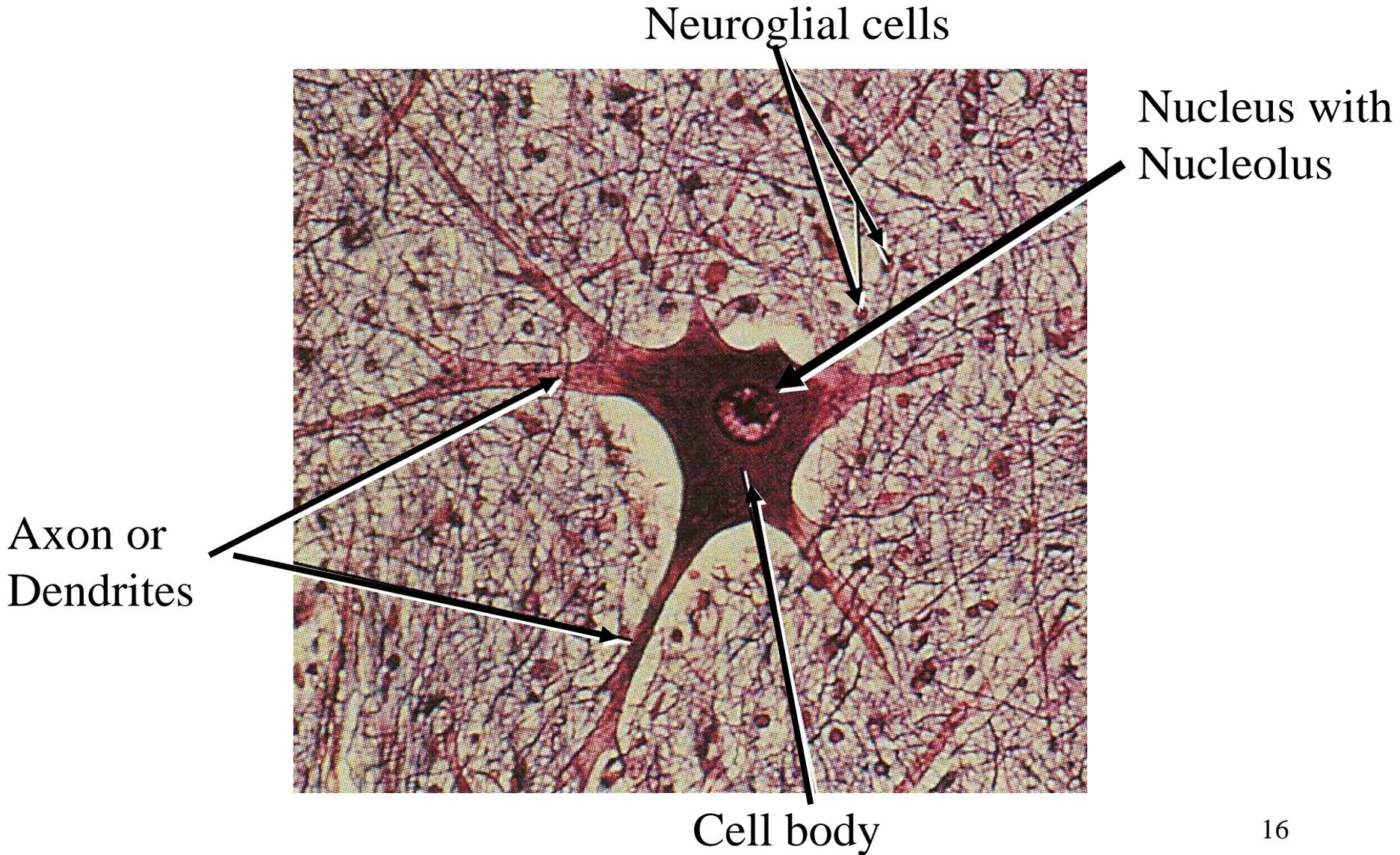
- Sensing, thinking, remembering, controlling muscle activity, and regulating glandular secretions
- Do not divide (no centriols!!!)
- Long lived
- High metabolic activity
- **Electrically excitable**

## Neuroglia :

- Support, nourish, and protect neurons
- Divide
- Smaller cells but they greatly outnumber neurons



# Parts of a Neuron



## 1. Multipolar neurons

- usually have several dendrites and one axon
- motor neurons

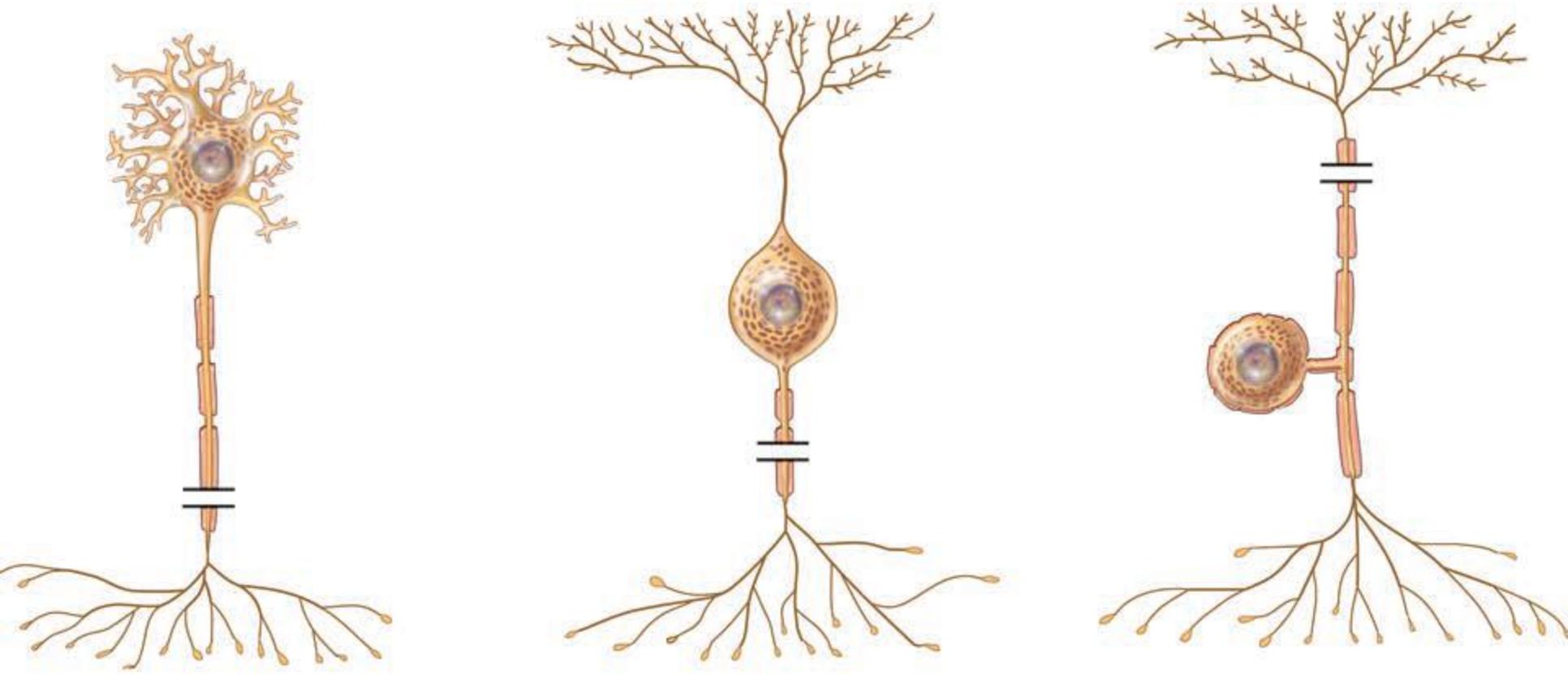
## 2. Bipolar neurons

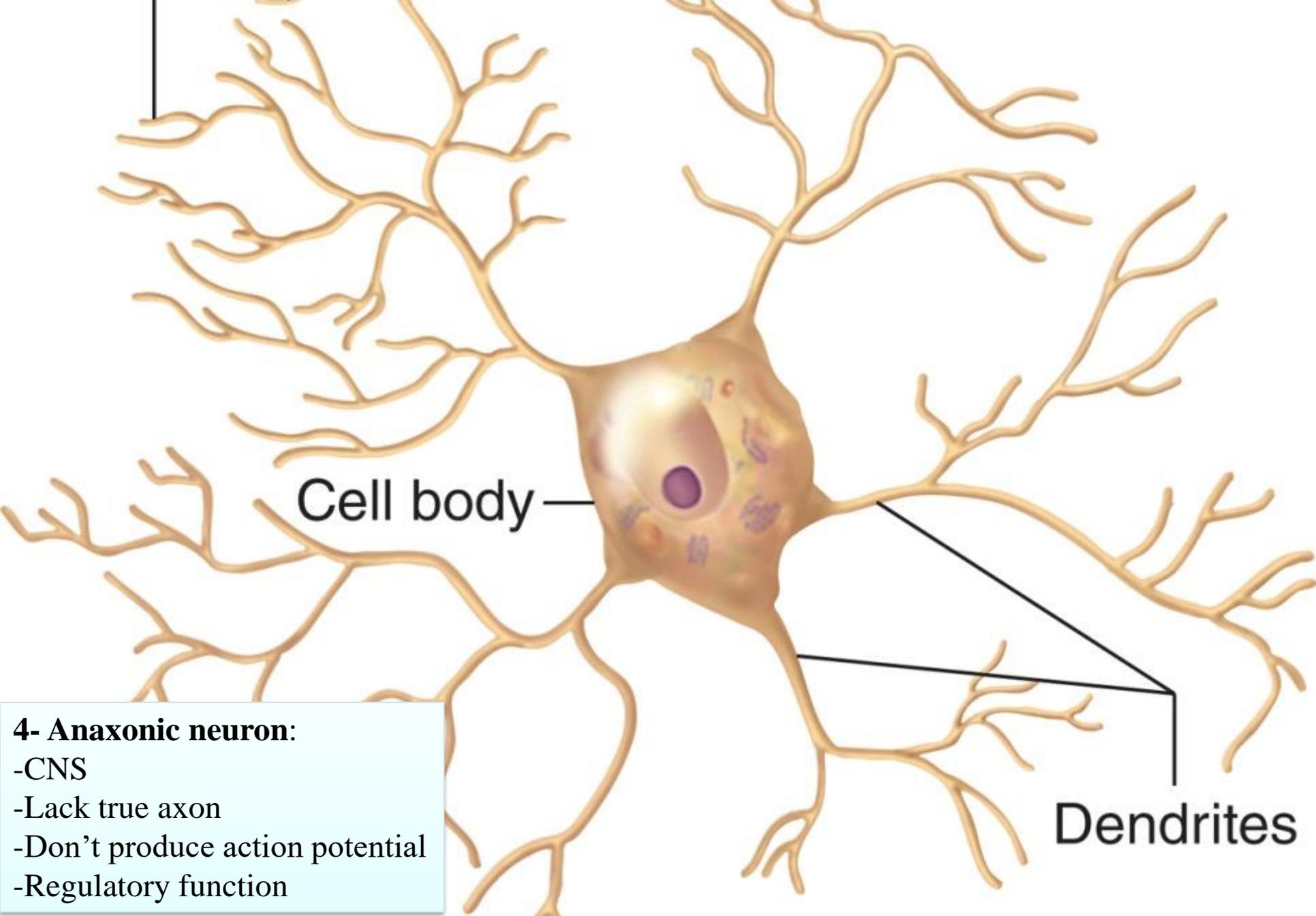
- have one main dendrite and one axon
- the retina of the eye

## 3. Unipolar neurons (pseudounipolar neurons)

- sensory neurons

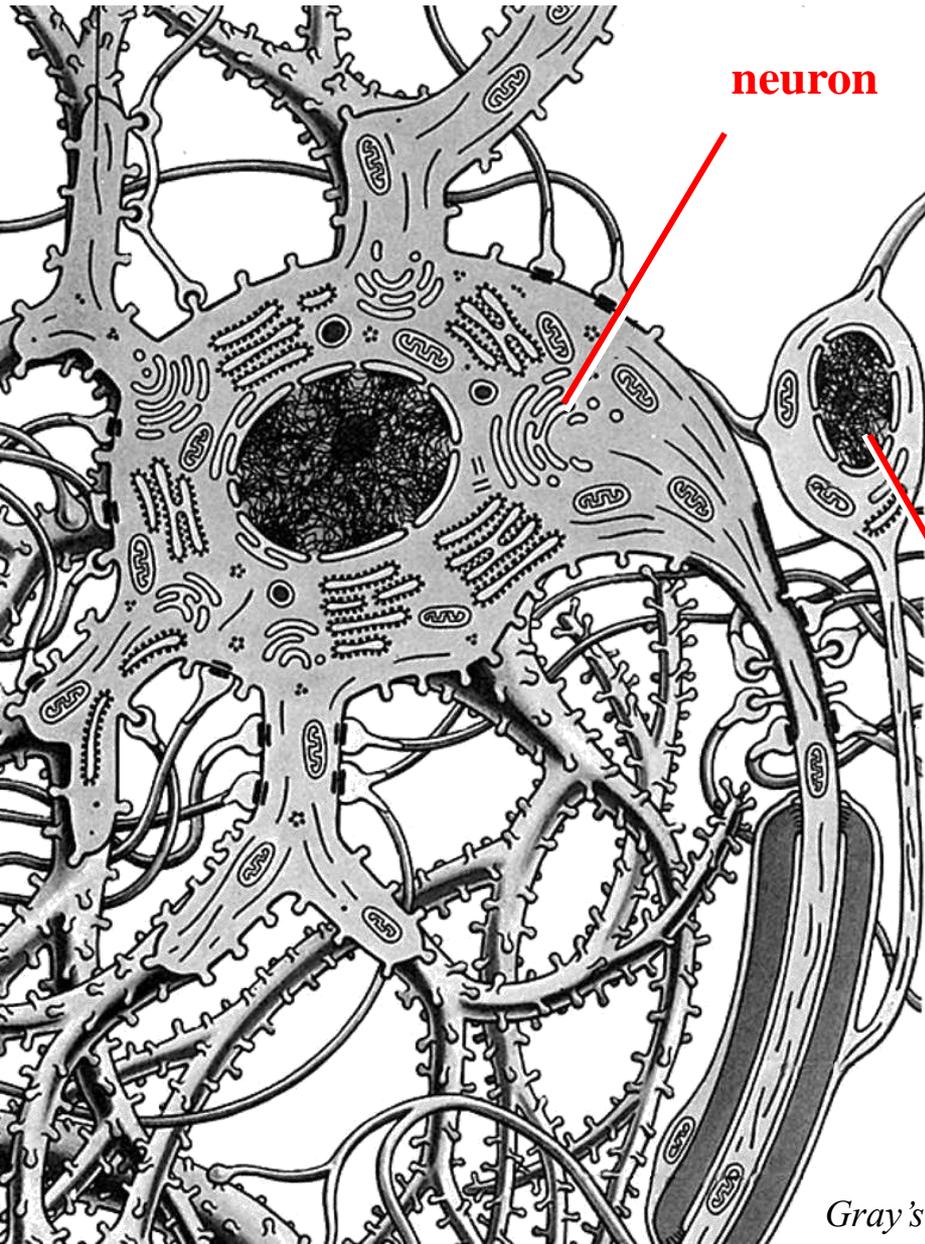
## Structural classification of neurons





- 4- Anaxonic neuron:**
- CNS
  - Lack true axon
  - Don't produce action potential
  - Regulatory function

Figure 9-4



**neuron**

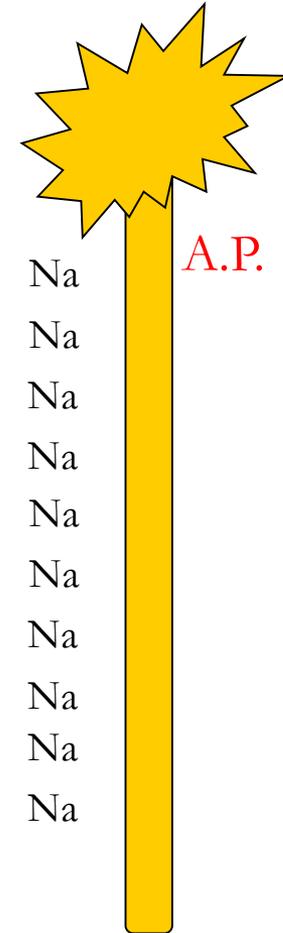
1. Tissues: neurons vs. glia
2. Position: CNS vs. PNS
3. Function 1: sensory vs. motor
4. Function 2: somatic vs. visceral

**glial cell**



# Continuous versus Saltatory Conduction

1. **Continuous conduction (unmyelinated fibers)**
2. **Saltatory conduction (myelinated fibers)**

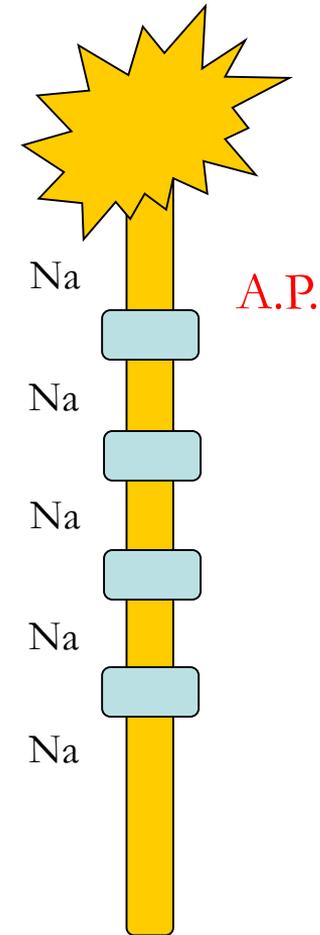




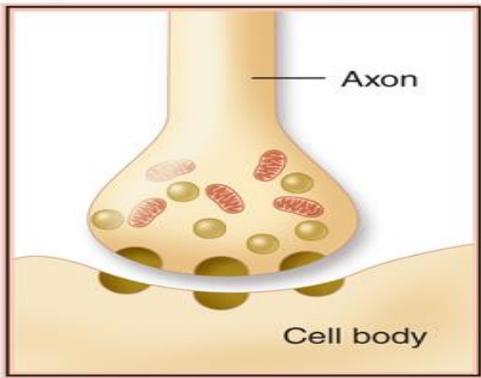
# Saltatory Conduction

- Nerve impulse conduction in which the impulse **jumps** (**Salta**) from node to node

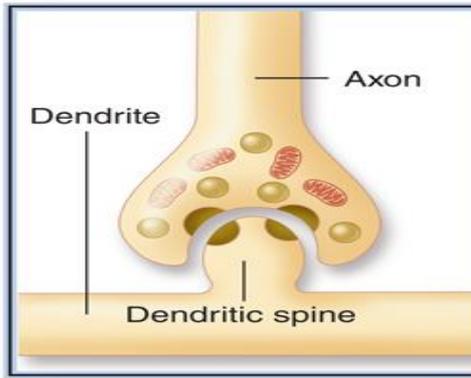
Local anesthetics!!!!!!



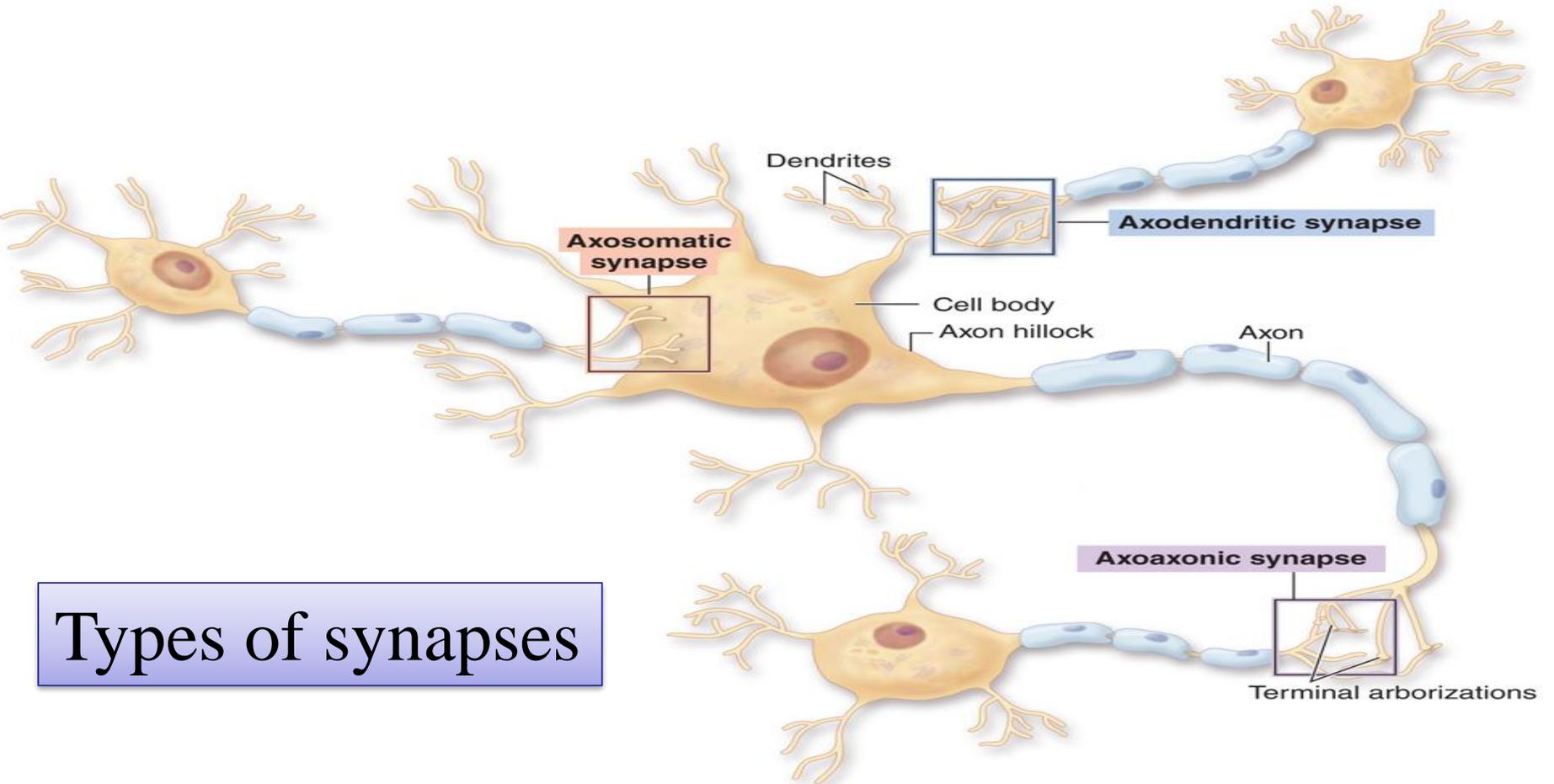
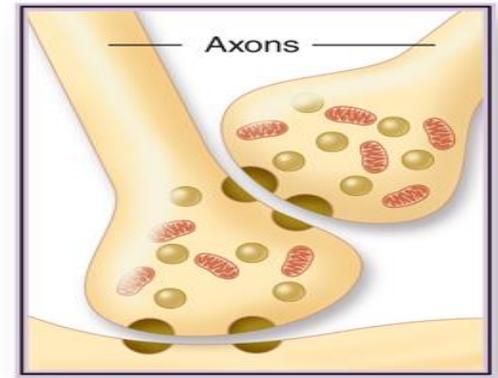
**Axosomatic synapse**



**Axodendritic synapse**



**Axoaxonic synapse**

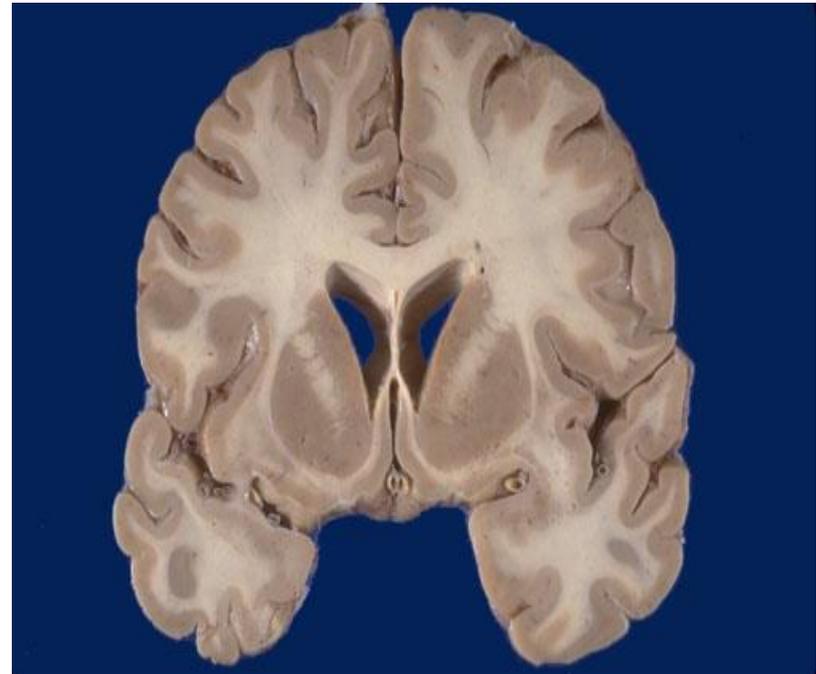


**Types of synapses**



## *Clusters of Neuronal Cell Bodies*

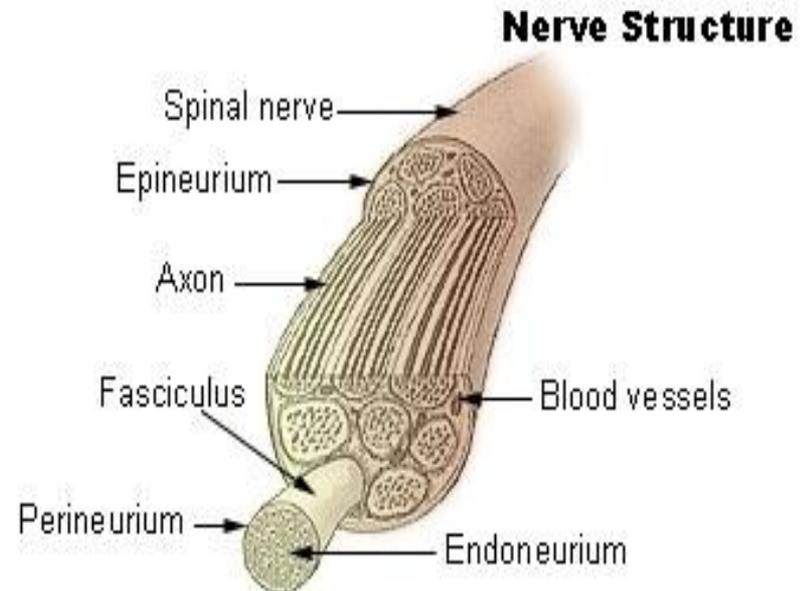
1. a **ganglion** (plural is ganglia) a cluster of neuronal cell bodies located in the PNS.
2. a **nucleus**: a cluster of neuronal cell bodies located in the *CNS*.

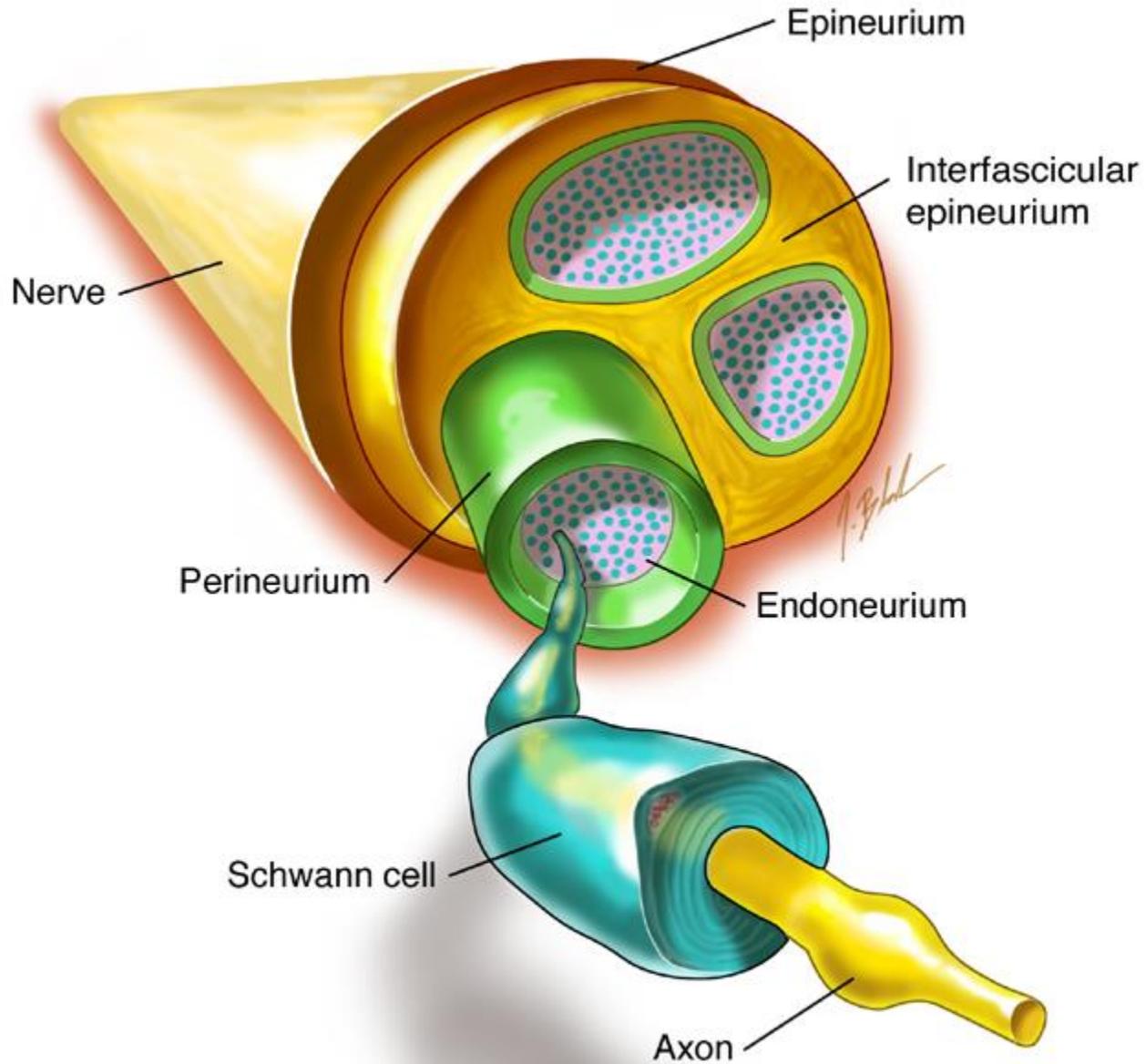




## Bundles of Axons

- A **nerve:** is a bundle of axons that is located in the *PNS*.
  - Cranial nerves connect the brain to the periphery
  - spinal nerves connect the spinal cord to the periphery
  
- A **tract:** is a bundle of axons located in the *CNS*.
  - Tracts interconnect neurons in the spinal cord and brain.





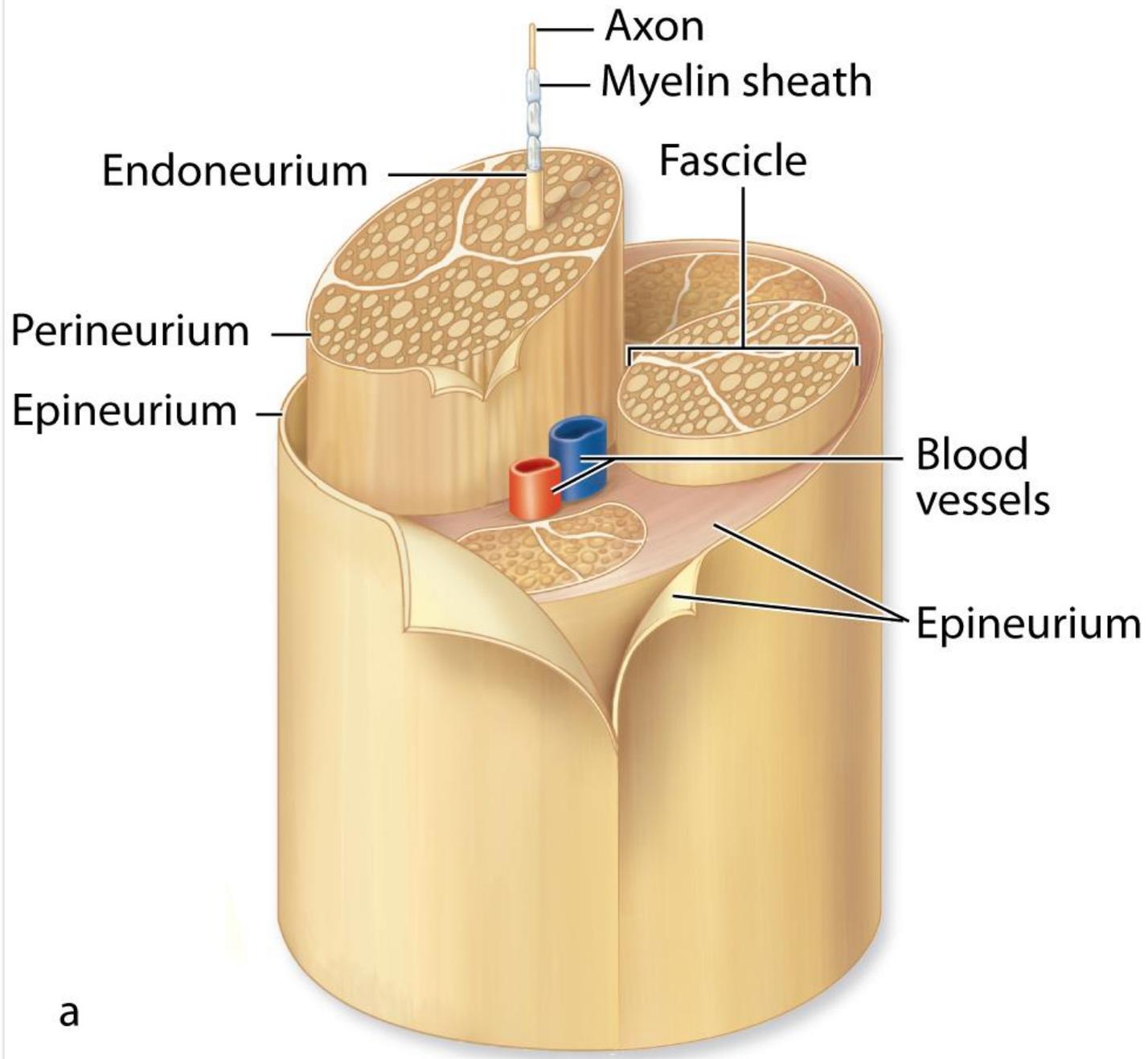


Figure 9-26

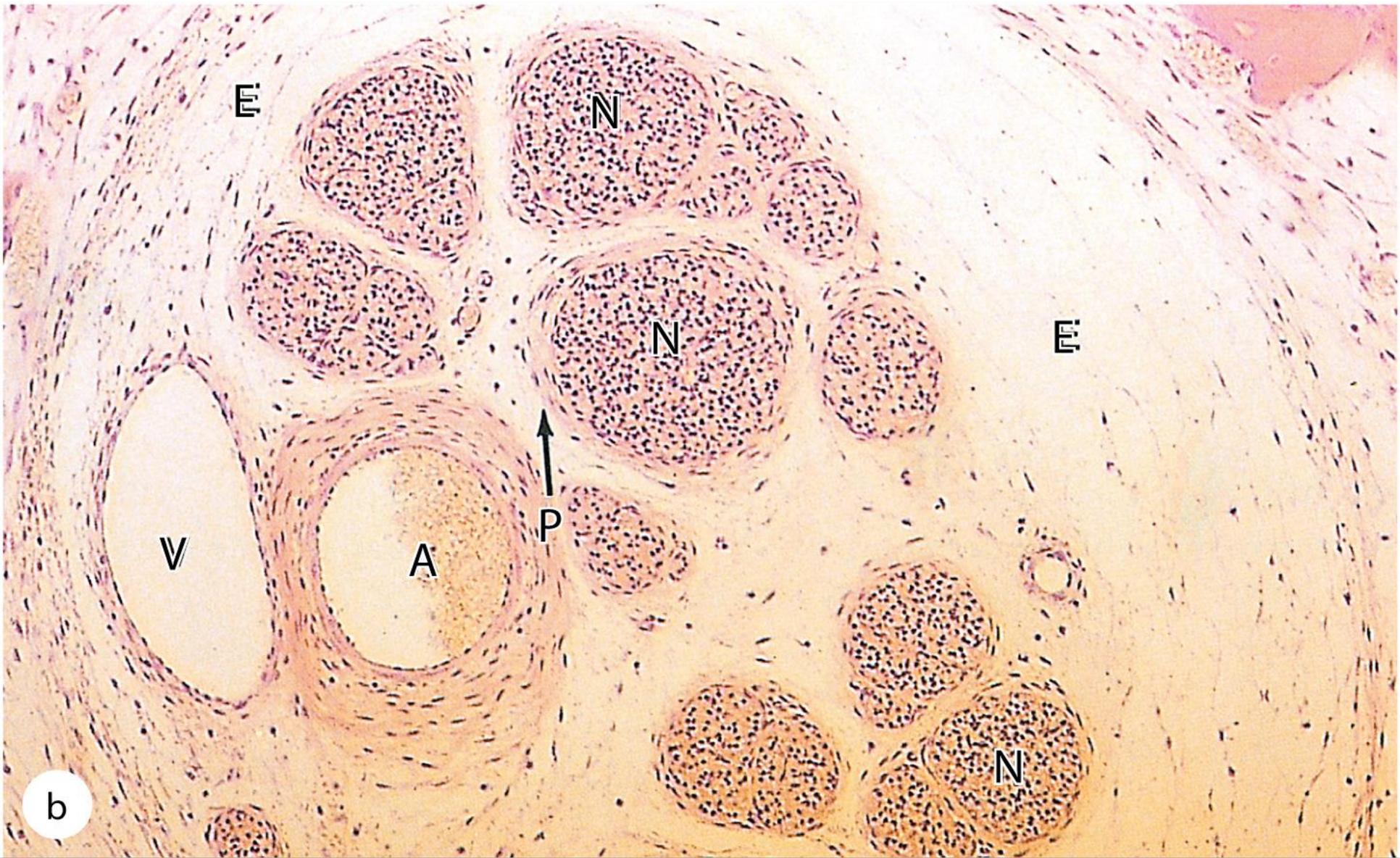


Figure 9-26

# Peripheral Nerve

