

NERVE CELLS

Objectives

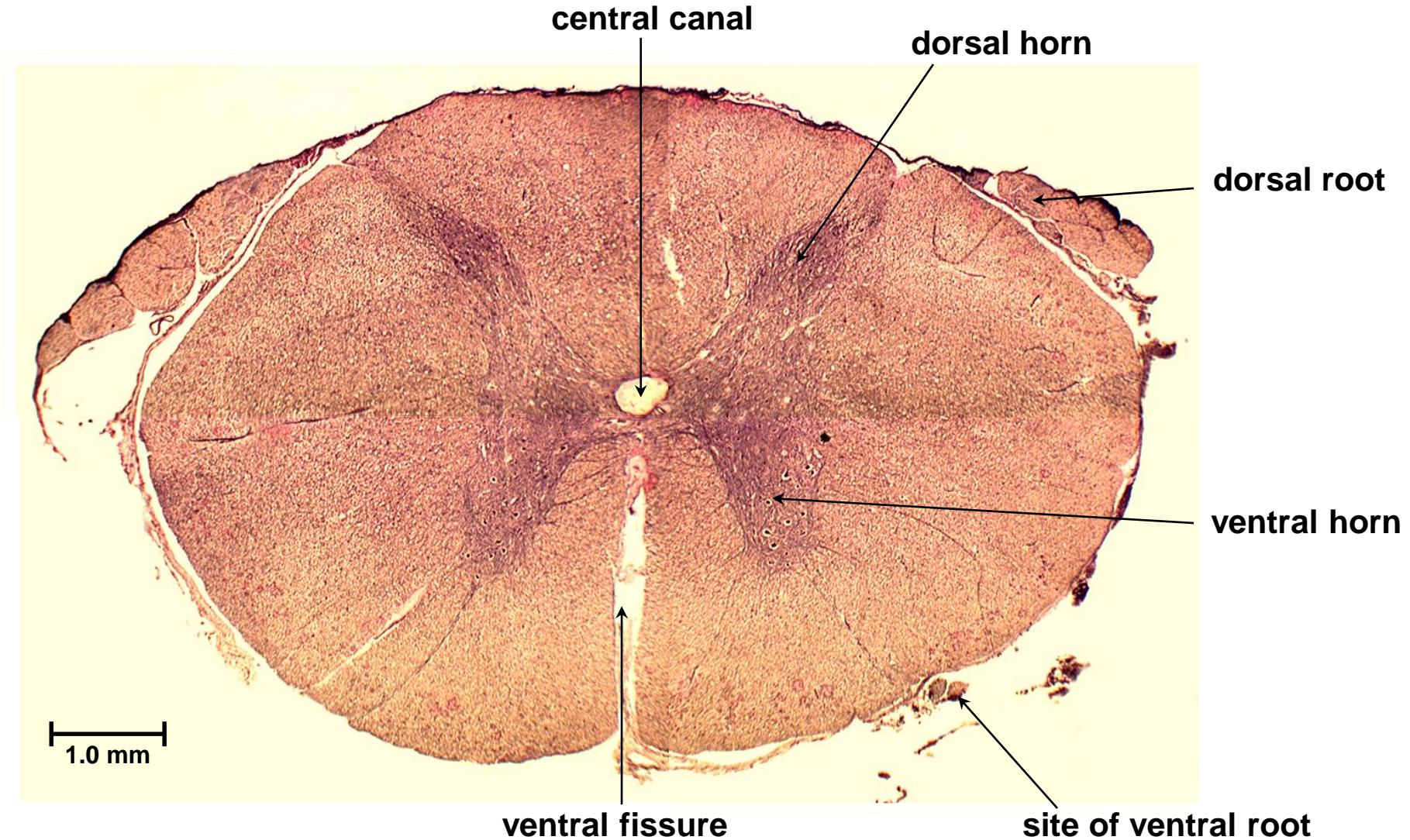
Students should be able to:

- 1. Recognise and label a transverse section of spinal cord and identify both the multipolar neurons in the ventral horn and the cells lining the central canal.**
- 2. Identify a transverse section of whole nerve and label epi-, peri- and endoneurium.**
- 3. Identify myelinated fibres both in longitudinal and transverse section and determine whether they have been stained with H&E or a special lipid stain.**
- 4. Identify sections of dorsal root and autonomic ganglia and know the features that differentiate one from the other.**
- 5. Identify Purkinje cells in the cerebellum and pyramidal cells in the cerebral cortex.**
- 6. Identify Meissner's and Pacinian corpuscles in the skin.**

Spinal cord TS section

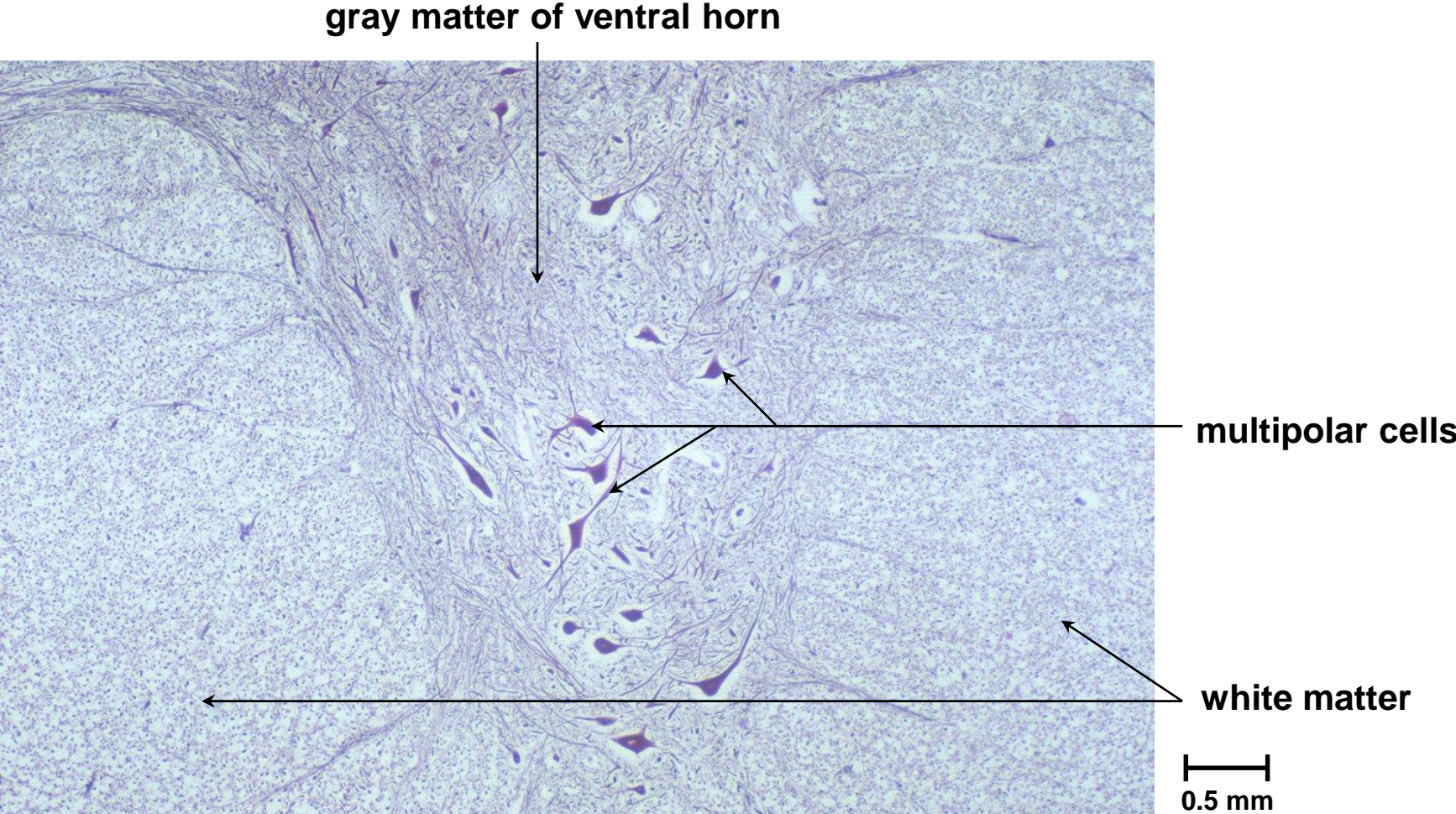
What is the predominant cell type found in the spinal cord?

Neuroglial cells



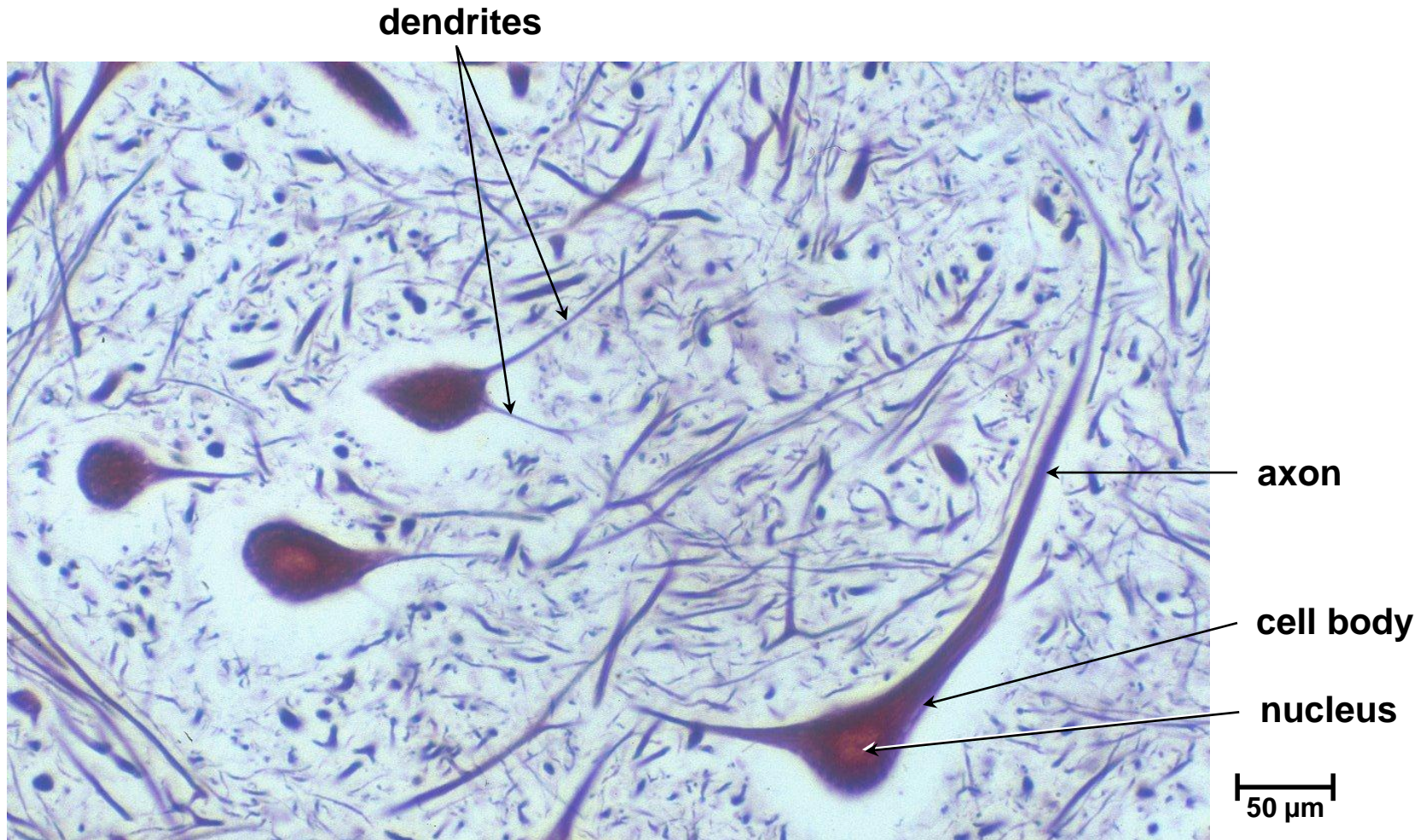
Spinal cord TS section

Identify the large multipolar cells seen within the ventral horn.



Spinal cord TS section

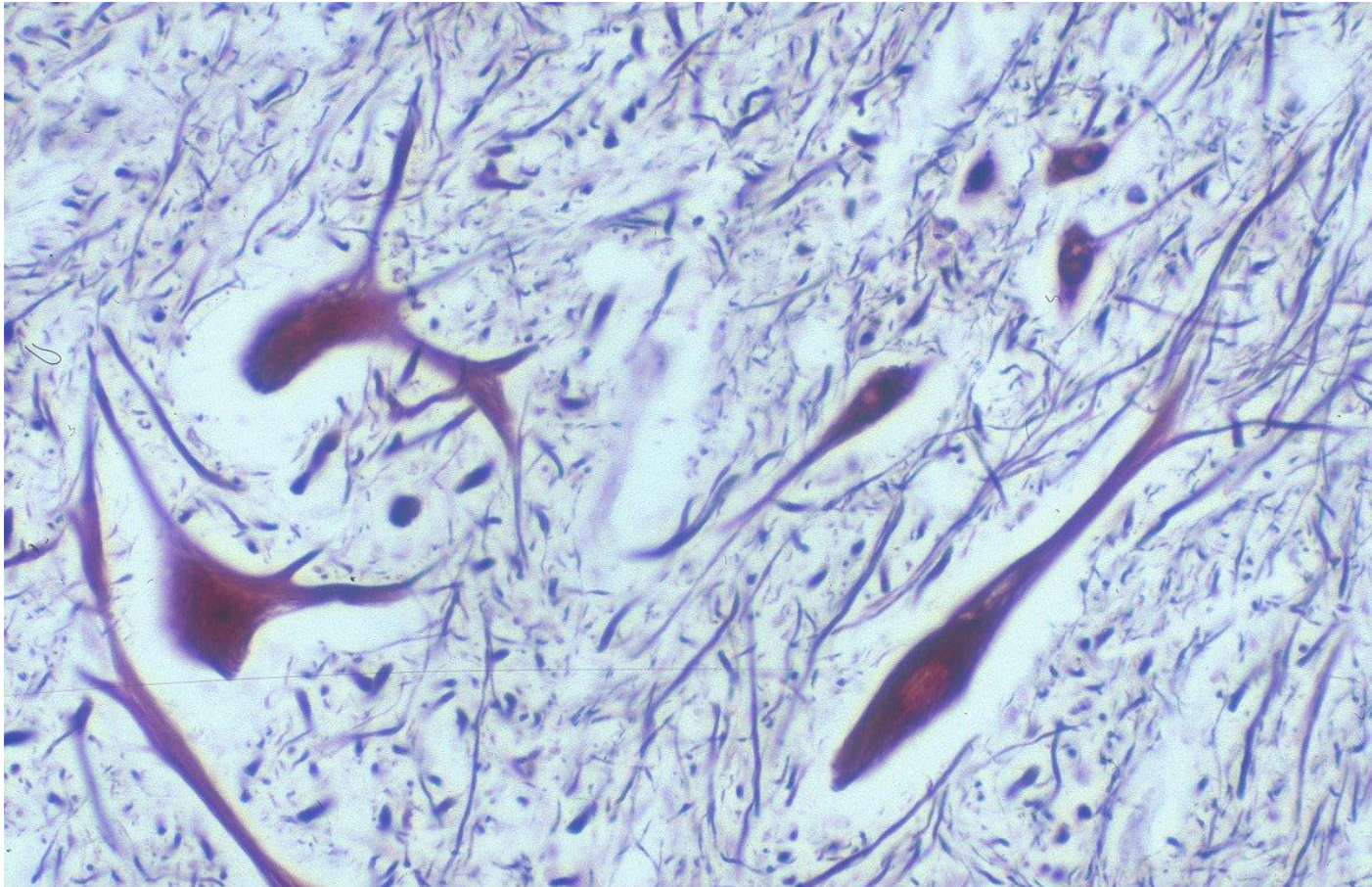
As the neurofibrils are stained deep red, both the cell bodies and the cell processes are clearly seen.



Spinal cord TS section

What is the function of these cells?

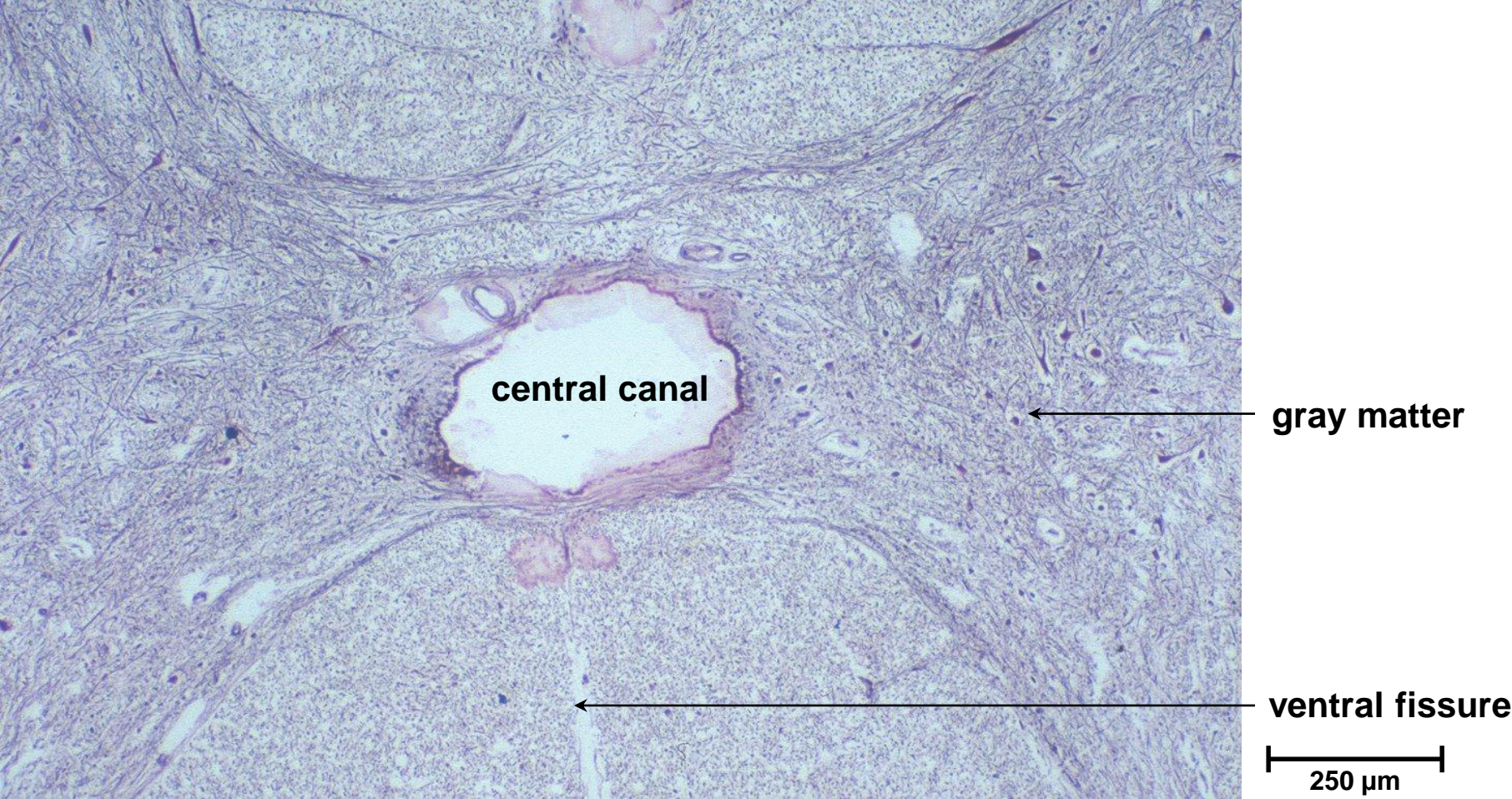
They are motor (efferent) neurons, innervating skeletal muscle.



50 μm

Spinal cord TS section

Identify the cells lining the central canal.



Spinal cord TS section

What are these cells called?

Ependymal cells.

To which type of cells do these belong?

Neuroglial cells.



ependymal cells

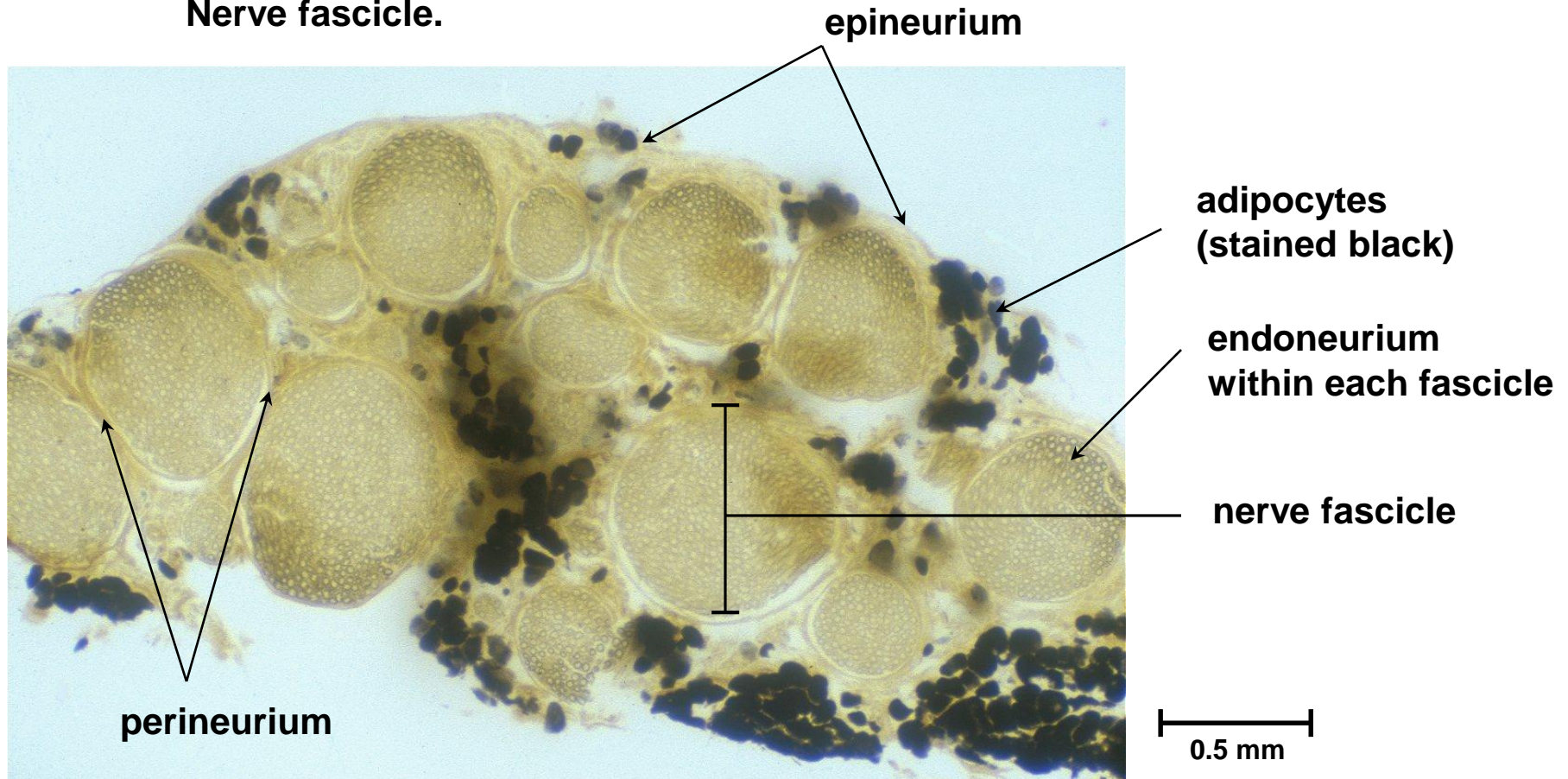
central canal

50 μ m

Myelinated nerves in a small nerve fibre

Slide stained for lipid

- Identify: Epineurium.
Perineurium.
Endoneurium.
Adipocytes (fat cells).
Nerve fascicle.



Myelinated nerves in a small nerve fibre

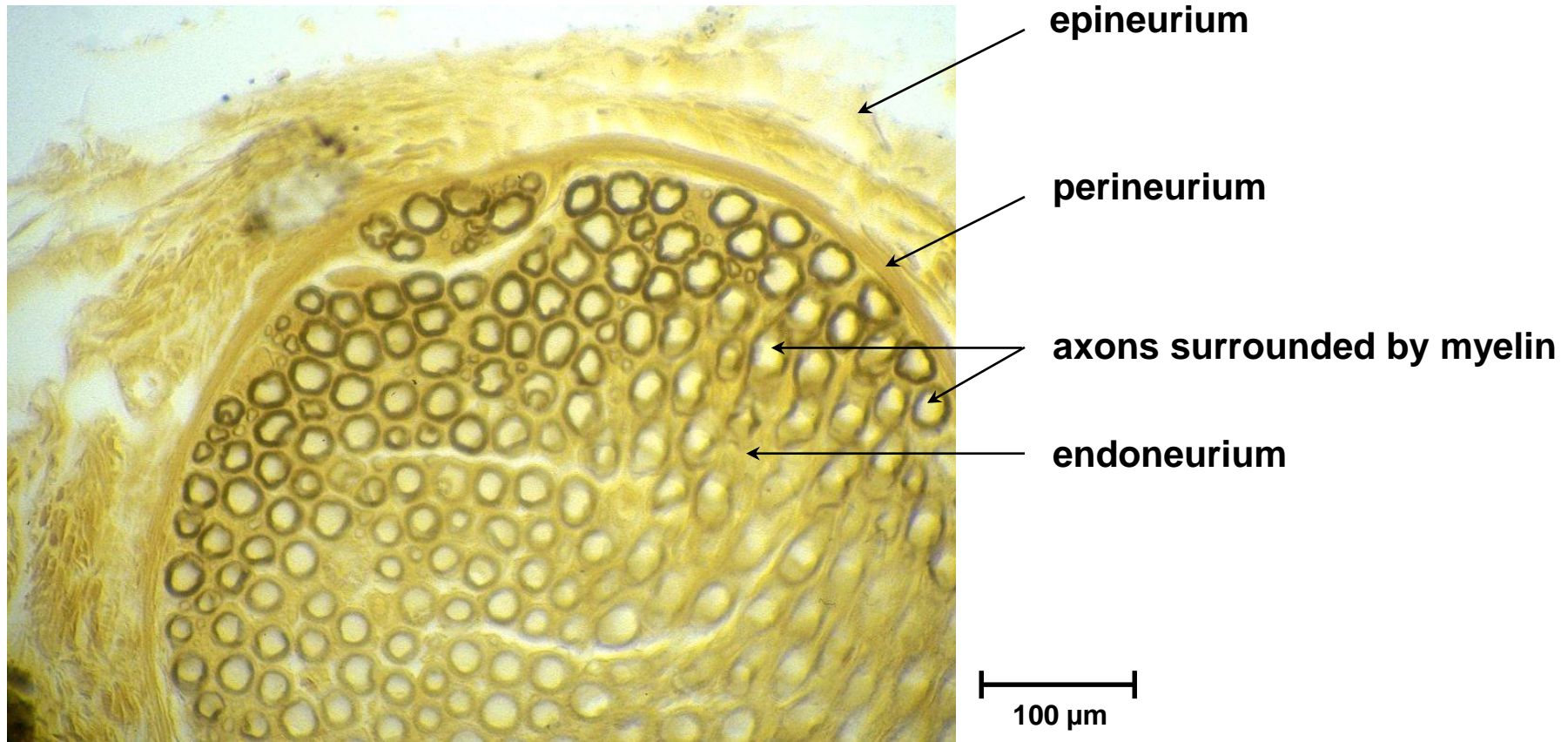
Slide stained for lipid

Note the large amount of epi- and peri-neurium.

It is highly resistant to trauma (eg stretching, compression and ischaemia.)

What type of tissue makes up the epi- and peri-neurium?

Connective tissue.



Myelinated nerves in a small nerve fibre

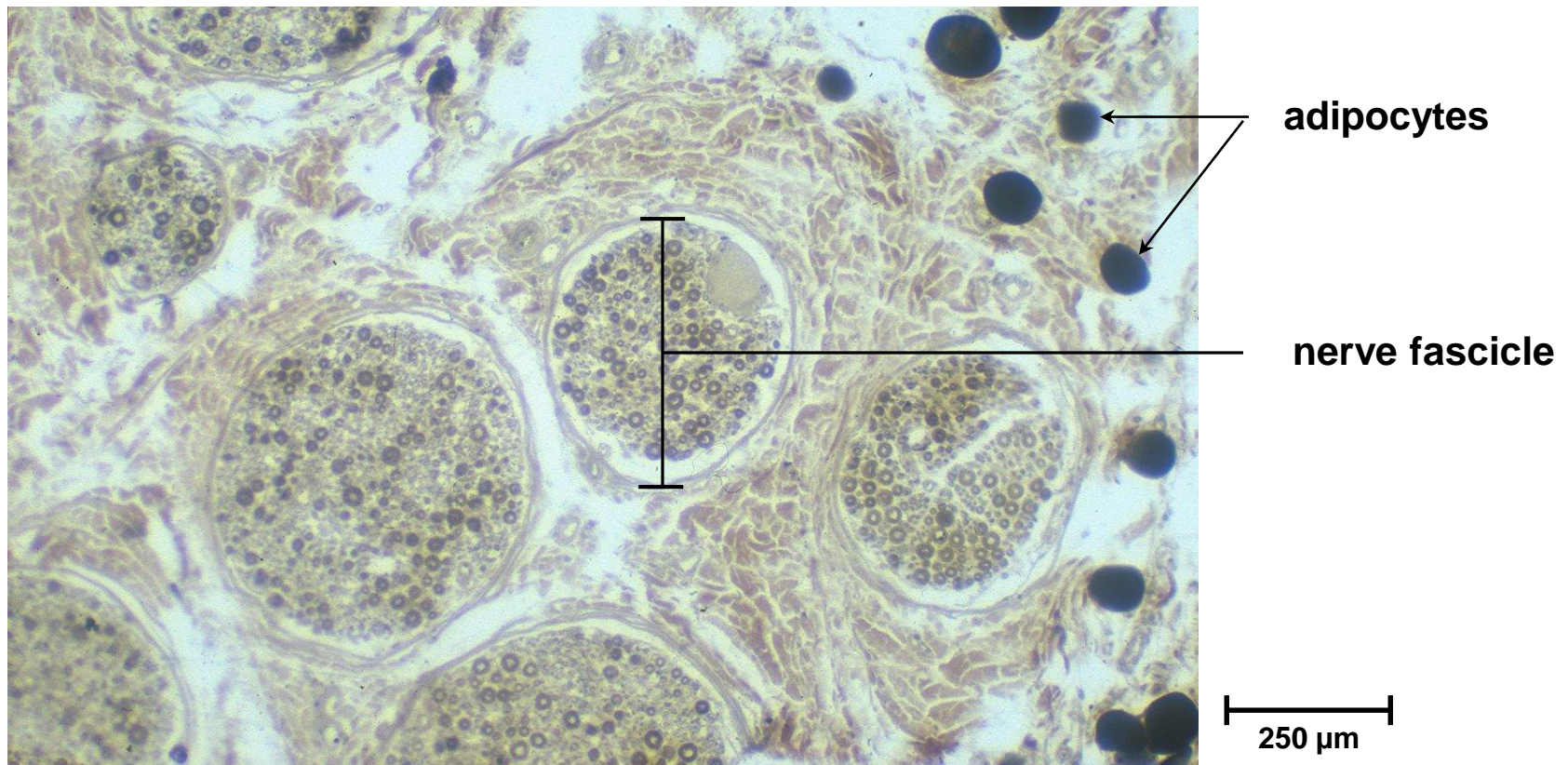
Slide stained for lipid

Why is there so much of this type of tissue in a peripheral nerve?

It gives the characteristic cylindrical shape to a nerve.

It provides support and strength; prevents tearing during motion.

The perineurium and endoneurium provide a constant environment for the nerve fibres.

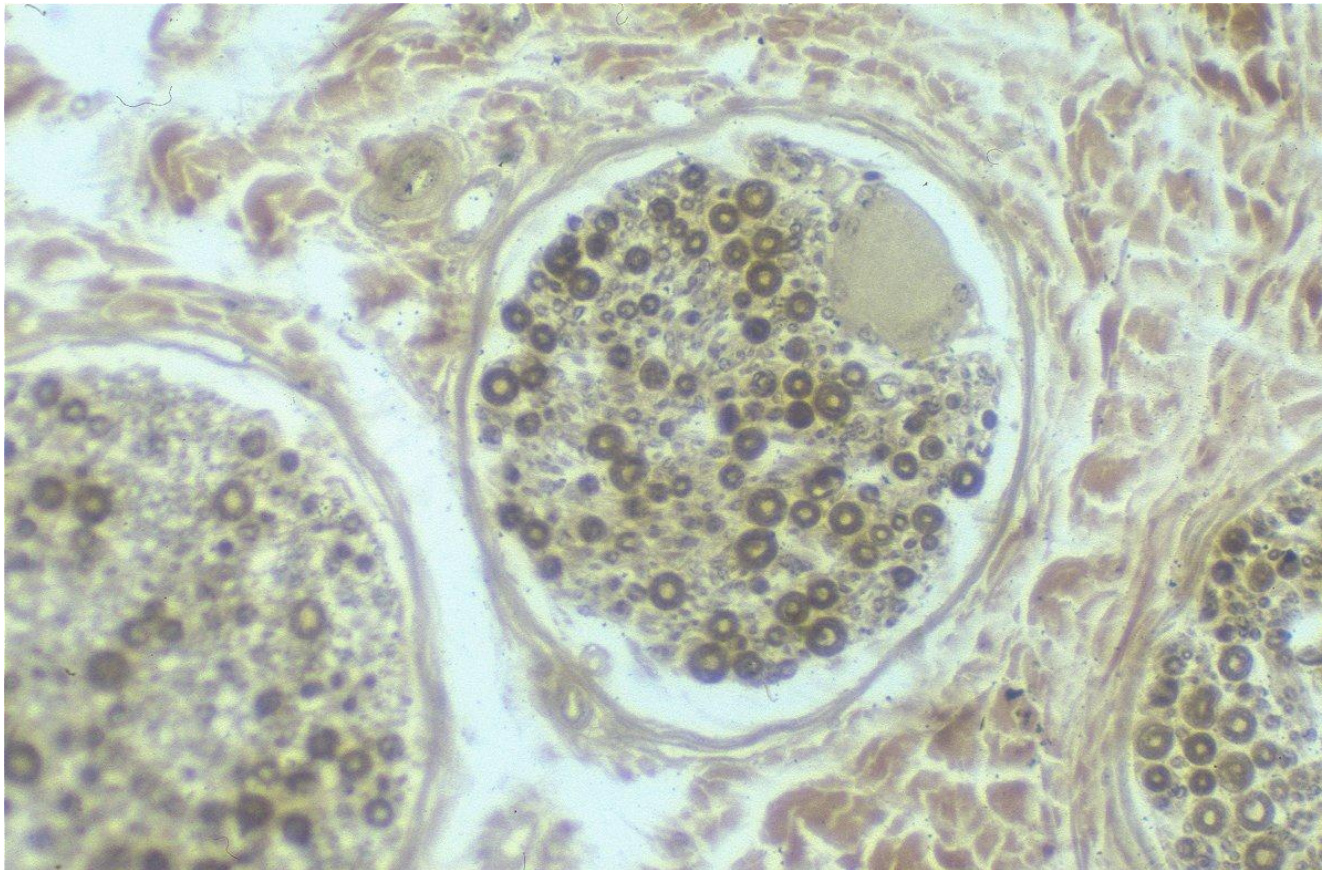


Myelinated nerves in a small nerve fibre

Slide stained for lipid

Is there any correlation between the diameter of the nerve fibre and the degree of myelination?

The larger the axon – the thicker the myelin sheath.



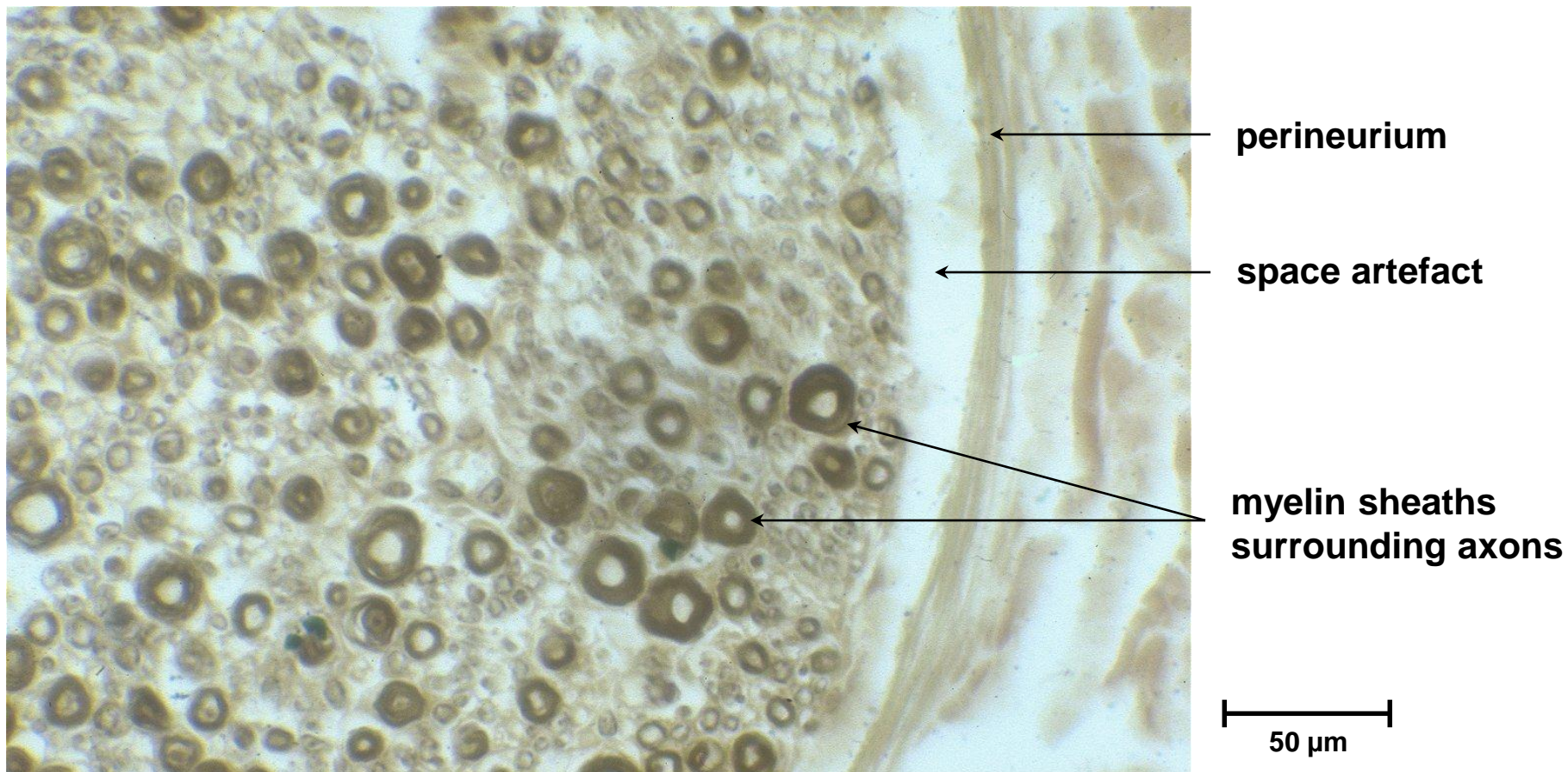
100 μ m

Myelinated nerves in a small nerve fibre

Slide stained for lipid

What is the relationship between the diameter of the fibre and the conduction velocity?

**The rate of conduction of action potentials is proportional to the diameter of the axon.
The larger the diameter the higher the conduction velocity.**



Micrographs showing cross sections of a nerve fascicle

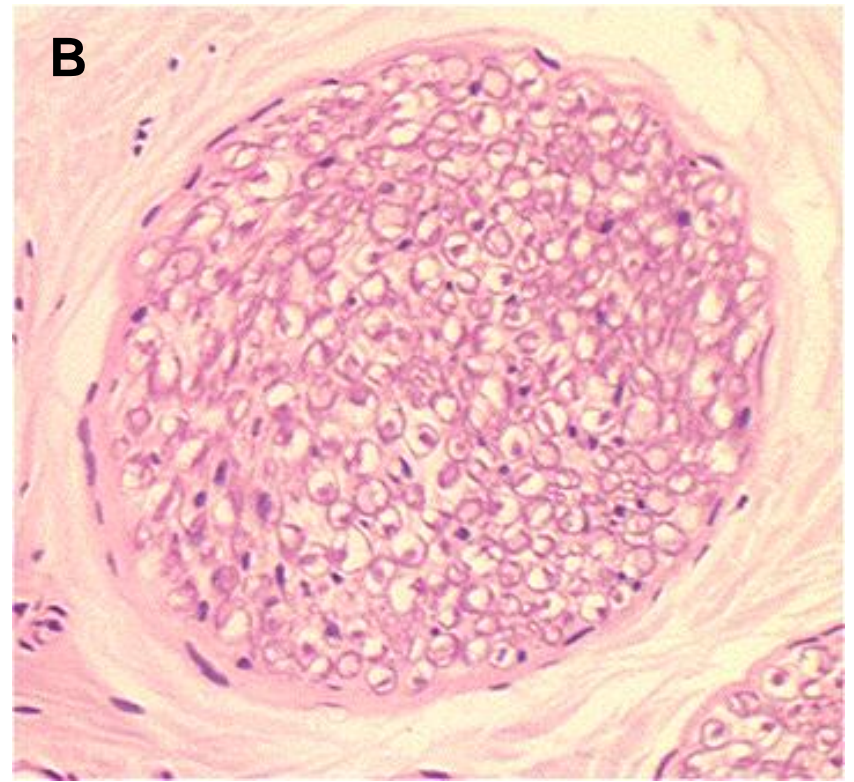
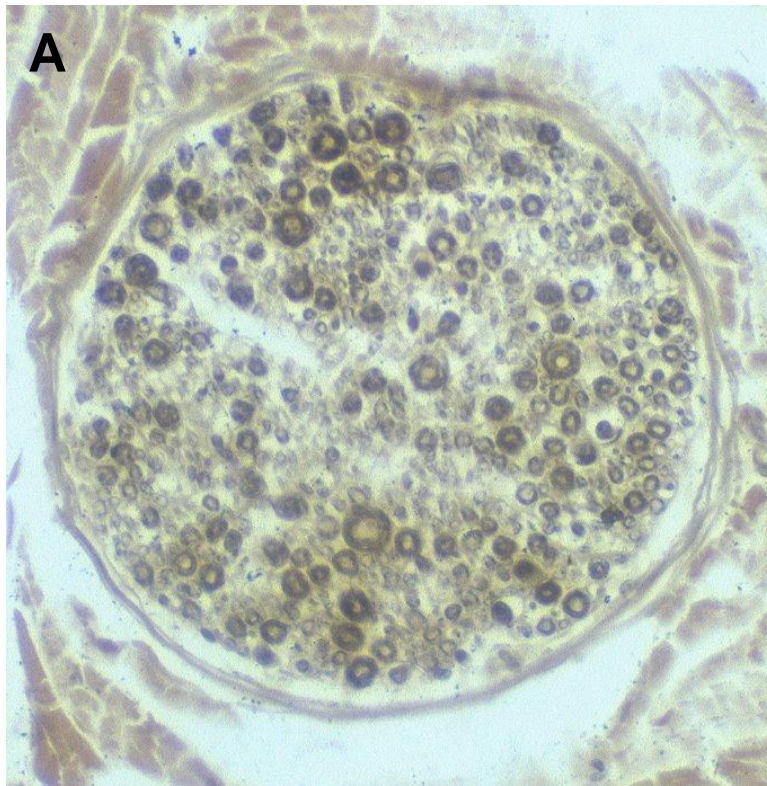
These sections have been stained differently.

Which was stained with haematoxylin and eosin?

B.

What was the other section stained to show?

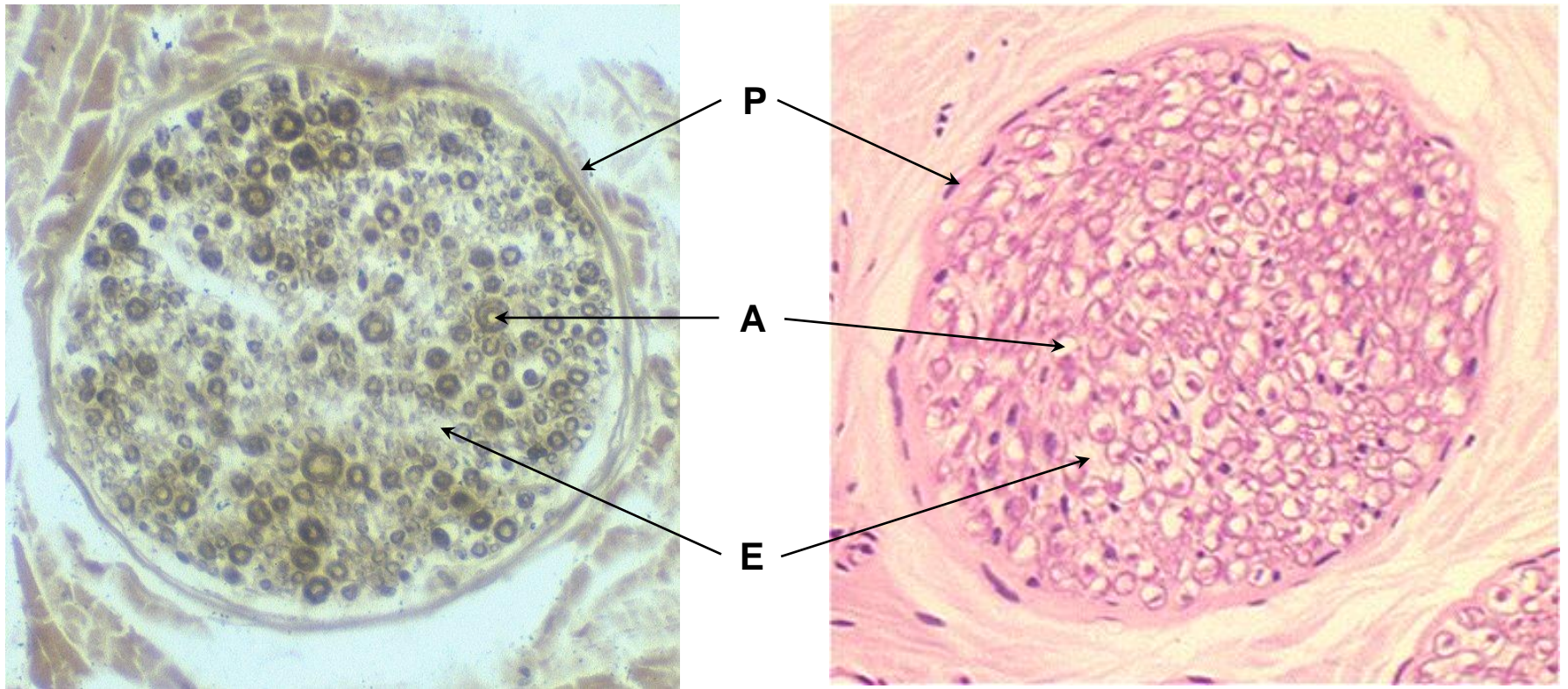
The myelin sheath. (lipid in the myelin demonstrated by an osmium based stain).



50 μ m

Micrographs showing cross sections of a nerve fascicle

Identify P : perineurium
 E : endoneurium
 A : axon



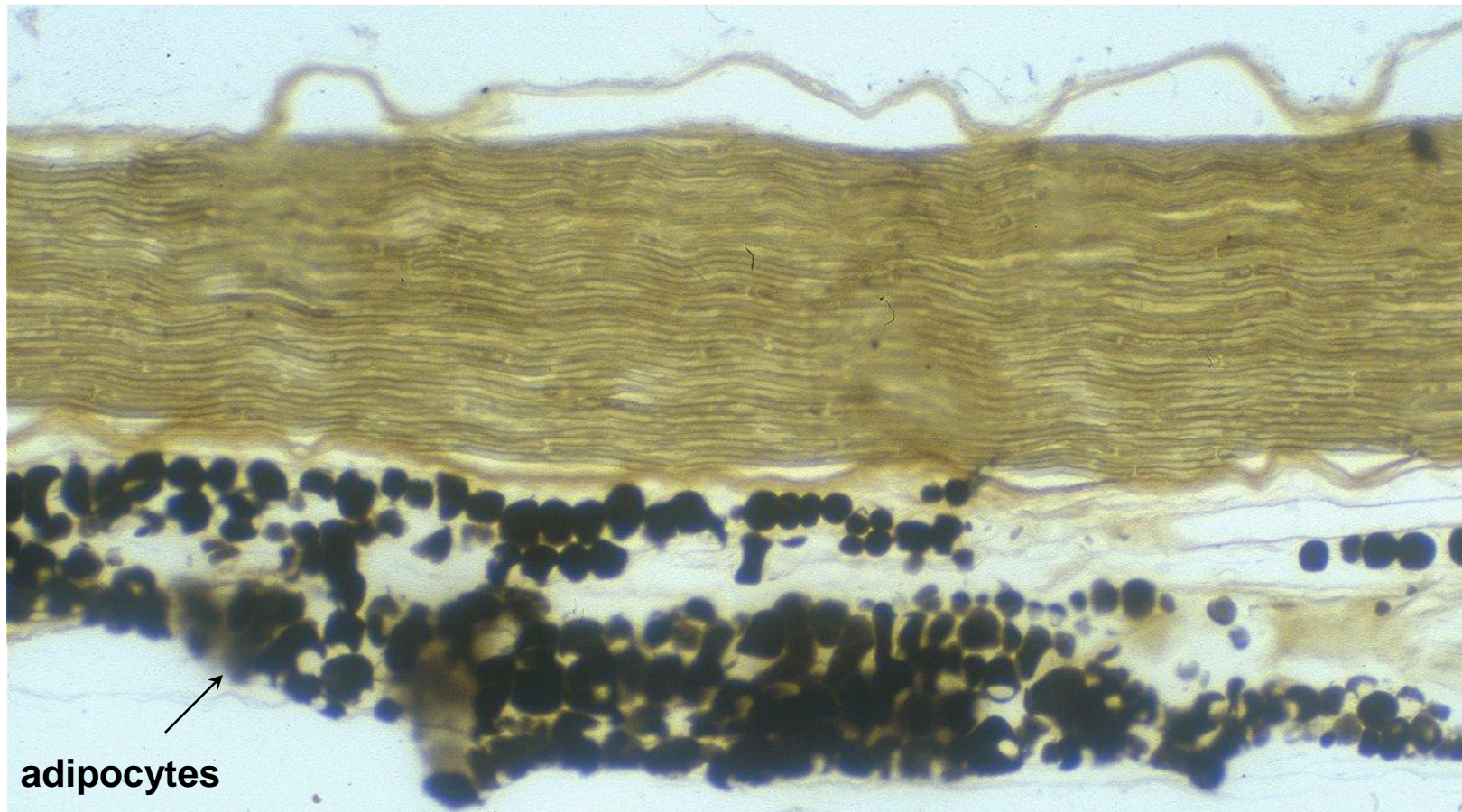
50 μm

Myelinated nerve fibres

in longitudinal section

The fibres look 'wavy'. Suggest a functional significance for this.

They are able to stretch.



Myelinated nerve fibres

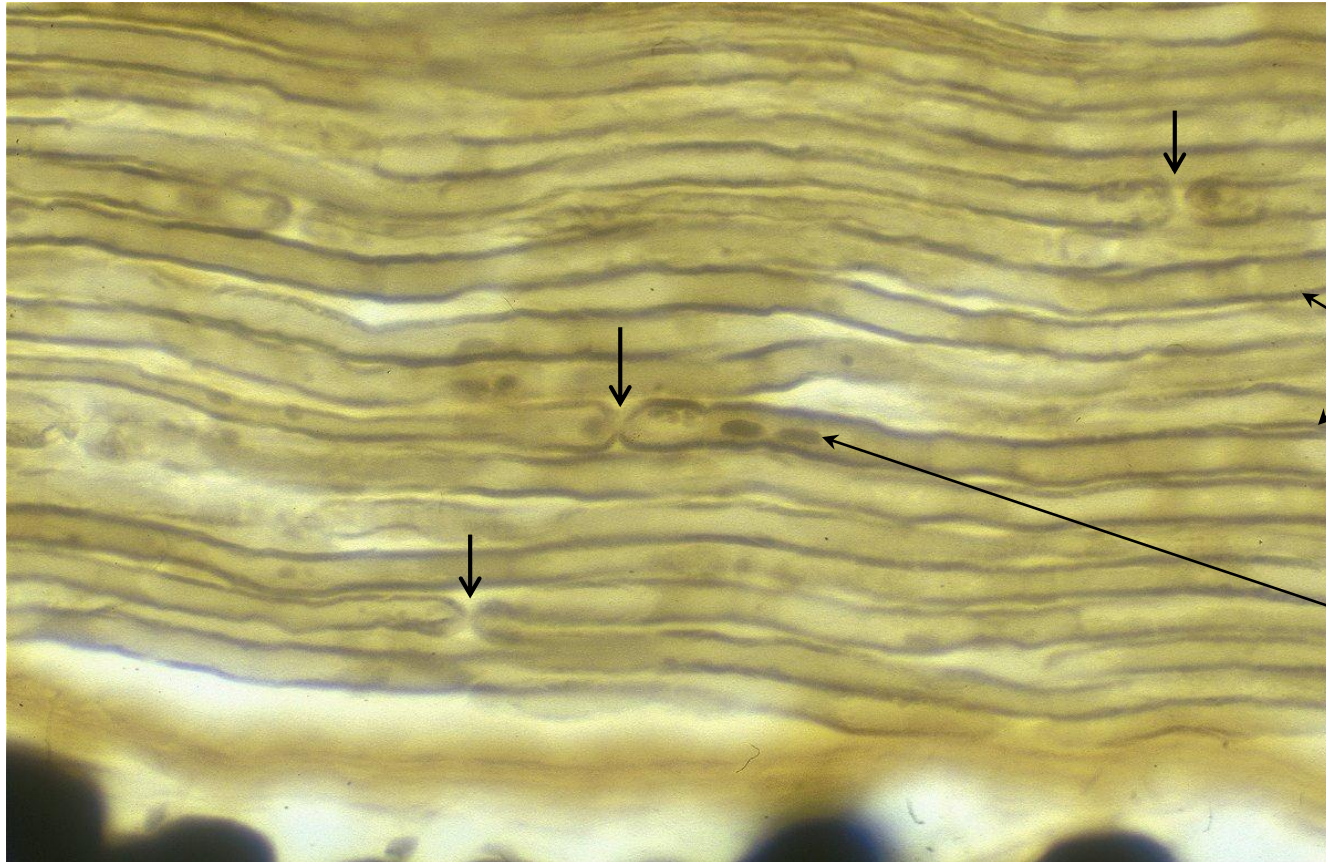
in longitudinal section

Identify:

Myelin sheaths of axons.

Schwann cell nuclei.

Nodes of Ranvier.



nodes of Ranvier
arrowed

myelin sheaths

Schwann cell nucleus

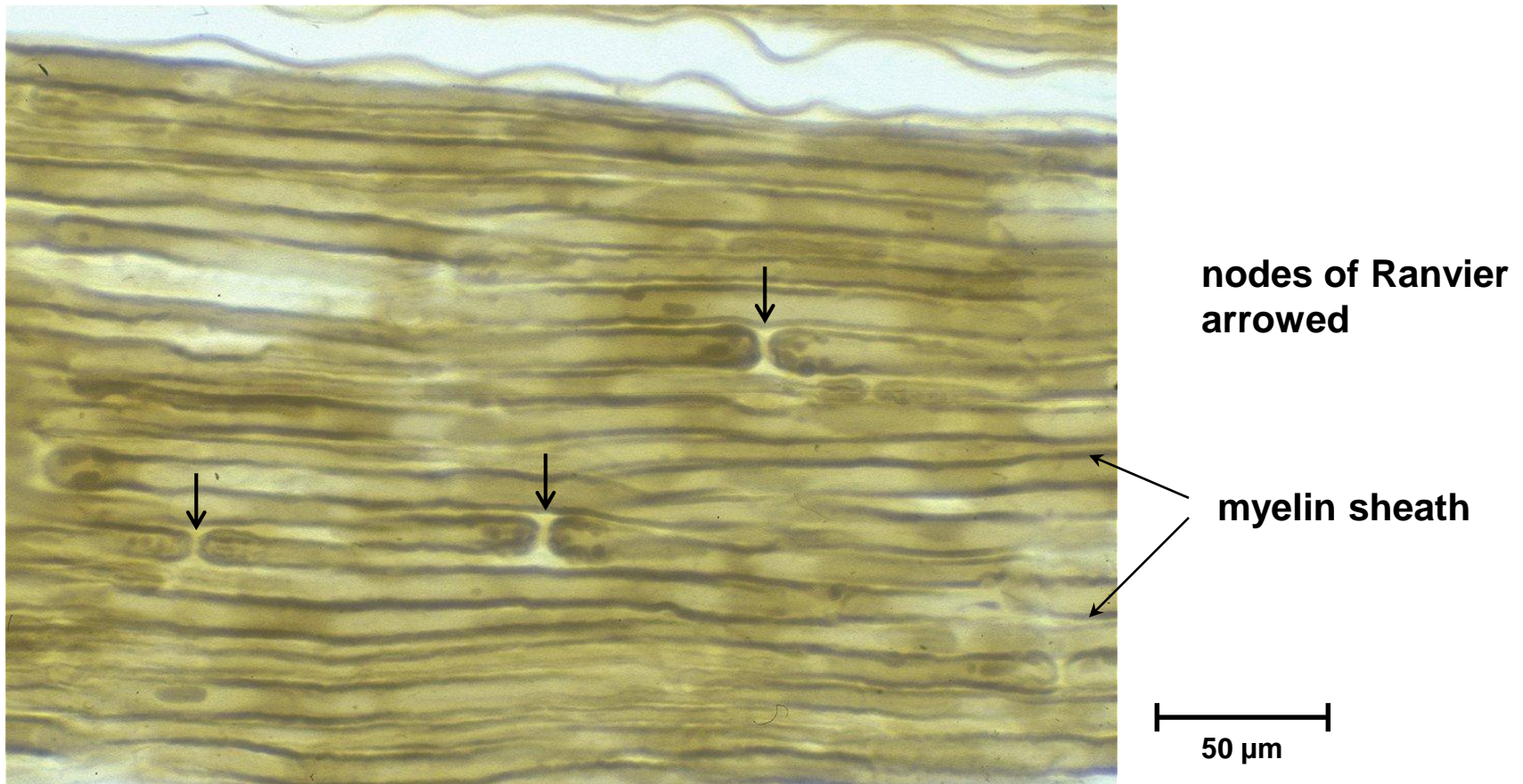
50 μm

Myelinated nerve fibres

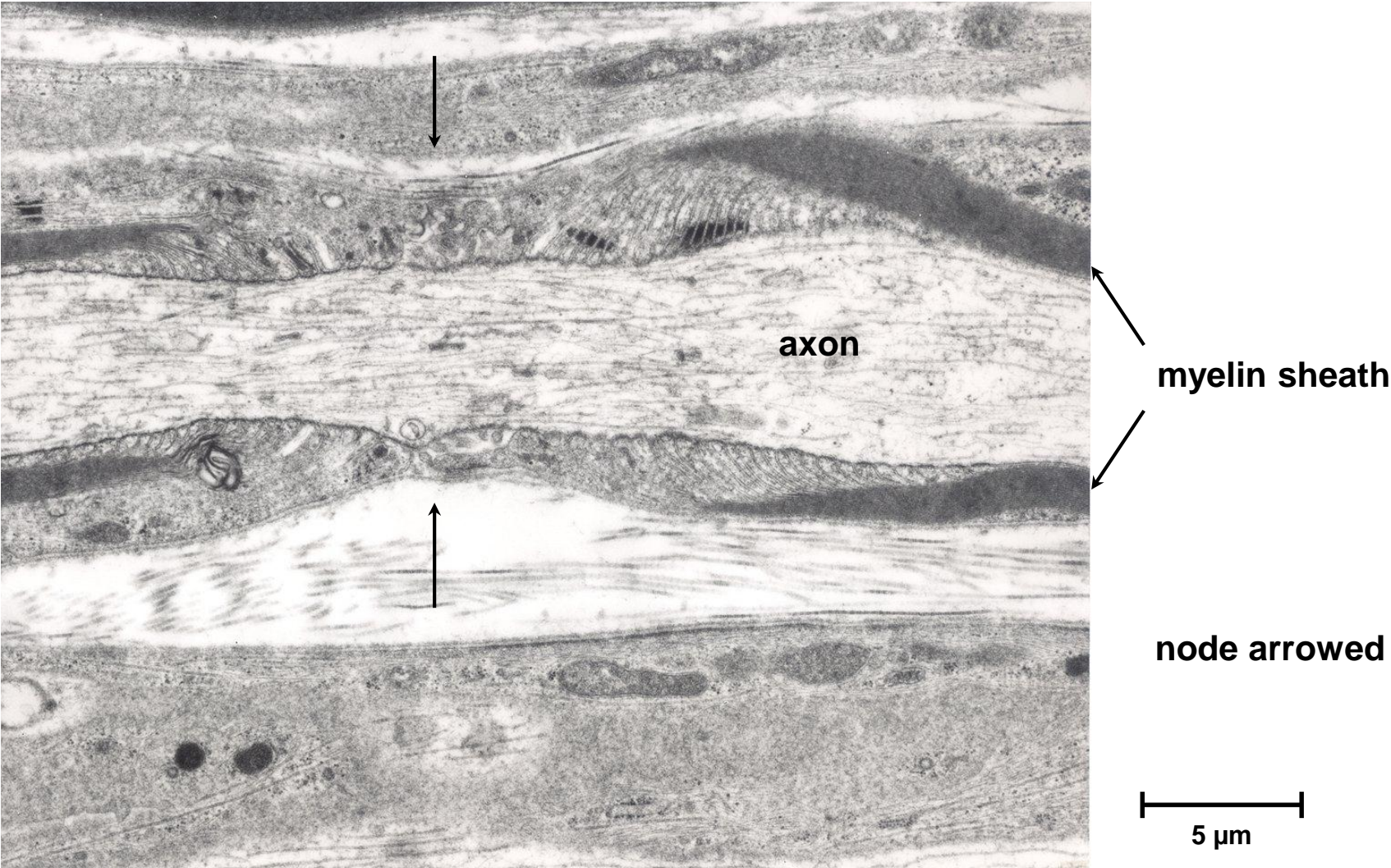
in longitudinal section

What is the function of the myelin sheath?

Myelination greatly increases axon conduction velocity compared to that of a non-myelinated axon of the same diameter.



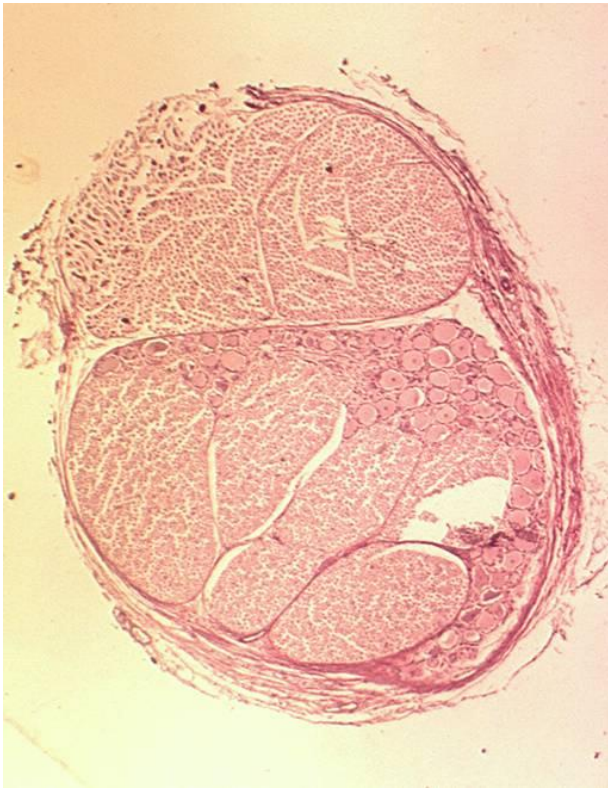
Electron micrograph of node of Ranvier



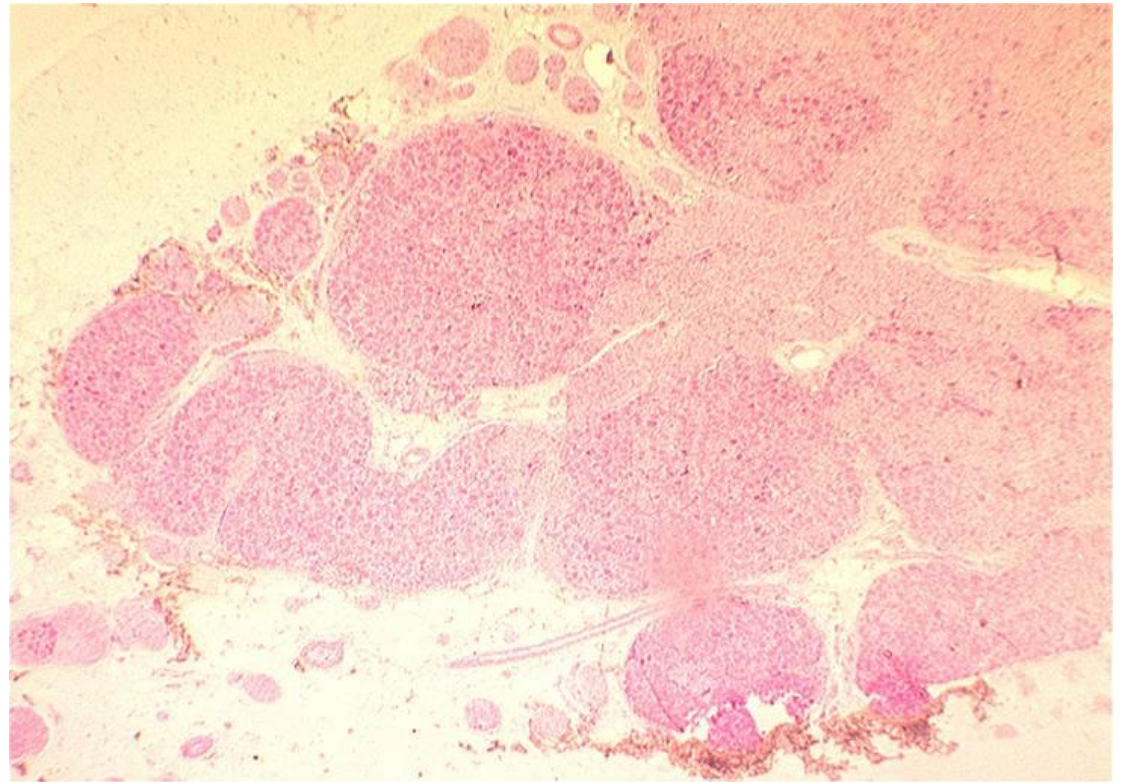
Neurons in dorsal root ganglion

Neurons in autonomic ganglion

Identify the differences between these two ganglia; shape of cells, satellite cells, relationship between cells and fibre tracts.



0.5 mm



0.5 mm