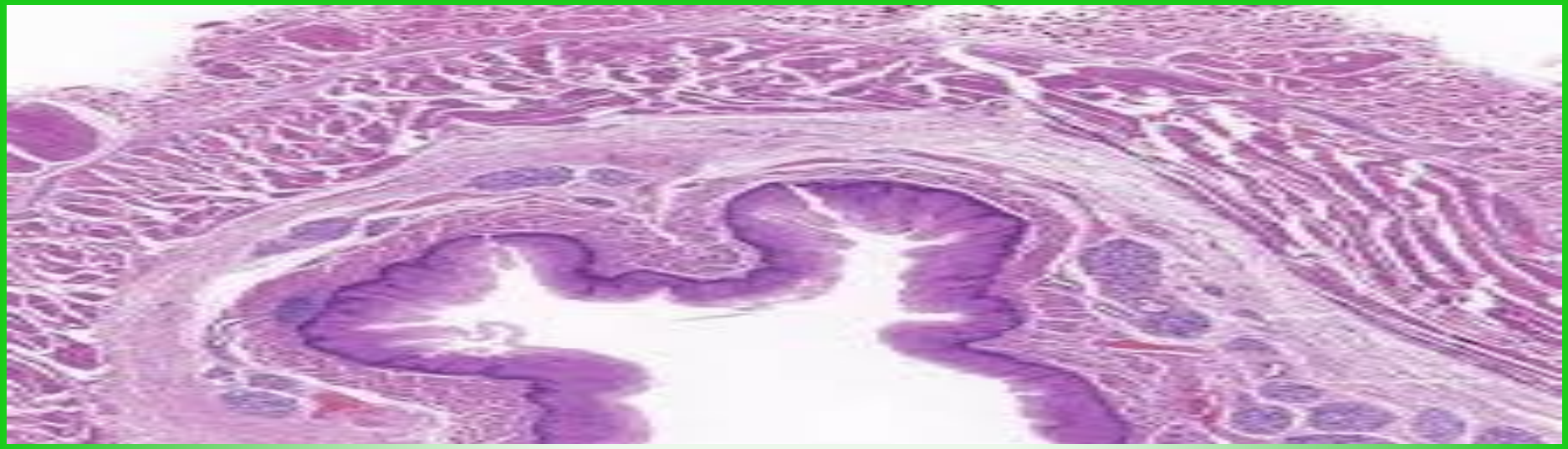


General Histology

(Practical)

Lab 6

Lab Six

Nervous system

The nervous system is organized anatomically into the central nervous system (CNS) which include the brain and spinal cord, and the peripheral nervous system (PNS) which lies outside the CNS, include cranial nerves, emanating from the brain; spinal nerves emanating from the spinal cord and their associated ganglia. Functionally, the nervous system is divided into a sensory (afferent) component , which receives and transmits impulses to the CNS for processing and a motor (efferent) component, which originates in the CNS and transmit impulses to effectors organs through the body. The motor component is further impulses are transmitted via neurons. In addition to the neurons, nervous tissue contains neuroglial cells, which support neurons.

Lab Six

Neurons:

The cell responsible for the reception and transition of nerve impulses to and from the CNS are the neurons. Most neurons are composed of three distinct parts: A cell body, multiple dendrites and a single axon.

Neuronal cell body:

The cell body (soma, perikaryon) is the region of the neuron containing the large pale- staining nucleus and perinuclear cytoplasm. The nucleus is large , usually spherical to ovoid, and centrally located. A well defined nucleolus is also common. The cytoplasm has abundant rough endoplasmic reticulum (RER) with many cisternae. Polyribosomes are also scattered through the cytoplasm. When these cisternae and polyribosomes are stained with basic dyes, they appear as clumps of basophilic material called nissl bodies.

Lab Six

Neurons are classified morphologically into:

1- Unipolar neurons: Possess a single process and are rare in vertebrates except in early embryonic development.

2- Bipolar neurons: Possess two processes emanating from the soma, a single dendrite and a single axon, they are located in the olfactory epithelium of the nasal cavity.

3- Pseudounipolar neurons: Possess only one process emanating from the cell body, but this process branches later into a peripheral and a central branch. They are present in the dorsal root ganglia and in some of the cranial nerve ganglia.

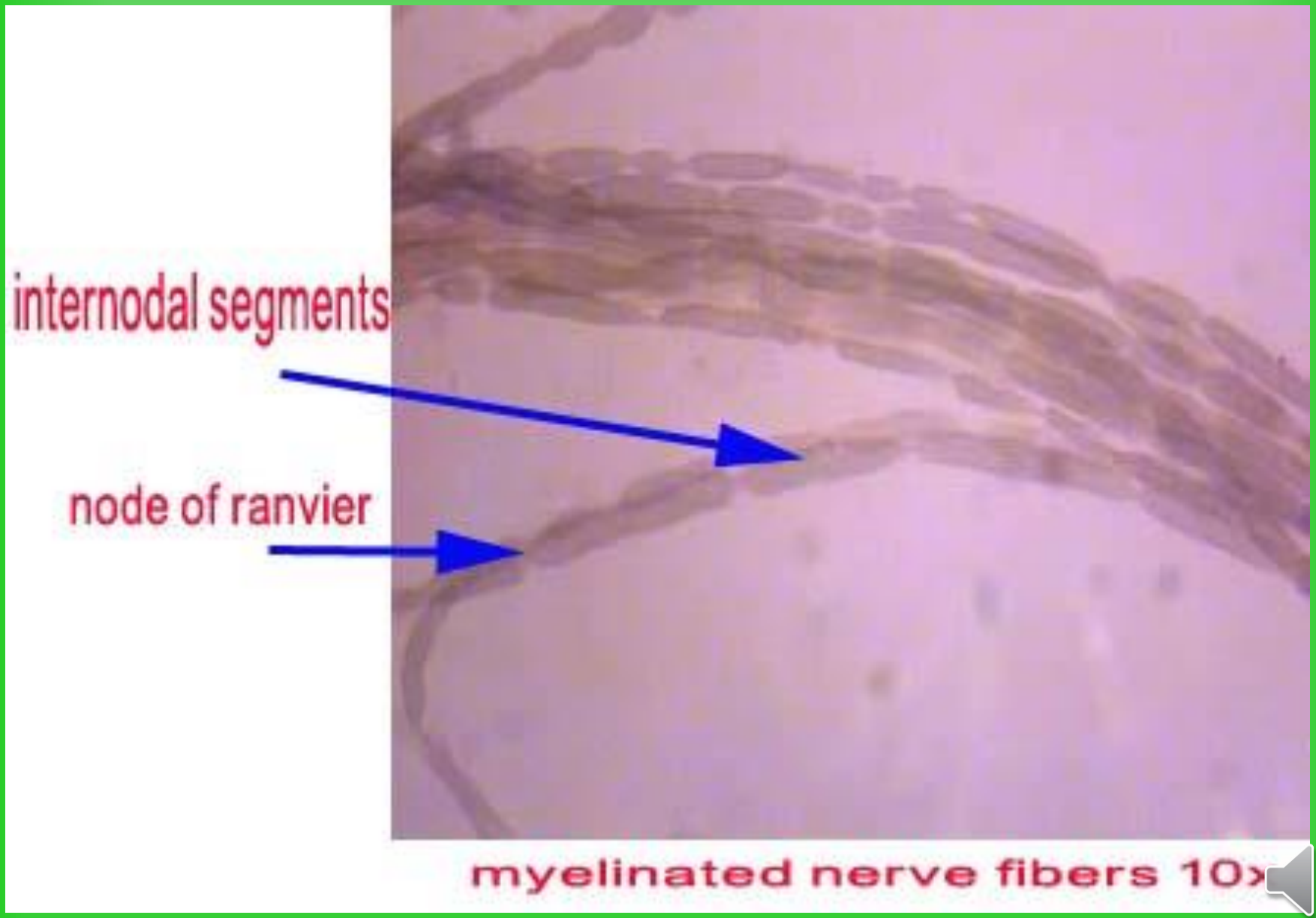
4- Multipolar neurons: Are the most common type of neurons. They possess various arrangements of multiple dendrites emanating from the soma and a single axon . they are present throughout the nervous system, and most of them are motor neurons

Nerve fibers:

Axons enveloped by Schwann cells which form two types of coverings over these axons: myelinated and non- myelinated.

1- Myelinated nerve fibers: Axons that have wrapped around them are called myelinated nerves. Myelin (the plasma lemma) of the Schwann cell organized into a sheath that is wrapped several times around the axon. At regular intervals along the length of the axon, interruptions occur in the myelin sheath, called **nodes of ranvier**. Areas of the axon covered by concentric lamellae of myelin and the single Schwann cell that produced the myelin are called **internodal segments,** several cone shaped oblique clefts in the myelin sheath of each internodal segment called **clefts of shmidt-lanterman.**

Lab Six


internodal segments
node of ranvier
myelinated nerve fibers 10x

Lab Six

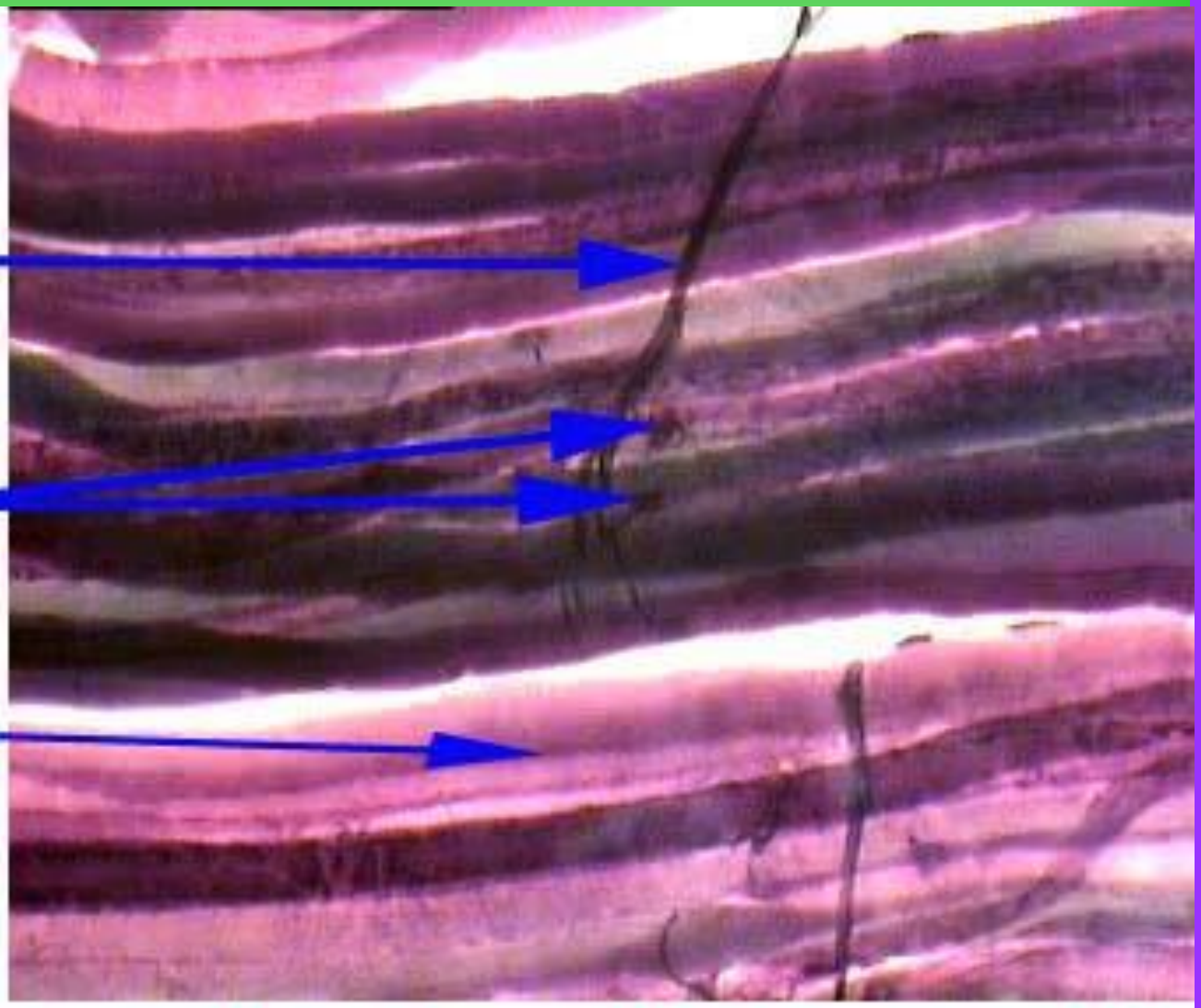
2- Unmyelinated nerve fibers:

Axons that not wrapped with many layers of myelin. These unmyelinated axons are surrounded by a single layer of Schwann cell plasma membrane and cytoplasm of the cell .

Nerve endings:

1- Motor end plate: The axon forms abulbous expantion at its terminal end of skeletal muscle.

Lab Six



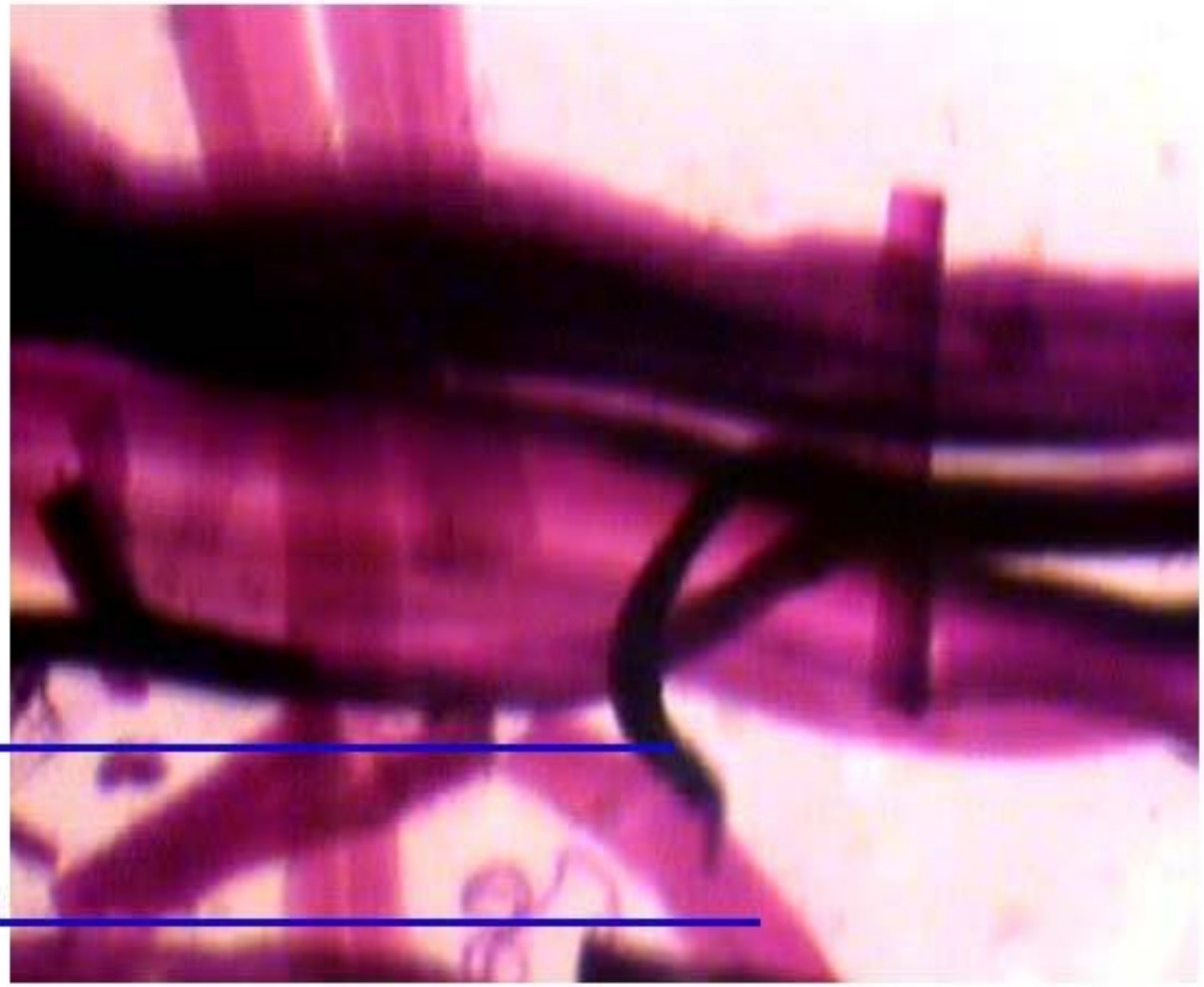
nerve ending with skeletal muscule 10x

(motor end plate)

2- Muscle spindle:

The muscle spindle is a fusiform structure found between and in parallel with ordinary skeletal muscle fibers . The organ is enveloped by connective tissue capsule consisting of fibroblasts and dense collagen fibers within it there are two distinctive types of muscle fibers , known as intrafusal fibers . The muscle spindle is a muscle receptor organ , innervated with both sensory and motor nerves .

Lab Six



nerve ending (muscle spindle) 4x