INTRODUCTION

- **Nervous tissue-->** Consists of two types of cells: ***neurons (nerve cells)*** and **neuroglial cell.**
- Nervous tissue has property of irritability and conductivity.

- Nerve cells are capable of receiving information from external and internal environment.

- About *10 million neurons* in human beings.
- **Size of neuron→ 10 um to 120 um**
- Neurons ***do not divide after birth***, so their number does not increases during lifetime.

COMPOSITION OF NERVOUS TISSUE

1)***Neuron (nerve cell)***—Structural and functional units of nervous system.

2)***Nerve cell processes***—Many radiating processes called ***dendrite*** and a single process called ***axon***.

3)***Neuroglia***—Supporting function for neurons and their processes.

- ***NEURON—***
- Functional cell of nervous tissue.

- **Consists of→**

→**Nerve *Cell body* --** Expanded portion.

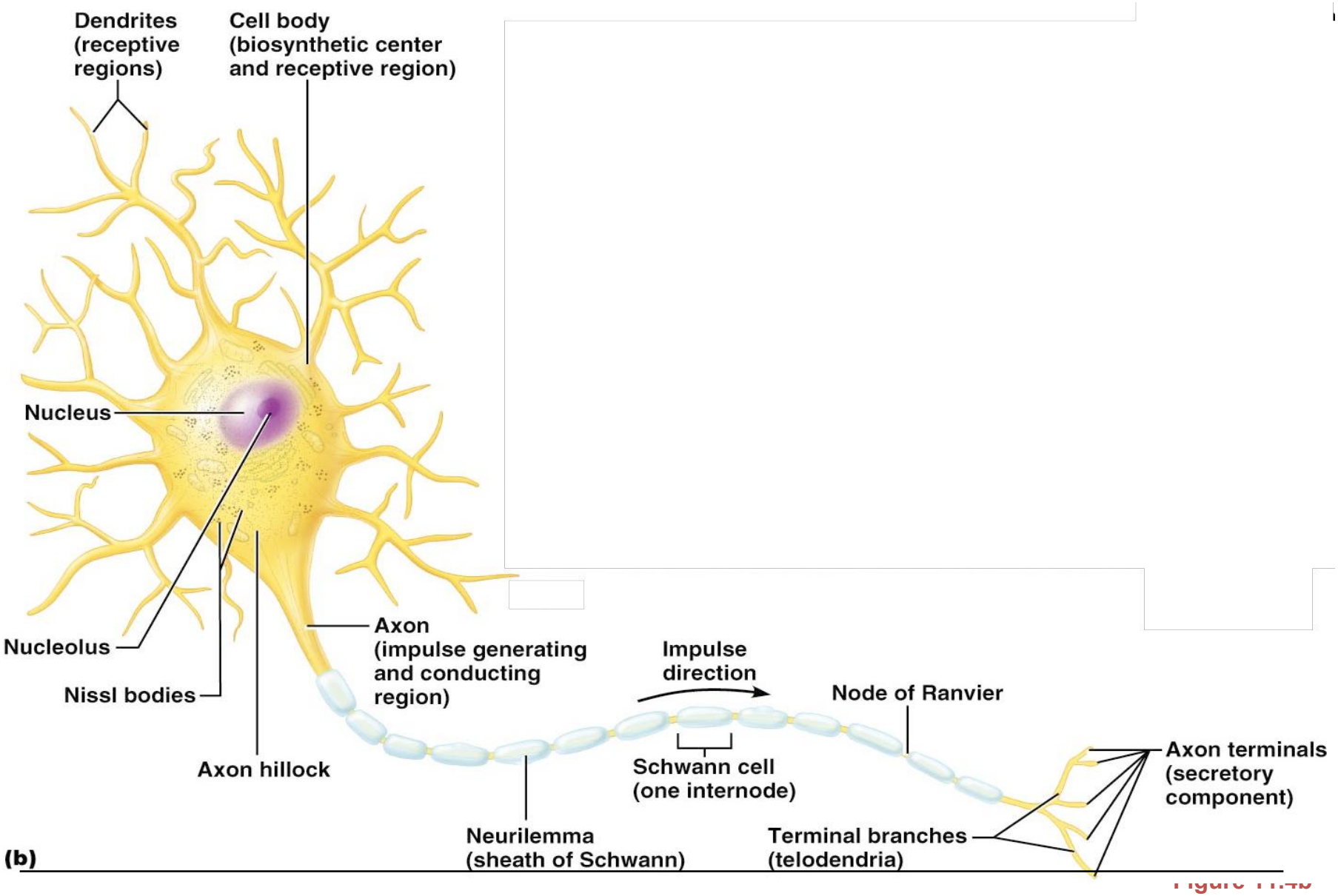
→**Nerve cell processes--** ***Dendrite*** and ***axon***, emerges from cell body.

- ***Nerve cell body—***
- ***Contains:--***
- ***Nucleus*—**large, spherical and centrally located.

- ***Nissl bodies*—**large aggregations of rough endoplasmic reticulum.

- ***Melanin pigments***—dark brown granules in substantia nigra.

Neurons (Nerve Cells)



- ***Nerve cell processes—***

- Elongated cytoplasmic processes originate from the cell body
- Two types – **Axon** (single)
  - **Dendrite** (multiple)
- **Nerve fibre** term used for nerve cell process (axon or dendrites).

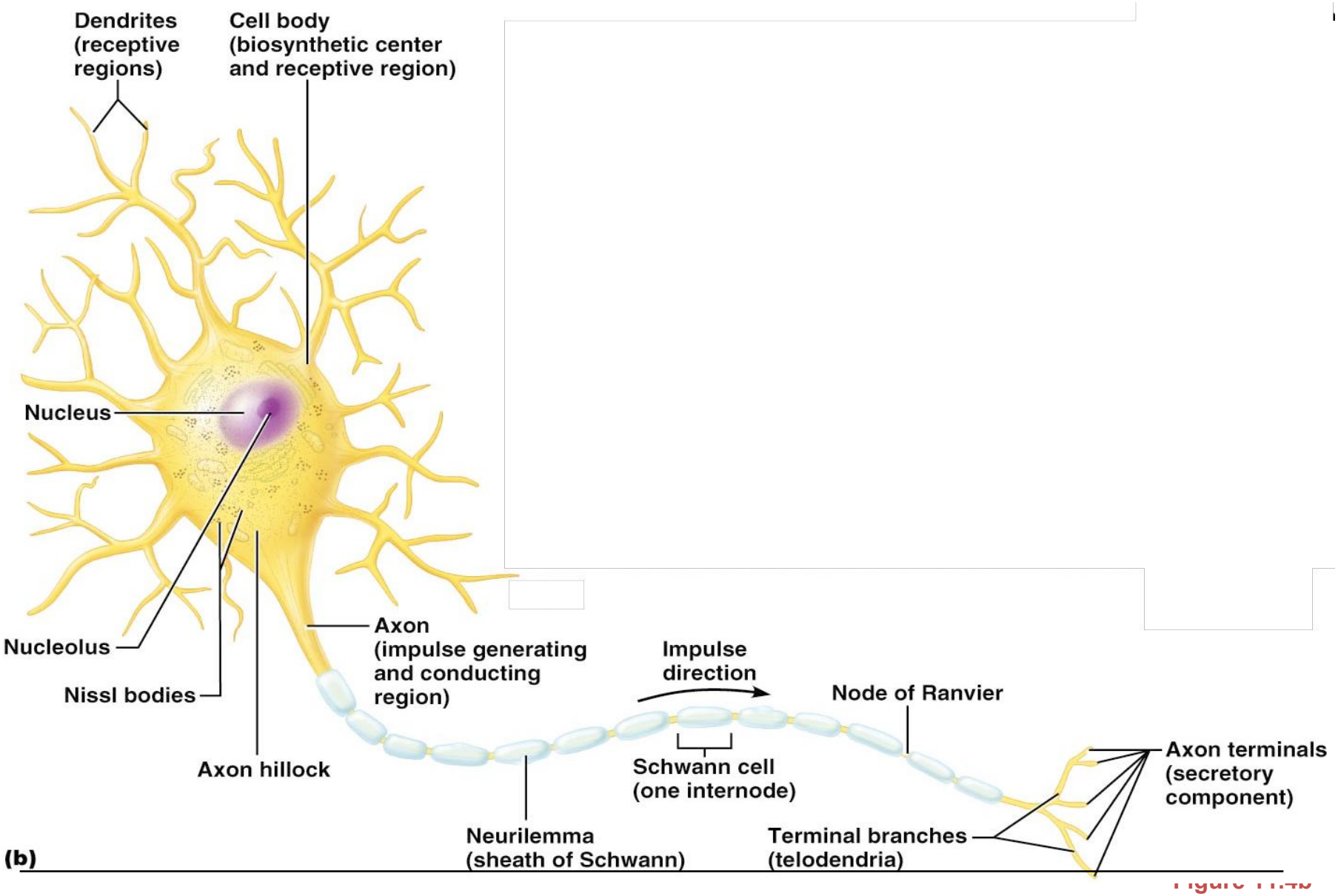
- ***Dendrites—***
- Multiple, short, branched and tapering processes of nerve cell.

- Receive information from other cells (input portion of neuron).

- Cytoplasm contains--*Nissl bodies, microtubules*, *microfilament* and other *organells*.

- ***Axon—***
- Single, long, cylindrical process of nerve cell.
- Send information away from nerve cell body to another cell.
- ***Axon hillock--*** Conical origin of axon from cell body
- Axon terminals are known as ***end bulbs*** *(terminal boutons).*
- ***Axolemma--***Plasma membrane of axon
- ***Axoplasm***-- Cytoplasm of axon.
- Nissl bodies is ***absent*** in axon.

Neurons (Nerve Cells)



DIFFERENCE BETWEEN AXON & DENDRITE

AXON	DENDRITE
SINGLE, LONG THIN PROCESS OF NERVE CELL	MULTIPLE, SHORT, THICK & TAPERING PROCESSES OF NERVE CELL
TERMINATES AWAY FROM NERVE CELL BODY	TERMINATES NEAR THE NERVE CELL BODY
UNIFORM DIAMETER & SMOOTH	NOT UNIFORM
FREE OF NISSL GRANULES	CONTAIN NISSL GRANULES
NERVE IMPULSE TRAVELS AWAY FROM CELL BODY	IMPULSE TRAVELS TOWARDS CELL BODY

CLASSIFICATION OF NEURONS

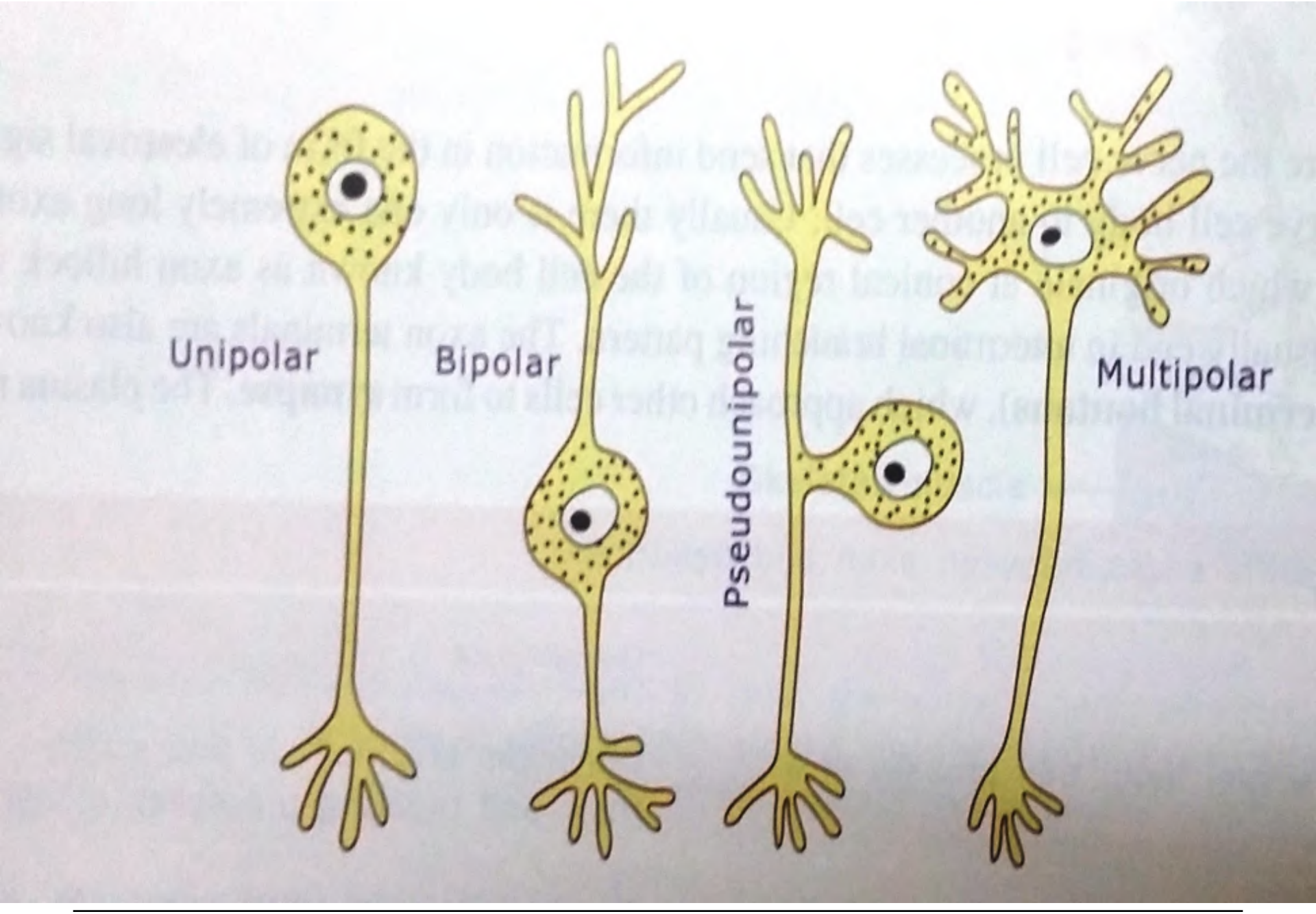
- ***BASED ON SHAPE OF CELL BODY & NUMBER OF CELL PROCESSES***

- ***UNIPOLAR NEURONS—***
- Only one process (usually dendrite) extending from cell body.
- Mesencephalic nucleus of trigeminal nerve.

- ***PSEUDOUNIPOLAR NEURON—***
- Has one process that divide into axon and dendrite.
- Dorsal root ganglion and cranial nerve ganglion.

- ***BIPOLAR NEURONS—***
- Has two processes(an axon and dendrite).
- Present in Retina.

- ***MULTIPOLAR NEURONS—***
- Has many processes (an axon and many dendrite).
- These are ***most common type*** of neurons
- Depending upon shape of cell bodies they are called ***stellate (star shaped)***, **purkinje (flask shaped)** or **pyramidal (triangular).**
- Present in ***spinal cord***, ***cerebrum*** & ***cerebellum***.



- ***CLASSIFICATION BASED ON FUNCTION***

- ***SENSORY (AFFERENT)—***
- Receives stimuli from receptor and conduct impulse to CNS.

- ***MOTOR (EFFERENT)—***
- Conduct impulse from CNS to effector organs.

- ***INTERNEURON—***
- Located only in CNS .
- Small size, interconnect other neuron.

Synapses

- A junction that mediates information transfer from one neuron:
  - To another neuron
  - To an effector cell
- ***Presynaptic neuron*** – conducts impulses ***toward*** the synapse
- ***Postsynaptic neuron –*** transmits impulses ***away*** from the synapse

Structure of synapse

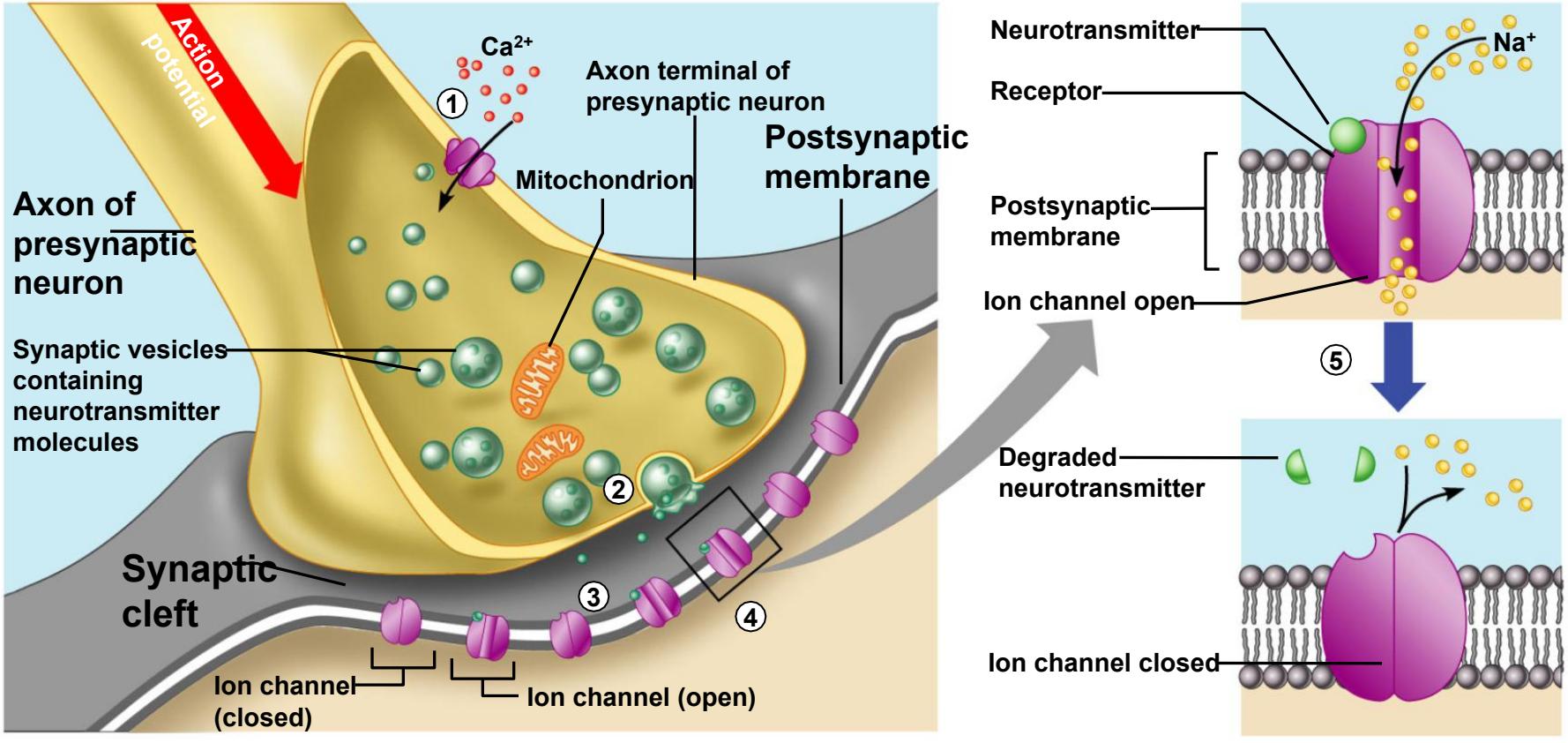


Figure 11.18

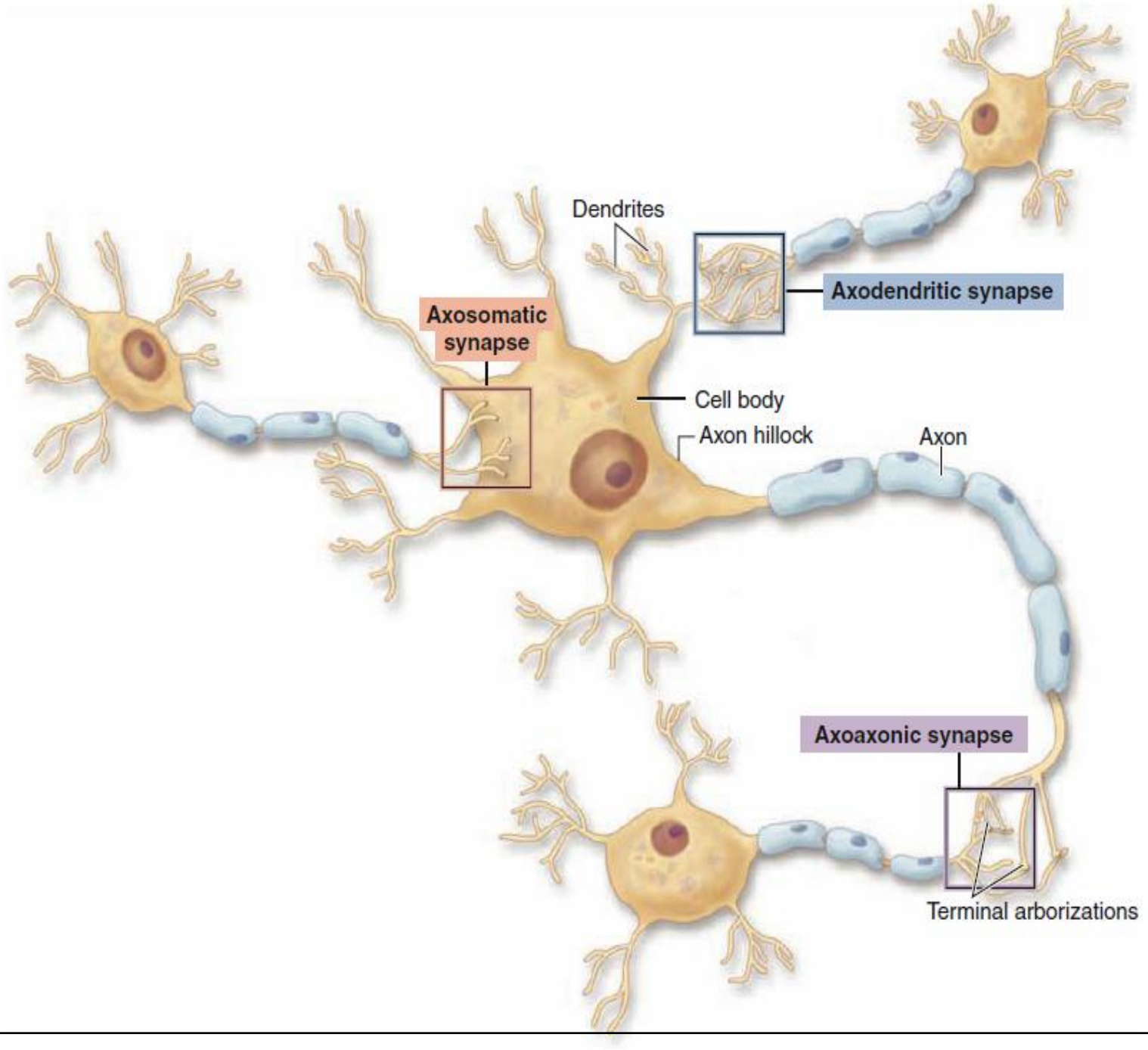
Types of Synapses

- ***Axodendritic*** – between the axon of one neuron and the dendrite of another.

  Most common type.

- ***Axosomatic*** – between the axon of one neuron and the soma of another.

- ***Axoaxonic-*** between one axon to other axon .



NEUROGLIA

- **Neuroglia**
  - Provide structural and metabolic support for neurons.
  - Segregate and insulate neurons.
- **Neuroglial cells in CNS**

  a)Astocytes

  b)Ependymal cell

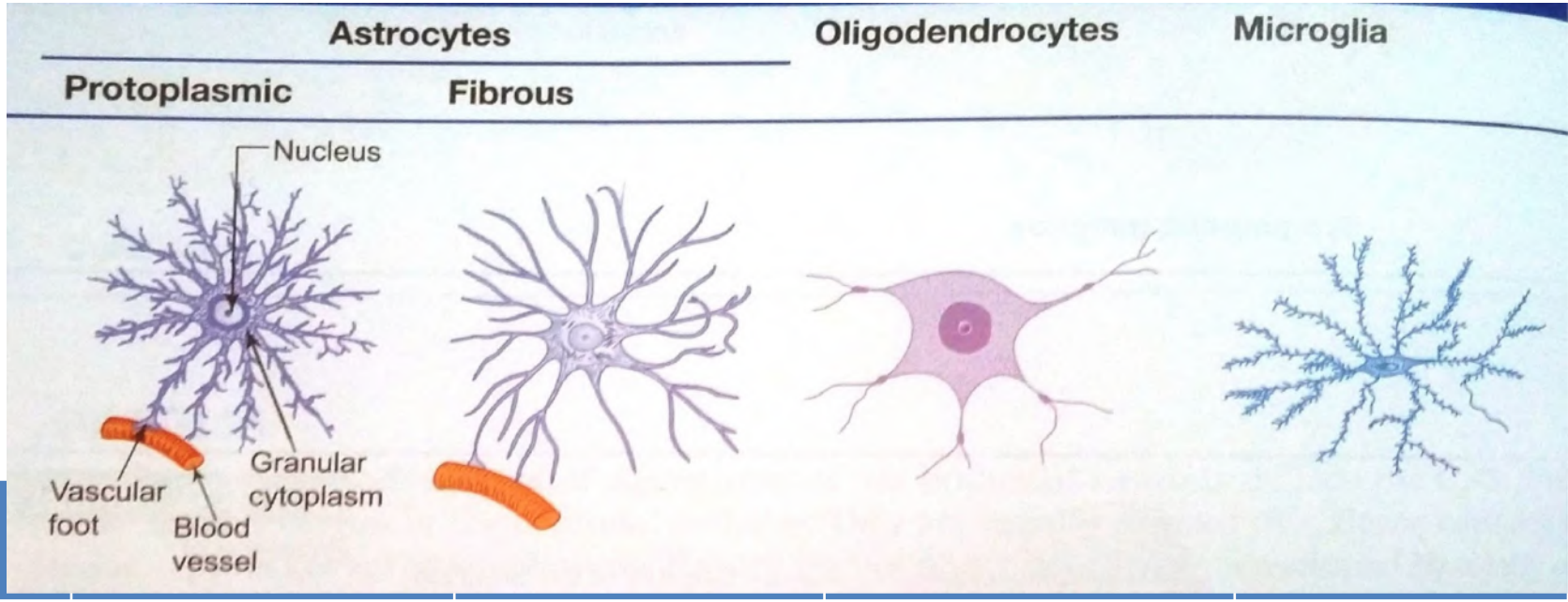
  c)Oligodendrocytes

  d)Microglia

- **Neuroglial cells in PNS**

  a)Schwann cells

  b)Satellite cells



SIZE	LARGE	LARGE	MEDIUM	SMALL
NUCLEUS	OVAL	OVAL	SPHERICAL	ELONGATED
OCCURRENCE	GREY MATTER	WHITE MATTER	WHITE MATTER	GREY AND WHITE MATTER
FUNCTION	SUPPORTING, REPAIR AND BARRIER		MYELINATION	PHAGOCYTOSIS
ORIGINE	NEURONAL ECTODERM		NEURONAL ECTODERM	MESODERMAL

MYELIN SHEATH

- Myelin is an insulating sheath surrounding axons of central and peripheral nervous system.
- **CNS**— Oligodendrocytes cells
- **PNS**— Schwann cells
- Between adjacent segment of myelin along each axon, a gap occurs where axon is not covered by myelin.
- These gaps are called are called ***nodes of Ranvier.***
- Myelin sheath increases the velocity of conduction of impulse.
- It provides insulating sheath surrounding fibres.