

NERVOUS SYSTEM (NERVOUS TISSUE)

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CONTROL AND COORDINATION

Integration of all the activities of Organs so that all of them function in a synchronized fashion

BODY (2 systems)

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graph TD; A[BODY (2 systems)] --> B[NERVOUS SYSTEM]; A --> C[ENDOCRINE SYSTEM];
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NERVOUS SYSTEM

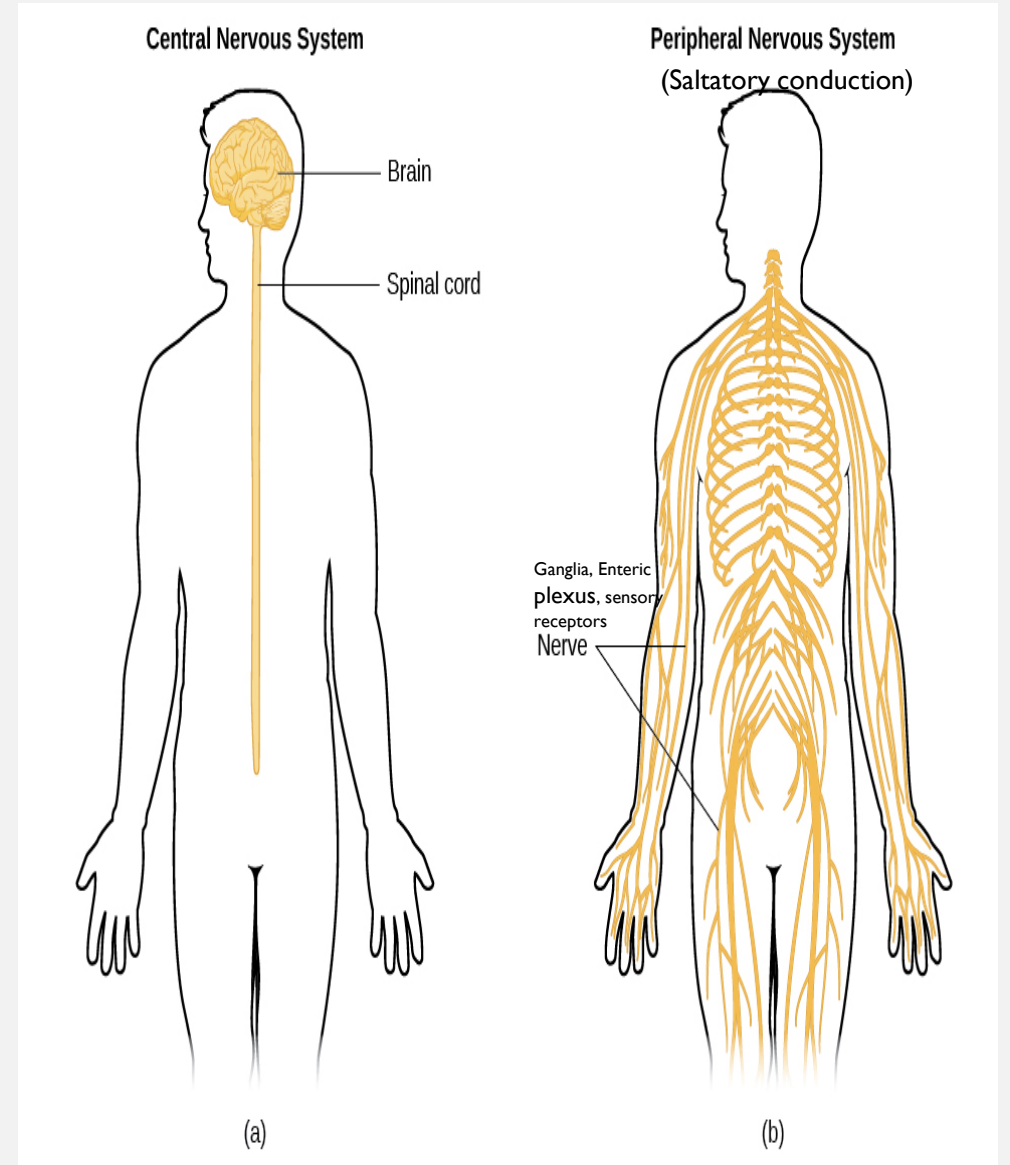
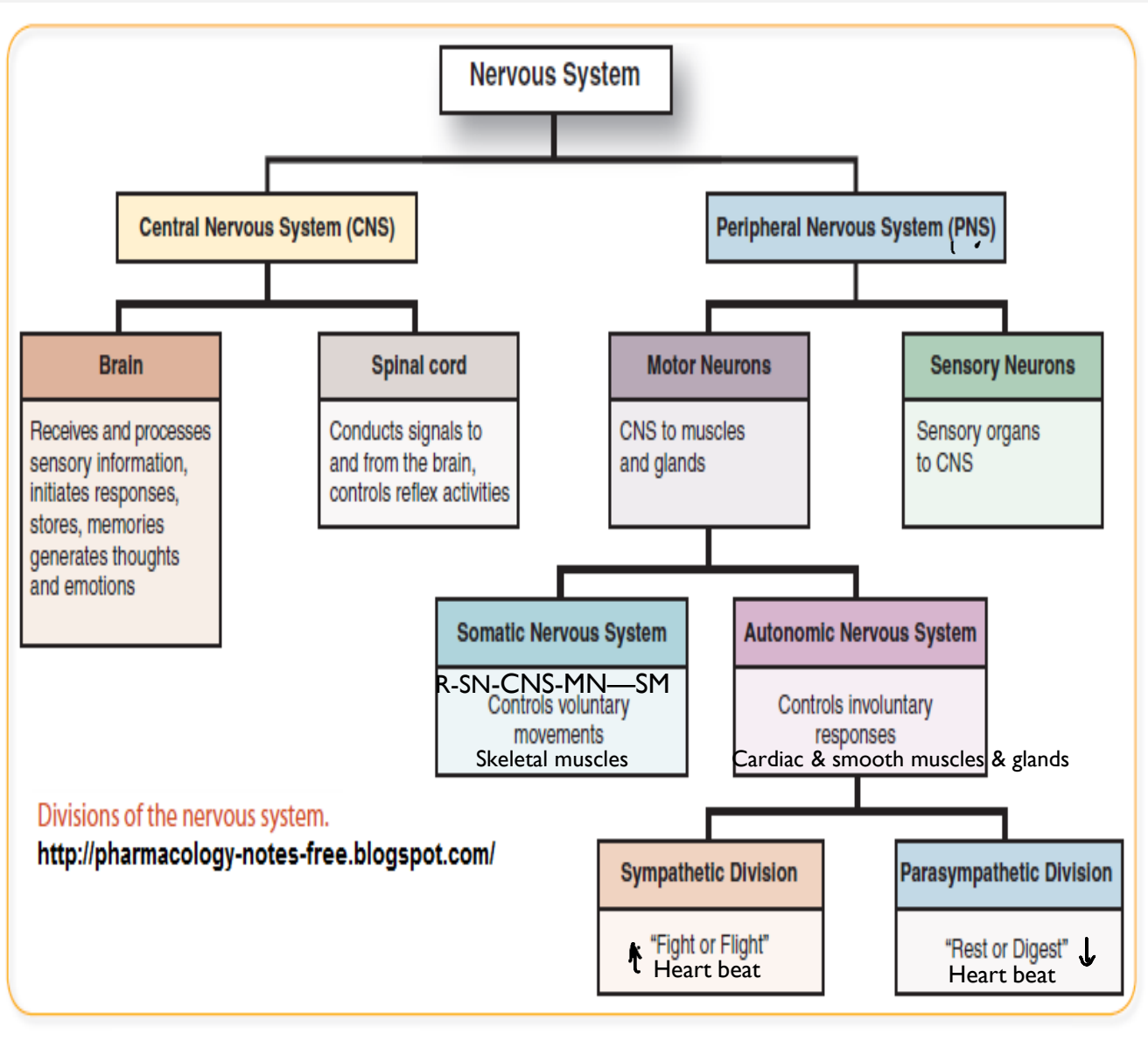
(comprises entire mass of nervous tissues in the body)

Electric current signals (communication)

The kind of tissues which receives and Transmits stimuli in the animal body is called as **Nervous Tissue**

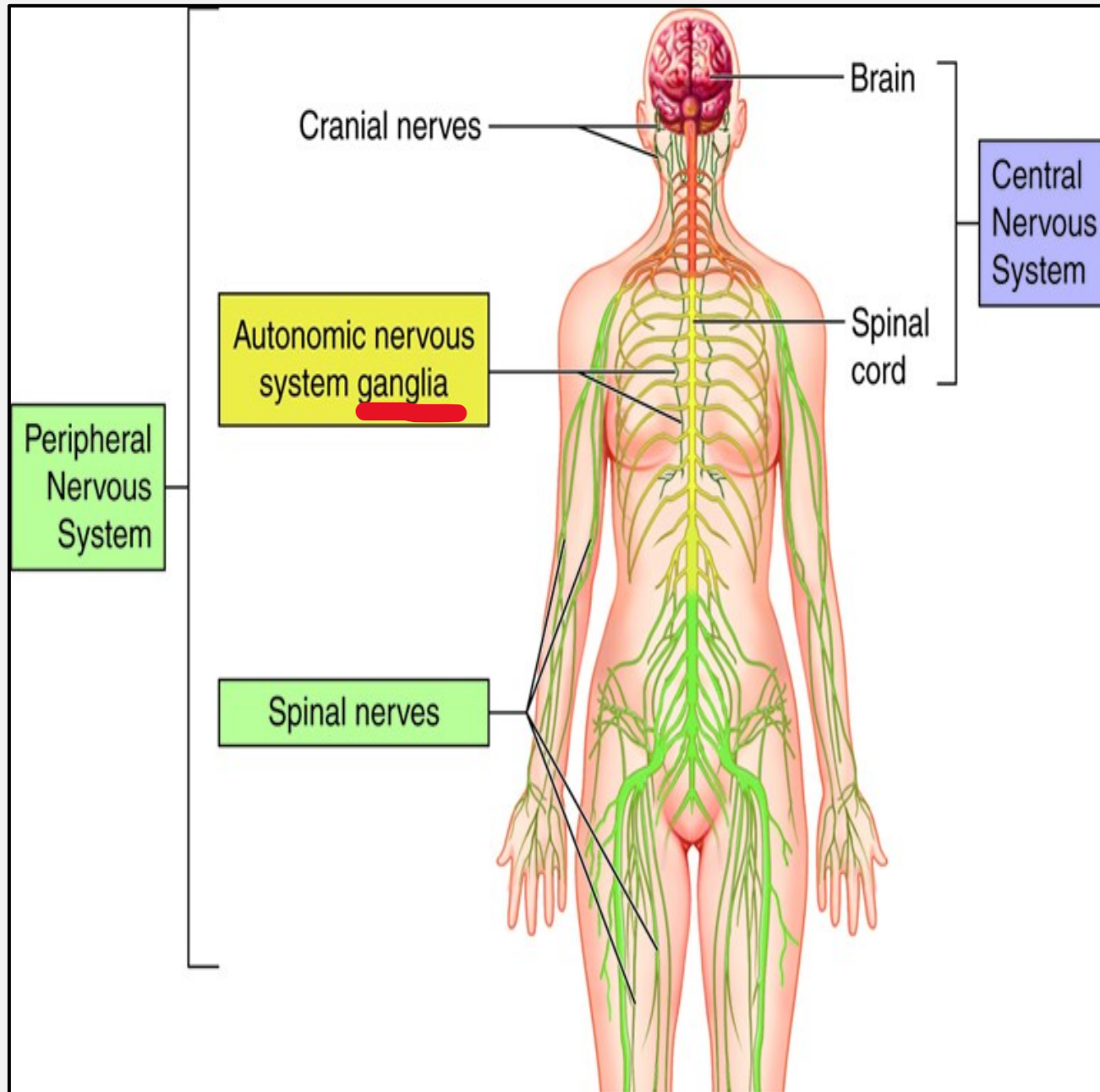
ENDOCRINE SYSTEM

Chemical messengers
(Hormones)

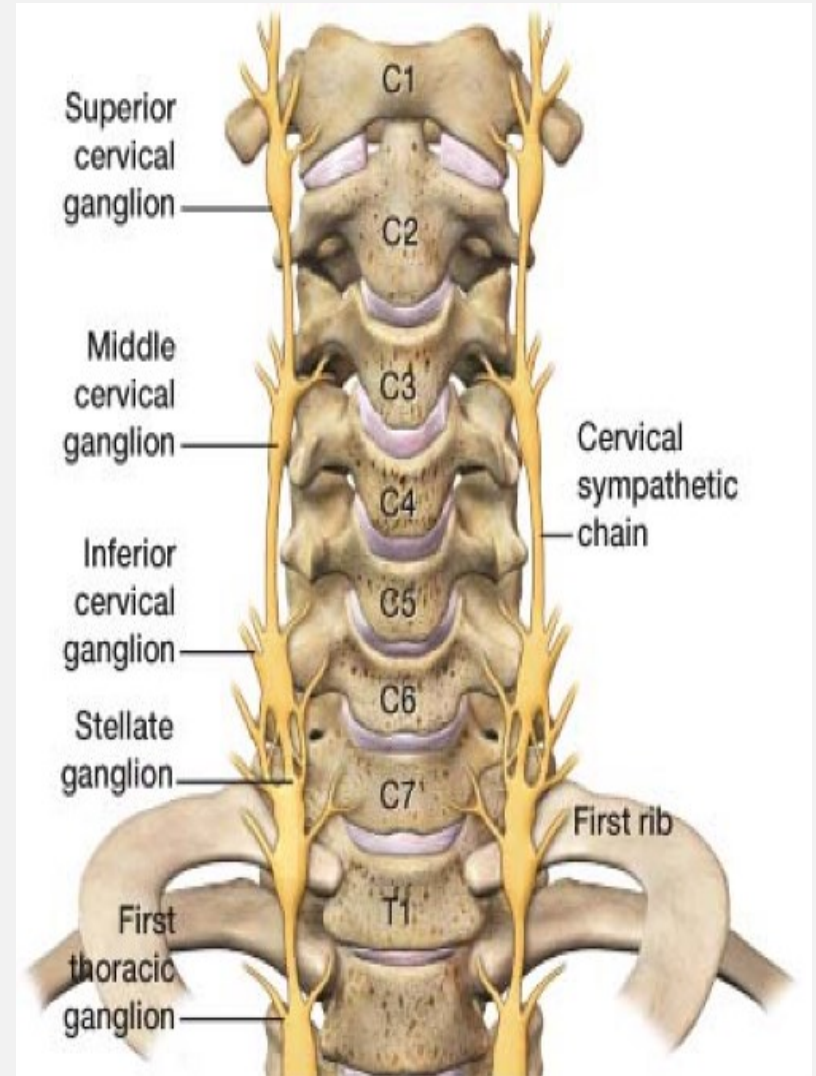


Nervous System---- main component is nervous tissue (specialized Tissue- CONDUCT IMPULSES)

Location: CNS & PNS

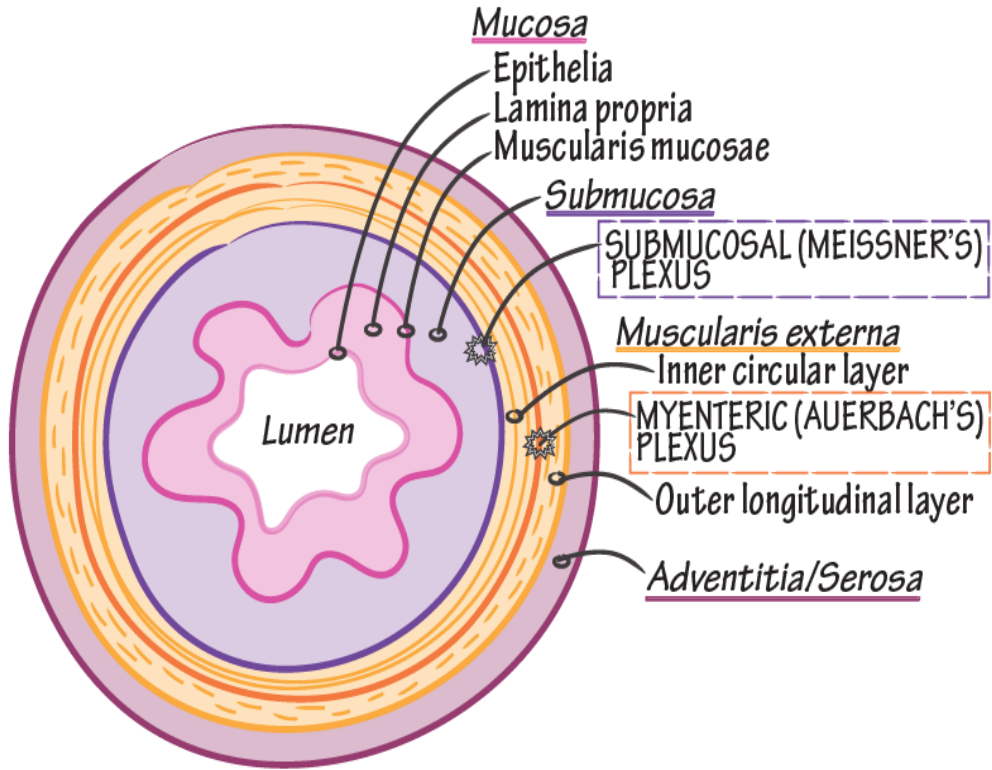


GANGLIA



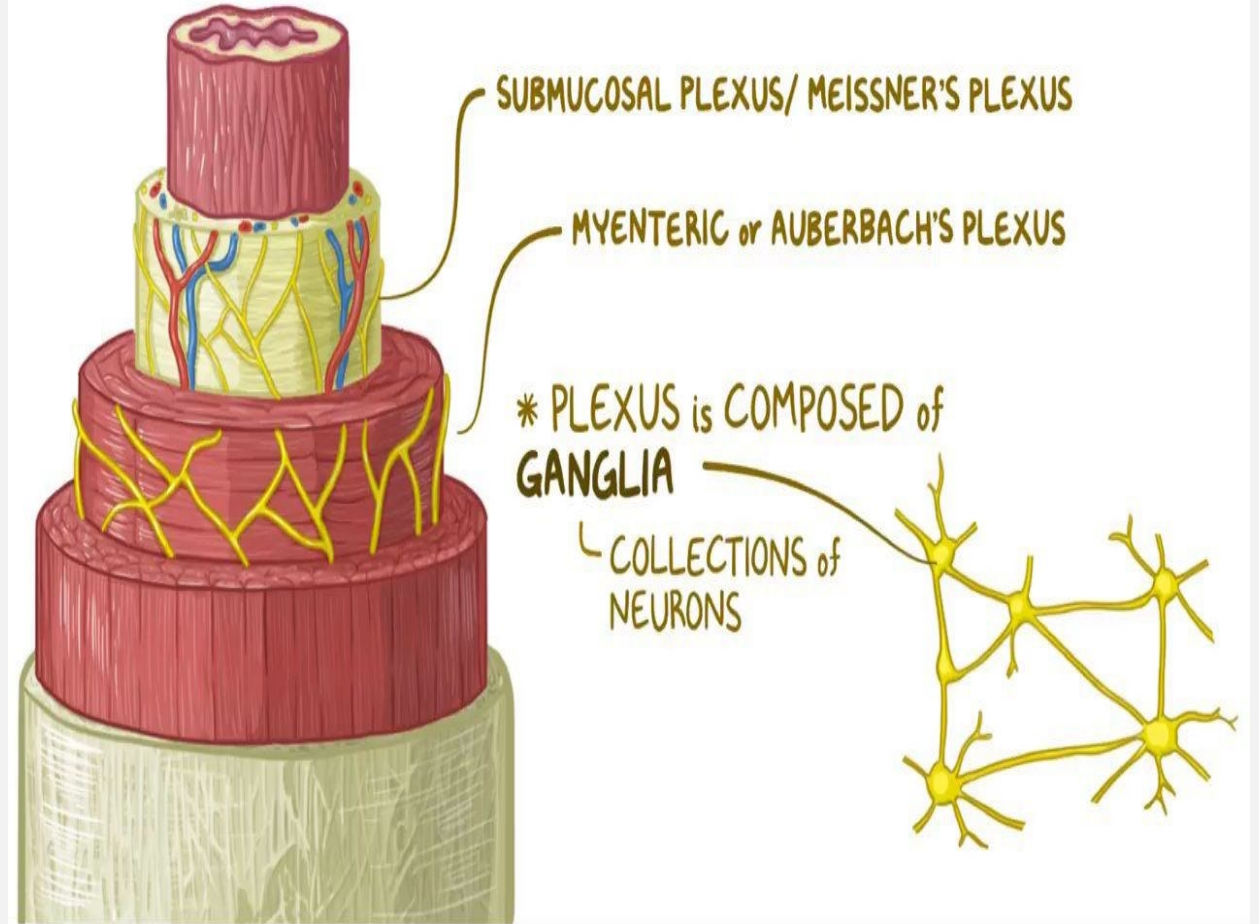
INTRINSIC

GI tract wall: Cross Section



ENTERIC NERVOUS SYSTEM

* FOUND WITHIN WALLS of ENTIRE GI TRACT



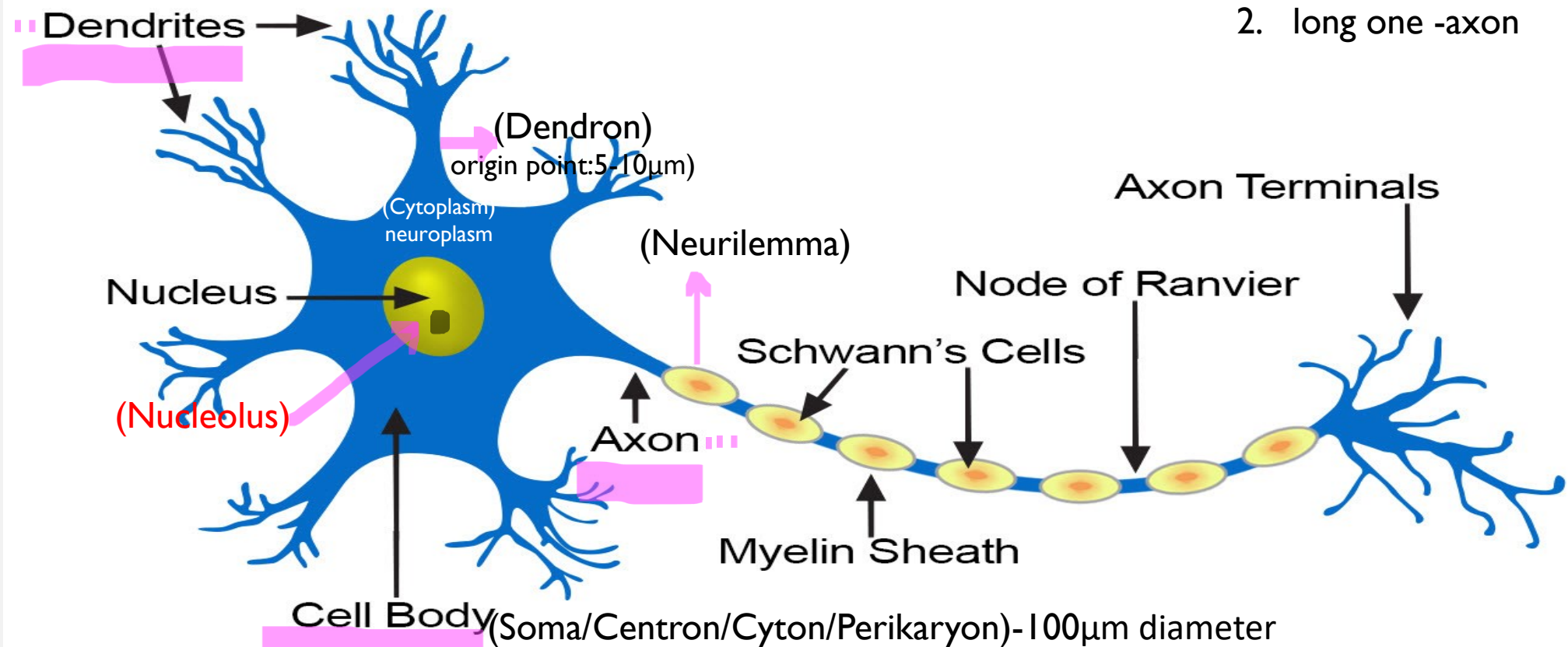
NERVOUS TISSUE CONTAINS TWO CATEGORIES OF CELL

I. Neuron

(A nerve cell with its processes that forms the structural and functional unit of the nervous system)

2. Neuroglia Or Glial Cell

Structure of a Typical Neuron



Processes- 2 types

1. Short one (dendrites)
2. long one -axon

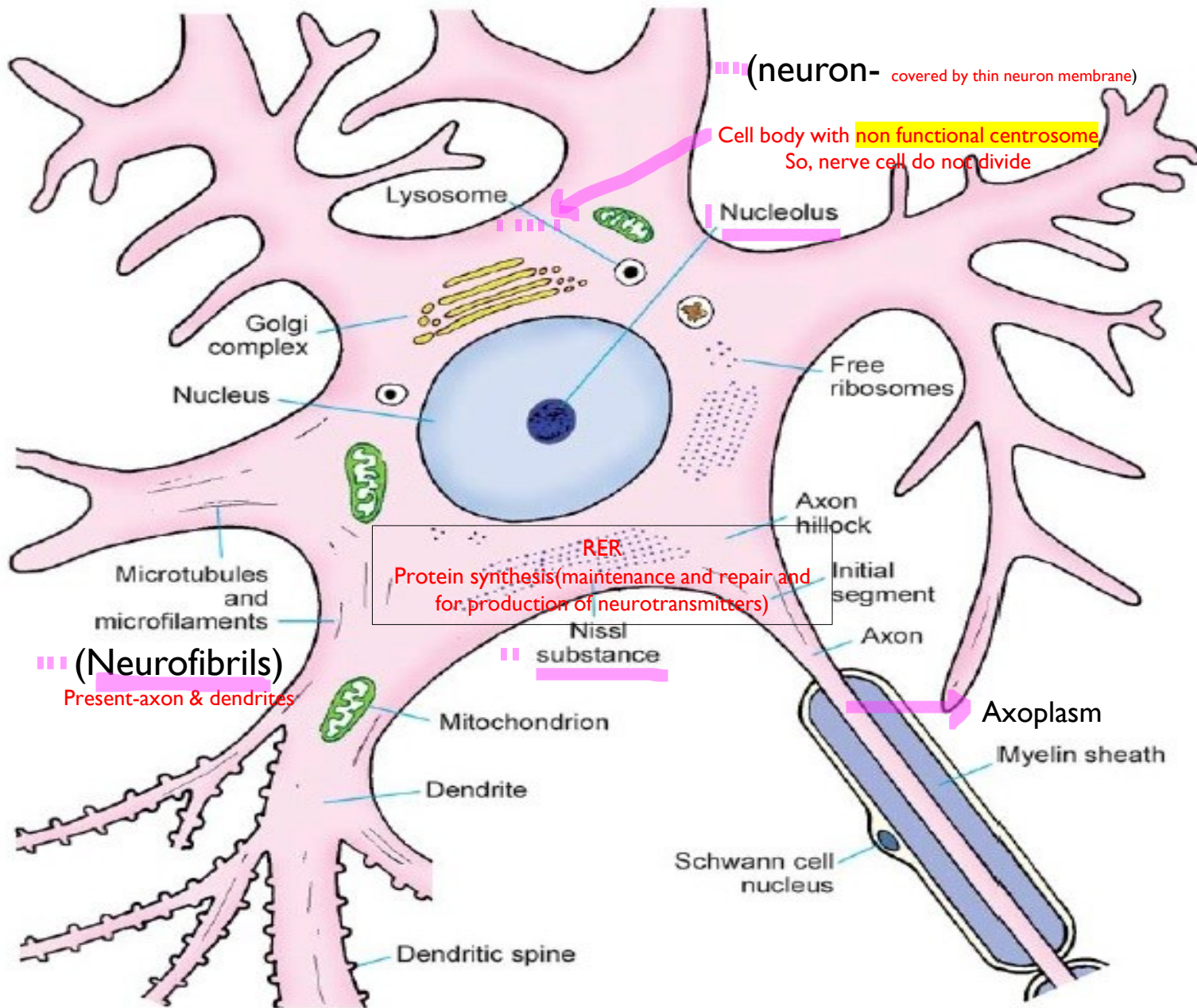


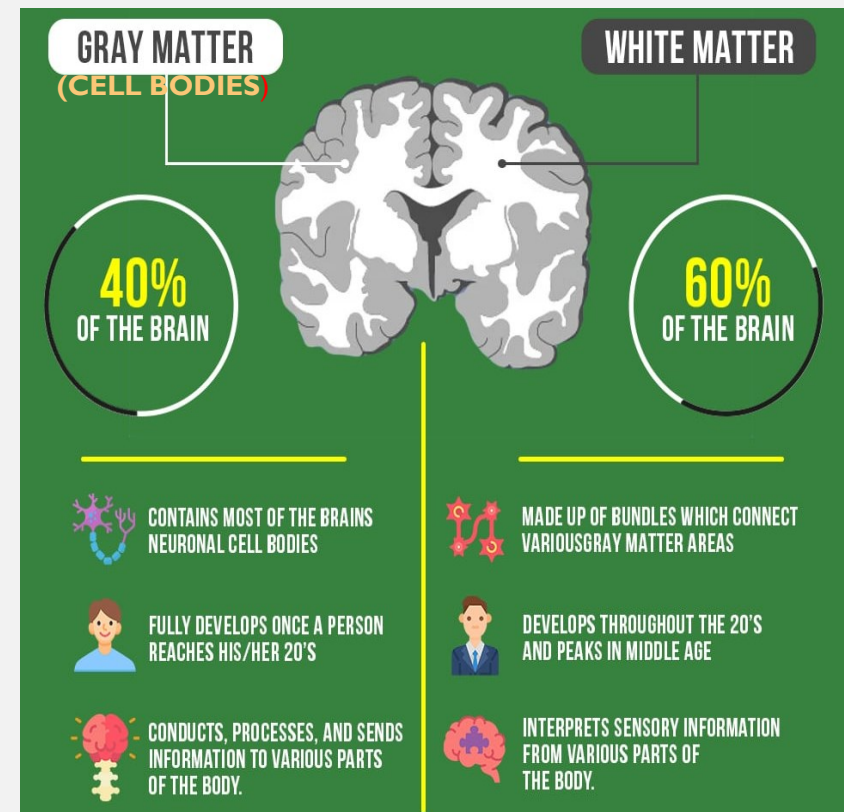
Fig. 1.2. Schematic presentation of some features of the structure of a neuron as seen by EM.

Distribution:

Brain (Grey matter)
Spinal cord

Function:

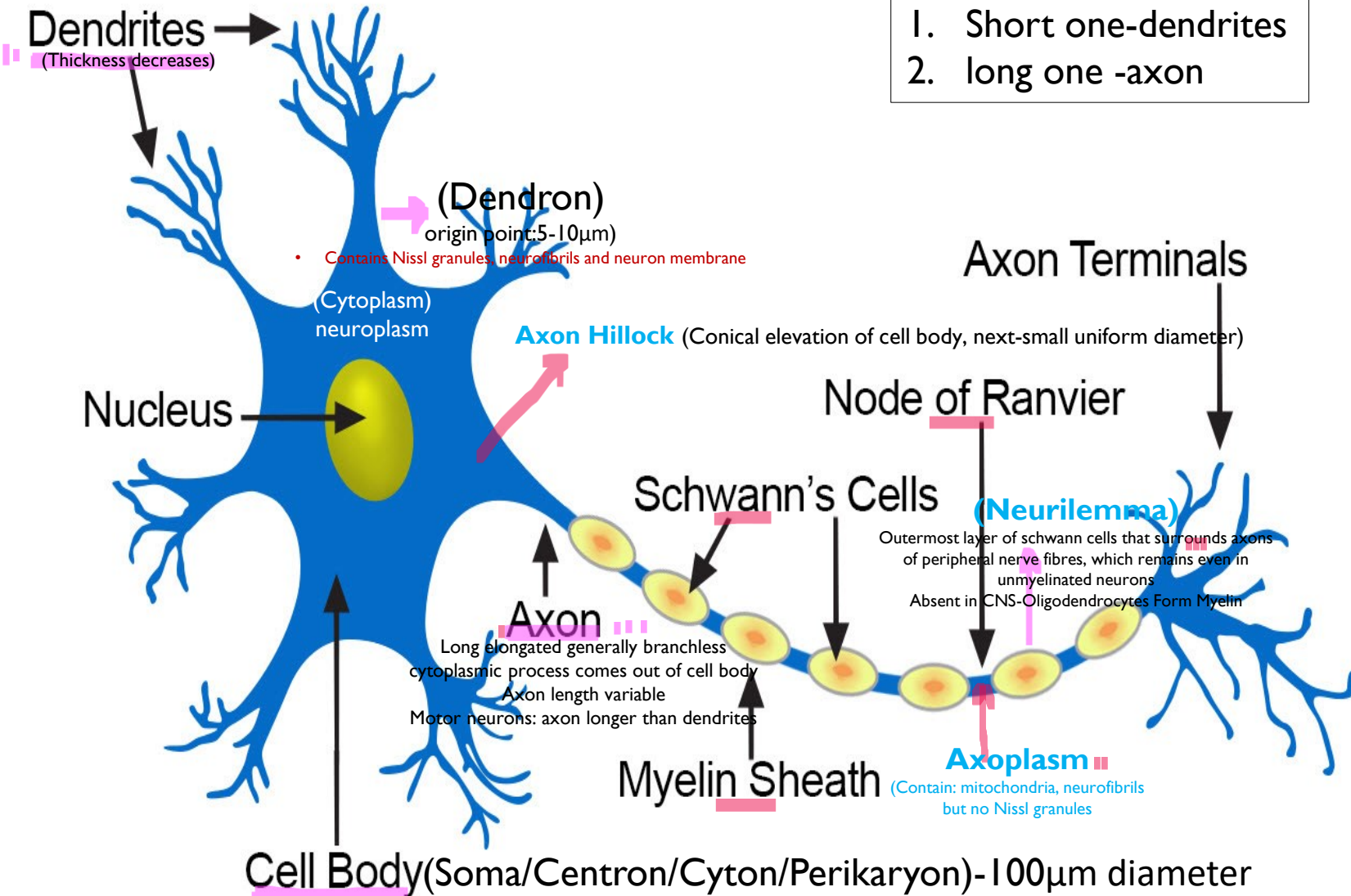
Cell body regulates and coordinates the function of a neuron



Structure of a Typical Neuron

Processes- 2 types

1. Short one-dendrites
2. long one -axon



DENDRITES

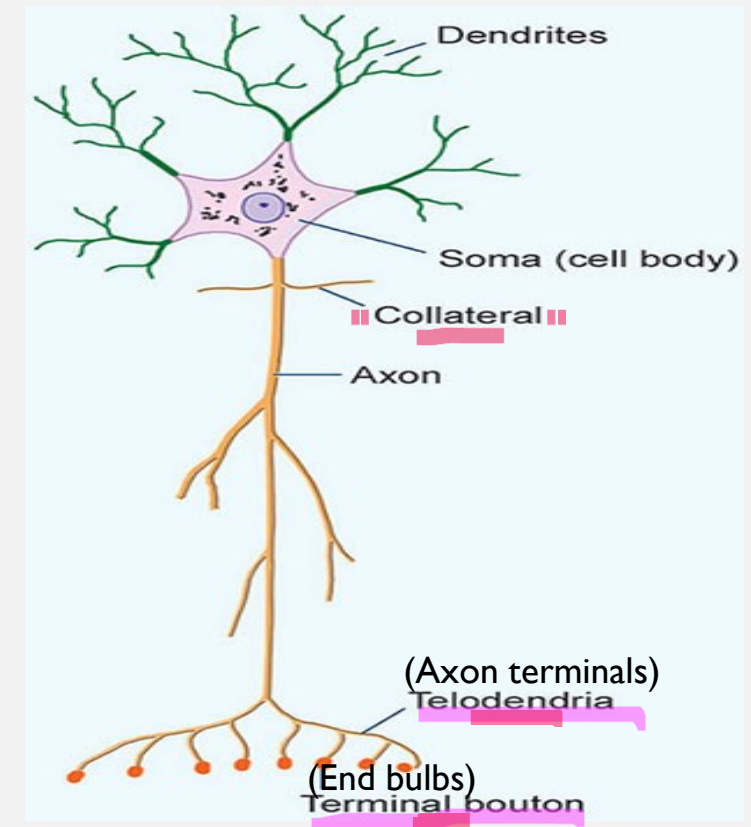
Distribution: Brain Spinal cord

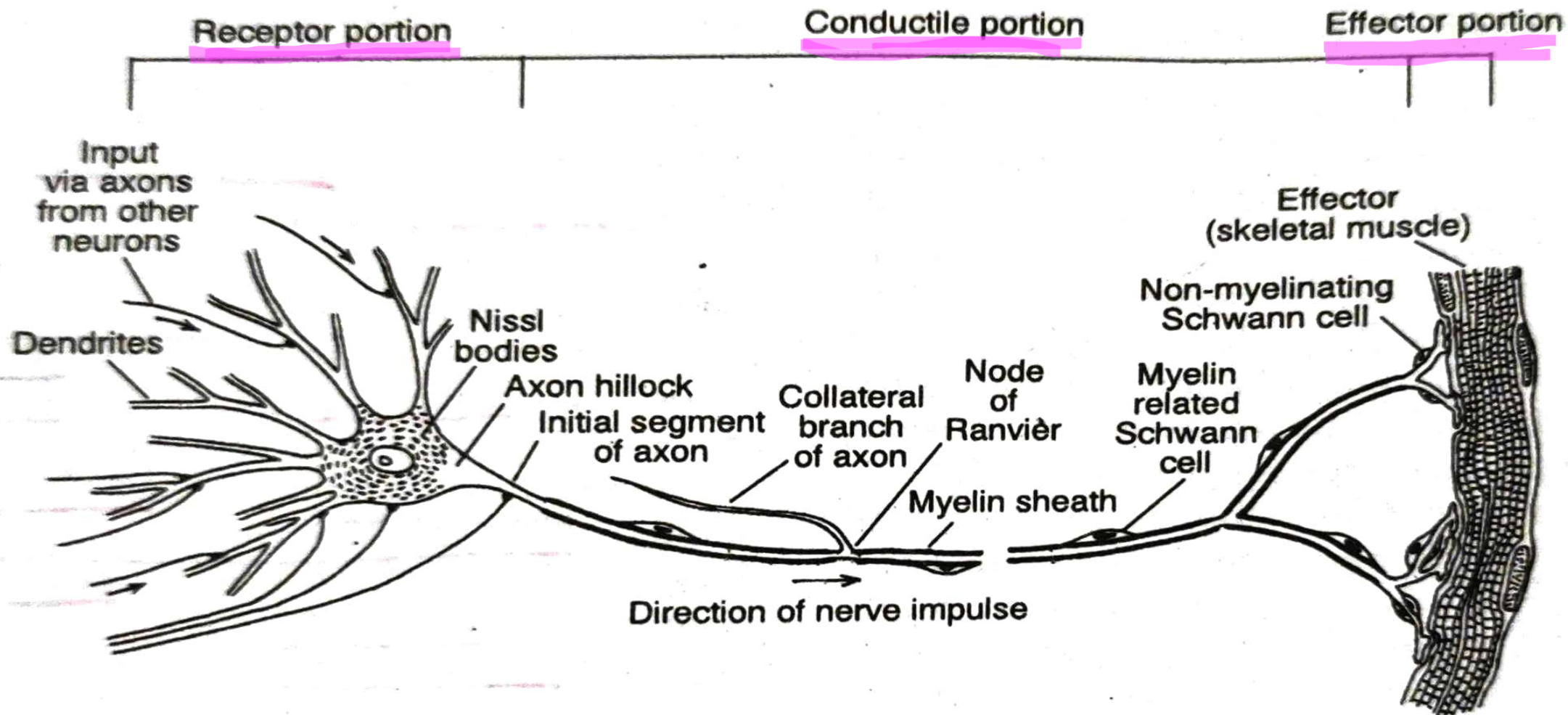
Function: Receives nerve impulses

AXON/AXIS CYLINDER

Distribution: white matter of CNC & PNS

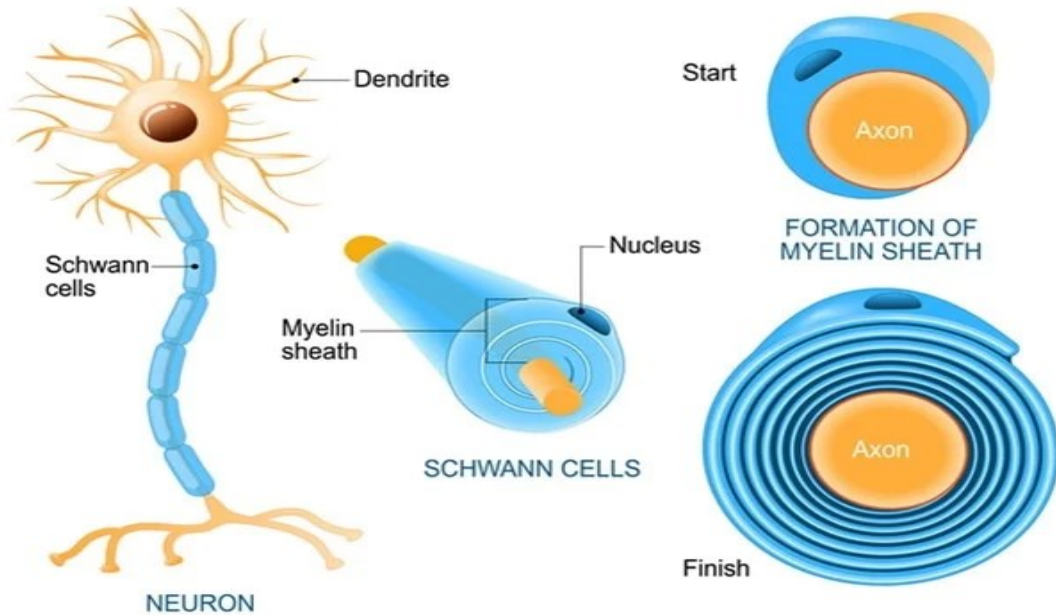
Functions: transmits impulses away from cell body





(d).1: This diagram illustrates the receptor, conductile, and effector portions of a typical large neuron. The effector endings on skeletal muscle identify this as a somatic motor neuron; in many neurons the effector endings are applied to the receptor portions of other neurons. The presence of the myelin sheath on the conductile portion of the neuron (the axon) increases conduction velocity. The axon is shown to be interrupted, for it is much longer than can be illustrated here.

SCHWANN CELLS



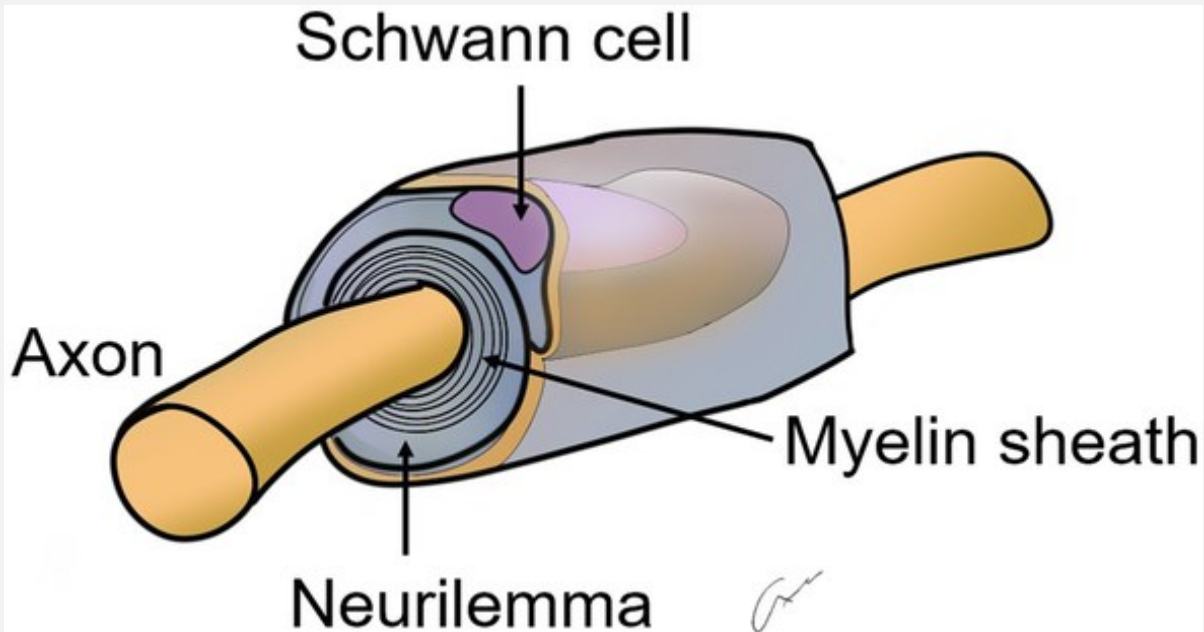
A well-developed Schwann cell is **shaped like a rolled-up sheet of paper, with layers of myelin between each coil.**

The inner layers of the wrapping **forms the myelin sheath**, while the outermost layer of nucleated cytoplasm forms the **neurilemma**.

Individual myelinating Schwann cells cover about 1 mm of an axon—equating to about 1000 Schwann cells along a 1-m length of the axon.

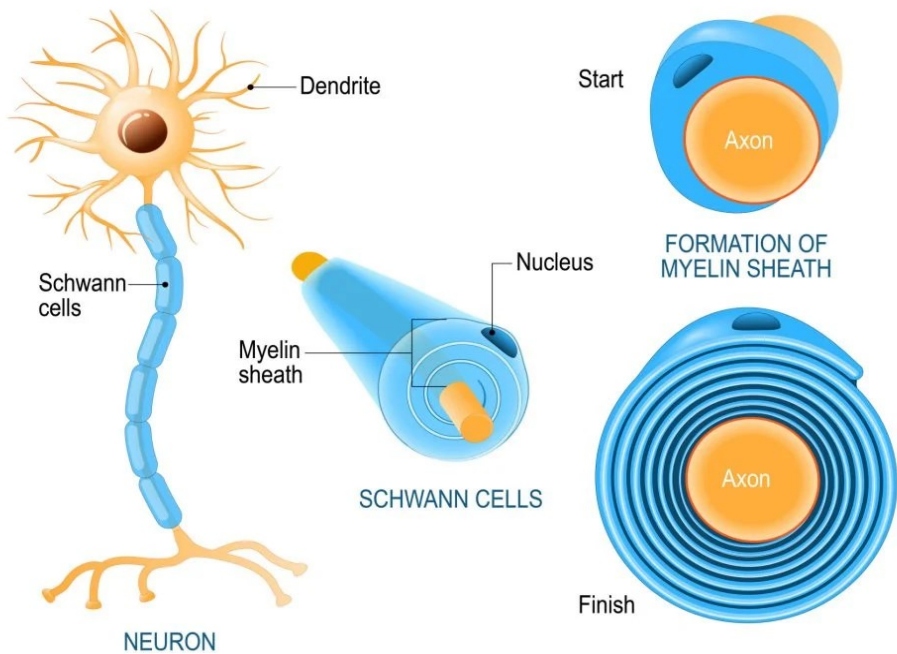
FUNCTION:

- *Myelin sheath in PNS.*

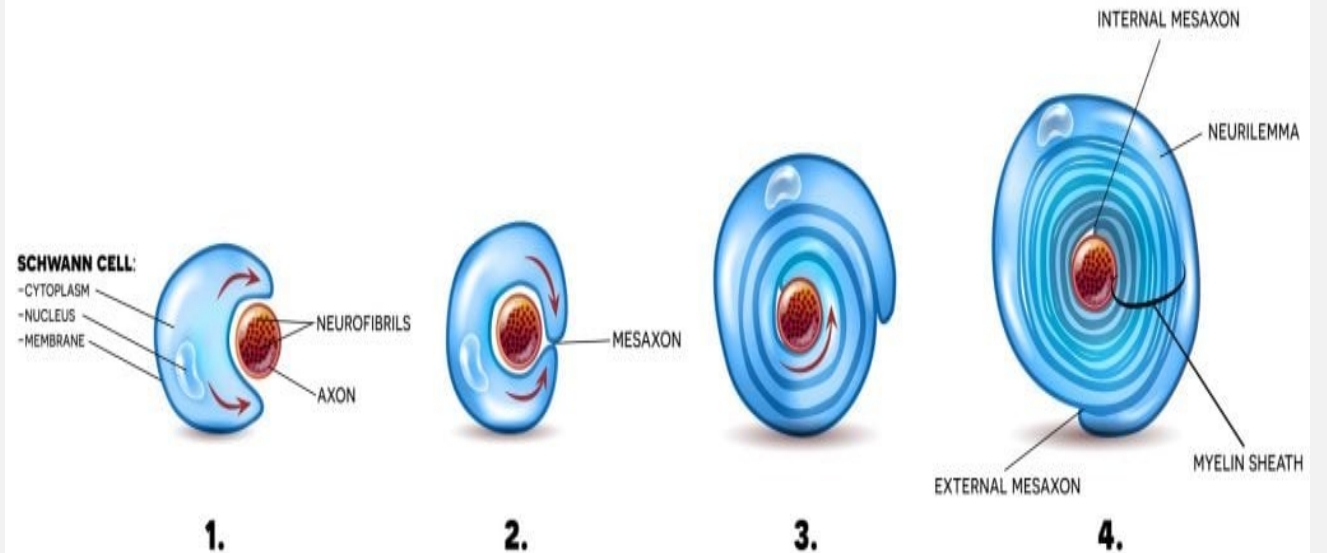


STAGES IN THE FORMATION OF THE MYELIN SHEATH BY A SCHWANN CELL

SCHWANN CELL



MYELIN SHEATH FORMATION STAGES



Differences between Axon and Dendrite

Character	Axon	Dendrite
1. Number	Axon is long and single which originates from the axon hillock of a cell body.	More than one short processes originate from the cell body of a neuron.
2. Branching	Generally unbranched.	More short branches are present in a dendrite.
3. Length	Longer in length.	Shorter in length.
4. Myelin sheath	Axon is myelinated.	Devoid of myelin sheath.
5. Neurilemma	In axon neurilemma is present.	Devoid of neurilemma.
6. Axoplasm	Axoplasm is seen.	Neuroplasm is noticed.
7. Schwann sheath	Sheath with schwann cell present.	Schwann sheath with cell absent.
8. Node of Ranvier	Sheath is differentiated into nodes and inter-nodes.	Absence of node of Ranvier, i.e., sheath is not differentiated into nodes and inter-nodes.
9. Nissl's granules	Absent.	Present.
10. Function	Transmits impulses received from cell body.	Receives impulses from other neuron and transmits to the cell body.

CLASSIFICATION OF NEURONS

- STRUCTURAL CLASSIFICATION OF NEURONS
(Based On No. Of Processes Extending From Cell Body)
- STRUCTURAL CLASSIFICATION OF NEURONS
(Based On Variation In Axons)
- Based on Function
- Based on presence or absence of myelin sheath

STRUCTURAL CLASSIFICATION OF NEURONS

(Based On No. Of Processes Extending From Cell Body)



Neurons Based on Structure

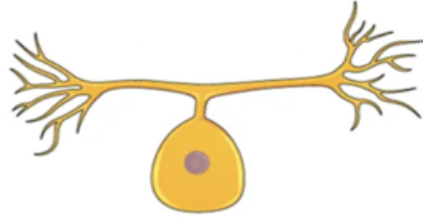
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Unipolar



Only one process that extends from the cell body. Primary afferents of spinal and some cranial nerves in vertebrates
most common neurons in the CNS of invertebrates

Pseudopolar



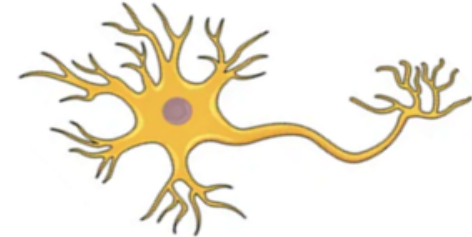
Are unipolar neurons but appears like bipolar neuron. Most sensory neurons are pseudounipolar, dorsal root ganglia of spinal nerves

Bipolar



2 distinct processes one axon and one dendrite arising directly from the cell body
Rod and cone cells of retina olfactory system

Multipolar

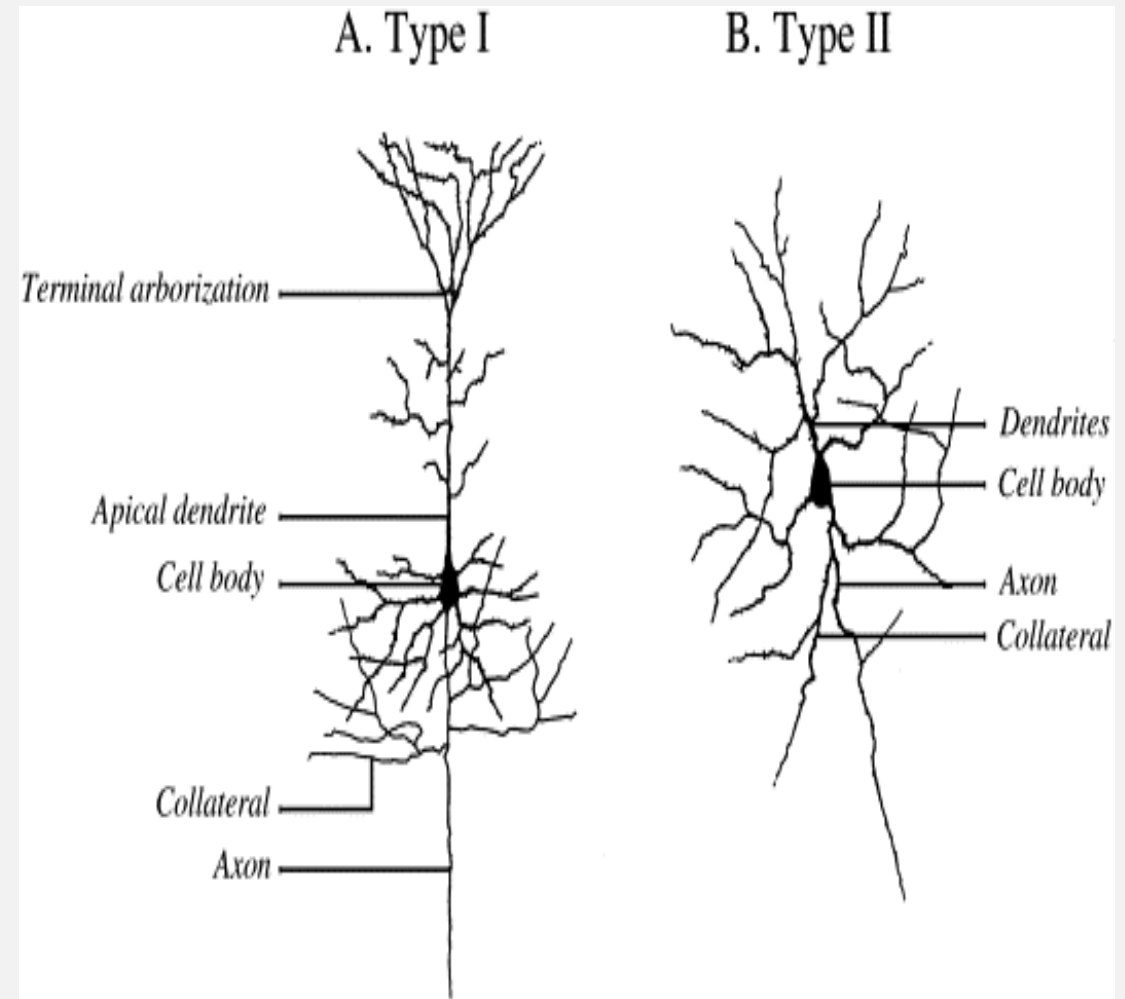


Most common with multiple extensions from soma
A motor neuron,
Majority of neurons of CNS and PNS

STRUCTURAL CLASSIFICATION OF NEURONS (Based On Variation In Axons)

I. Golgi type I neuron- long axons, cell body of these neurons in CNS and axon reaches to remote peripheral organs (connect remote regions)- **motor neurons**

I. Golgi type 2 neuron –Axons are short and end near the cell body – **present in cerebral cortex and spinal cord (ie interneurons)**



Neurons Based on Function

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Afferent
or
Sensory Neuron



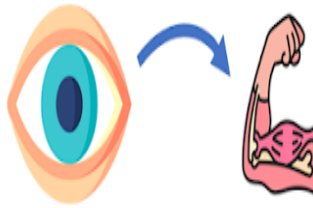
These neurons detect stimuli from the environment, such as light, sound, and touch. They transmit this information to the central nervous system (CNS).

Efferent
or
Motor Neuron



These neurons control the muscles and other organs of the body. They transmit signals from the CNS to the muscles, telling them to contract or relax.

Interneuron



These neurons connect sensory neurons and motor neurons. They help to process information and coordinate the activity of different parts of the nervous system.

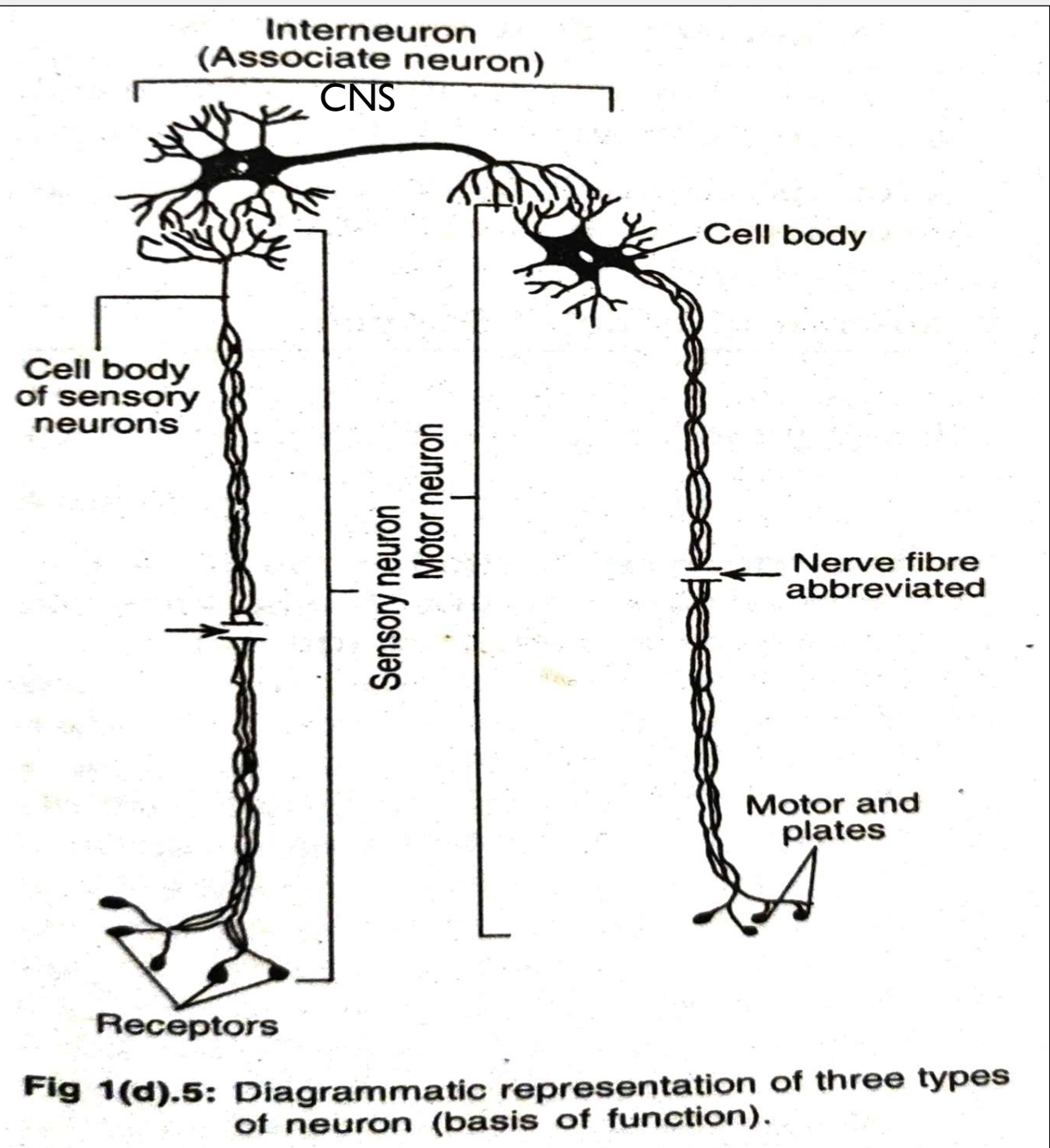
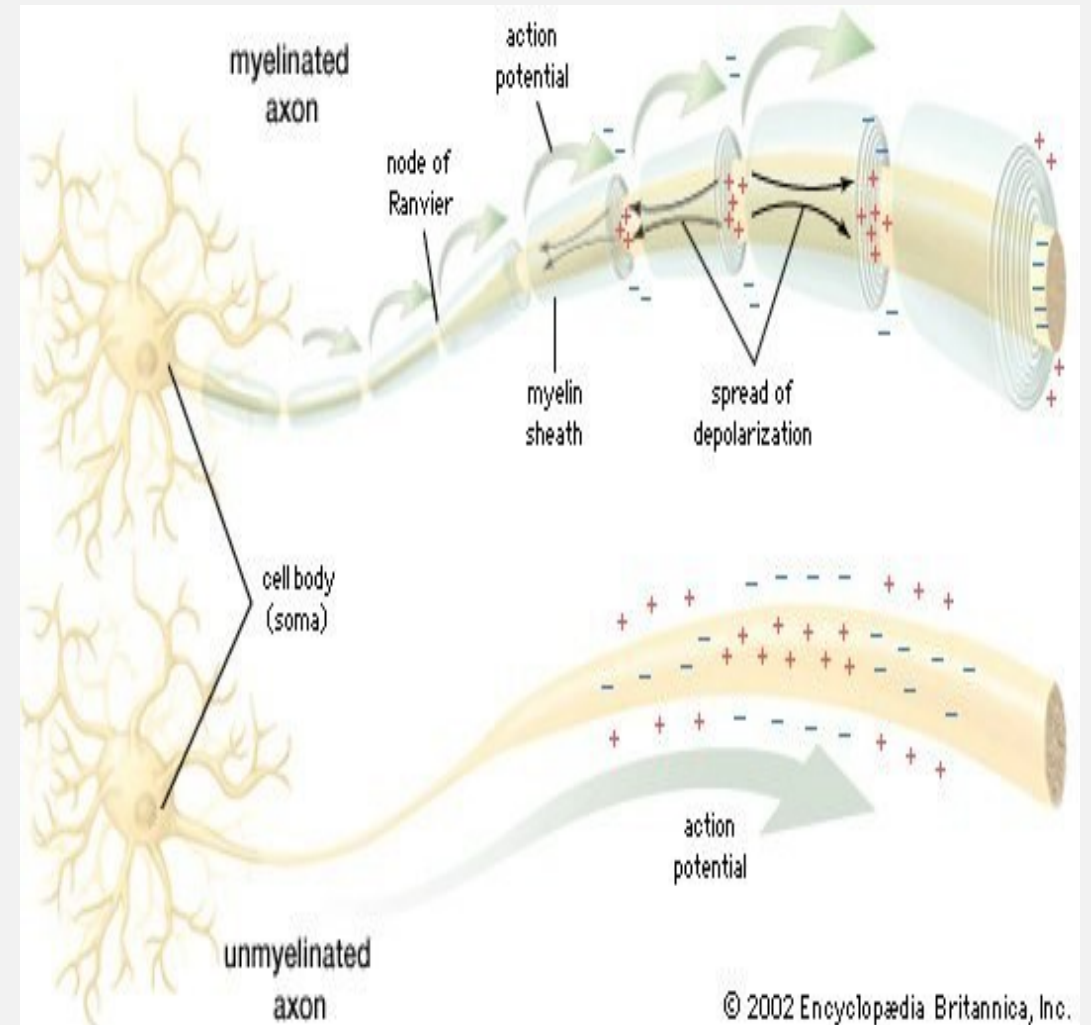
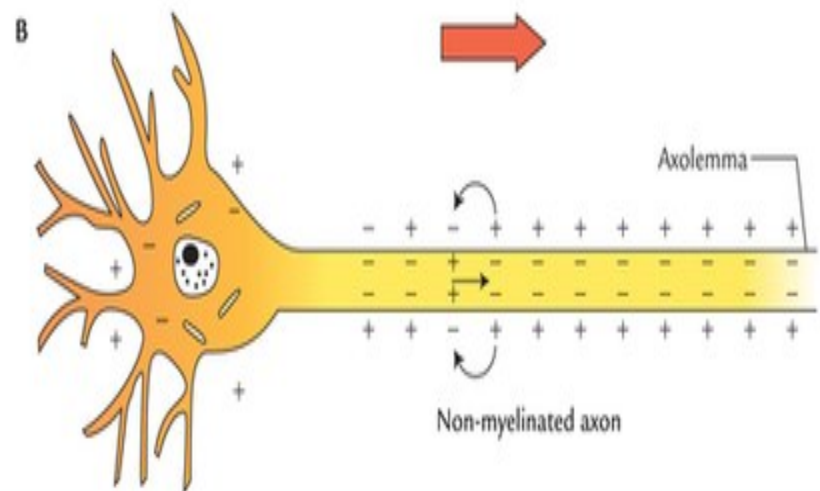
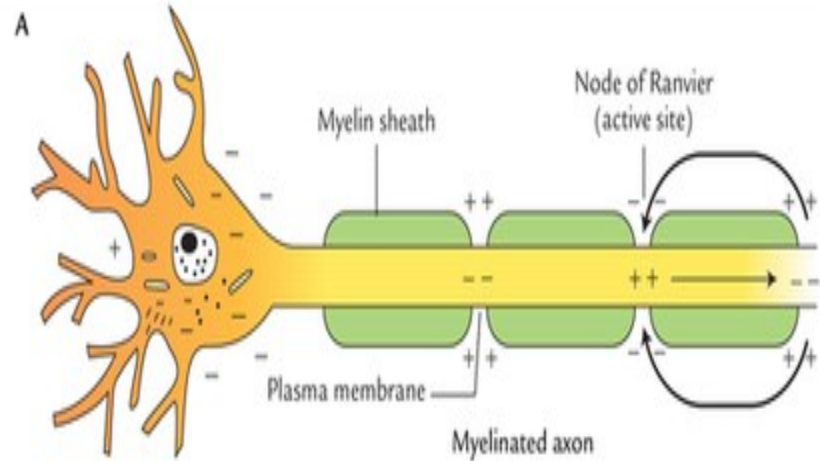


Fig 1(d).5: Diagrammatic representation of three types of neuron (basis of function).

MYELINATED AND NON-MYELINATED NEURONS



REFERENCES

- General concepts of Histology and Endocrinology by Swapan Kumar Rej (Textbook)
- Image sources: <https://www.google.com>

THANKYOU