

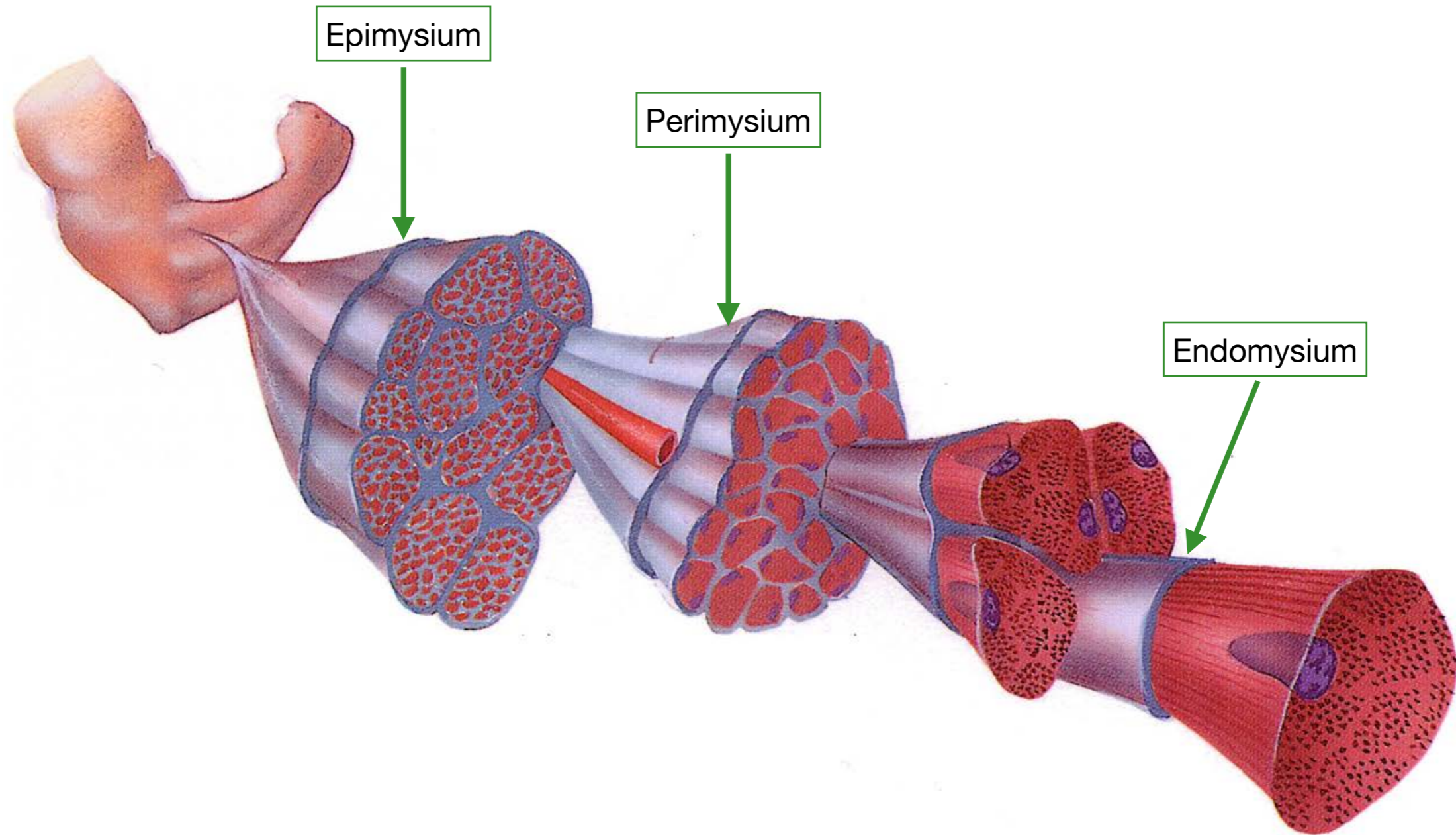
Structure and Function of Muscle and Nervous Tissue

What we'll talk about...

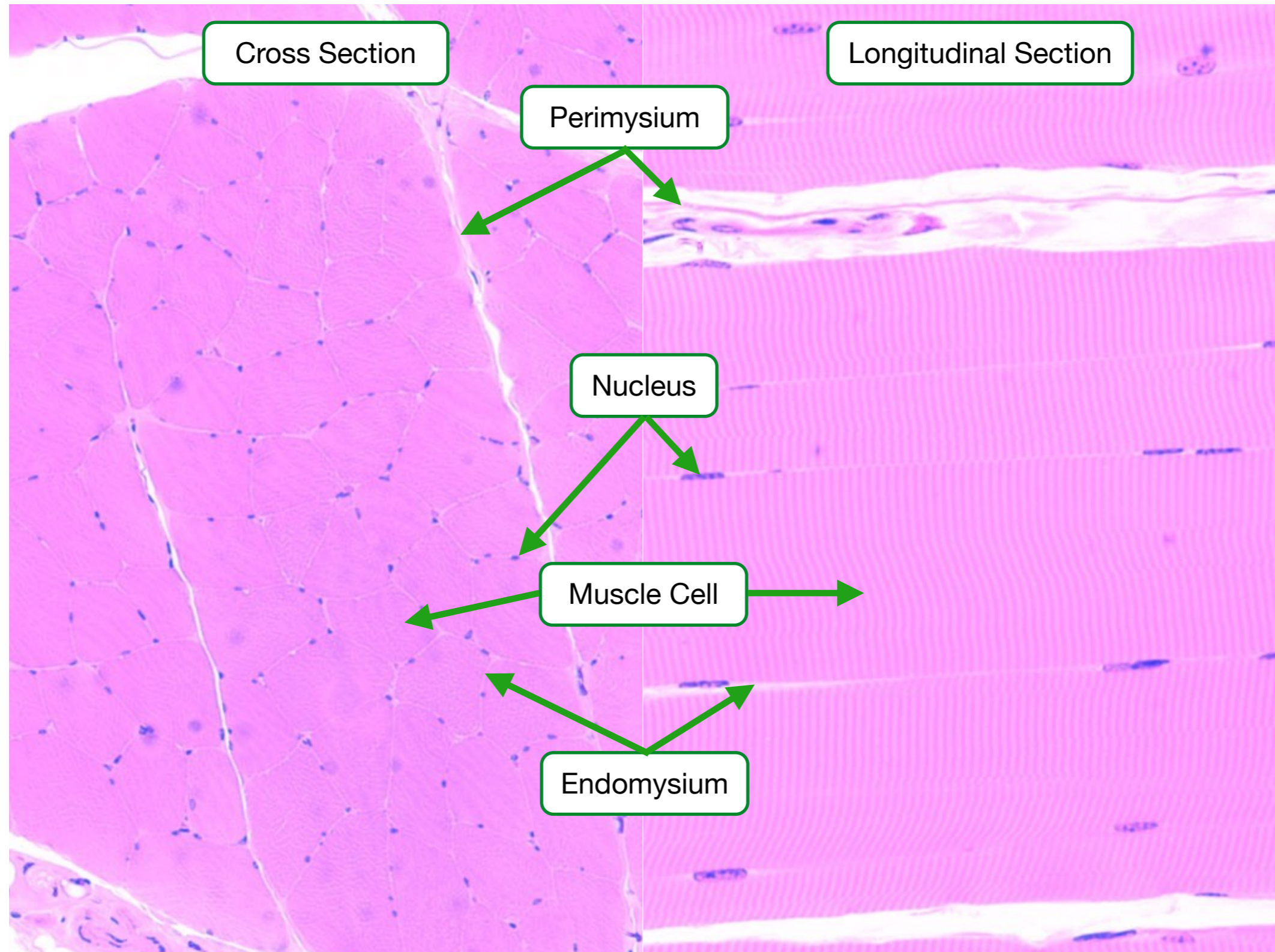
- Structure and functional features of muscle tissues
- Structure of neuromuscular junction
- Structure and organization of the spinal cord
- Structure of peripheral nerves

Skeletal Muscle

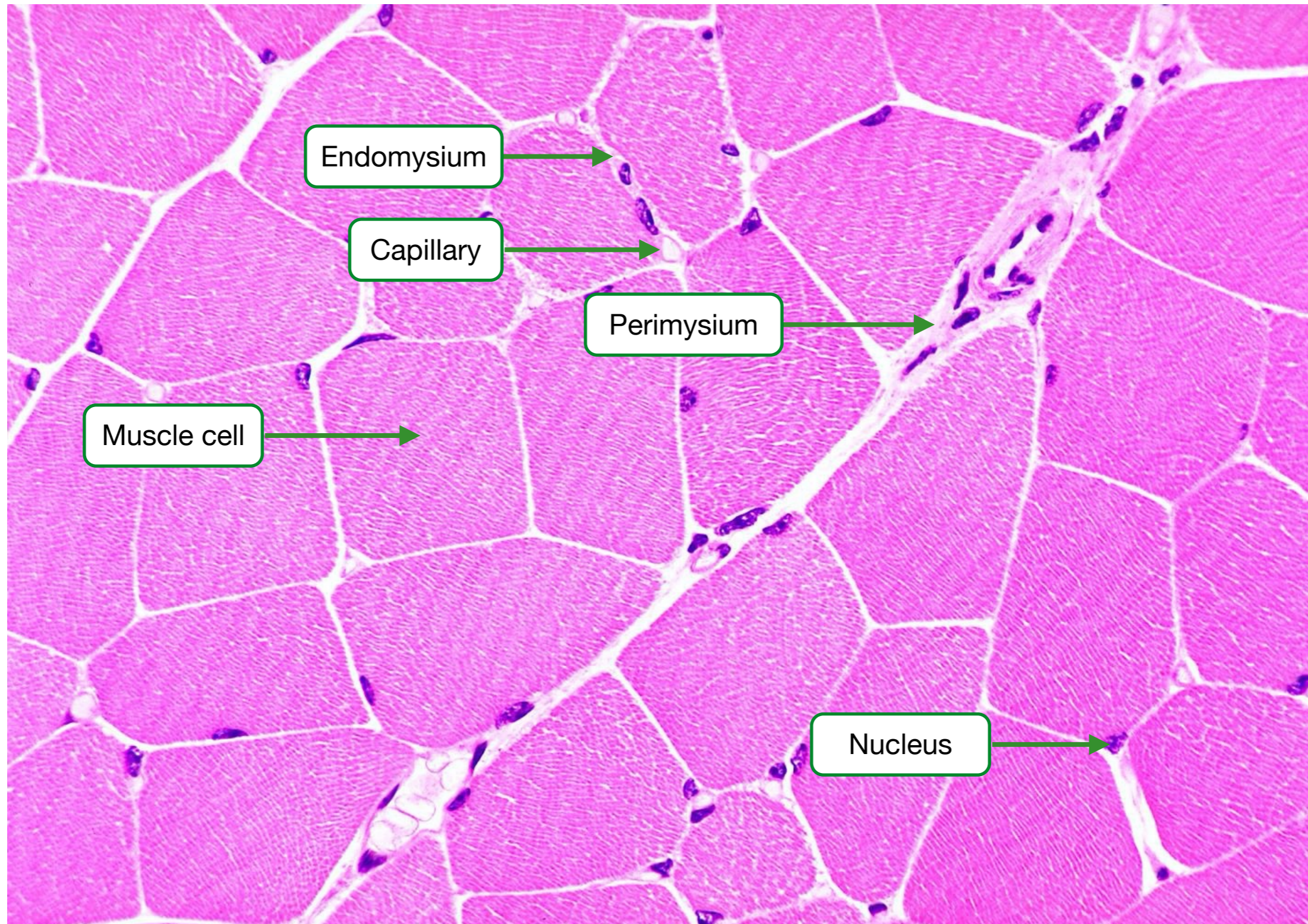
Skeletal muscle consists of bundles of cells wrapped in connective tissue layers.



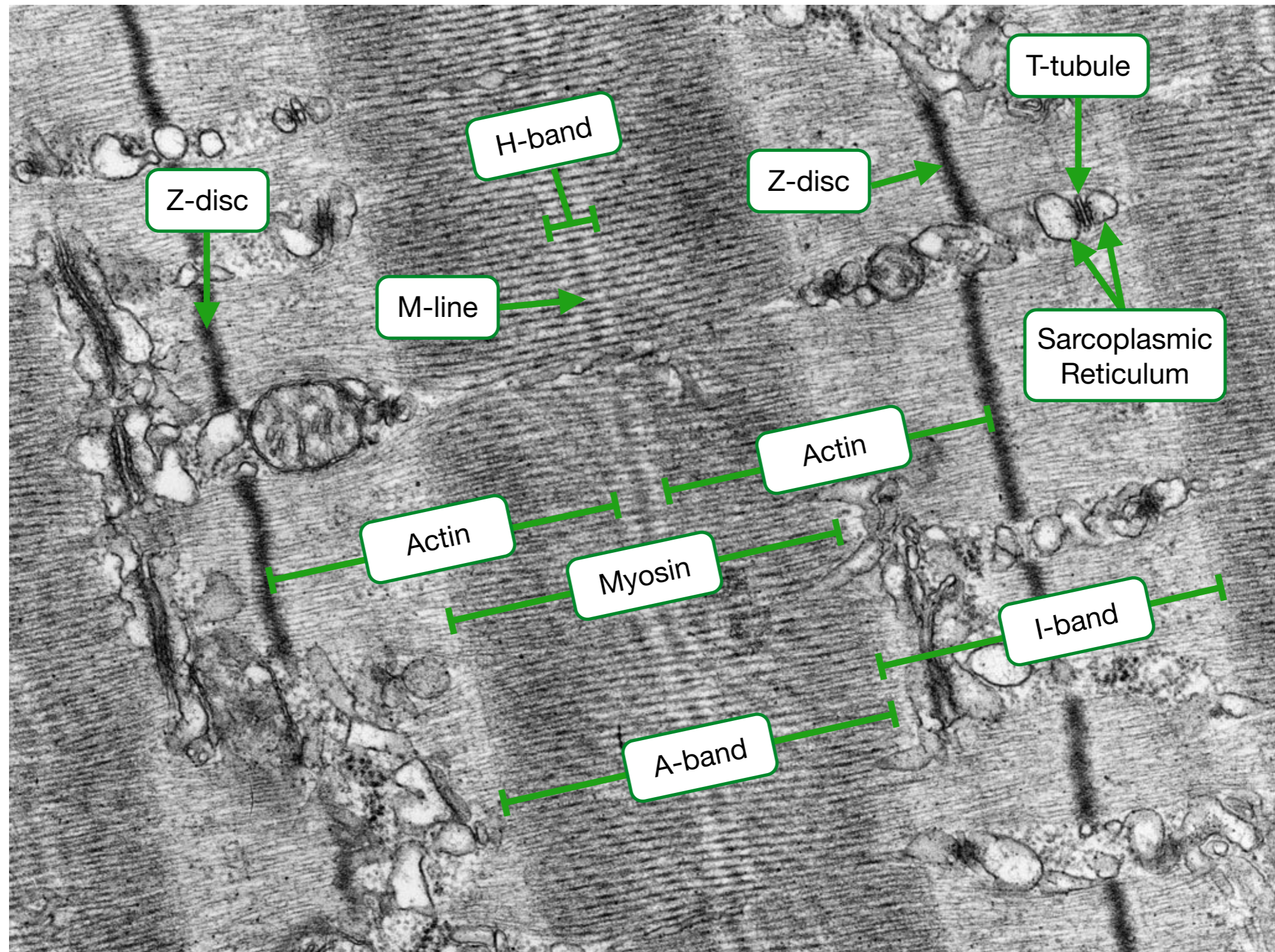
H&E stain reveals striated pattern and connective tissue layers.



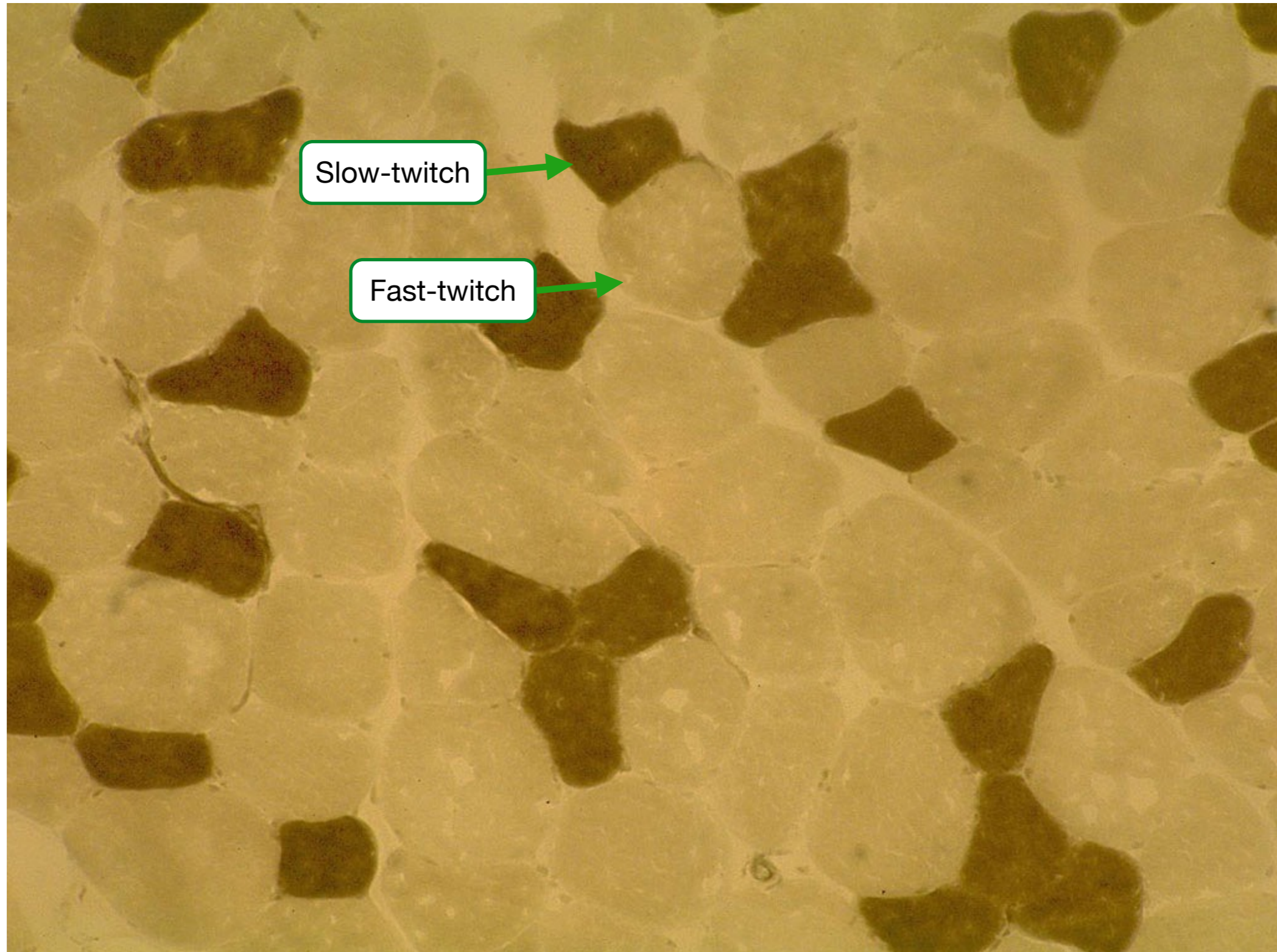
Each muscle cell is enveloped by endomysium and groups are wrapped by perimysium.



Electron micrographs reveal the structural components of the sarcomere.

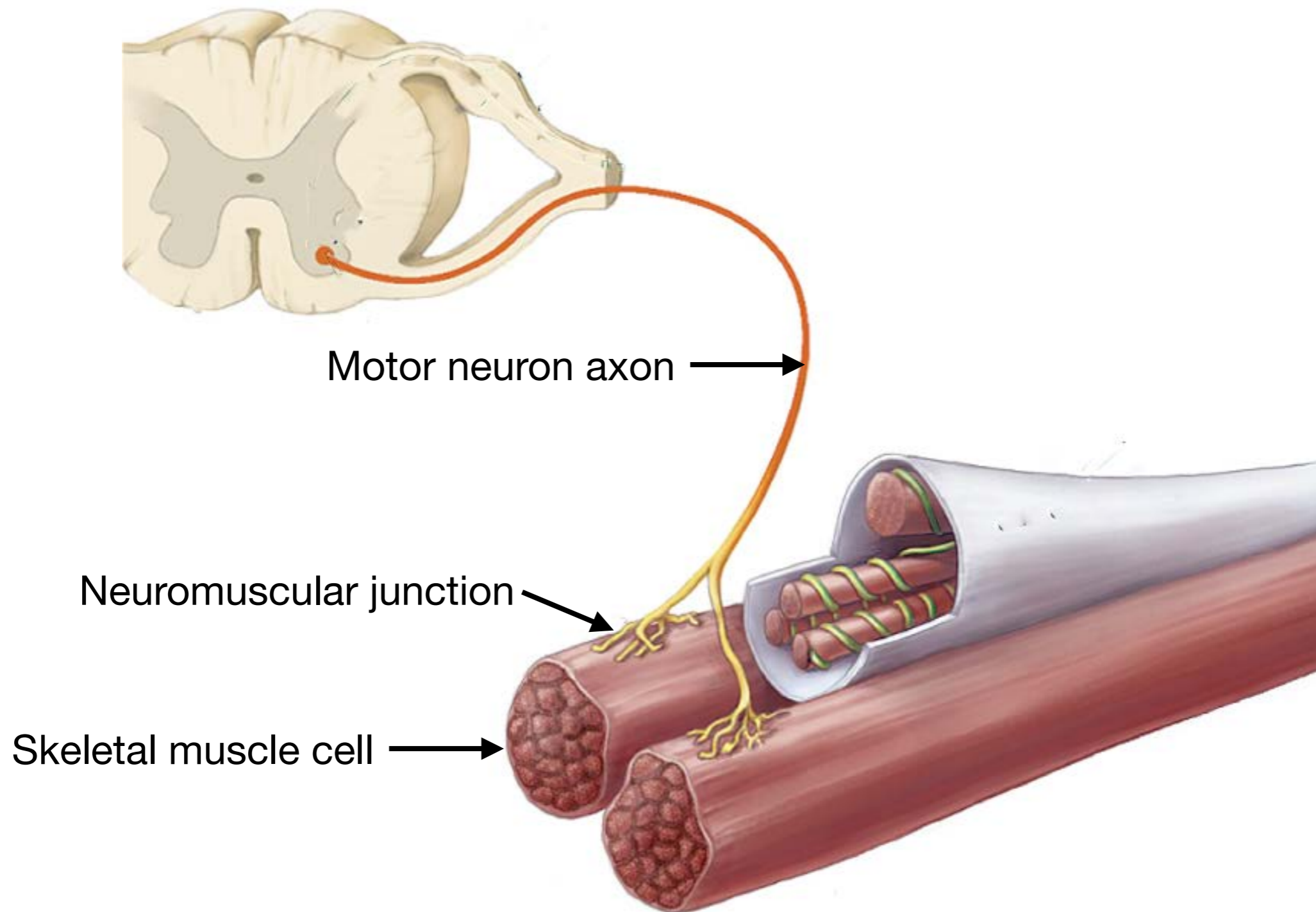


Skeletal muscle contains cells with different mechanical and biochemical properties.

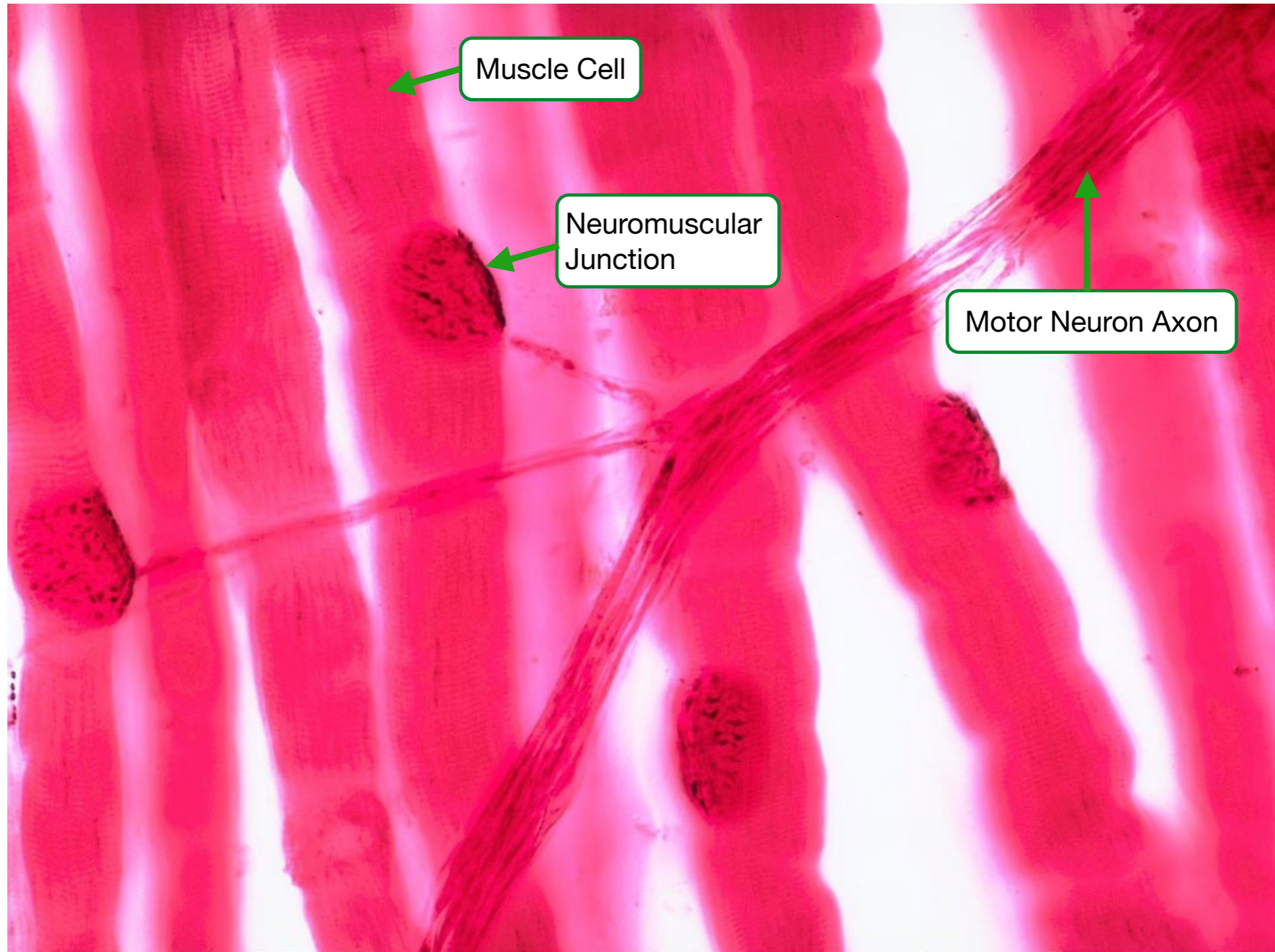


Neuromuscular Junction

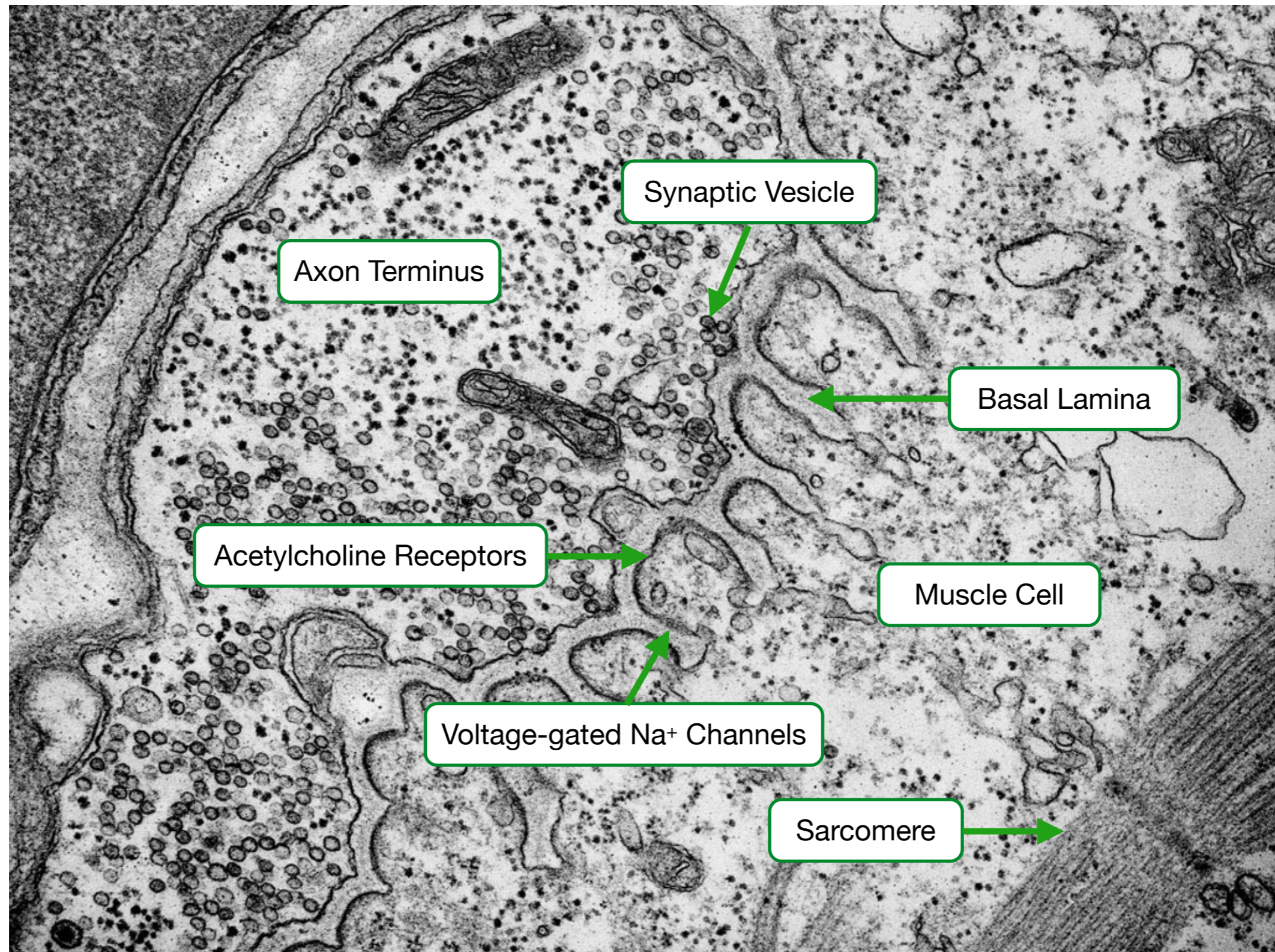
Motor neurons innervate skeletal muscle cells at neuromuscular junctions.



Motor neurons form synapses on muscle cells at the neuromuscular junction.



The neuromuscular junction contains a synapse between the axon terminus and skeletal muscle cell.

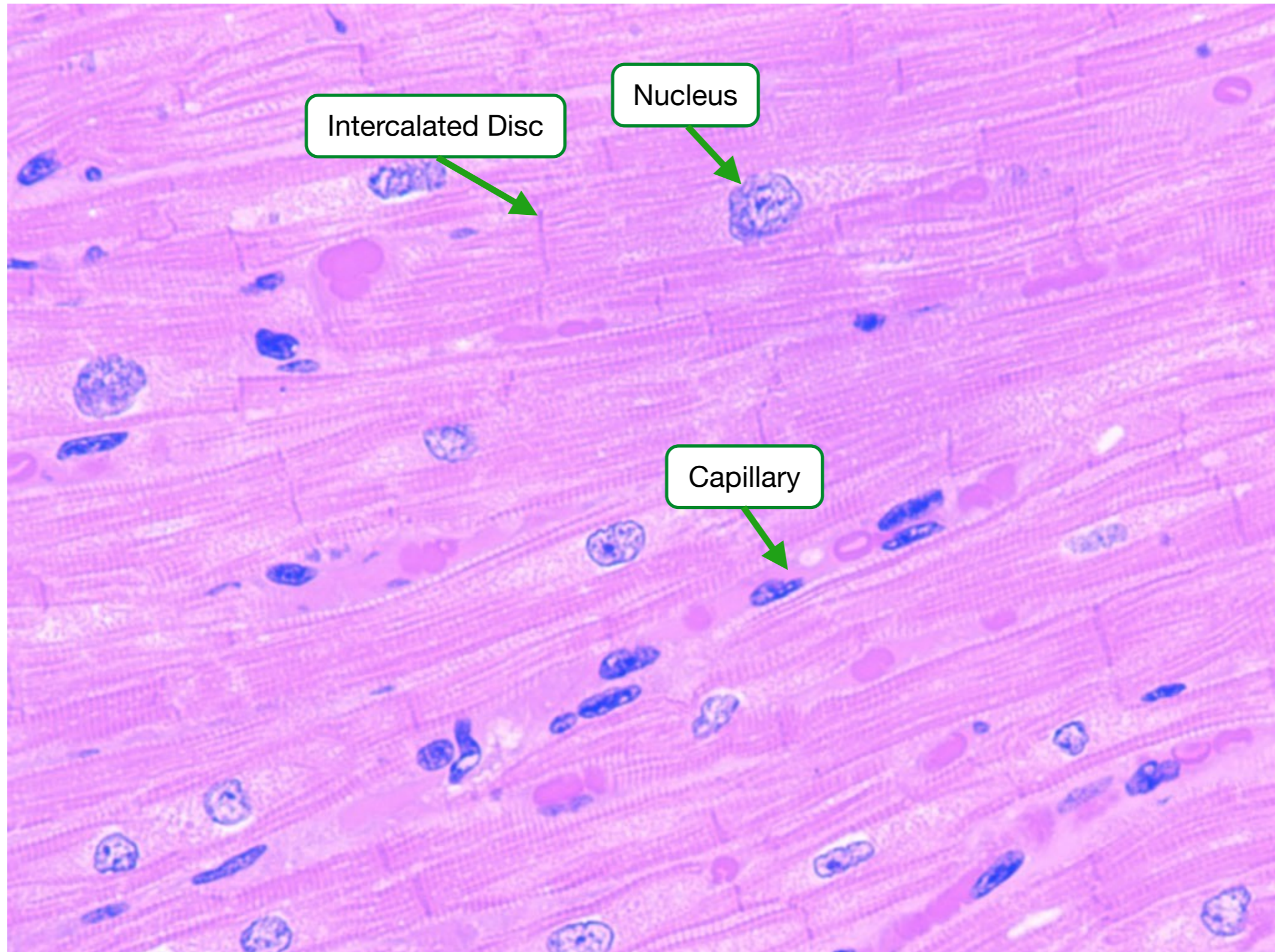


Cardiac Muscle

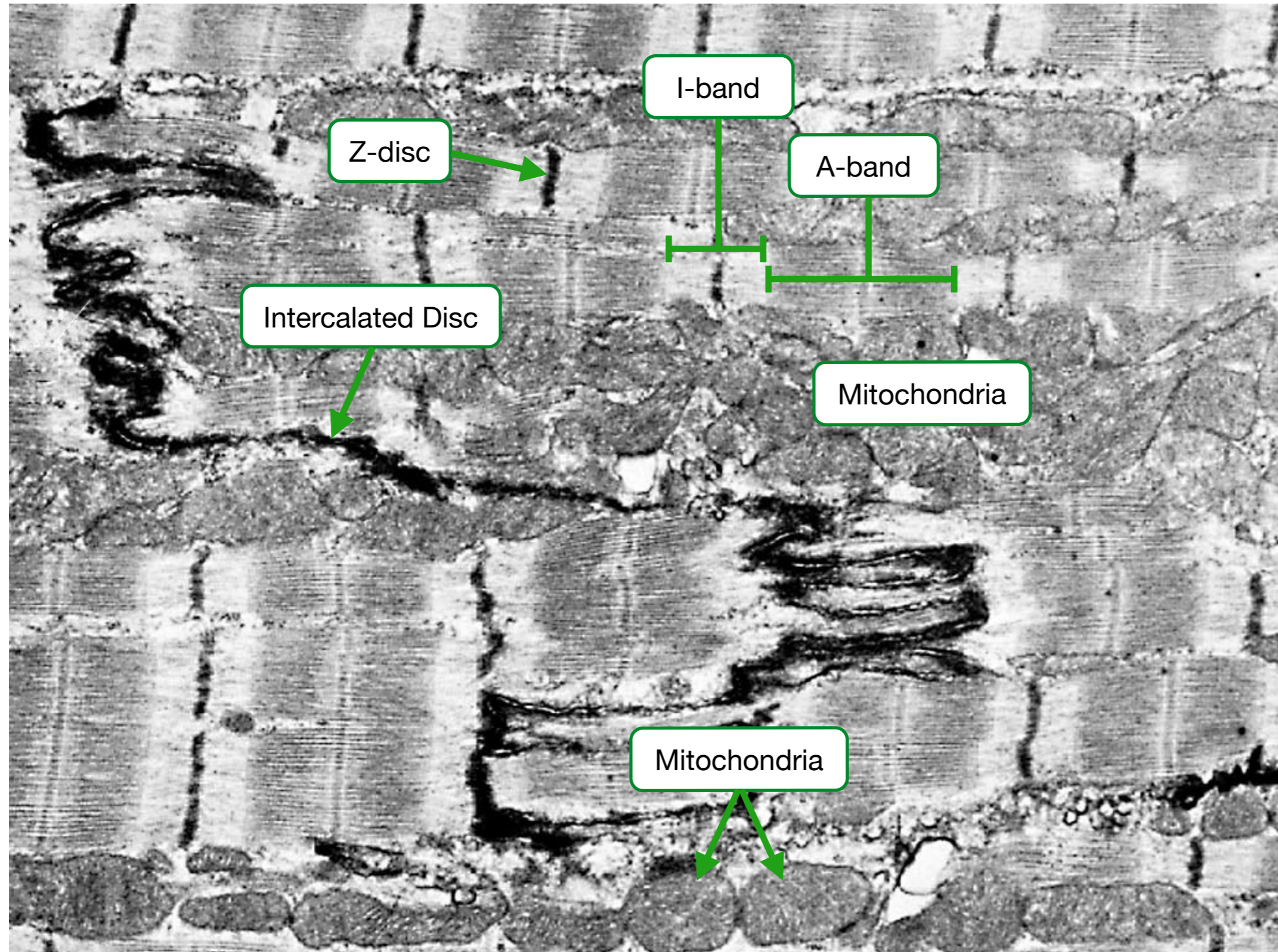
Cardiac muscle consists of smaller, interconnected cells called cardiomyocytes.



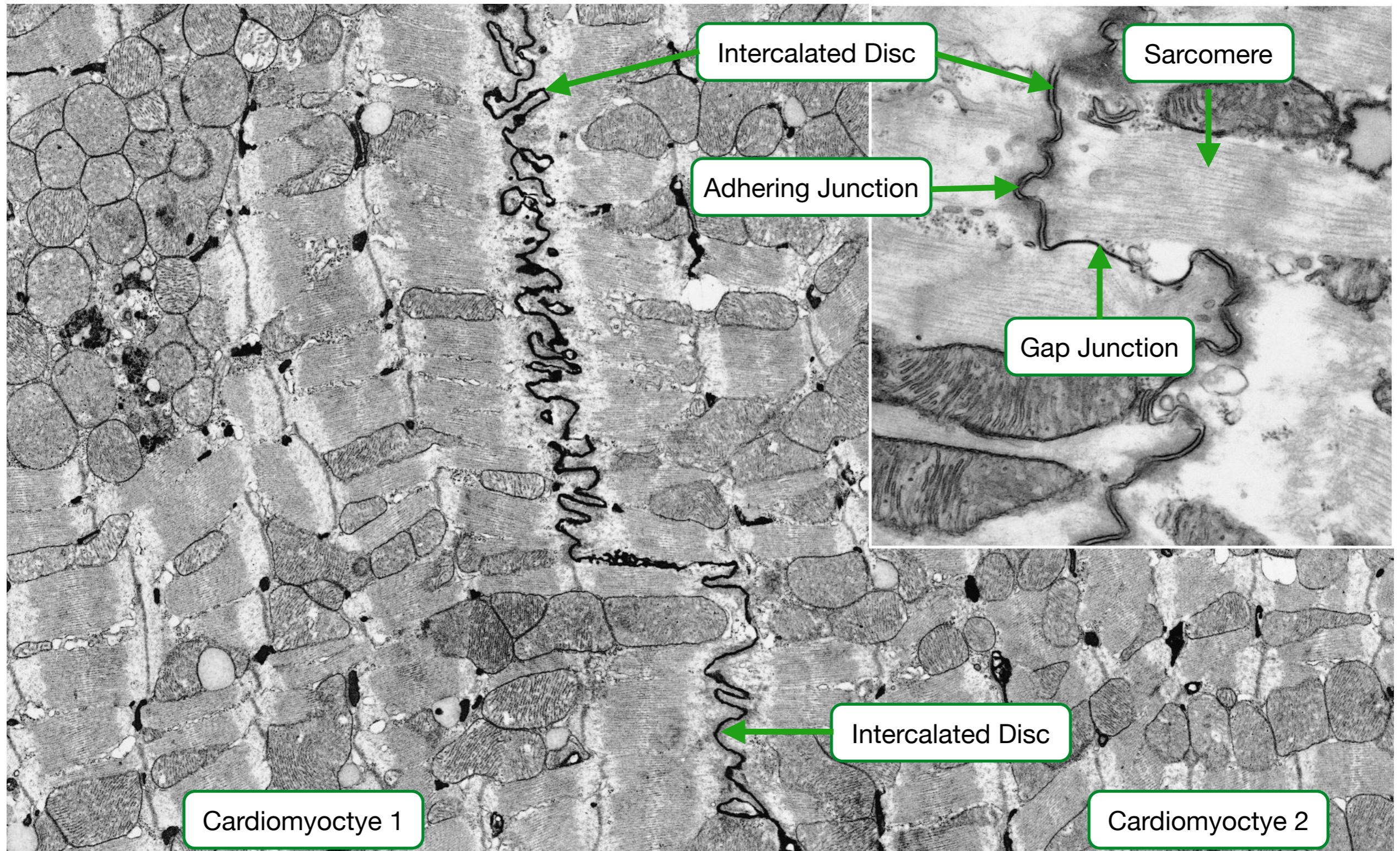
Cardiomyocytes appear striated and have a central nucleus and connect at intercalated discs.



Cardiomyocytes contain sarcomeres, numerous mitochondria and connect at intercalated discs.

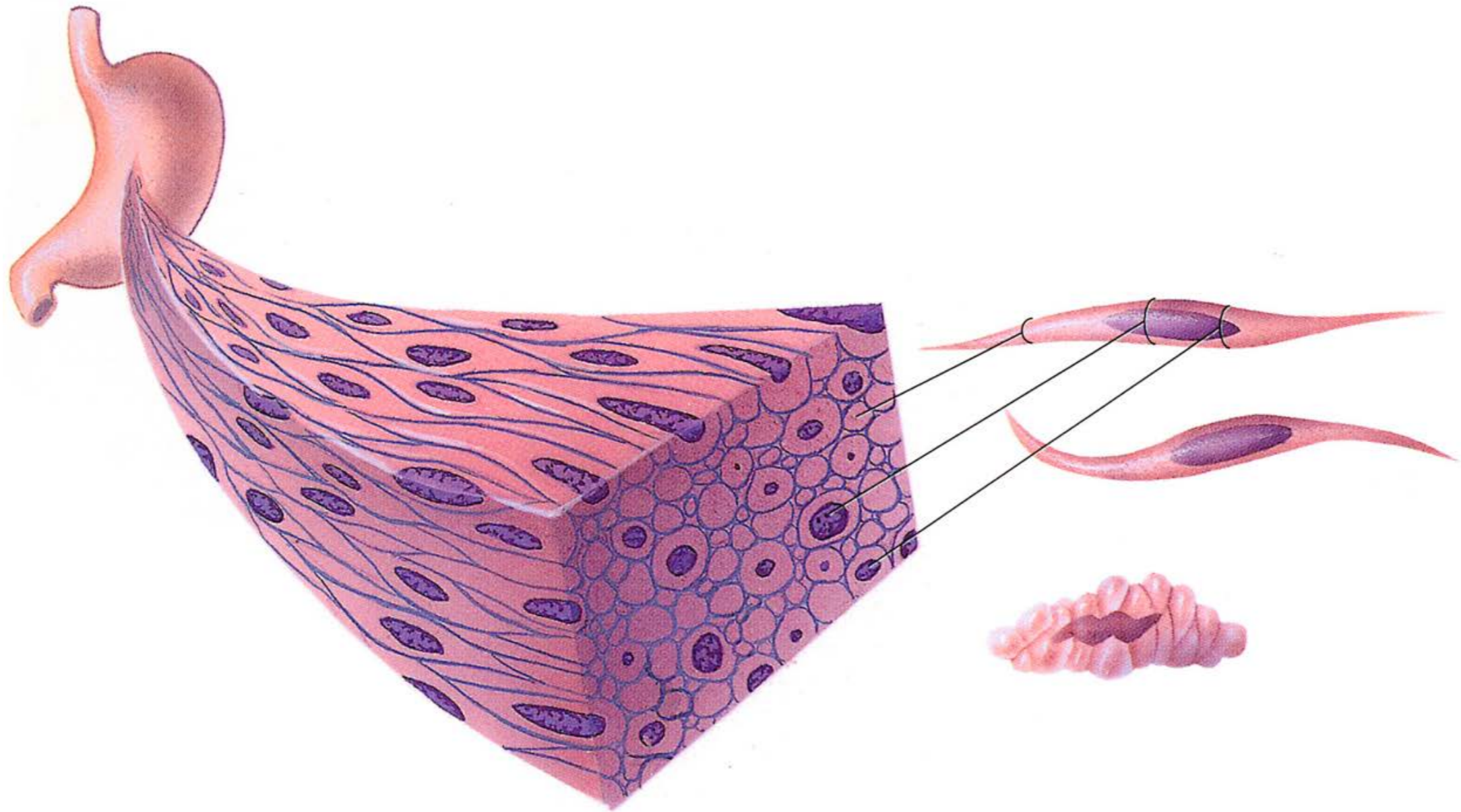


Intercalated discs contain adhering junctions and gap junctions.

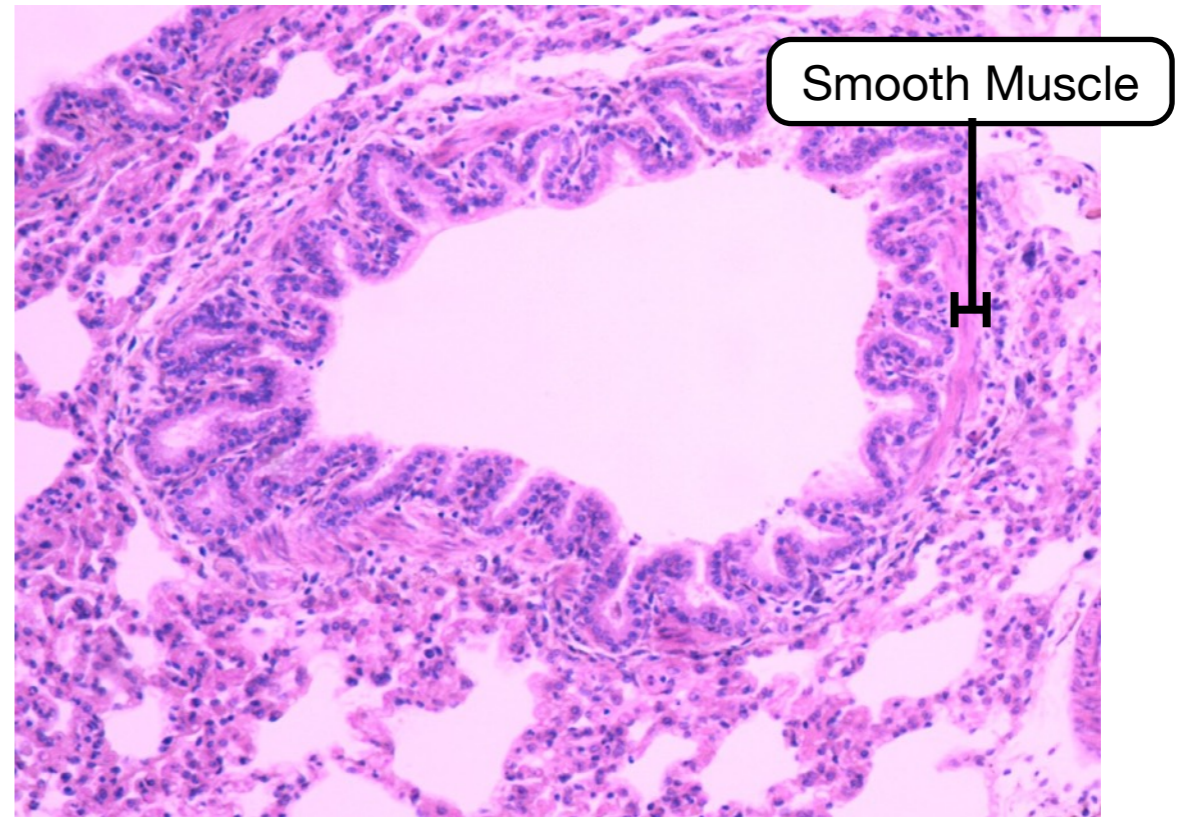


Smooth Muscle

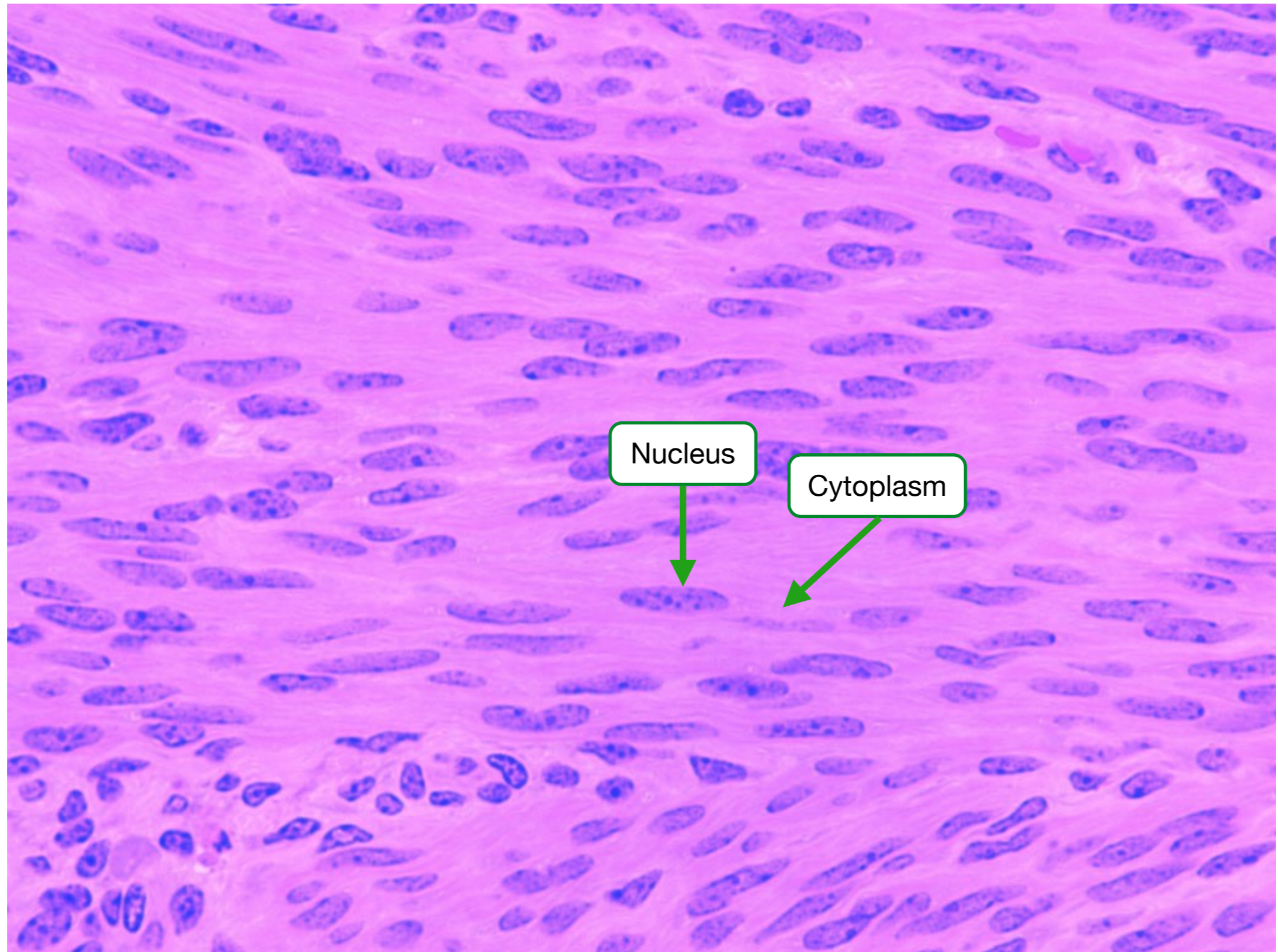
Smooth muscle contains spindle shaped cells.



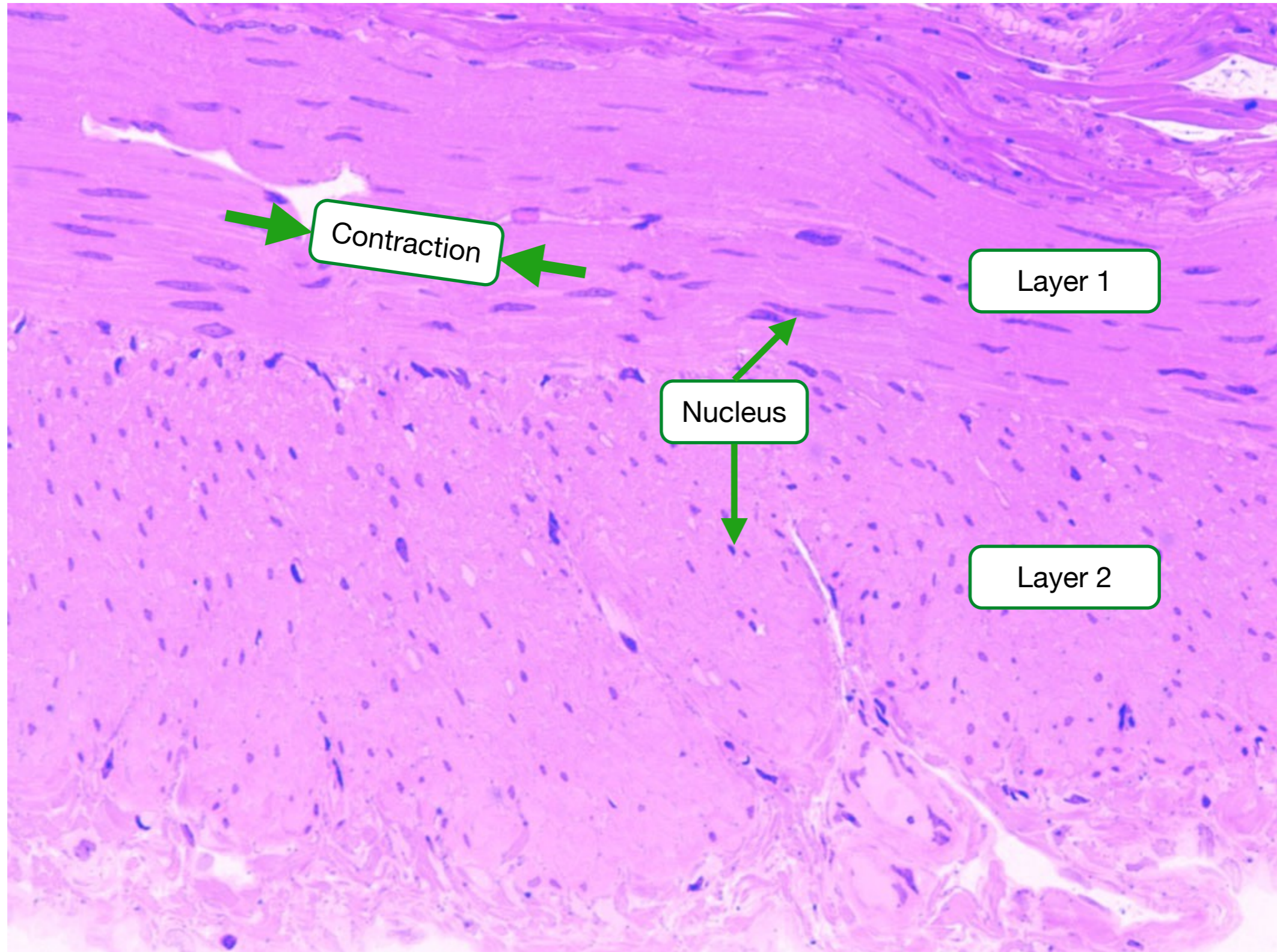
Smooth muscle controls diameter of tubes such as blood vessels and bronchioles.



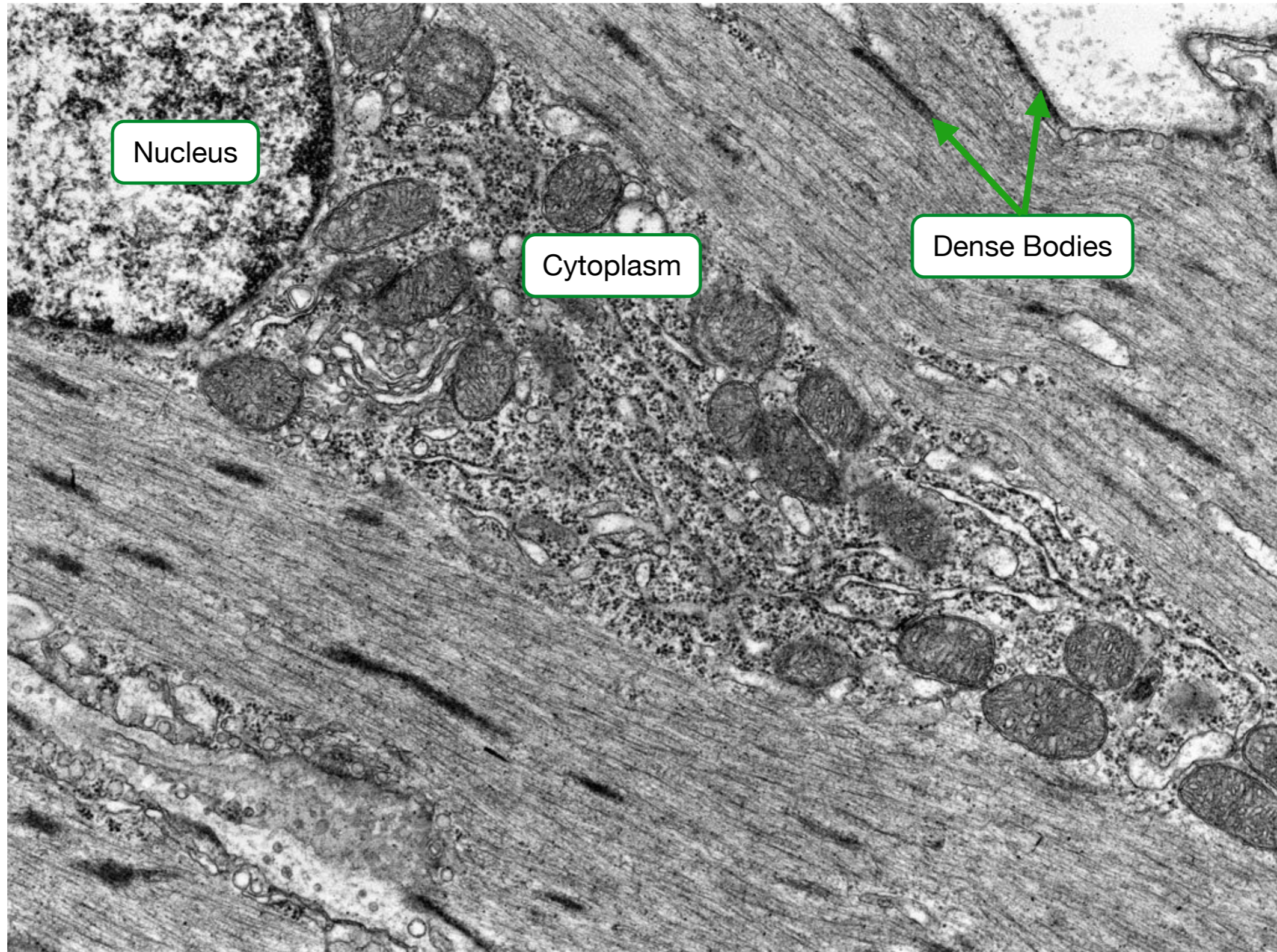
Smooth muscle cells are spindle-shaped with a single, elongated nucleus.



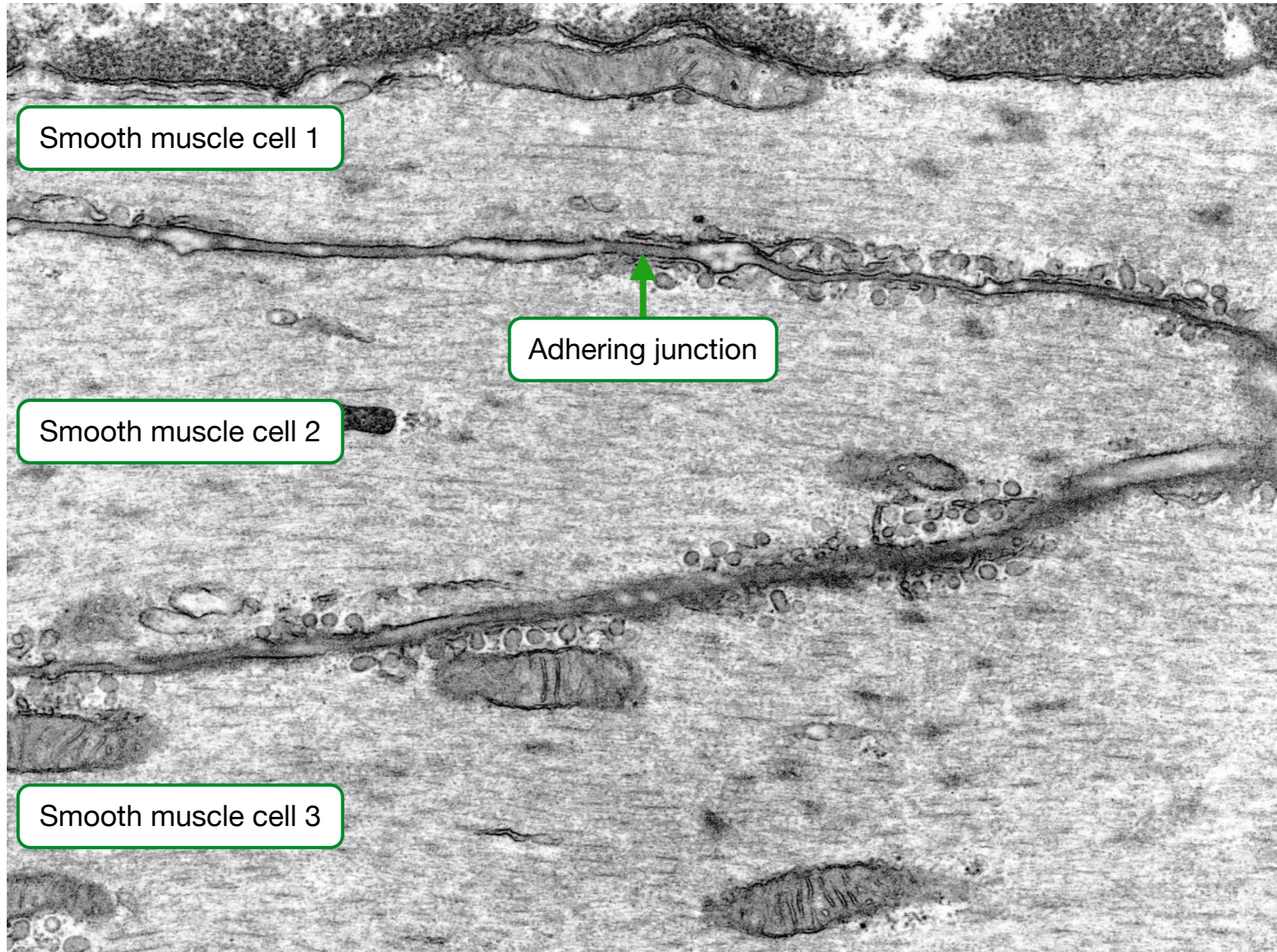
Some organs have layers of smooth muscle oriented in different directions.



Dense bodies in smooth muscle cells function as Z-discs to mediate contraction.

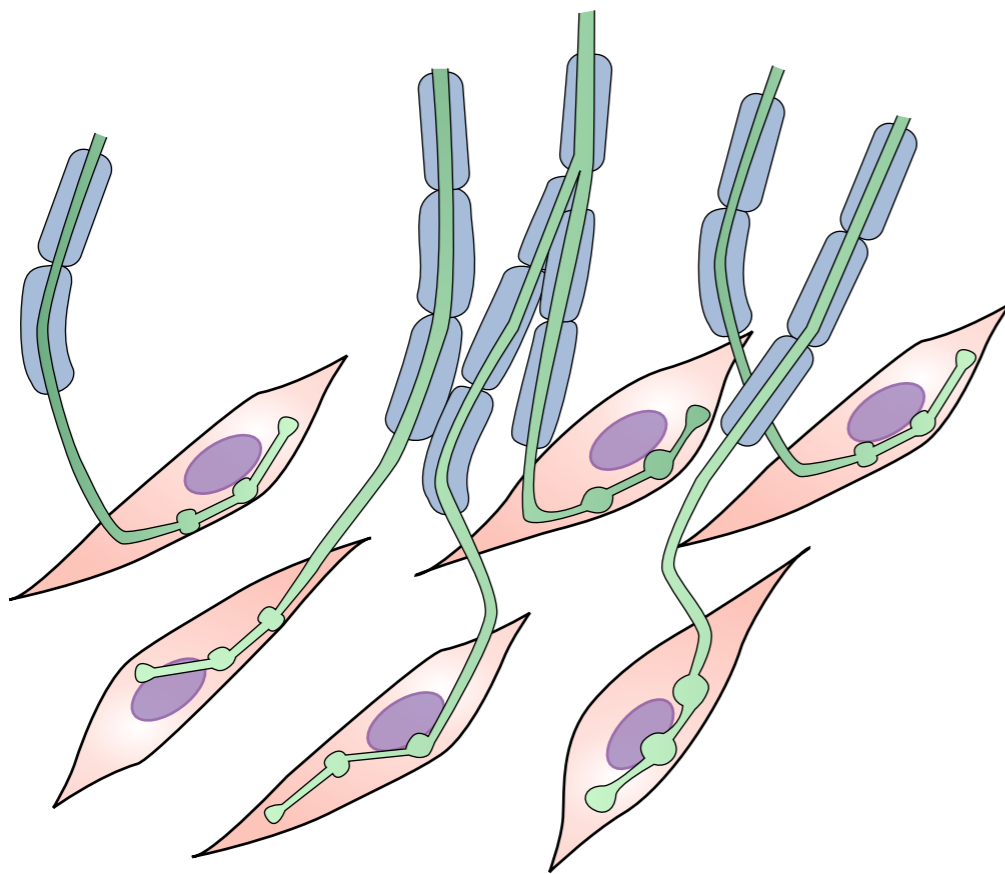


Adhering junctions connect adjacent smooth muscle cells.

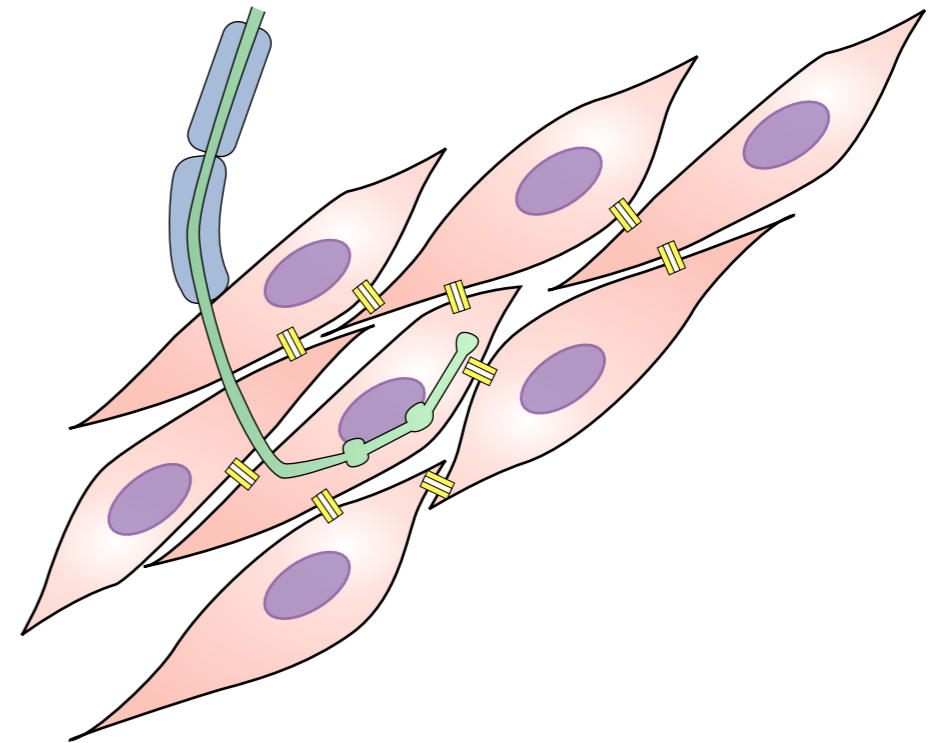


Smooth muscle cells can be individually innervated or work in groups via gap junctions.

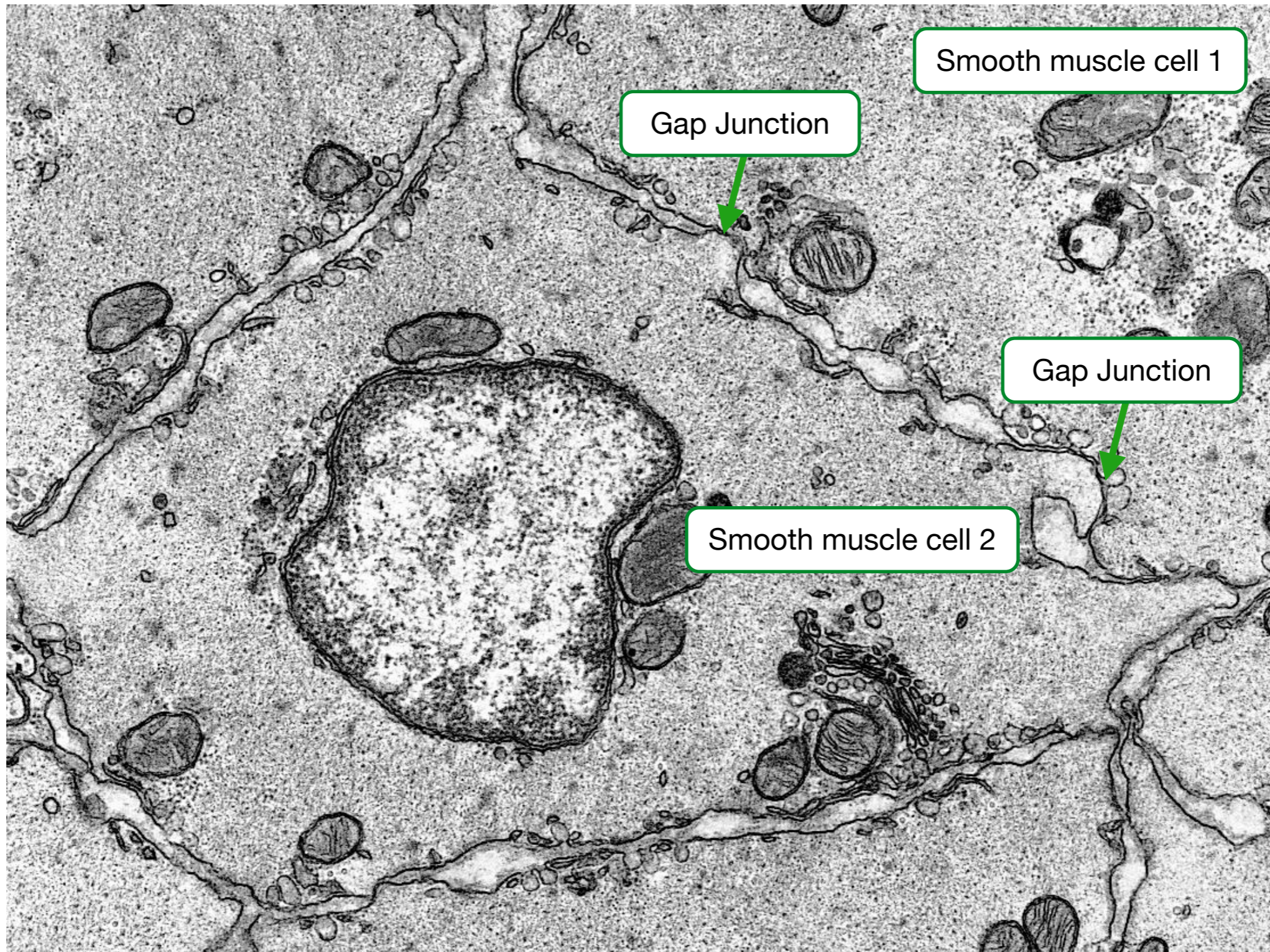
Multiunit



Unitary



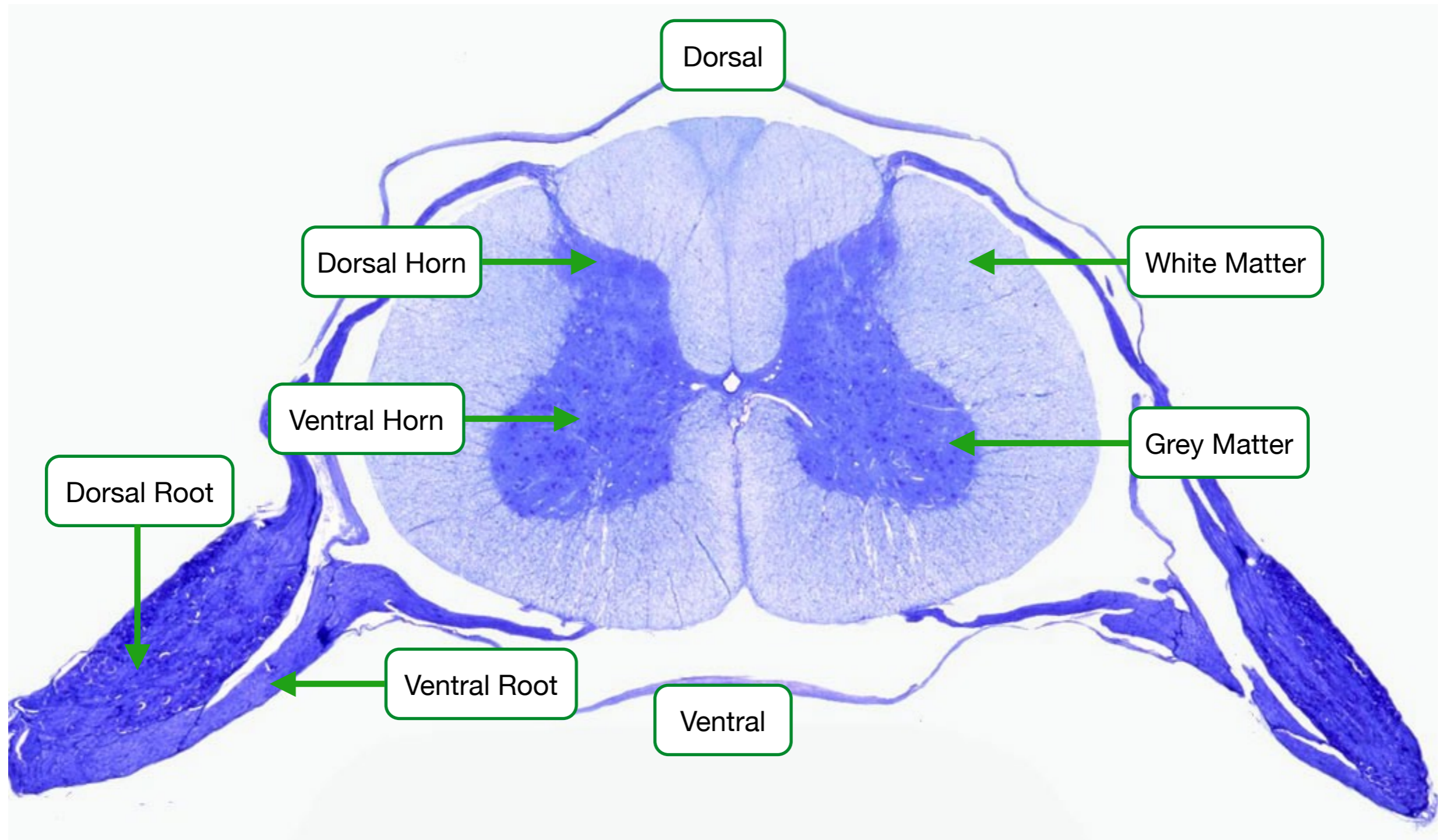
Gap junctions allows ions and current to pass between smooth muscle cells.



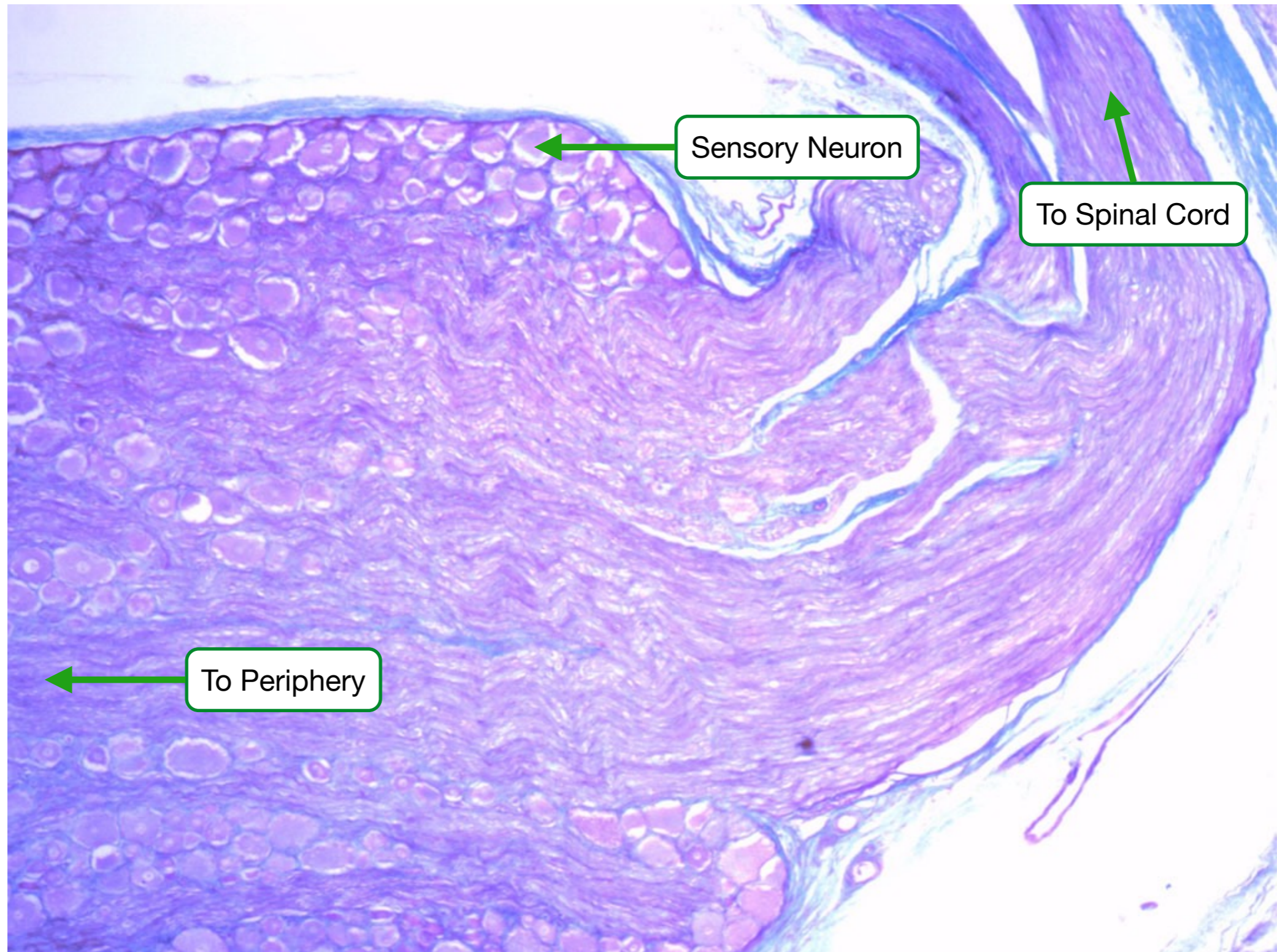
Nervous Tissue

Spinal Cord

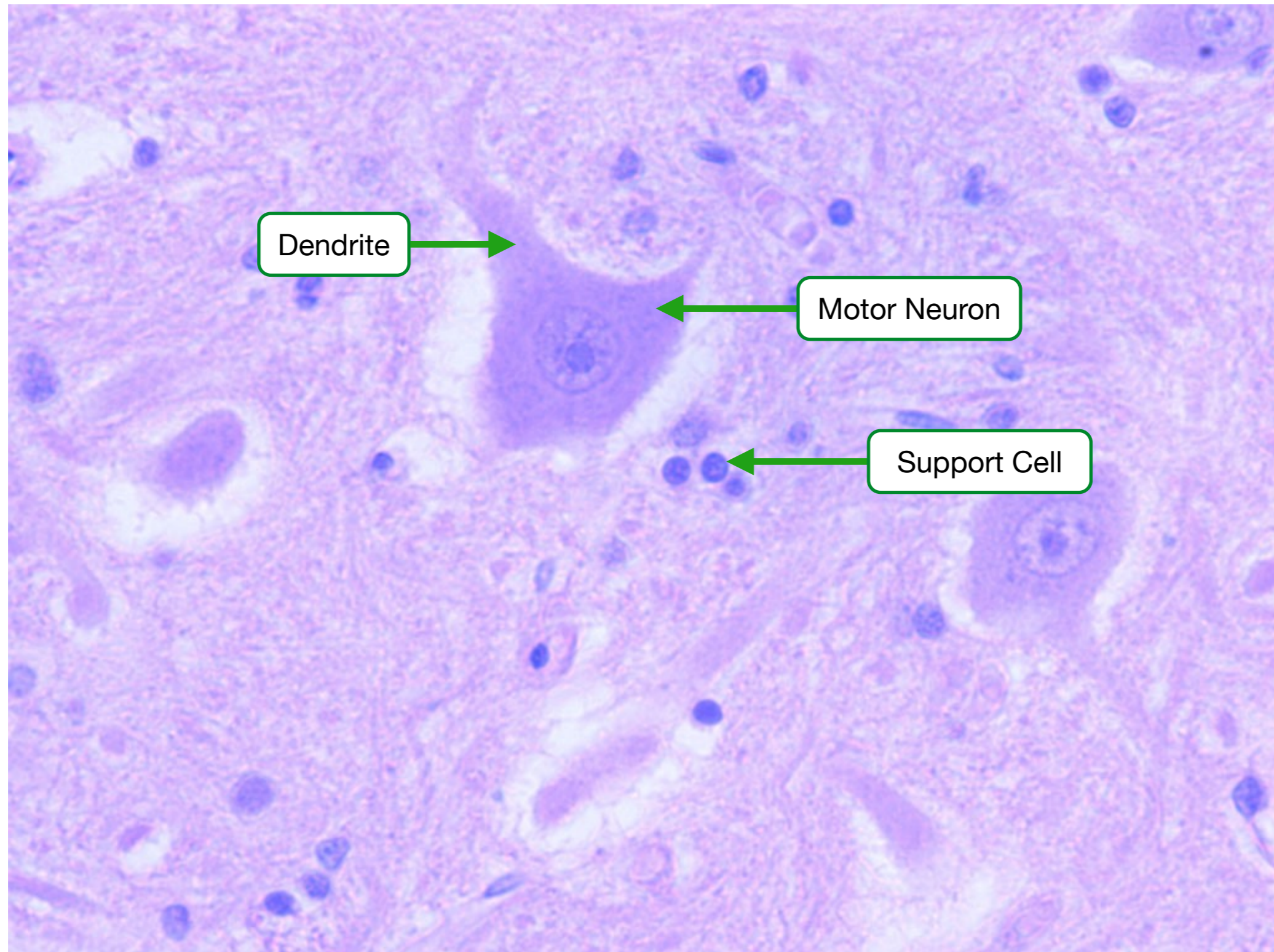
The cell bodies of motor neurons are found in the ventral horn.



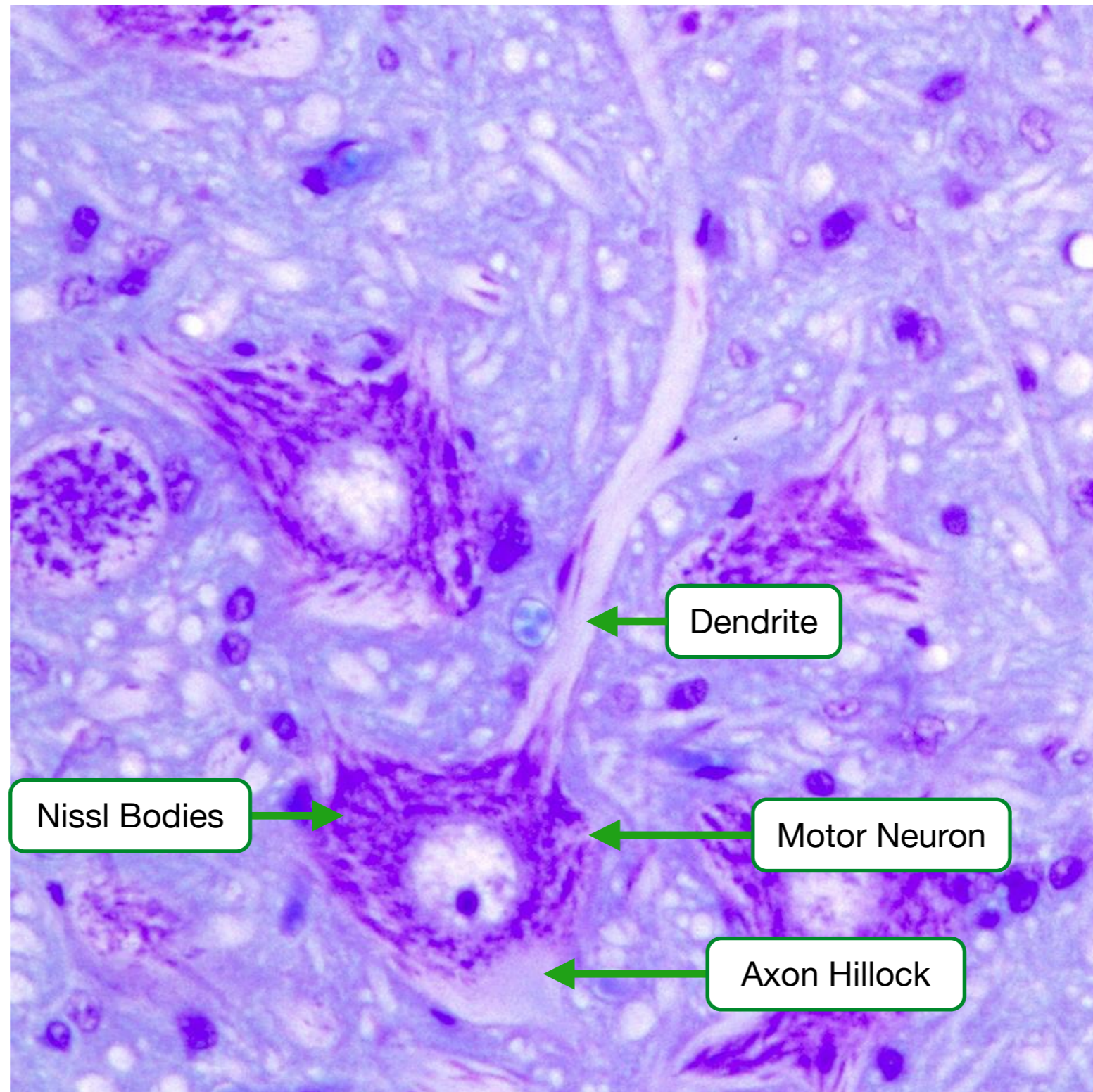
The dorsal root contains the cell bodies of sensory neurons.



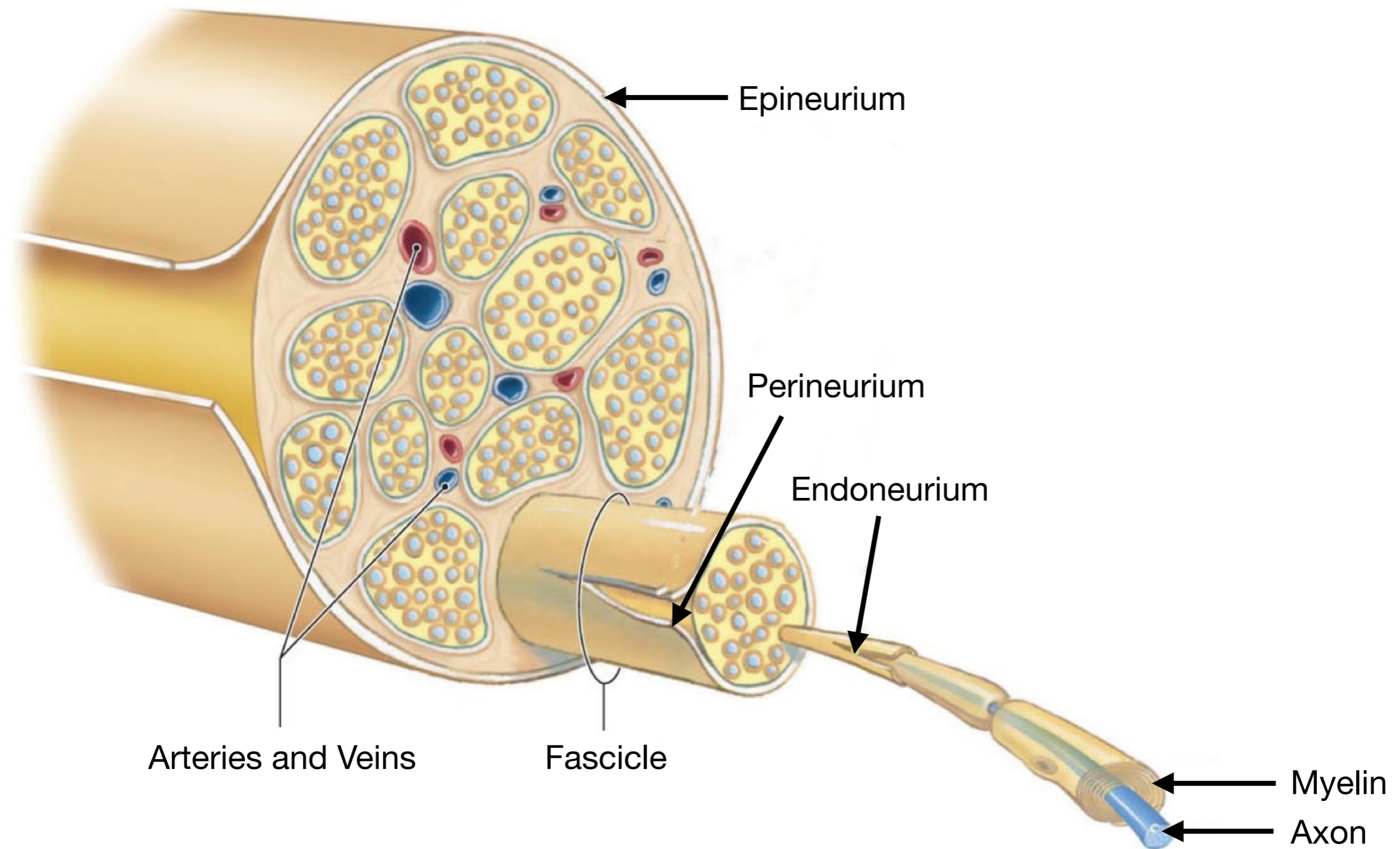
Motor neurons are multipolar neurons that are found in the ventral horn.



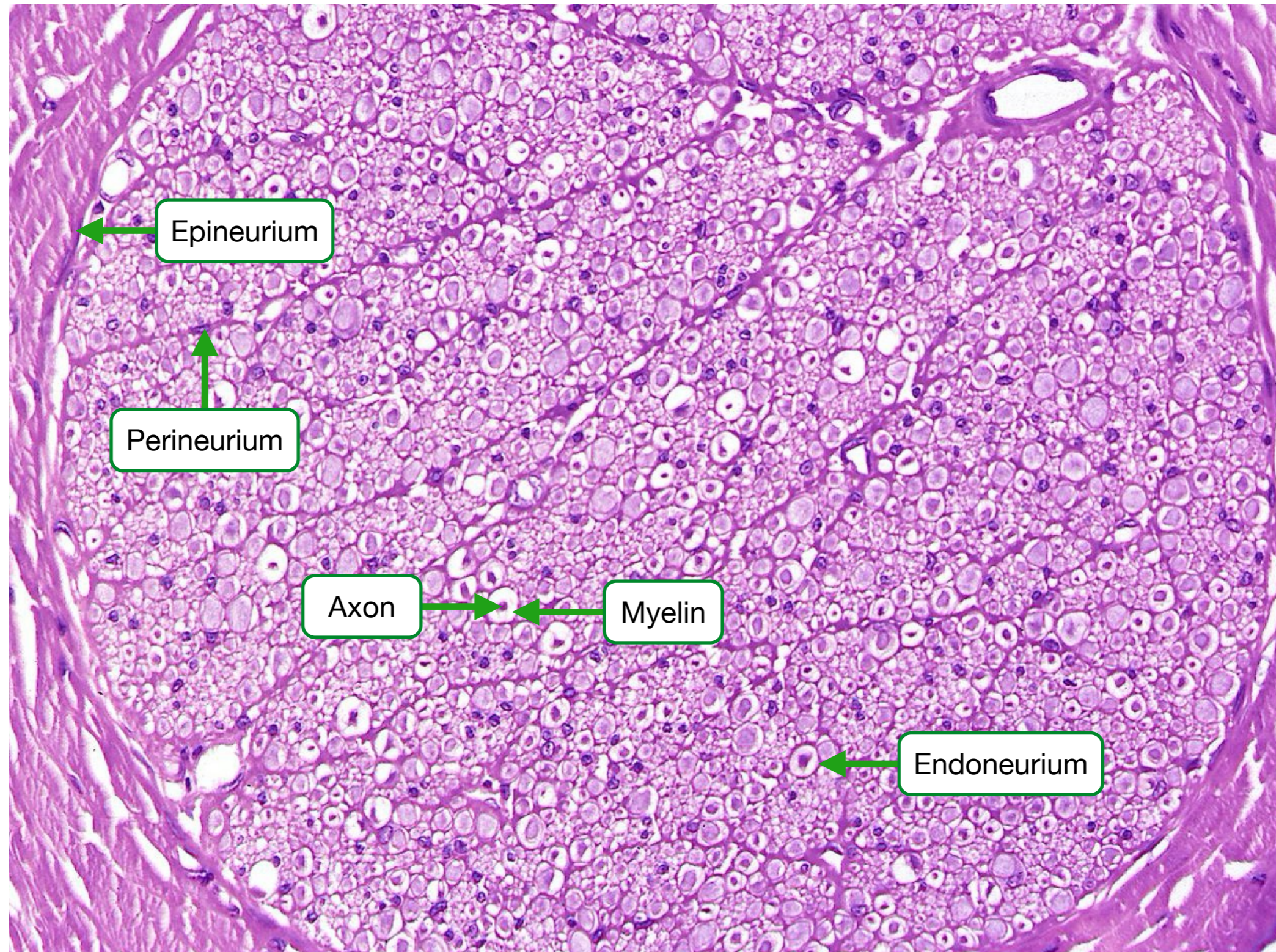
Nissl stain labels nucleic acids and highlights the rough endoplasmic reticulum in motor neurons.



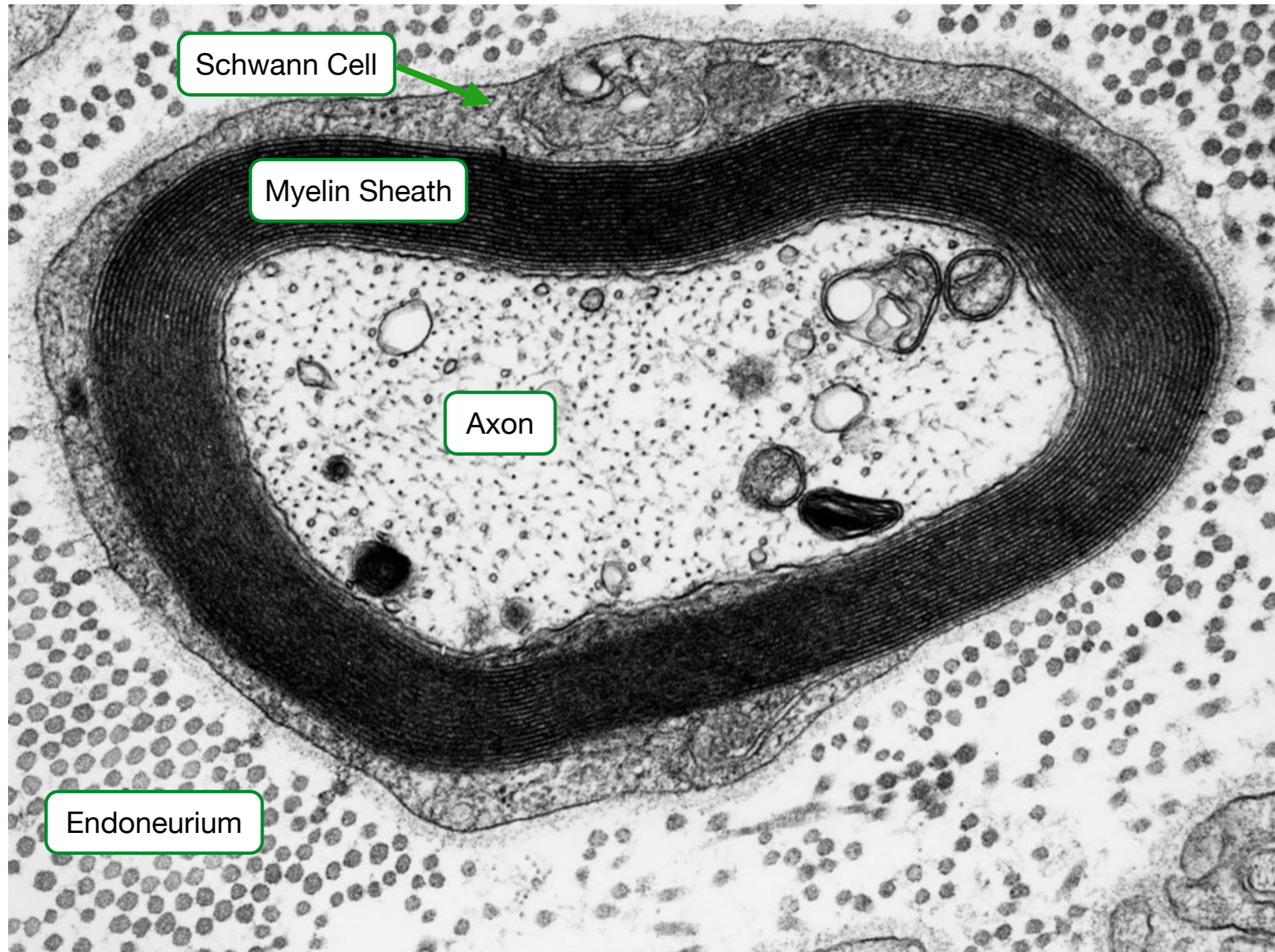
Peripheral nerves contain three layers of connective tissue.



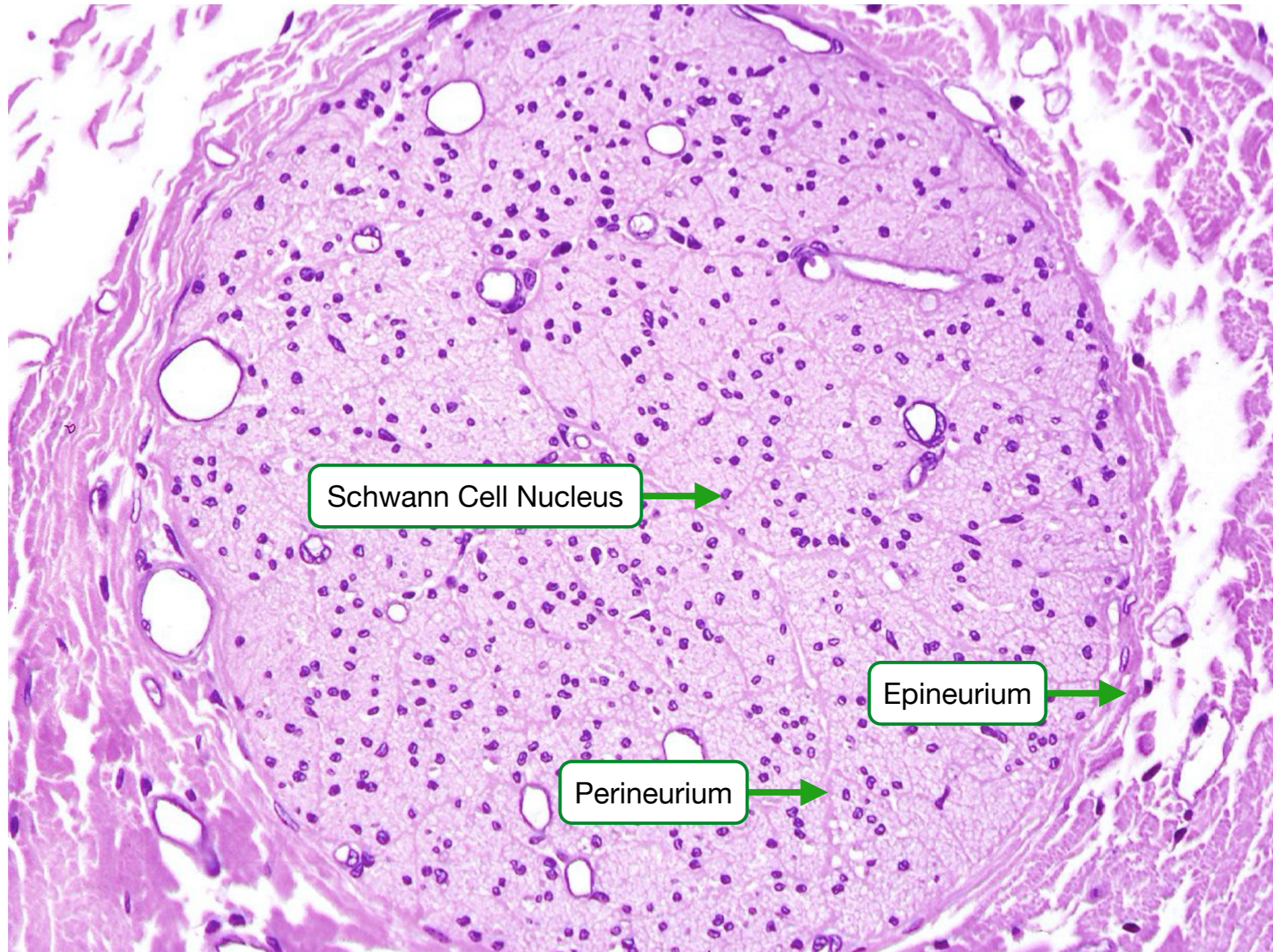
Peripheral nerves with myelinated axons contain an unstained region around the axon.



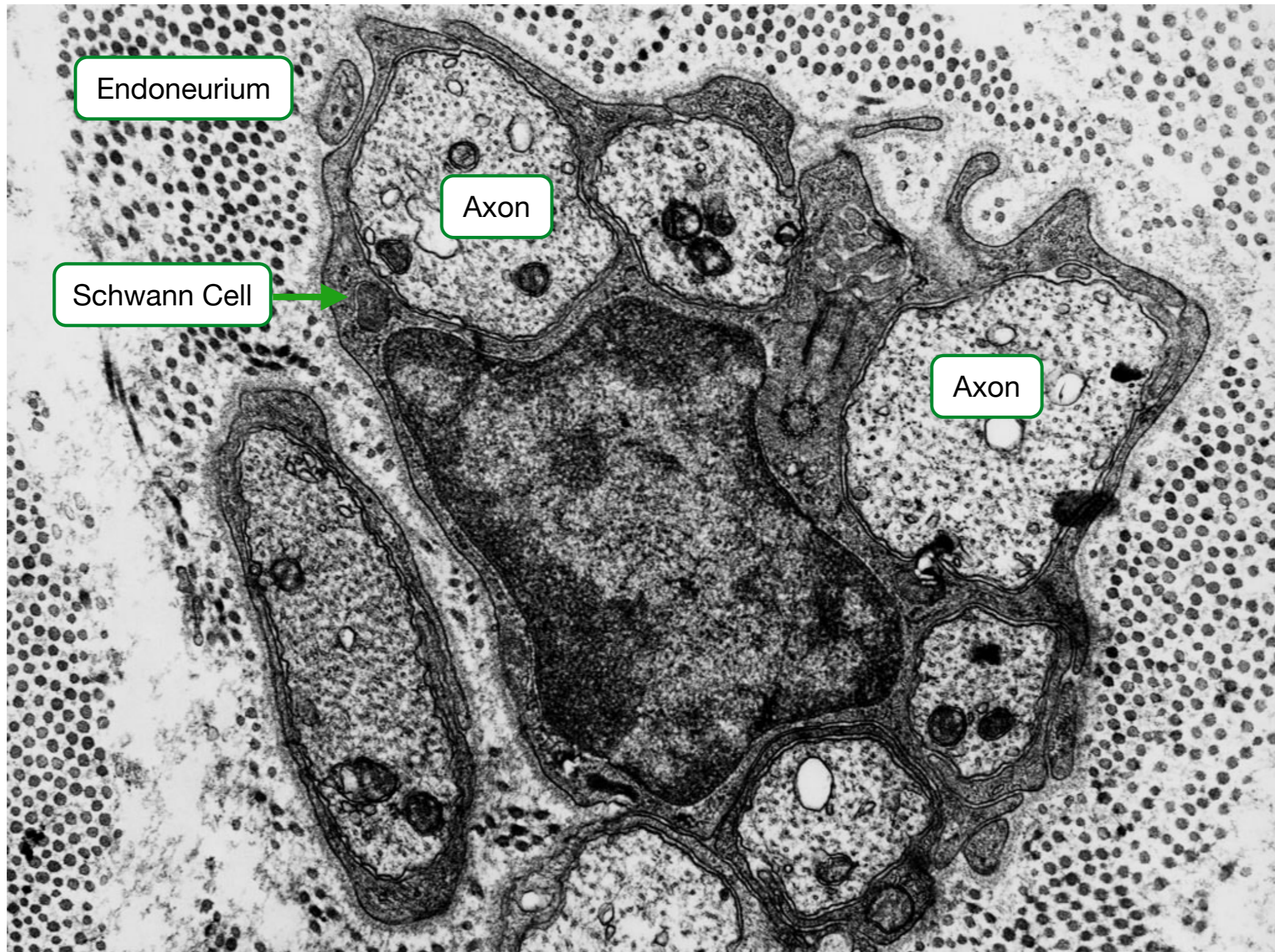
Electron micrograph reveals a myelinated axon and endoneurium with collagen.



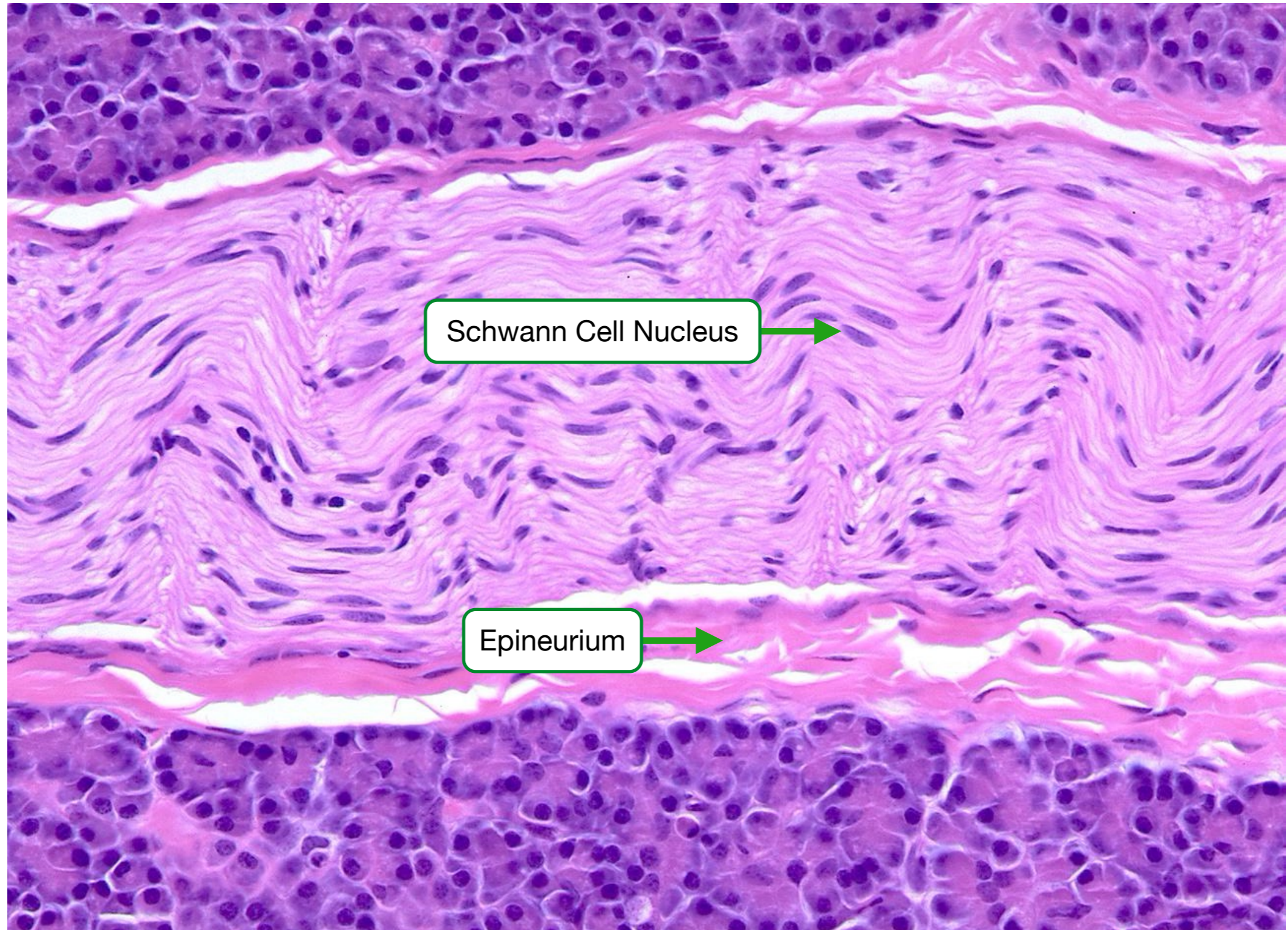
Nerves with unmyelinated axons contain the same connective tissue layers.



Electron micrograph reveals unmyelinated axons and collagen in the endoneurium.



Peripheral nerves appear wave-like in longitudinal sections.



Ganglia are collections of neurons that relay signals from the CNS to the local tissue.

