C - THE MUSCULAR TISSES.

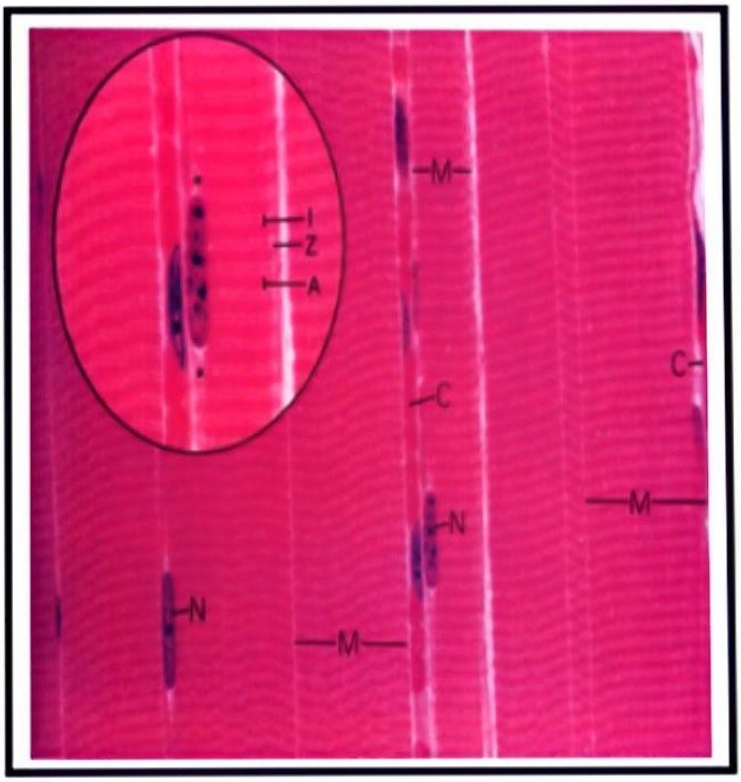
These tissues form the **muscles.** They are made up of muscle cells, which are typically elongated and arranged in parallel array, allowing them to work together effectively and they are called **muscles fibers .** Threekinds of muscles are known in the animal body: -

1-Striated or Skeletal Muscles.

In which the cells exhibit cross-striations at the light microscope level. Note the **striated muscle fibers** which appear as large elongated cylindrical cell, each showing a large number of fine alternating dark and light cross striations commonly known as the **dark bands (myosin filaments) and light bands (actin filaments),** they called **(A,I) bands** and contains a large number of peripherally situated **nuclei.** The striated muscles are usually found connected to the skeleton and their movement is controlled by the will of the animal. Hence, they are called **skeletal** or **voluntary muscles.(View 21)**

A: A band
C: capillary
I: I band
M: muscle fiber
N: nuclei of muscle cells
Z: Z line

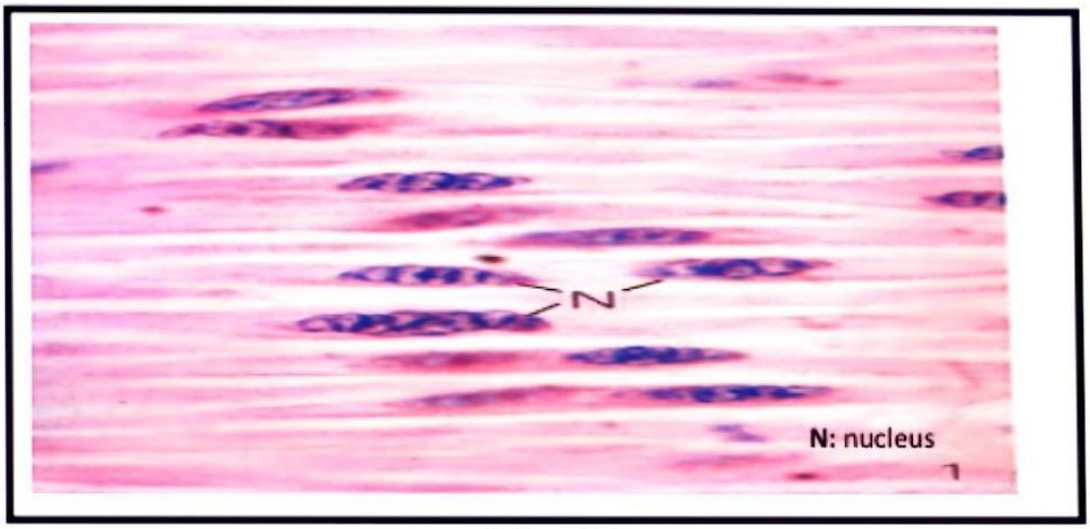
(View 21)



2- Unstriated or Smooth Muscles.

In which the cells do not exhibit cross striations. Note the bundles of **unstriated muscle fibers.** Each fiber is a long, spindle shaped cell with pointed ends and a thickened central part housing the **nucleus .** The unstriated muscles are usually found in the walls of the viscera and work without the interference

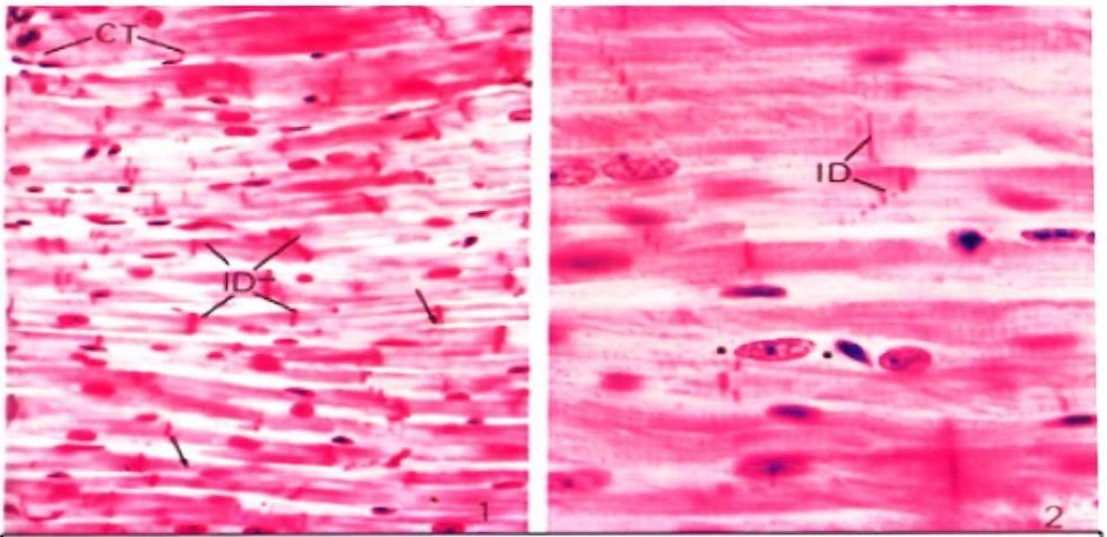
of the will of the animal. Hence they are also called **visceral** or **in voluntary muscles .** *(i.e.*Alimentary canal, blood vessels).**(view 22)**



(view 22)

3- Cardiac Muscles.

Note that the **cardiac muscle fibers** are also cylindrical, but not much elongated. Each fiber has one ovoid central **nucleus,** the cardiac fiber branch and unite with each other . Every two connected fibers have a darkly stained transverse band in between them known as the **intercalated discs** , and contains alternating **dark and light bands .** The cardiac muscles are found only in the wall of the heart and contract rhythmically. **(view 23)**



CT: connective tissue ,**ID:** intercalated discs **(view 23)**
Arrows: sites where fibers branch **Asterisks:** perinuclear cytoplasm areas

D-Nervous Tissue (system).

Is divided into the central nervous system **(CNS)**, consisting of the brain and the spinal cord , and the peripheral nervous system **(PNS)** , composed of nerve fibers and nerve cells which called nerve ganglia or neurons .

Neurons .

Are anatomic and functional units consist of three parts :-

1-*Dendrites* , multiple elongated processes specialized in receiving stimuli from the environment .

2- *Cell body*, perikaryon the trophic center.

3-*The axon* , single process specialized in generating or conducting nerve impulses to other cells .

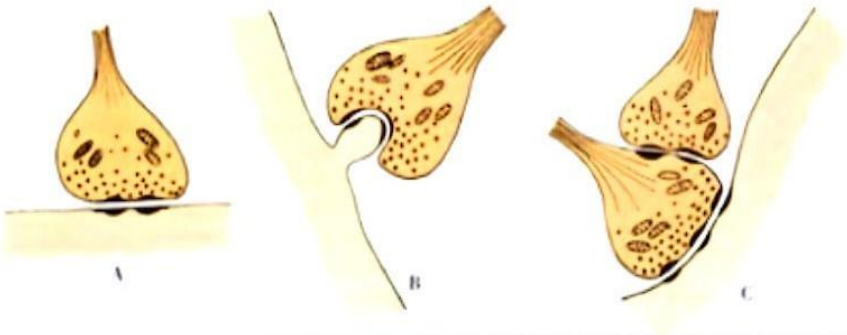
Neurons are classified on the basis of the number of processes extending from the cell body to :-

- *Multipolar*, neurons have an axon and two or more dendrites
- *bipolar* , neurons have one axon and one dendrites
- *Unipolar*, (actually pseudounipolar) have one process the axon , that divides close to cell body to two long processes.**(View 24)**

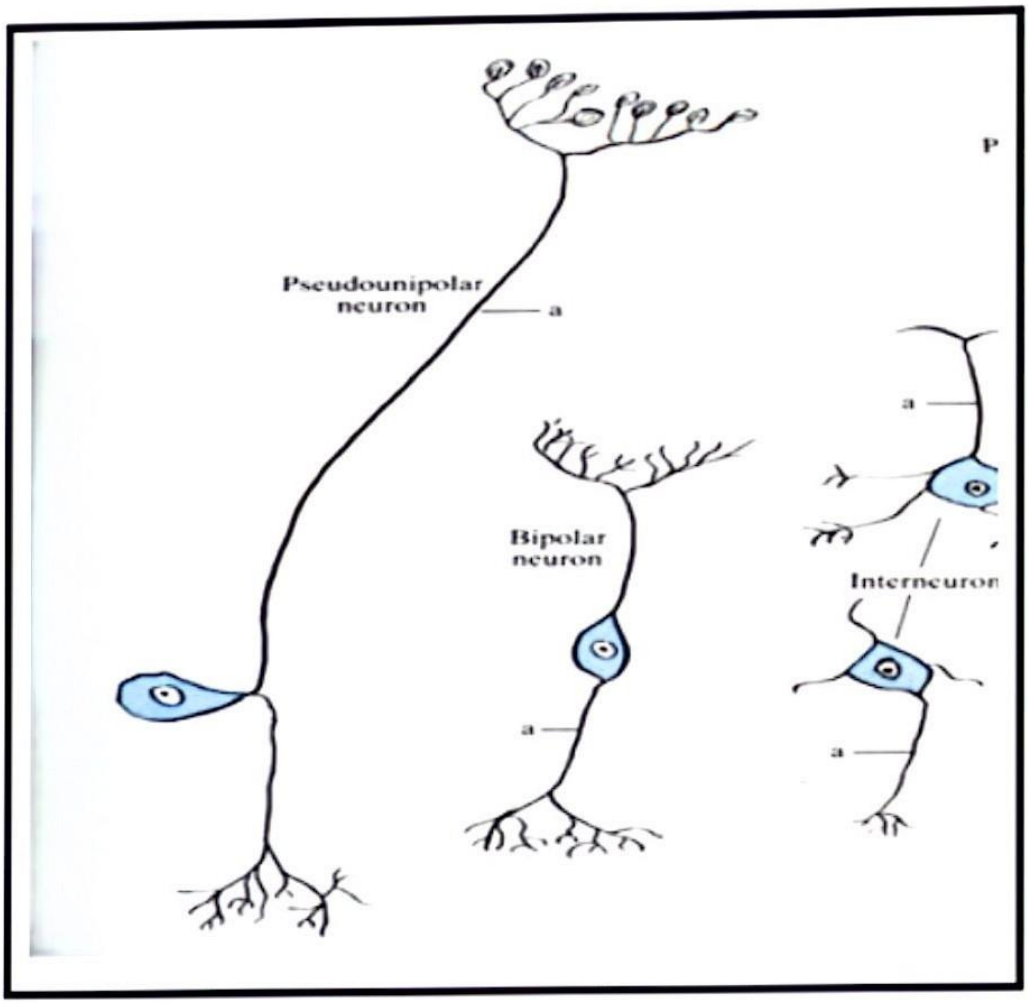
Synapses .

Are specialized junctions between neurons that facilitate transmission of impulses from one neuron to another. Synapses between neurons may be classified morphologically as :

- *Axodendritic*, occuring between axons and dendrites.
- *Axosomatic*, occuring between axons and cell body
- *Axoaxonic* , occuring between axons and axons.
- *Dendrodendritic*, occuring between dendrites and dendrites.**(View 25)**



A:axodendritic or axosomatic ,B:axodendritic in which an axon terminal synapses with a dendritic spin C:axoaxonic . **(View 25)**



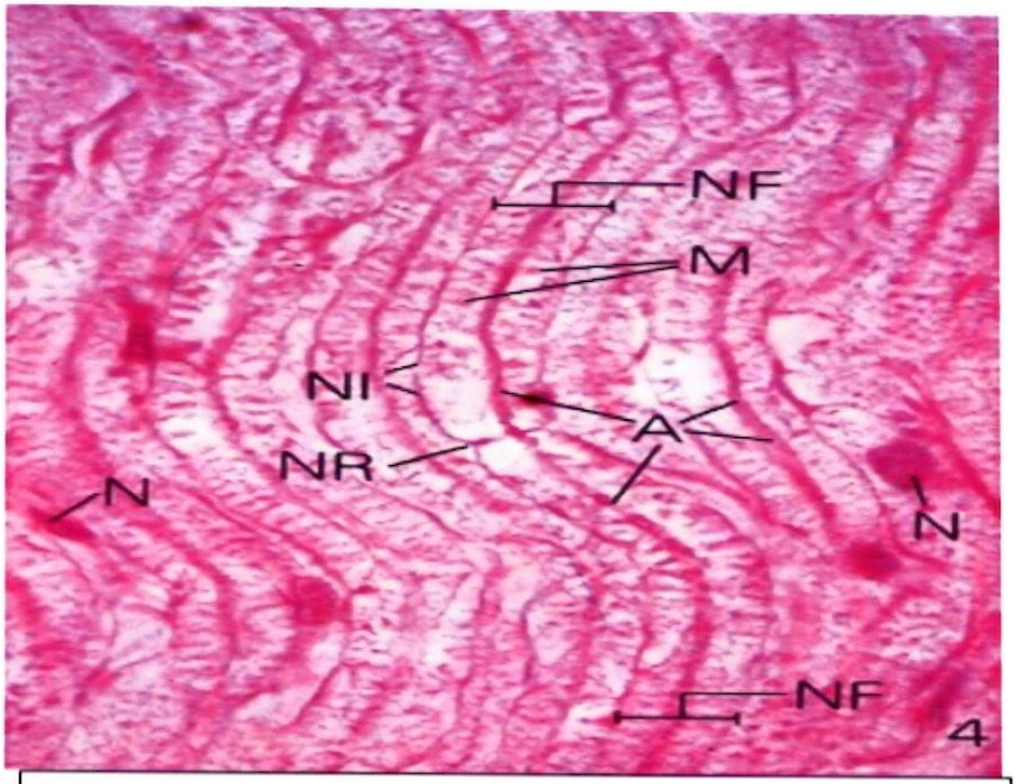
(View 24)

Myelinated and Unmyelinated Nerves.

Nerves are composed of bundles of nerve fibers held together by perineurium and connective tissue . Each nerve fiber consist of an axon that is surrounded by a cellular investment called the neurilemma or the sheath of Schwann . In addition , the fiber may be myelinated or unmyelinated which do not have myelin , if present, ediately around the axon then called myelinated nerves.The myelin sheath is segmented and this site is called the **node of Ranvier .(View 26)**

Autonomic nervous system

Is that portion of PNS that conduct impulses to smooth muscle, cardiac muscle, and glandular epithelium.



A: axon , **M:** myelin , **NF:** nerve fiber, **NR:**node of Ranvier
Pn:perineurium , **SS:** Schwann cell nucleus
Arrows, septum formed by perinerium**(View 26)**

Spinal cord

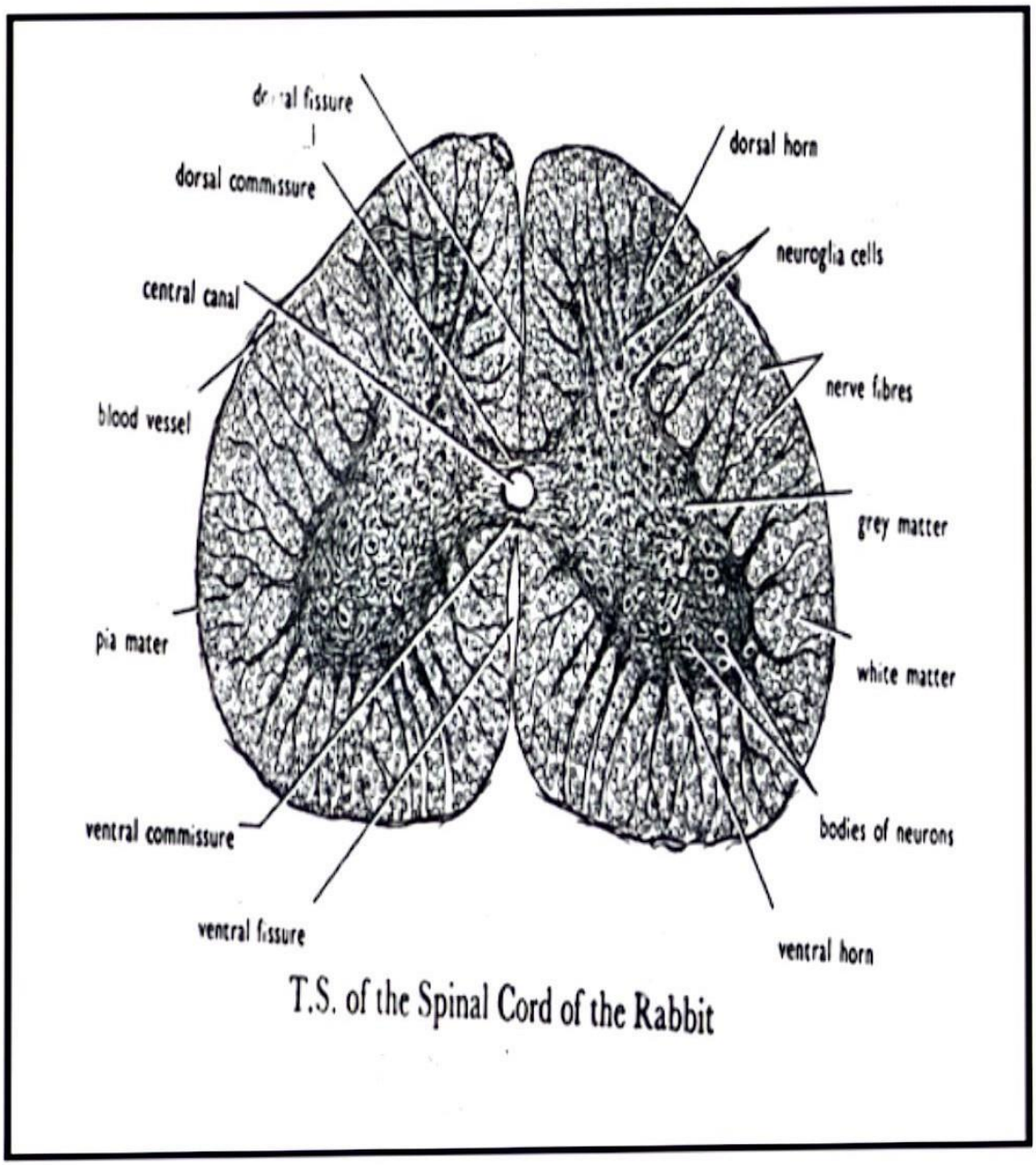
In cross section, the spinal cord is organized into two discrete parts exhibits a butterfly - shaped grayish-tan inner substance, the gray matter surrounding the central canal , and a whitish peripheral substance , the white matter which contains only myelinated and unmyelinated axons traveling to and from other parts of the spinal cord and to and from the brain . The gray matter contains neuronal cell bodies and their dendrites, along with axons and neuralgia. (View 27)

The brain (Cerebrum & Cerebellum)

Is contains gray matter and white matter but in a different arrangement , the gray matter forms an outer covering or cortex , which consists of a six layers :

I -Molecular layer.
II -Outer glranular layer.
III-Outer pyramidal cell layer.
IV- Inner granular layer.
V -Ganglionic layer (large pyramidal cell).
VI -Fusiform (polymorphic) cell layer.

(View 27)

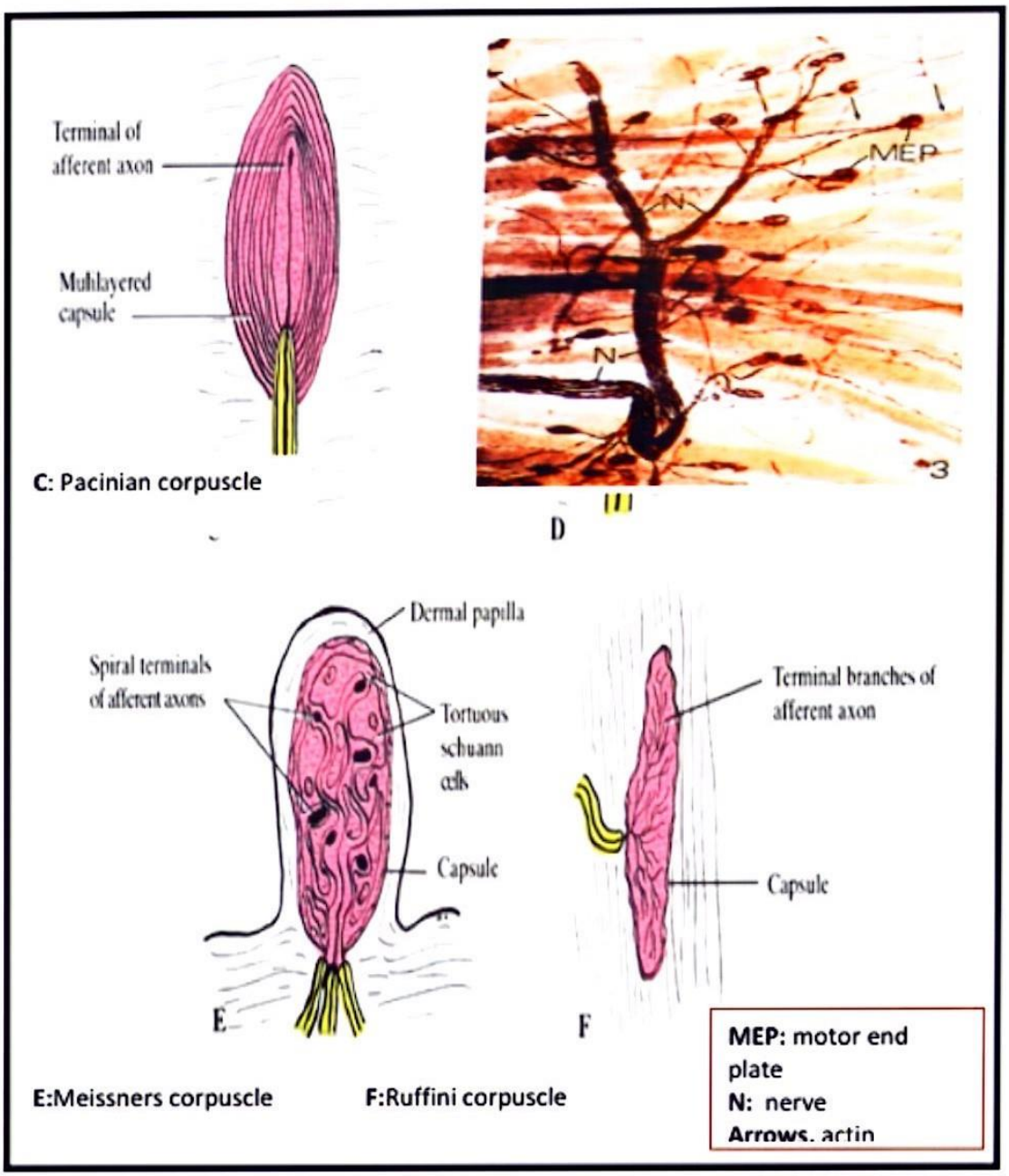


T.S. of the Spinal Cord of the Rabbit

Nerve ending

- *Pacinian corpuscles*,are large ovoid structures found in the deeper dermis and hypodermis also it found in the pancreas .
- *Meissner 's corpuscles* , are touch receptors that found in the papillary layer of hairless skin
- *Ruffini endings* , are the simplest mechanoreceptors ,they have an elongated fusiform shape .

- *Motor end plates* , are the physiologic contact between nerve and muscle.(View 28)



(View 28)