Muscle tissue

Modified by Mays Qashou

L.S >>> Longitudinal Section

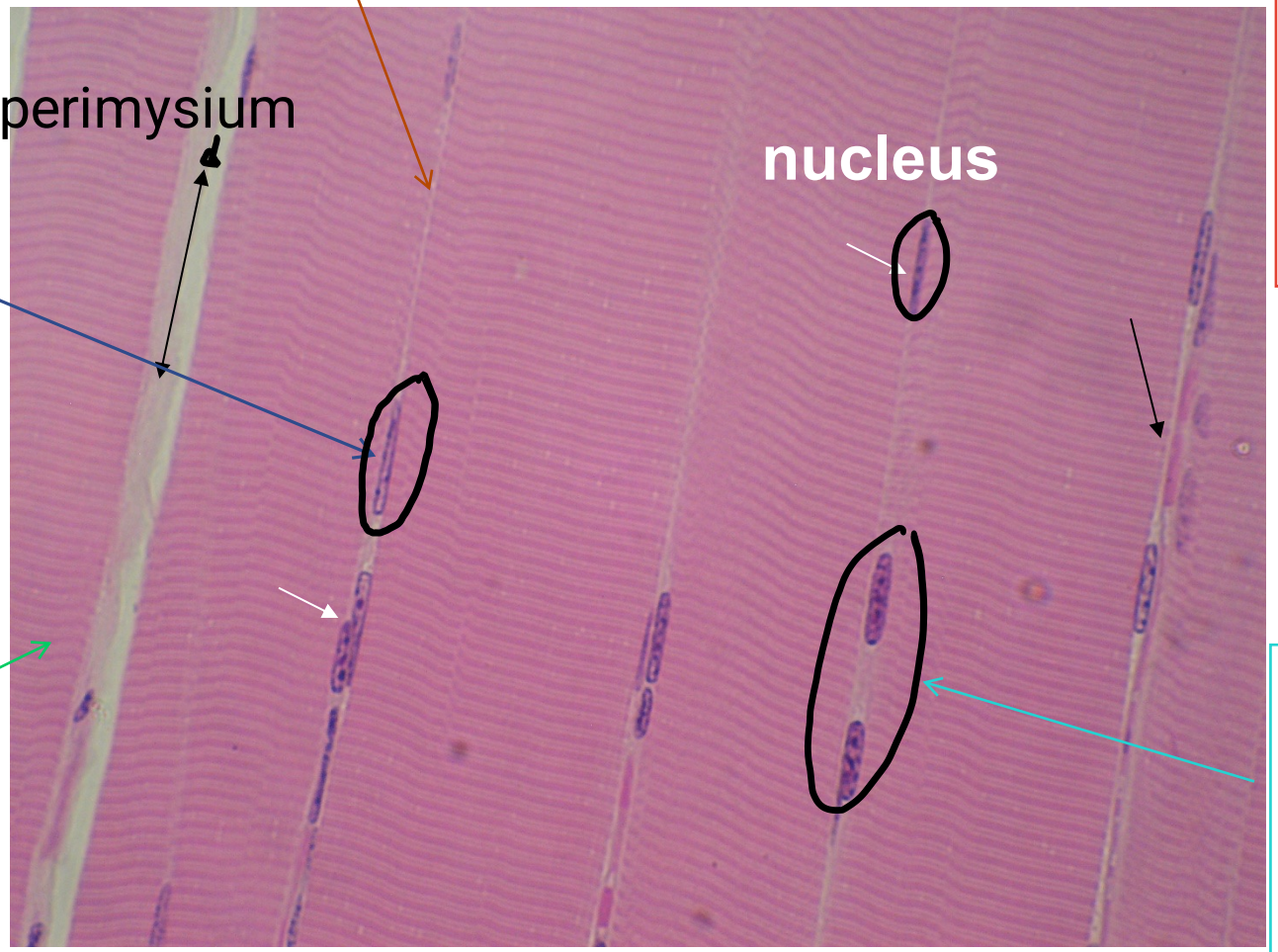
T.S >>> Transverse Section

C.S >>>Cross Section

Connective tissue covering (endomesum)

The striations are evidence that this is L.S , and it isn't considered cross-section because the cells are not rounded.

The nucleus appears more elongated, flattened, and squeezed to the periphery.

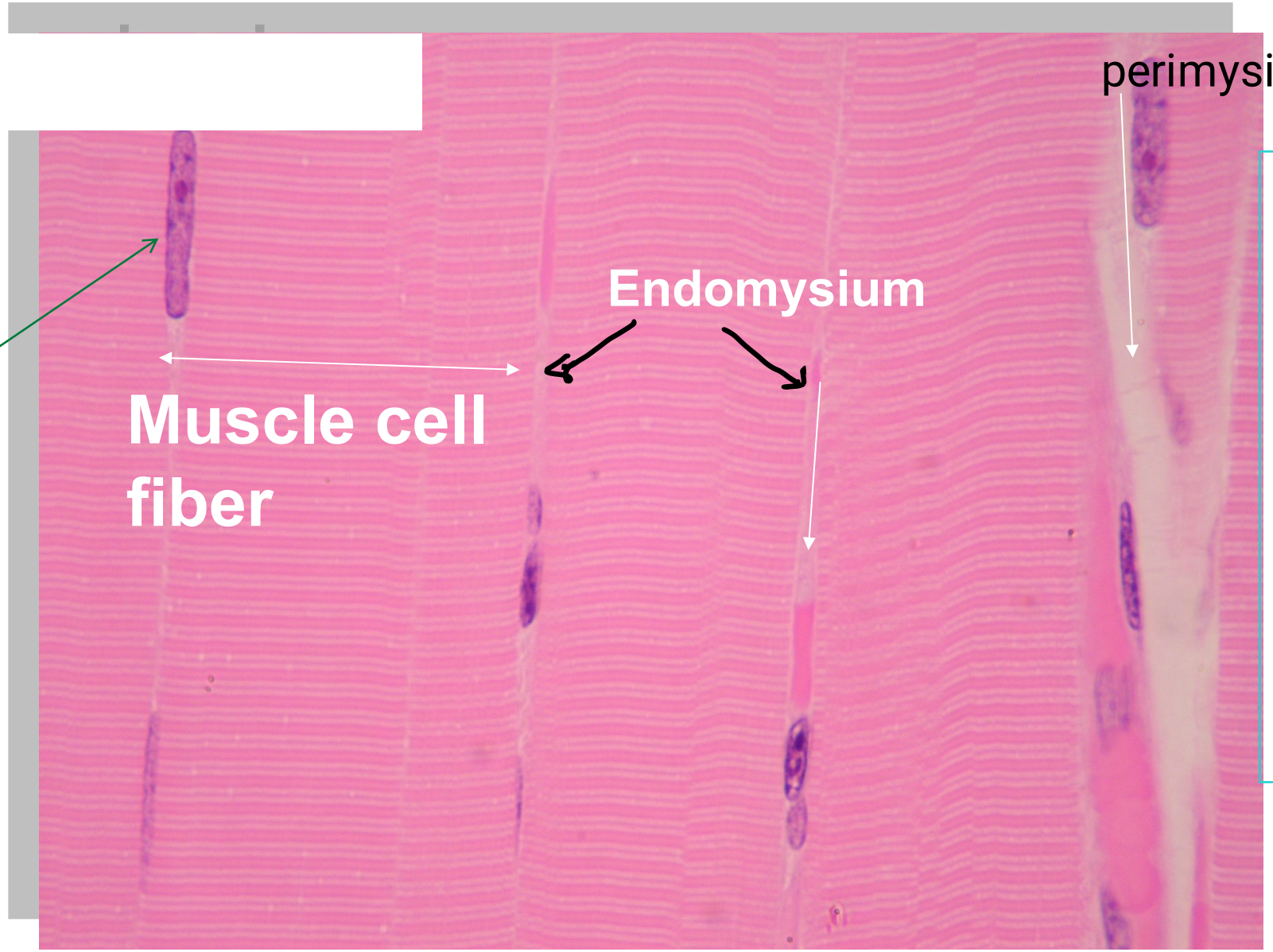


The striated is clear , dark and light bands .

we can see dinuclui aligned in rows because they are located in the periphery.

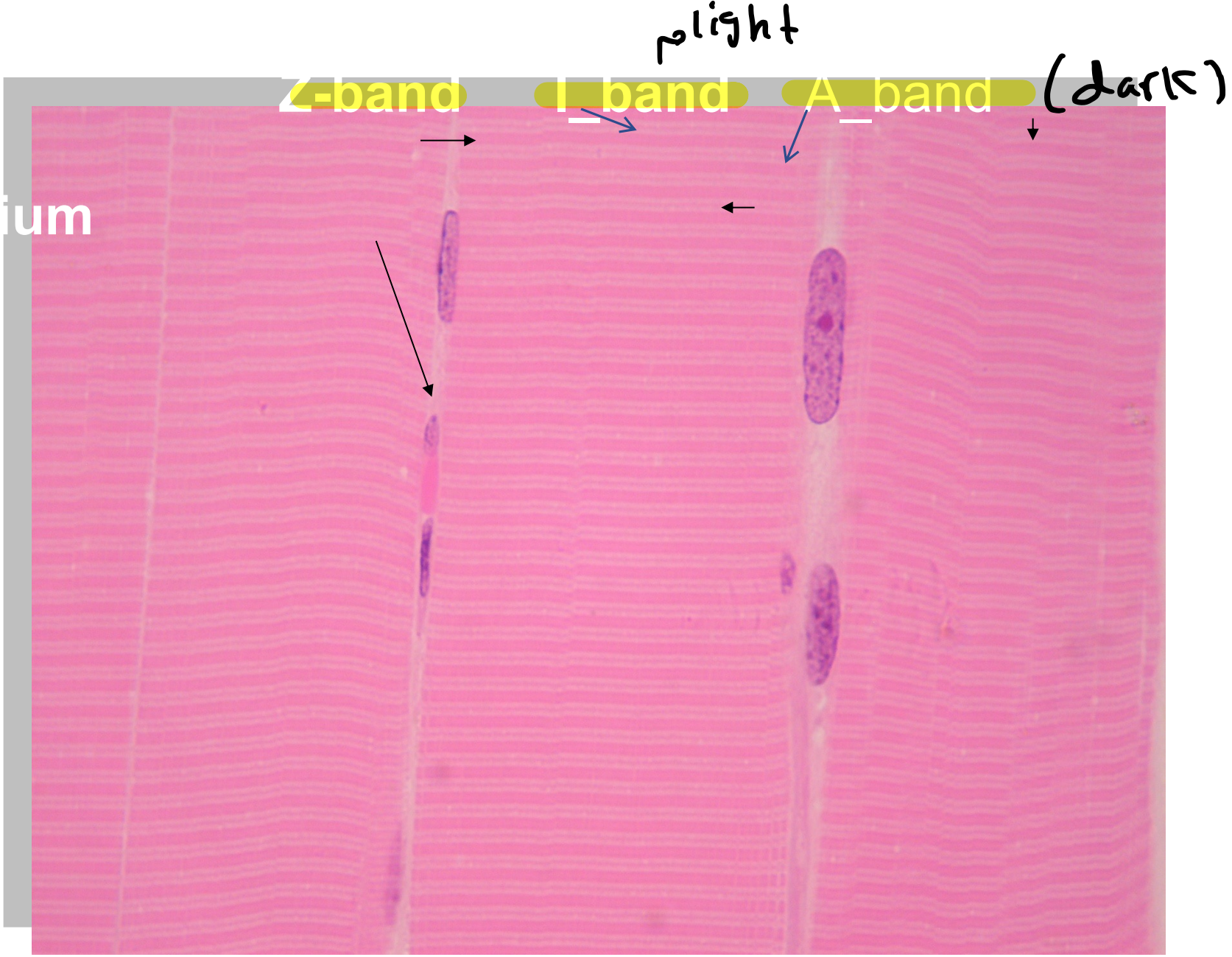
L.S for skeletal muscle

H&E Stain

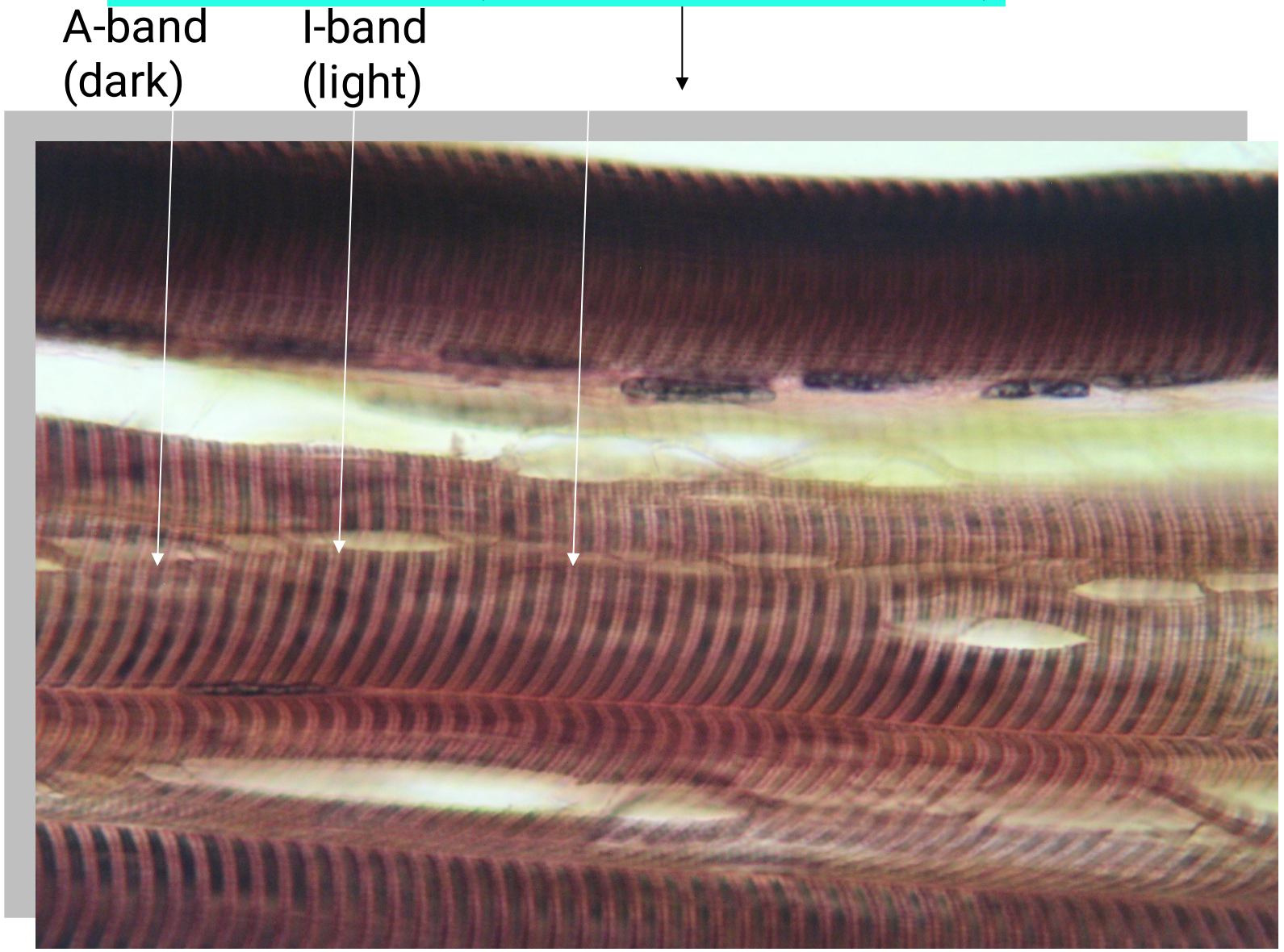


The nucleus appears more elongated, flattened, and squeezed to the periphery.

When connective tissue wraps around one fascial, it causes a thickening of endomesum to make perimysium.


light
Z-band
I_band
A_band
(dark)
ium

Special stain(Iron hamatoxyline)



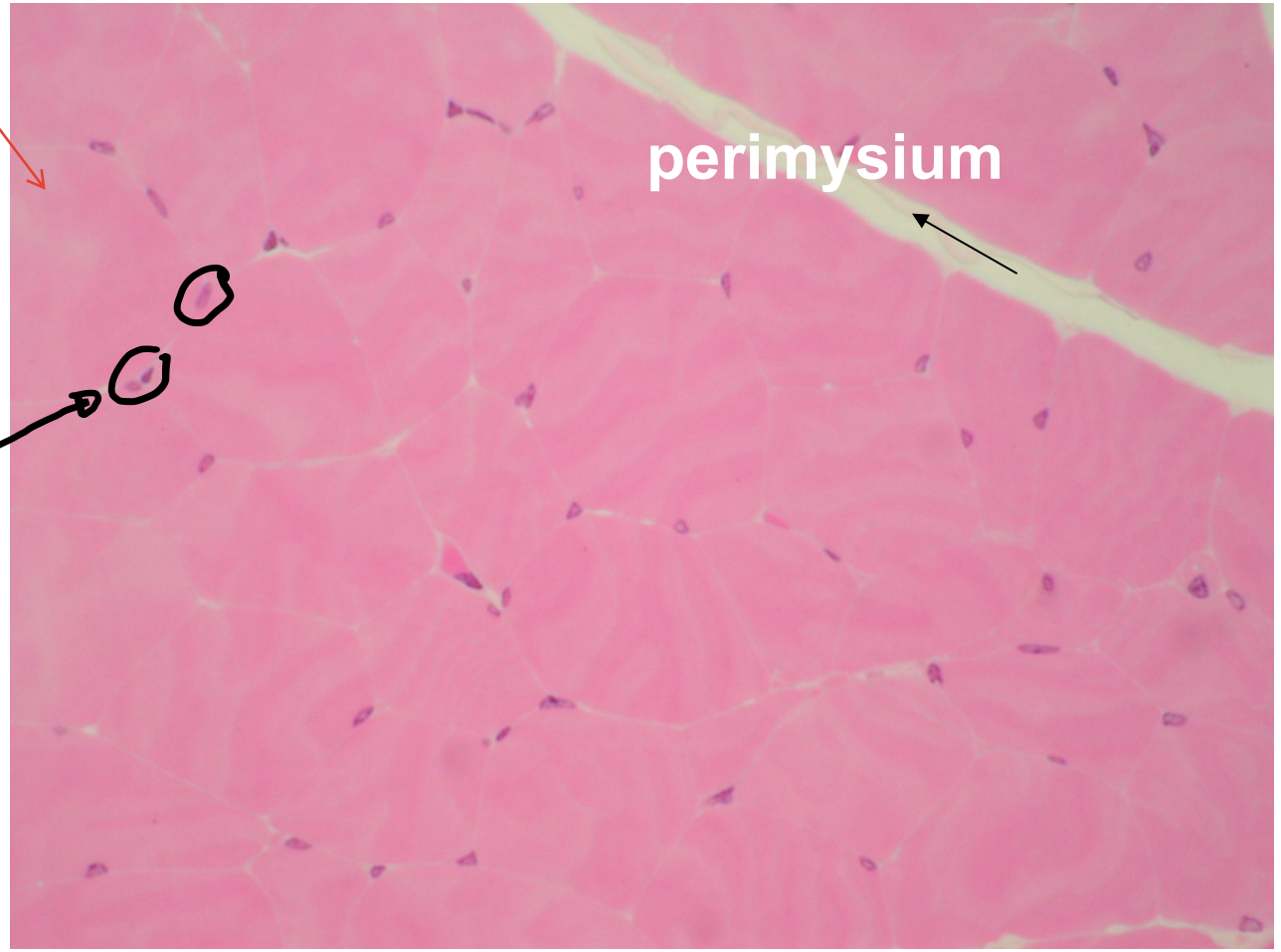
L.S for skeletal muscle

Skeletal muscle fibers are relatively large

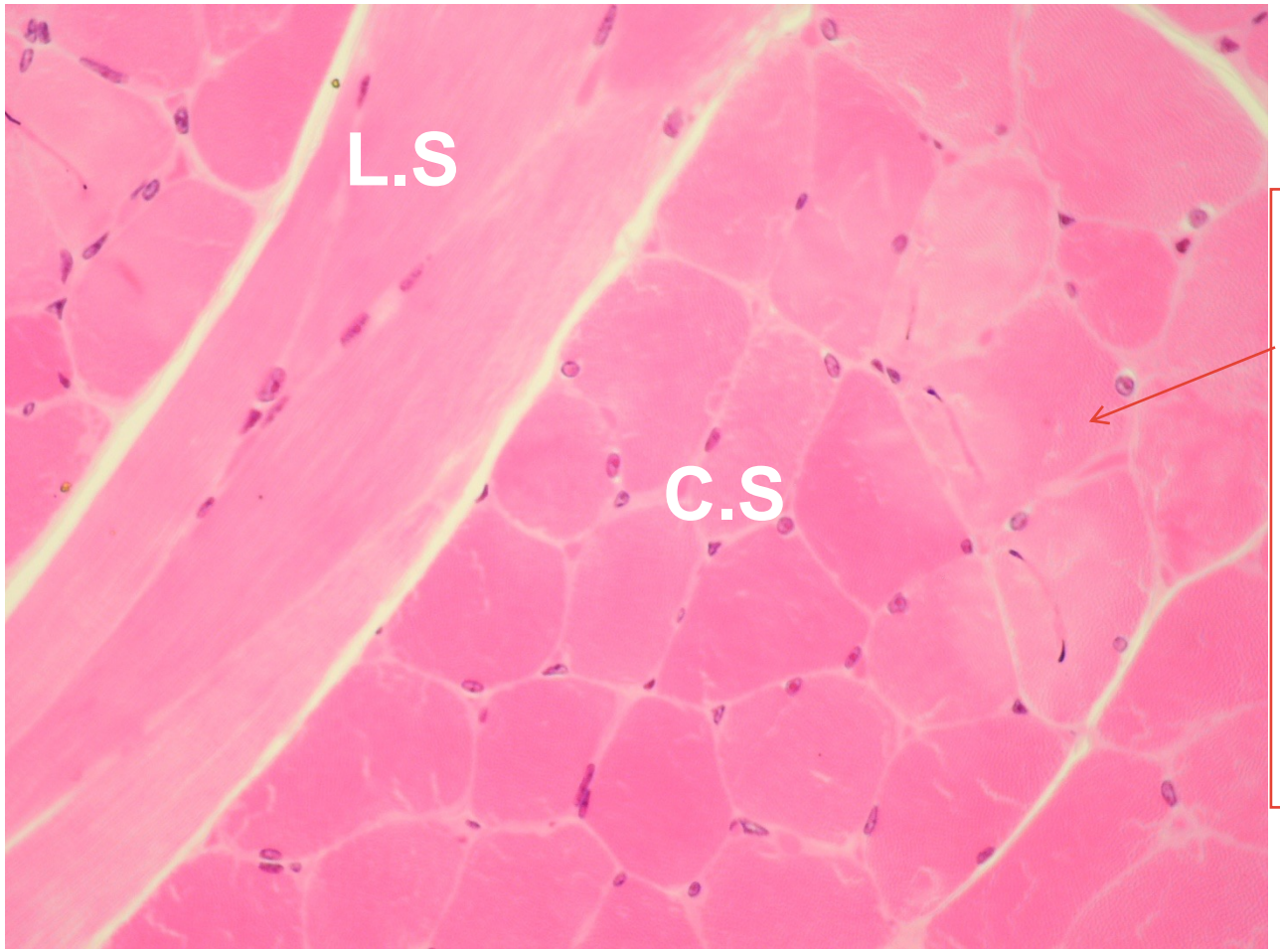
how do we know that?? 🤔

look at the nuclei and the site of them around the whole muscle , they are relatively tiny, so the ratio of fibers will be large .

C.S for skeletal muscle



C.S and L.S for skeletal muscle (e.g, tongue)

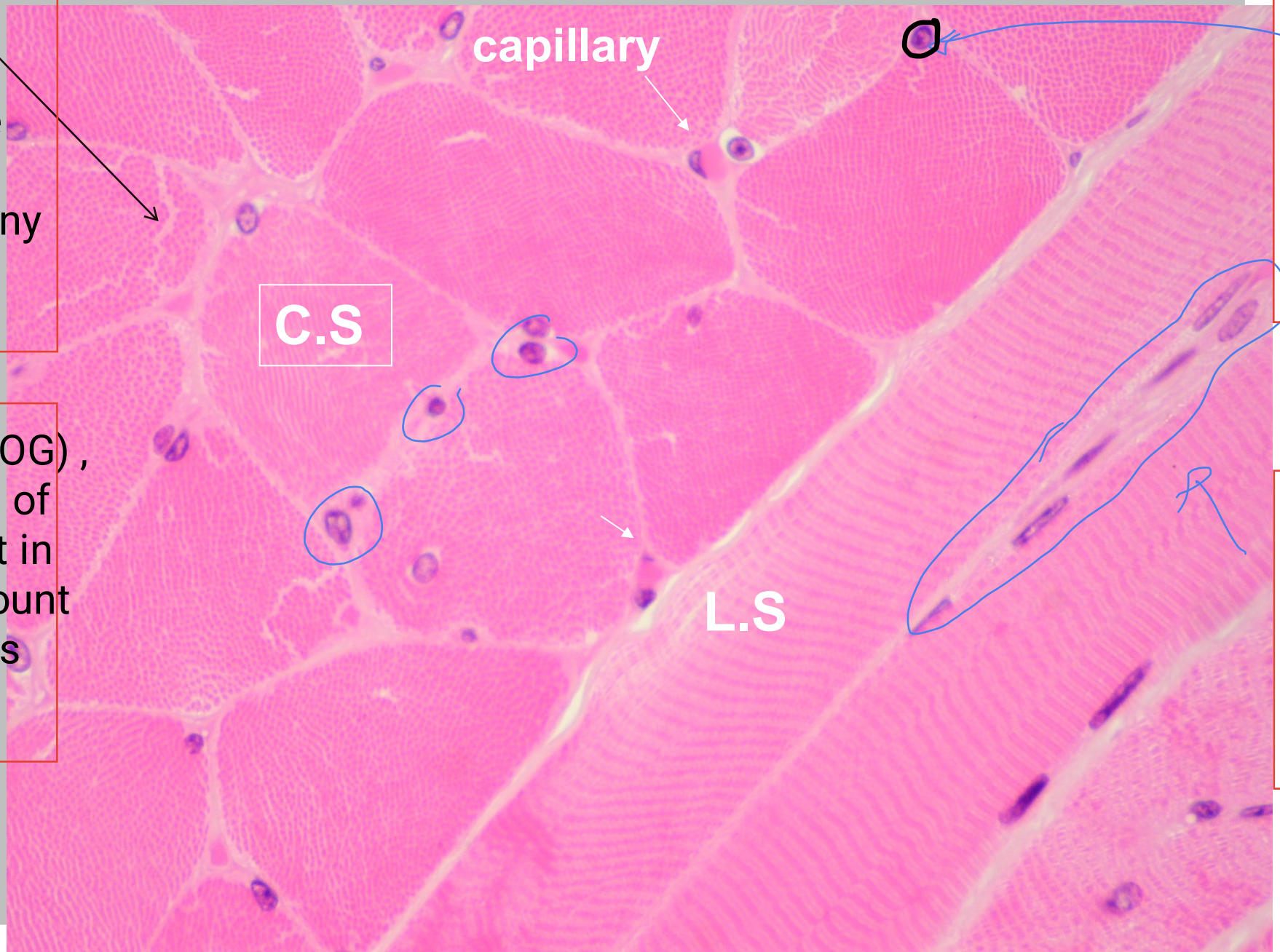


There is some uniformity, the muscle fibers are beside each other, and their sizes are relatively closed.

Higher magnification

At this highly magnification image , we are able to see the details of the sacroplasm (tiny ducts). These are myofibrils.

In (FG) and (FOG) , there are a lot of myofibrils, but in (SO) , the amount of myofibrils is less .

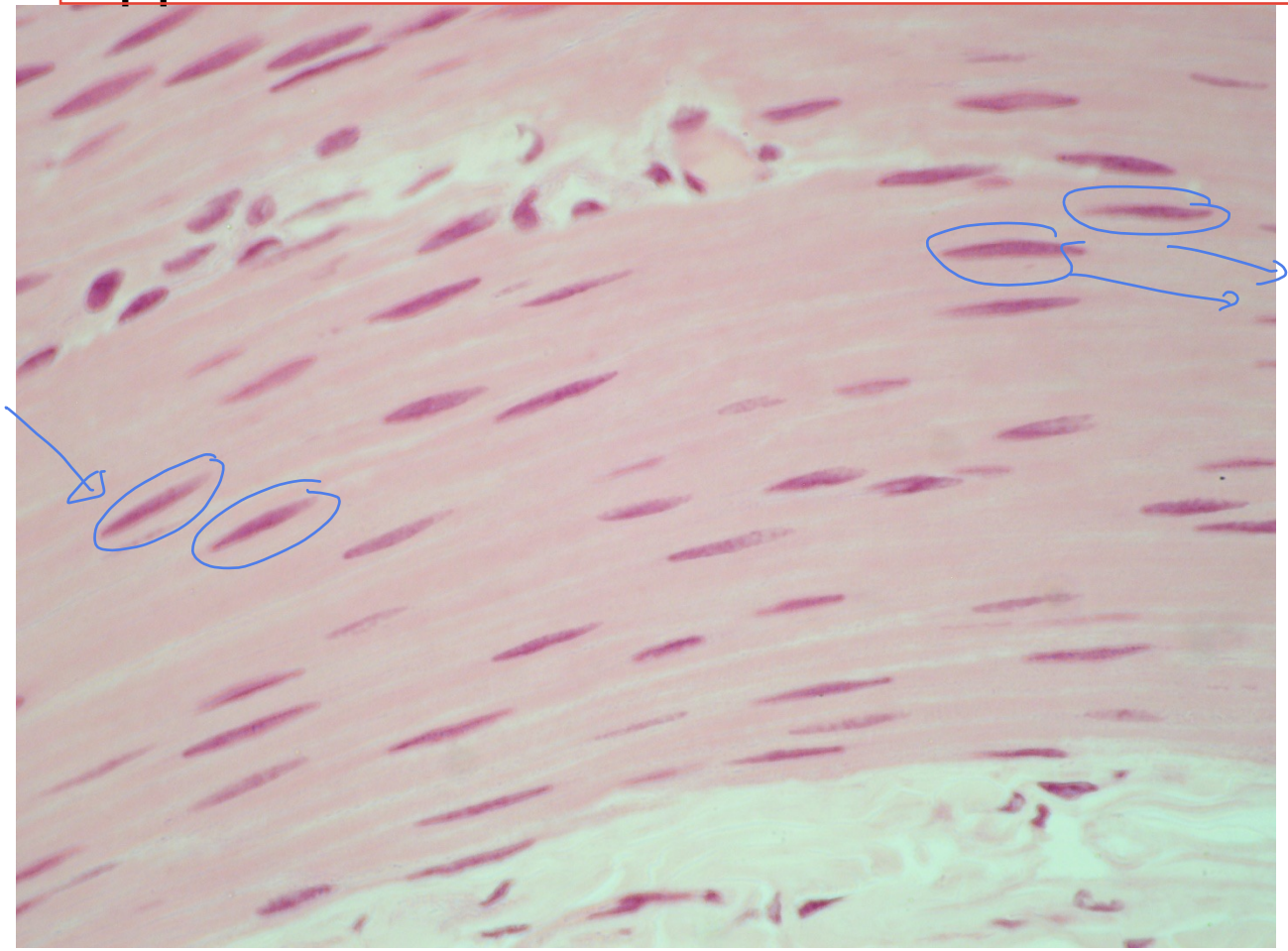


In C.S, the nuclei are arranged around the muscle fiber (around the sacroplasm).

In L.S, the nuclei are arranged in rows .

It looks like something that is running or flowing .

We aren't able to see the boundaries of the cell because the membranes are lipid, and they will dissolve , so we can only recognize the cell by appearance of their nuclei.



How do these nuclei look like ?

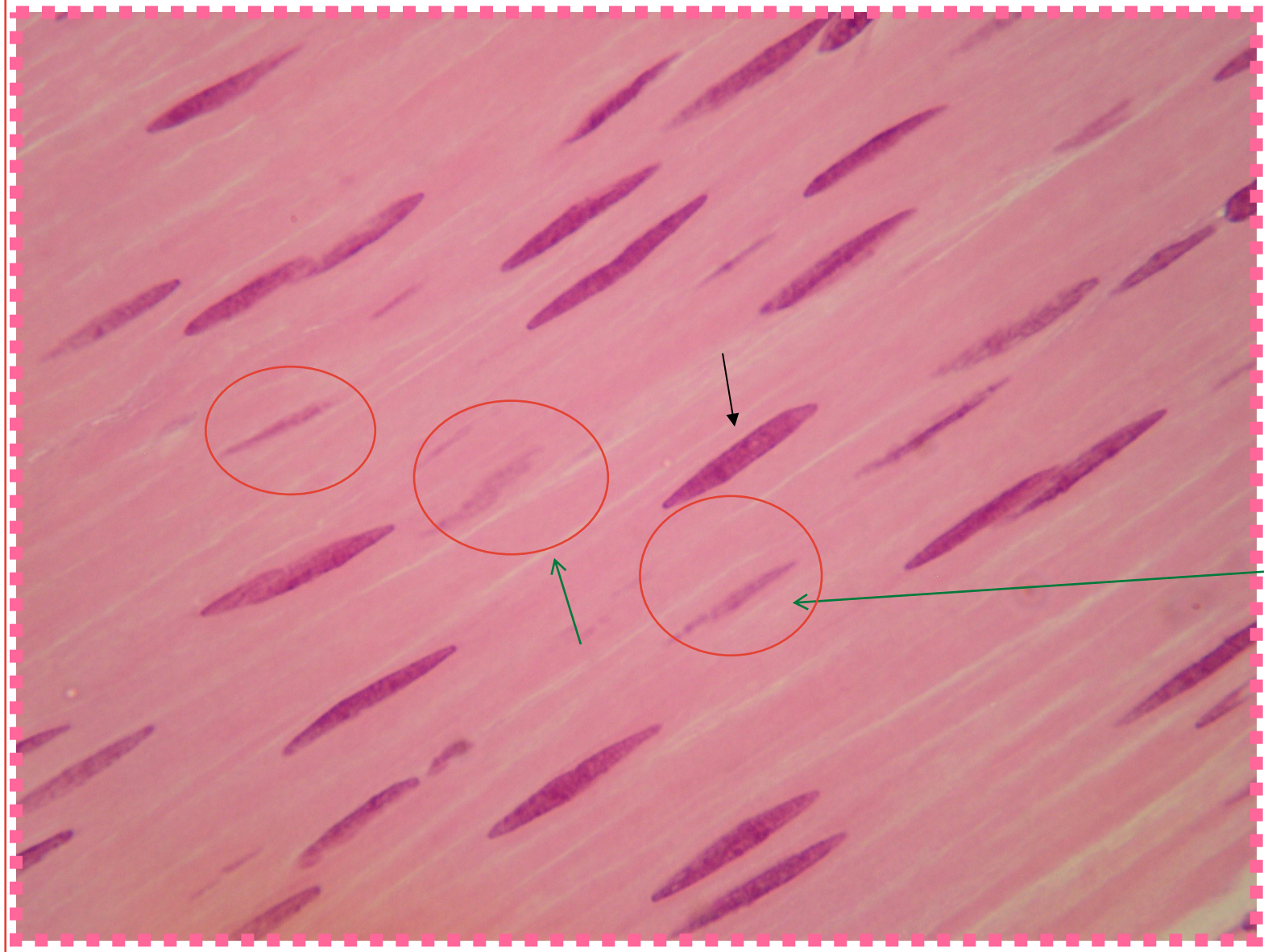
They are spindle and elongated .

The nuclei are running in all the fields because they are tiny cells , spindle shaped, and relatively long . Most of the cell volume is around the nucleus.

L.S for smooth muscle

How can we distinguish them from the skeletal muscle ?

The skeletal fibers are organized in rows in the periphery, and they were striated in the center.



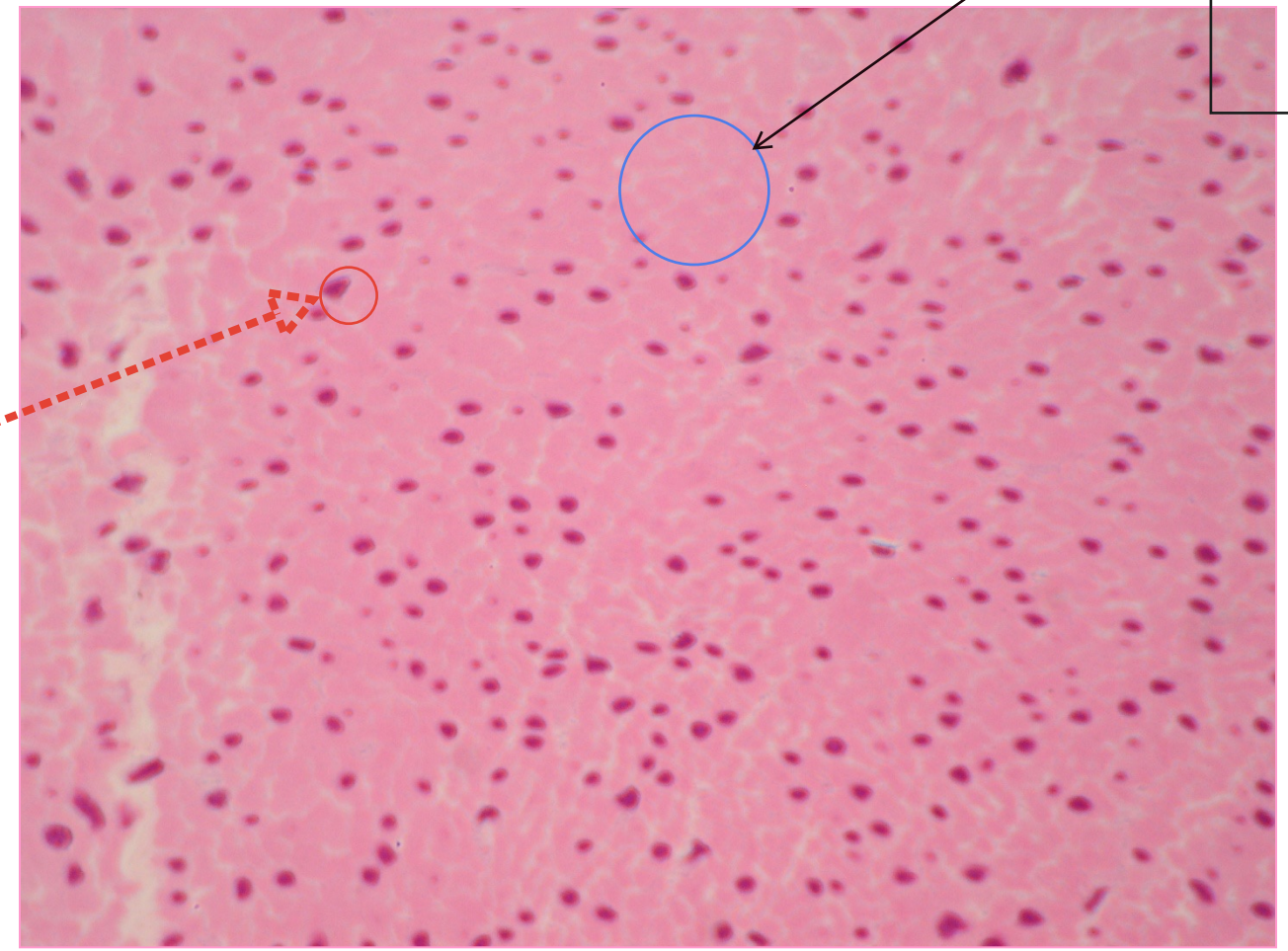
We have shade basophilic structures here

They are also nuclei, but the section doesn't pass through the full length and the thickness of them (so they appeared as a shadow).

This is a unique structure , there are many nuclei and their sizes are very small .

T.S for smooth muscle

هون مبين انه ما في نواة !
بس فعليا في نواة لكن المقطع ما مر فيهم (لذلك بين انه ما في اشي)



nucleus

The nuclei are circular and relaxed because they are not squeezed (pushed) to periphery.

look here , the nucleus is larger than the cell, and the cytoplasm is small.

Remember that smooth muscle is :

1. Involuntary.

2. it doesn't have a well-characterized neuromuscular junction.

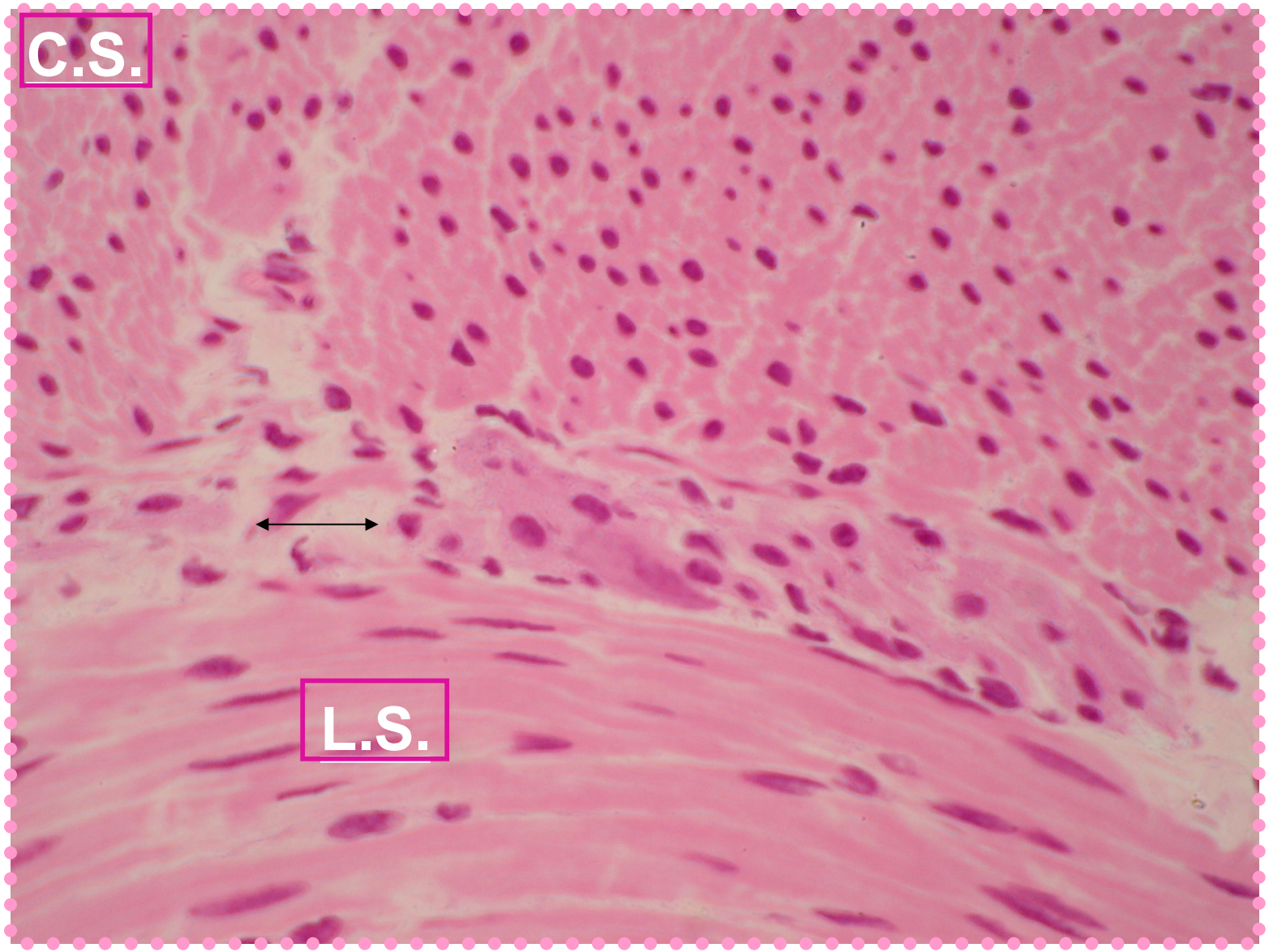
3. it is controlled by hormones and ANS(autonomicnervoussystem).

Ex: In females, the contraction of uterine muscle is controlled by oxytocin hormone.

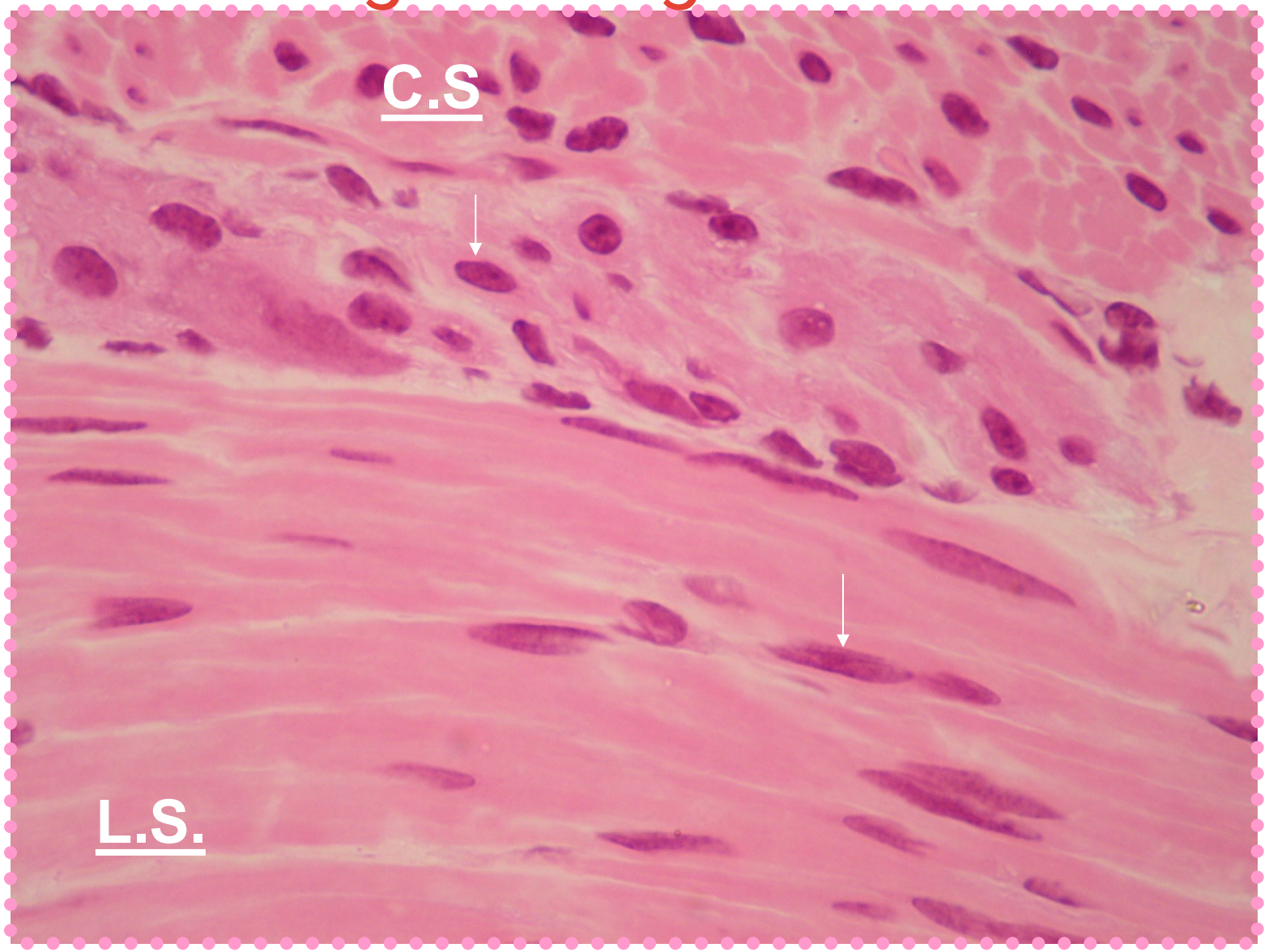
Musclaris externa in colon

In L.S, the spindle shape nuclei are running or flowing.

Whereas in C.S, there are rounded nuclei throughout the section, but as we said, not all nuclei passed in the section.



Higher magnification



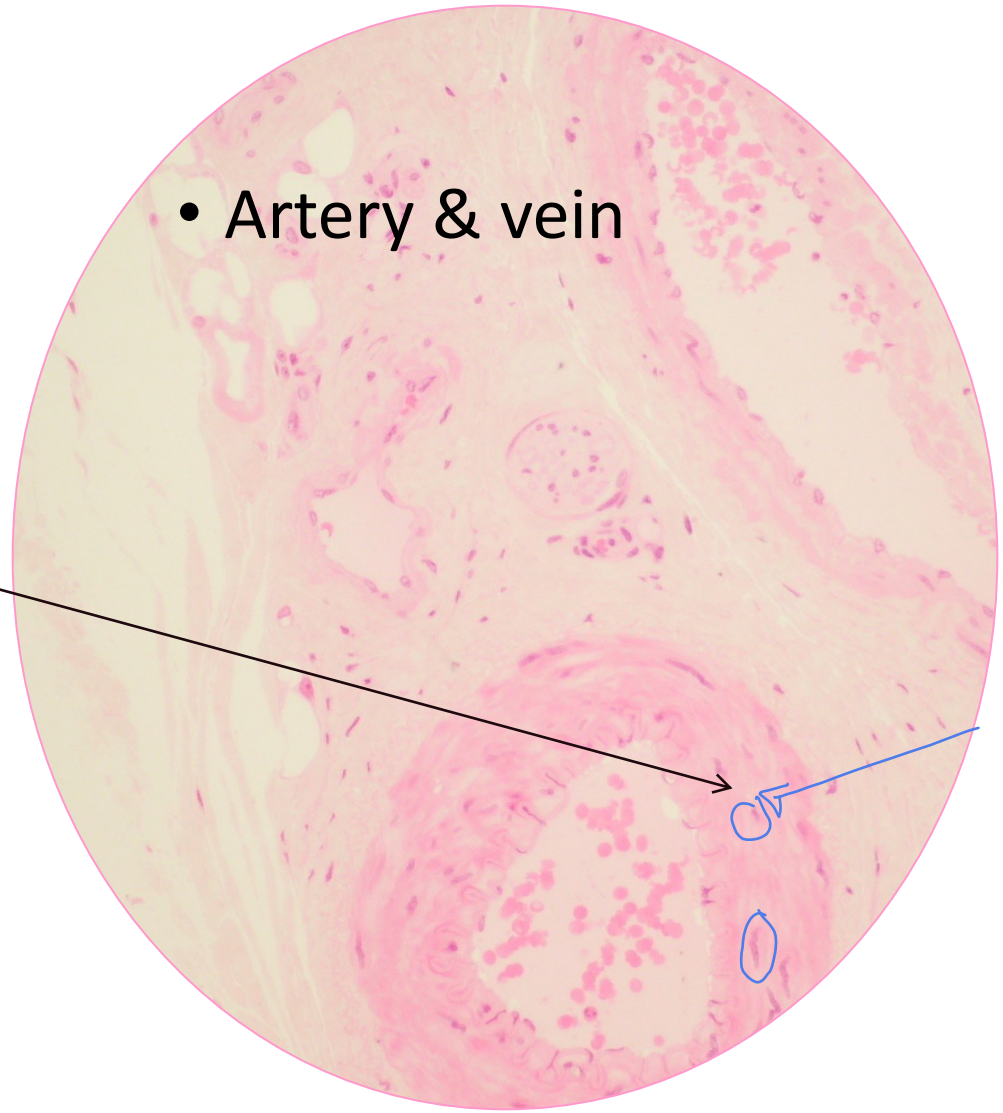
Wall of blood vessel

Tunica media of blood vessels has smooth muscle.

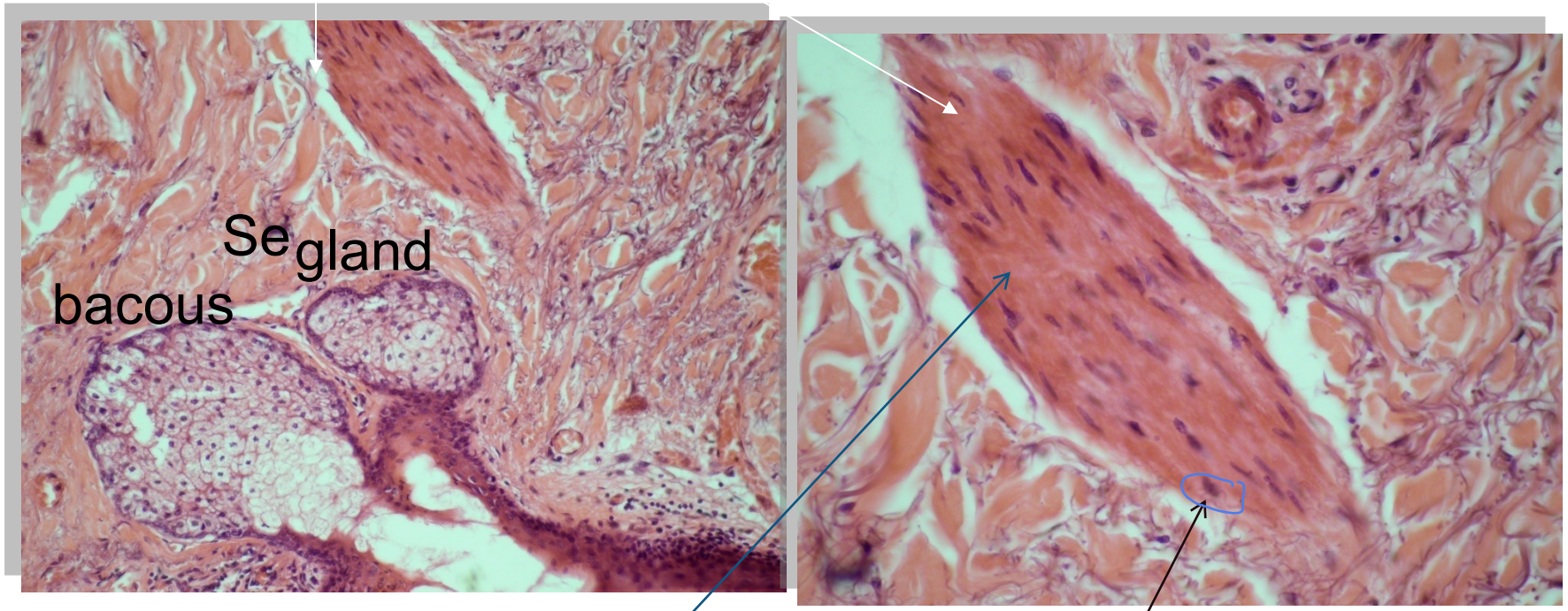
How can we identify them ?
By the shape of the nuclei, they are elongated and running in this field.

There is also connective tissue , so we will not see a lot of smooth muscle.

Cross section



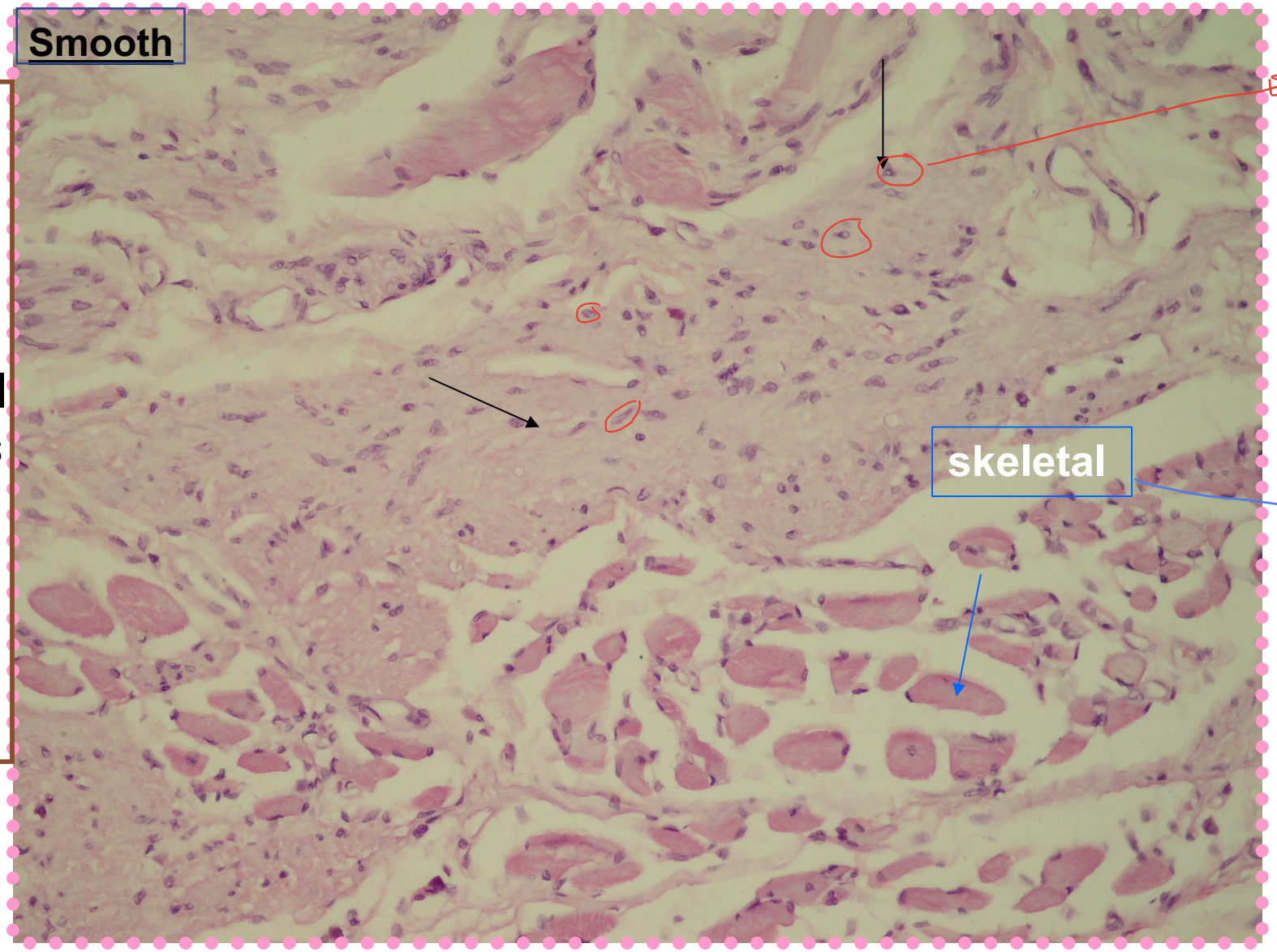
Arrector pili (smooth muscles in the skin)



This is the cytoplasm

The nuclei are spindle shaped, parallel, and running in the same direction.

mixed smoothe and skeletal muscle in mid esophagus.

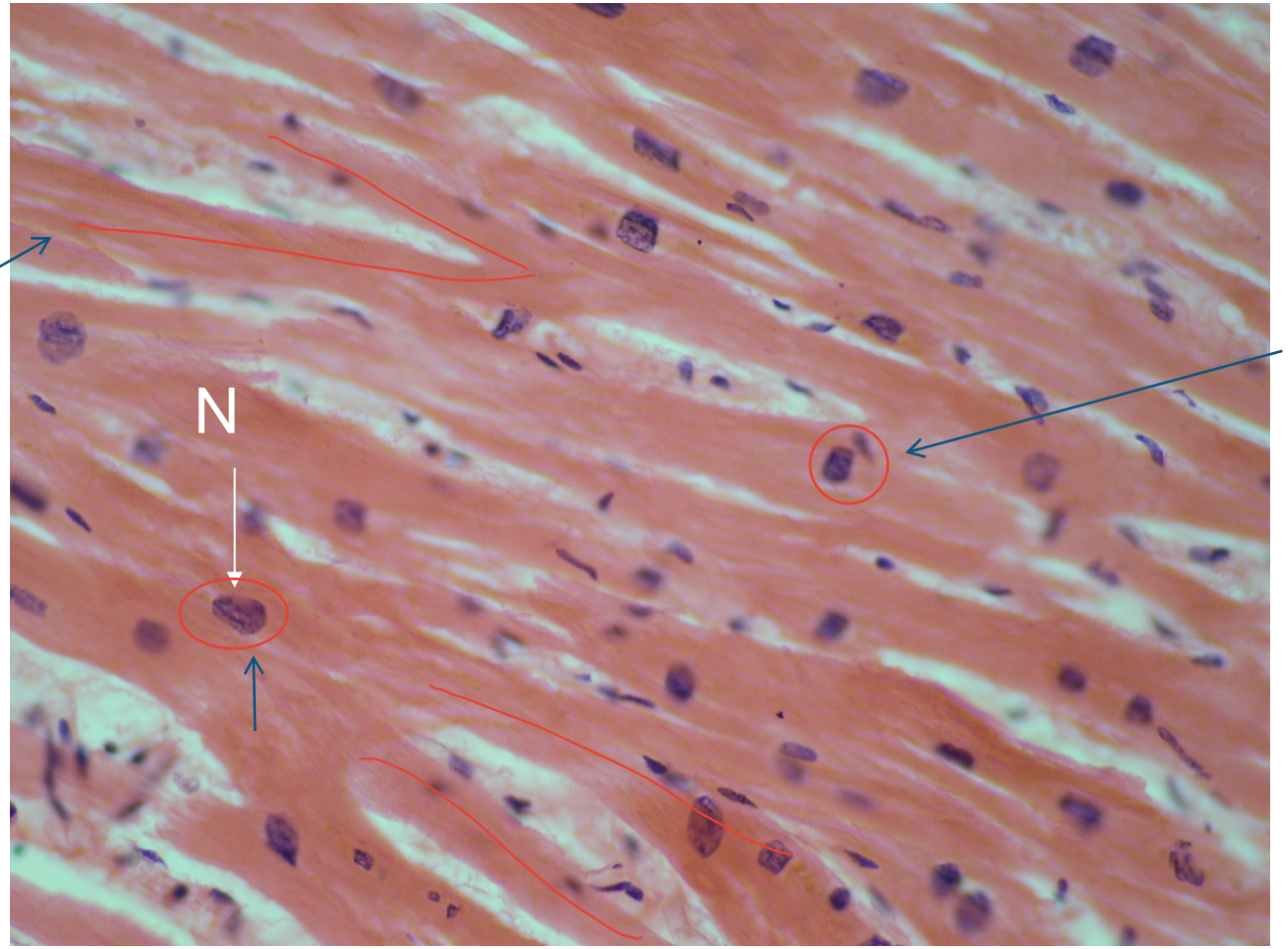


Here, the smooth muscle fibers are not perfectly running in one direction, so you will see elongated nuclei and others rounded , which make the smooth muscle disorganized.

large muscle fibers and peripherally located nuclei .

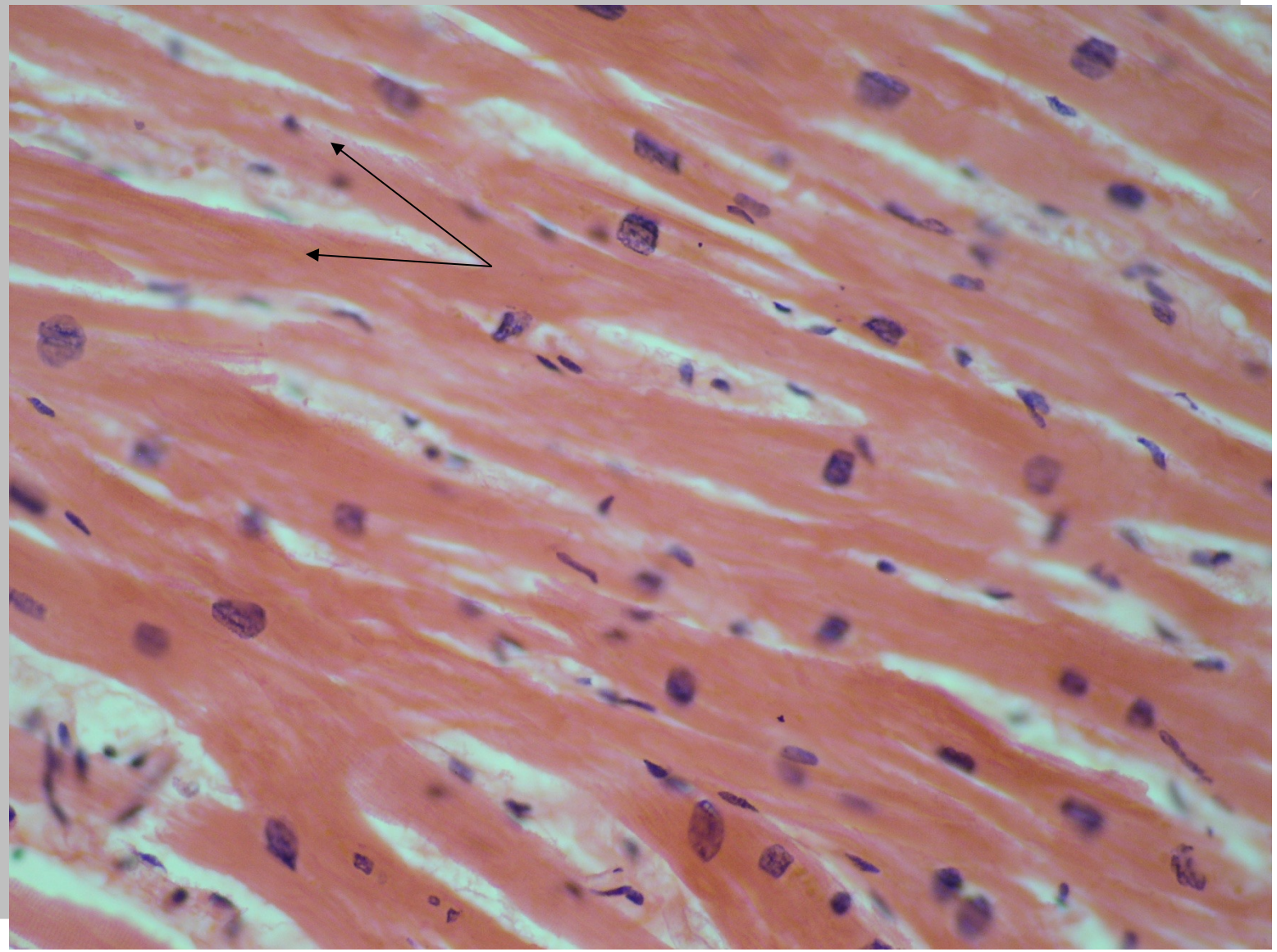
L.S for cardiac muscle

It has a unique characteristic, which is the branching .



There are rounded and centrally located nuclei , but in smooth muscle, there were spindle and centrally located nuclei.

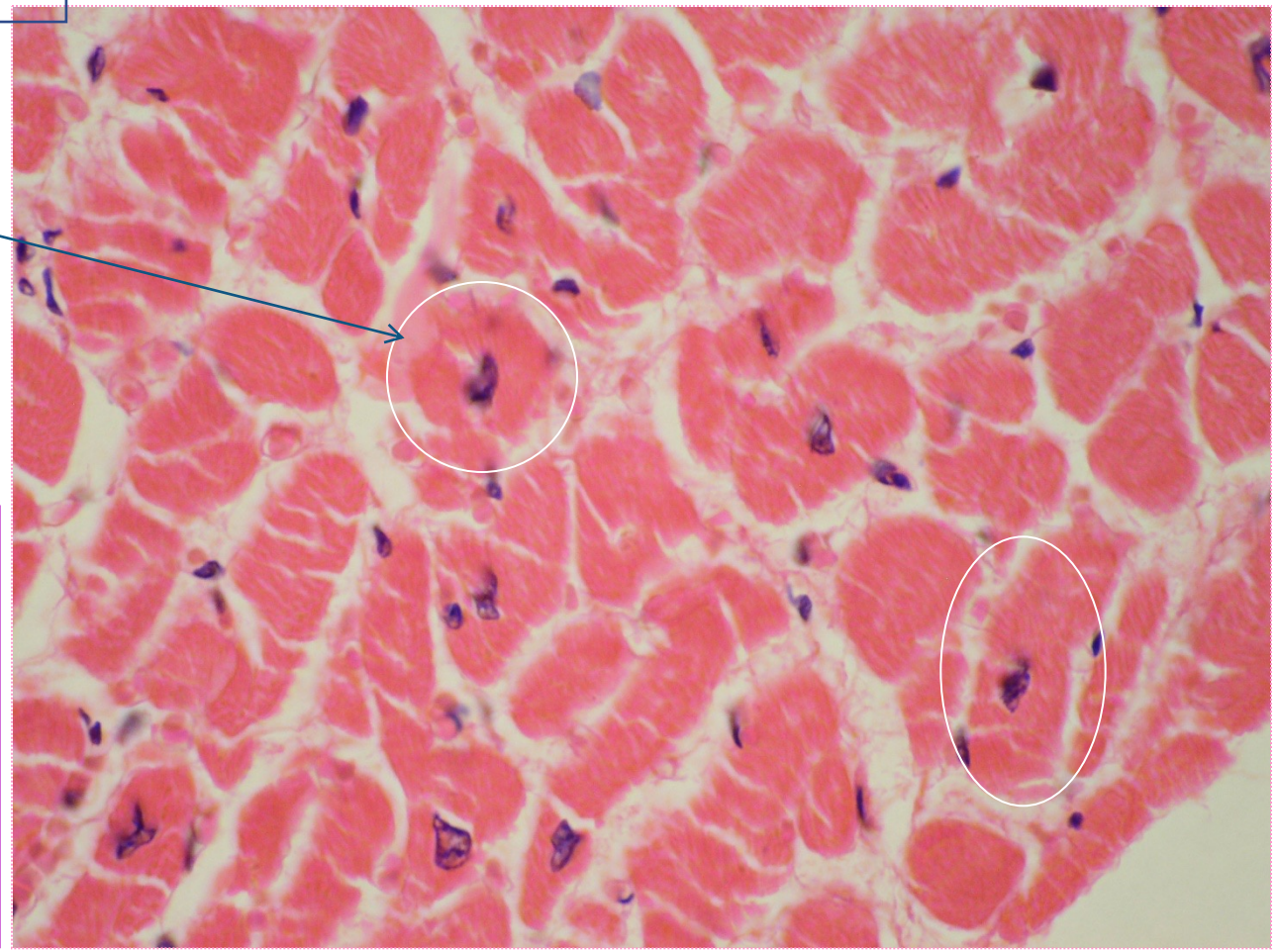
L.S = branching



C.S for cardiac muscle

How can we distinguish them from the skeletal muscle? 🤦

1.In the skeletal, the nucleus is peripherally located, but in the cardiac, the nucleus is centrally located.



2. In the skeletal , there is some organization , but in cardiac muscle , there is no order due to the branches.

Remember that cardiac muscle ：

1. Involuntary.

2. doesn't have a high content of glycogen.

3. has a high content of mitochondria.

4. it is highly vascularized.

5. it has its own internal electrical circuit (SA node).

6. The ANS doesn't make the action potential for cardiac, but it increases and decreases the heart rate.

7. The action potential propagates between fibers through gap junctions.

L.S. cardiac muscle

Intercalated discs

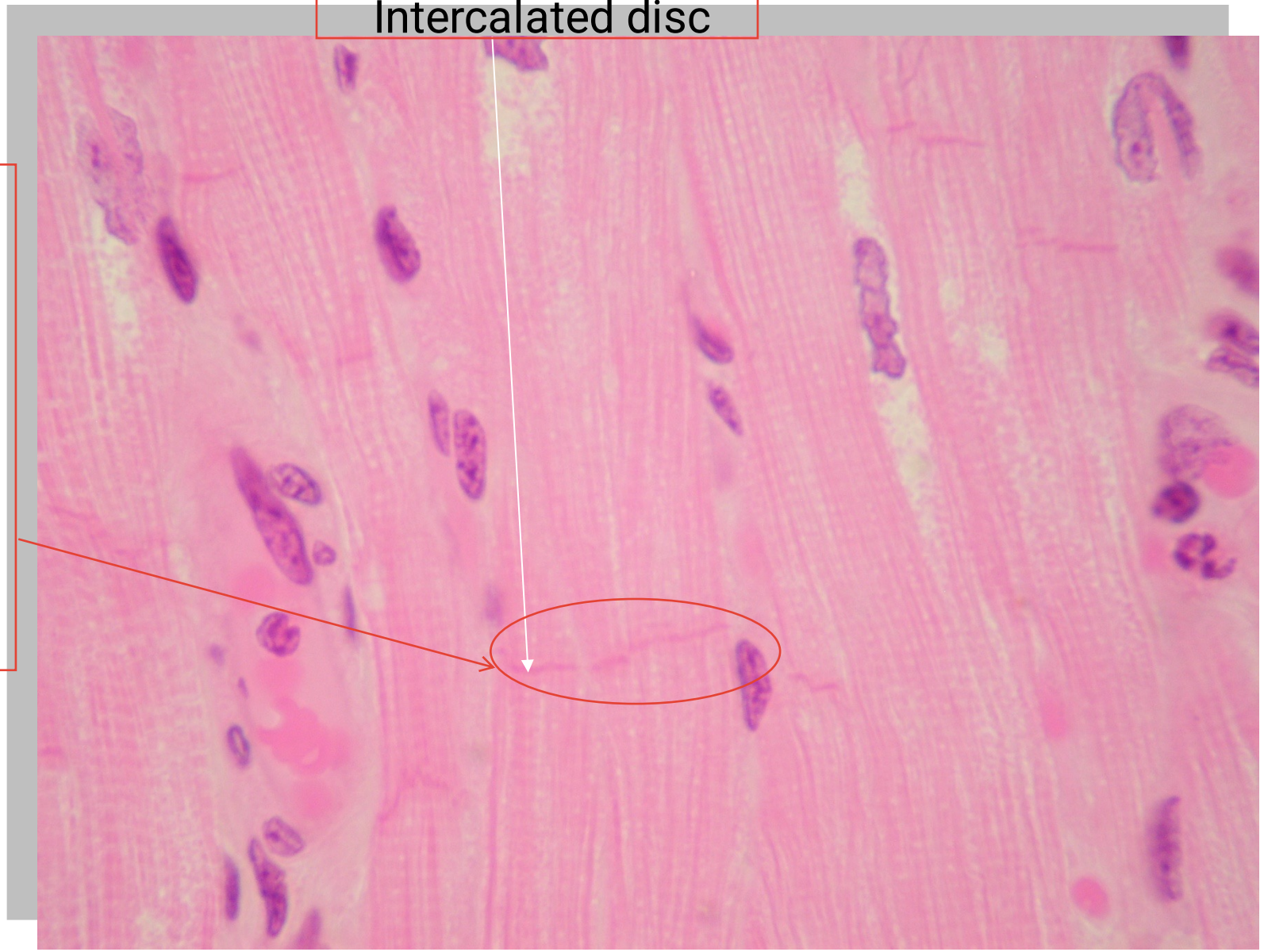
Nucieus

We have two aspects of Intercalated disc:

1. Transverse : deosmos >> for adhesion.
2. longitudinal : gap junctions >> for communication.

There is slight striatation in cardiac muscle due to the myofibrils , but not as much as the skeletal muscle.

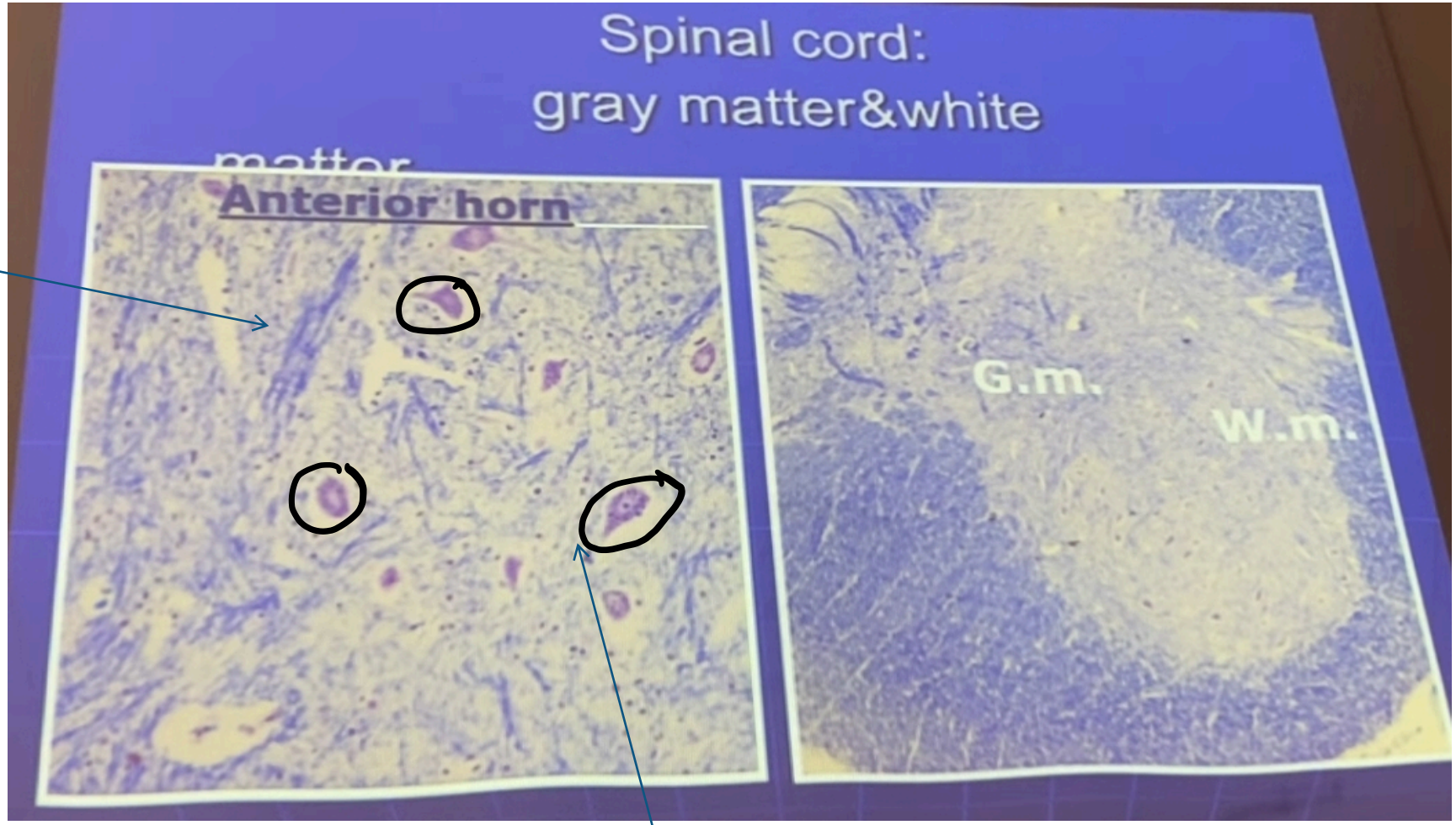
Intercalated disc



Usually, when you see a dark eosinophilic structure, this is telling you that there is a condensation of something.

Nervous tissue

Around them , there is a neuro glial .



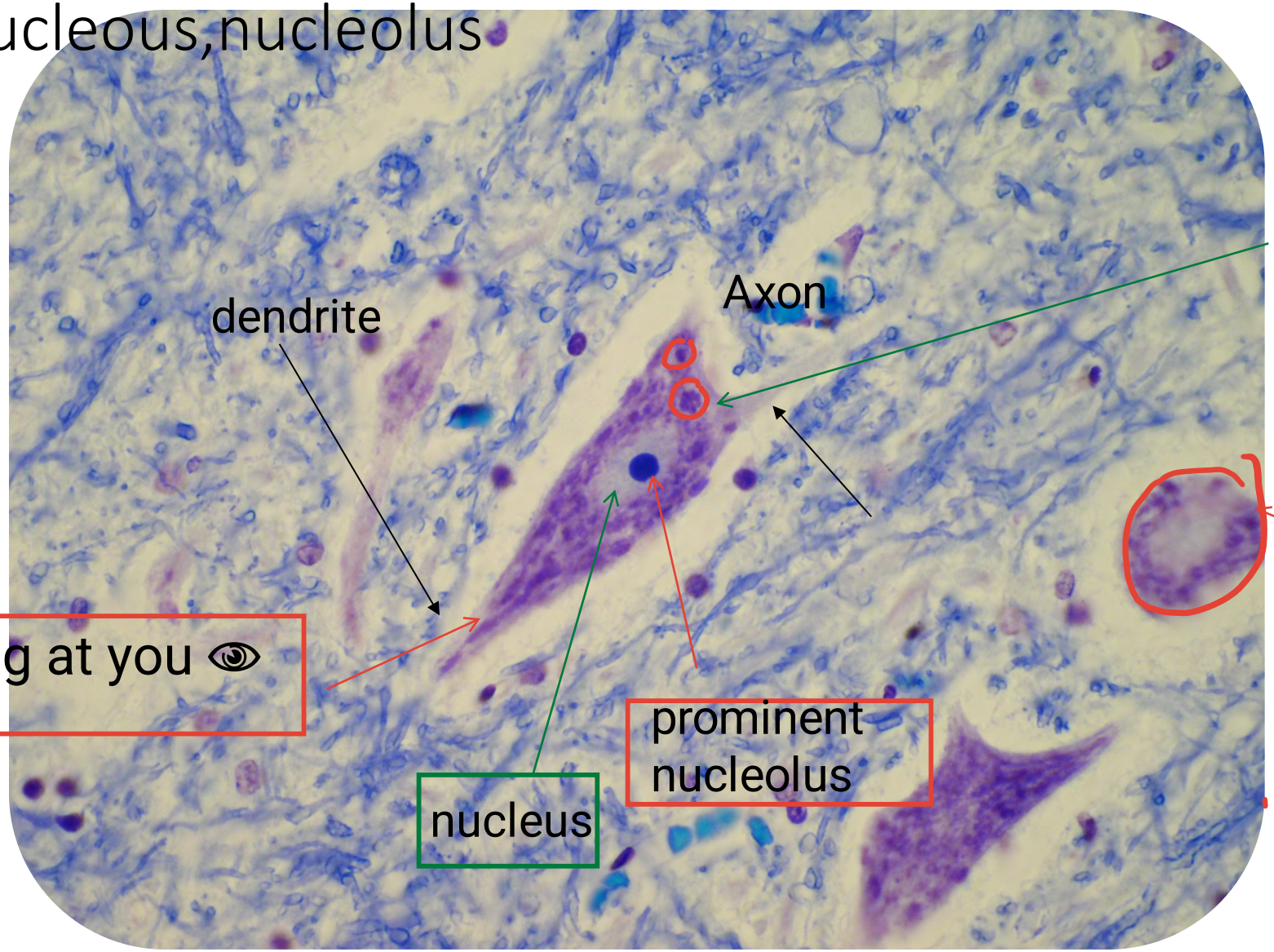
How can we distinguish that this is a nervous tissue??

They are huge cells (neurons are the largest cells in our body) , and there are processes sticking from them.

Its appearance that something is looking at you👁️

neuron:-soma=Nissl bodies

nucleous,nucleolus

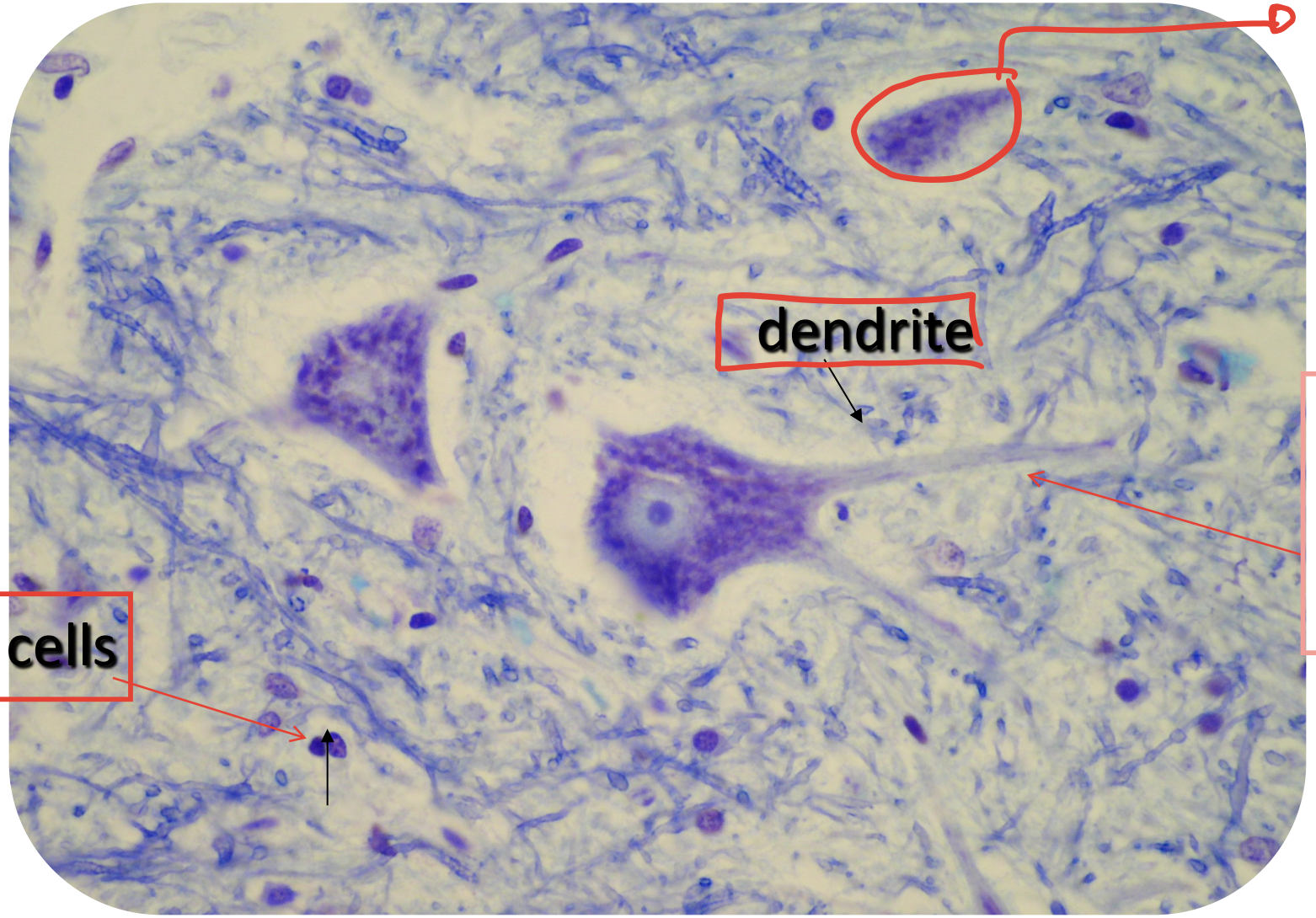


The cytoplasm appears patched , and there are clumps of basophilic structures inside it (nissl bodies).

It is looking at you 👁

The section passed through the nucleus but didn't pass through the nucleolus.

multipolar neuron (toluidine blue stain)

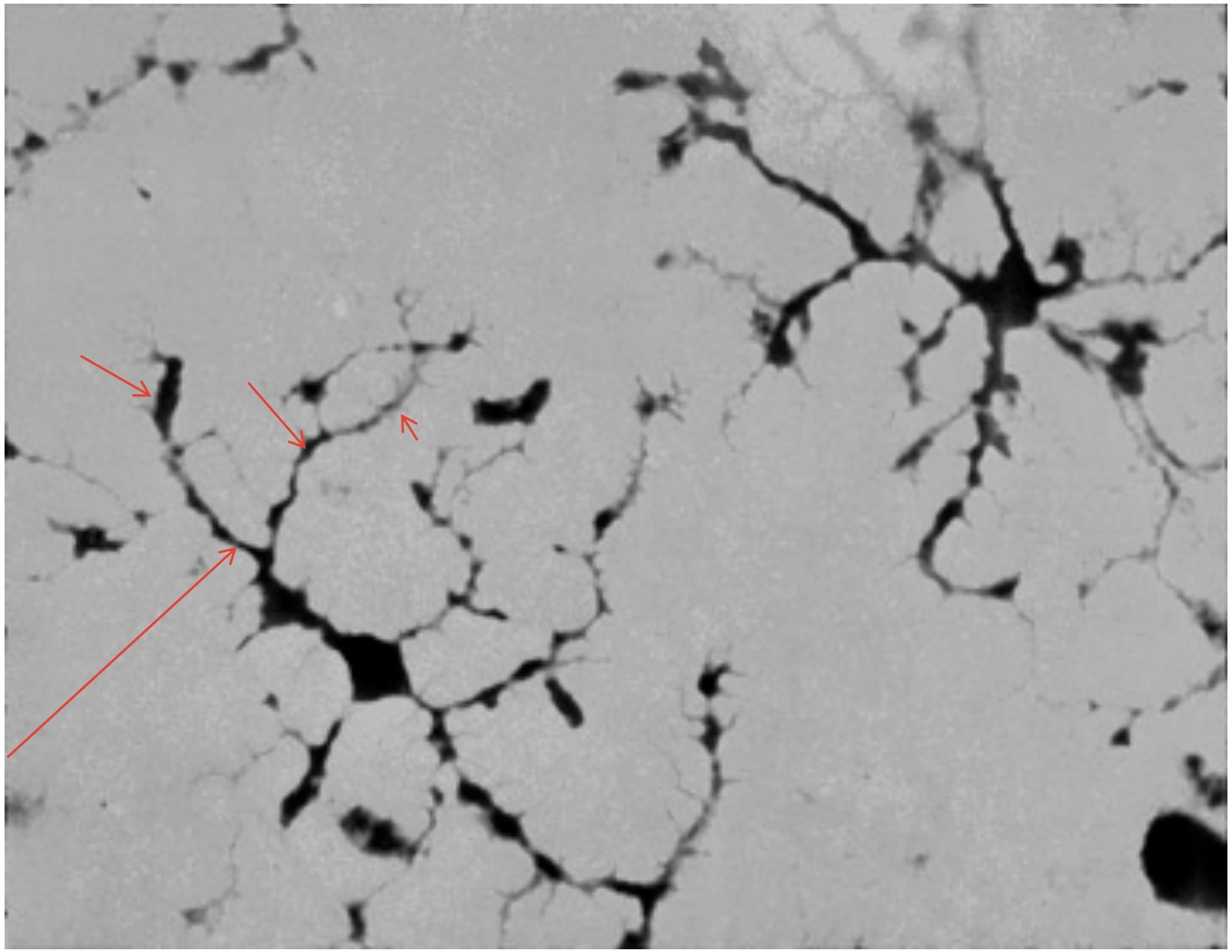


مبينة أصغر لانه
المقطع مر
بجزء منها فقط

The cytoplasm stopped on dendrite.

Sliver stain

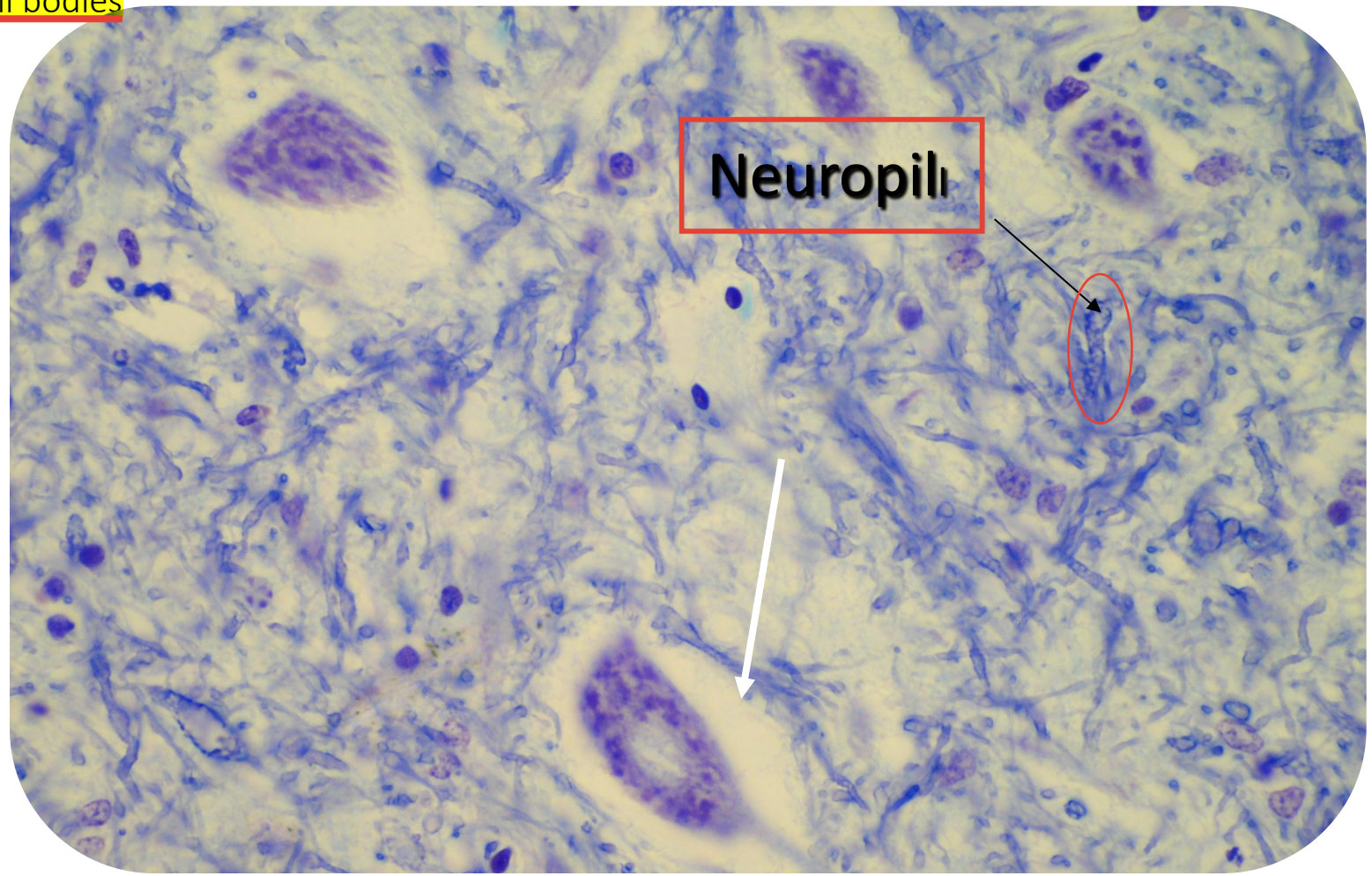
In the previous stain, we are not able to see all processes , so we use another stain, which is a sliver stain.



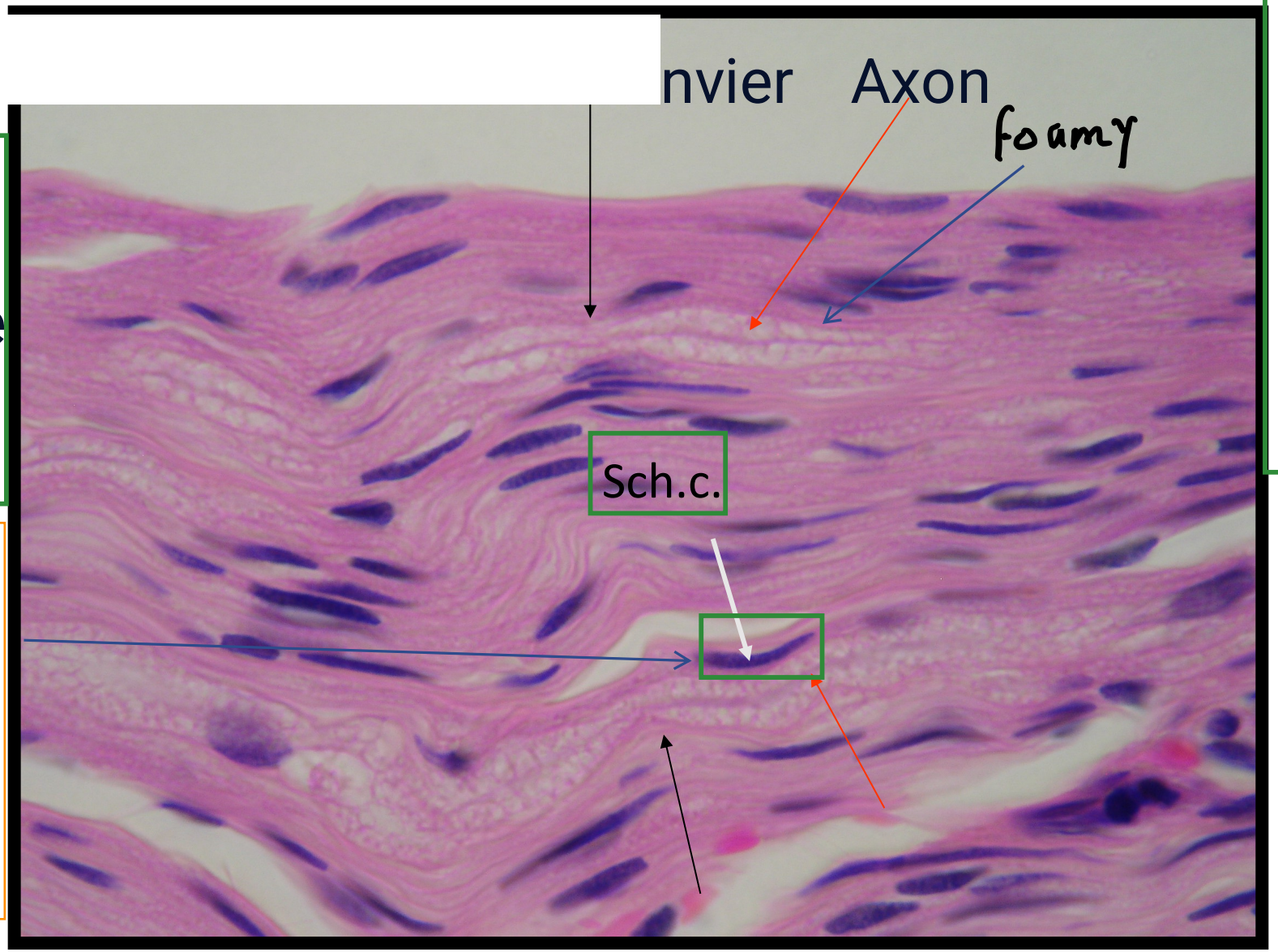
Here, all the processes appear well defined .

axon hillok of the axon

Neuropil: unmyelinated axons, dendrites and glial cell processes that forms a synaptically dense region containing a relatively low number of cell bodies



L.S. in nerve fibers -H&E stain



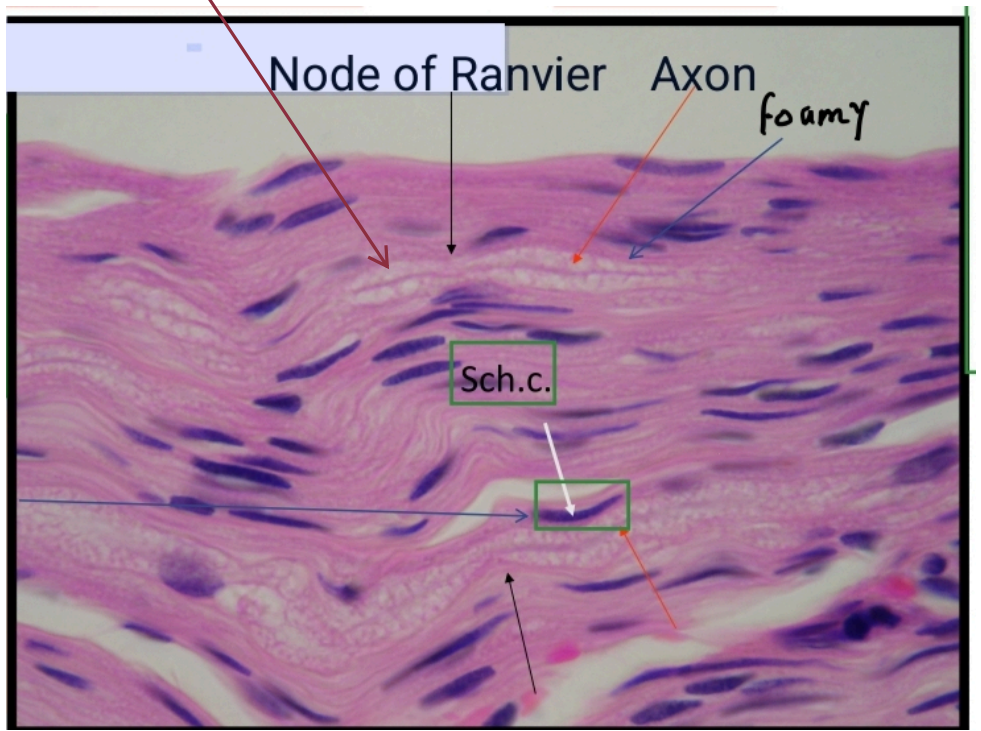
There are many nuclei running in the field.

The nucleus that located next to the axons.

They appear as I have alternating abundant regions of eosinophilic and foamy appearance (the washed-out appearance).

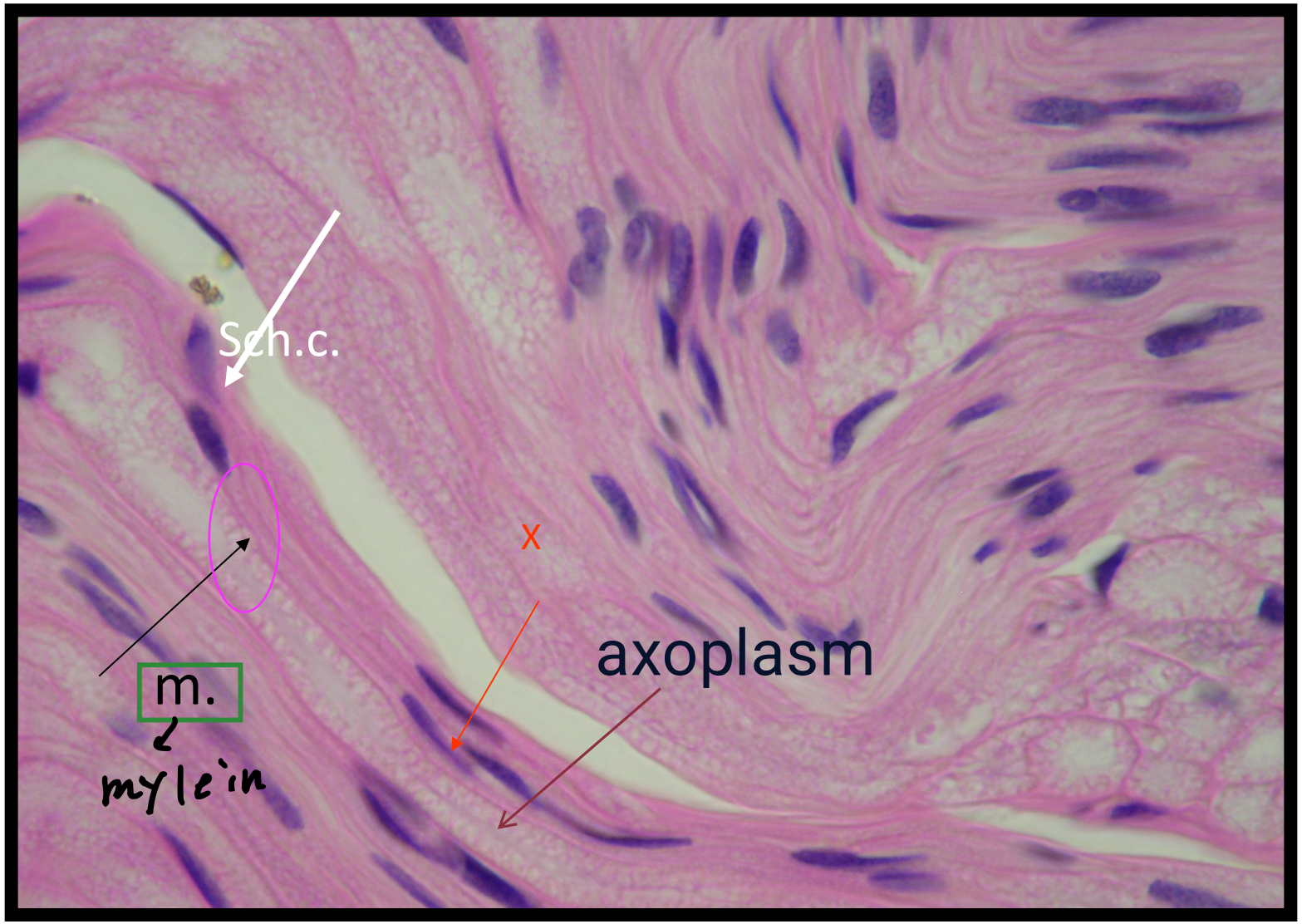
Why does it give a foamy appearance ?

Because of the presence of mylein which is a double layer of schwan membrane that wrapping itself on the axons and as we know the membrane mainly is made from fates and some proteins and what we see here are the proteins, whereas the empty space is for fat elements which dissolve during preparation of the sample and that what gives it a foamy appearance.



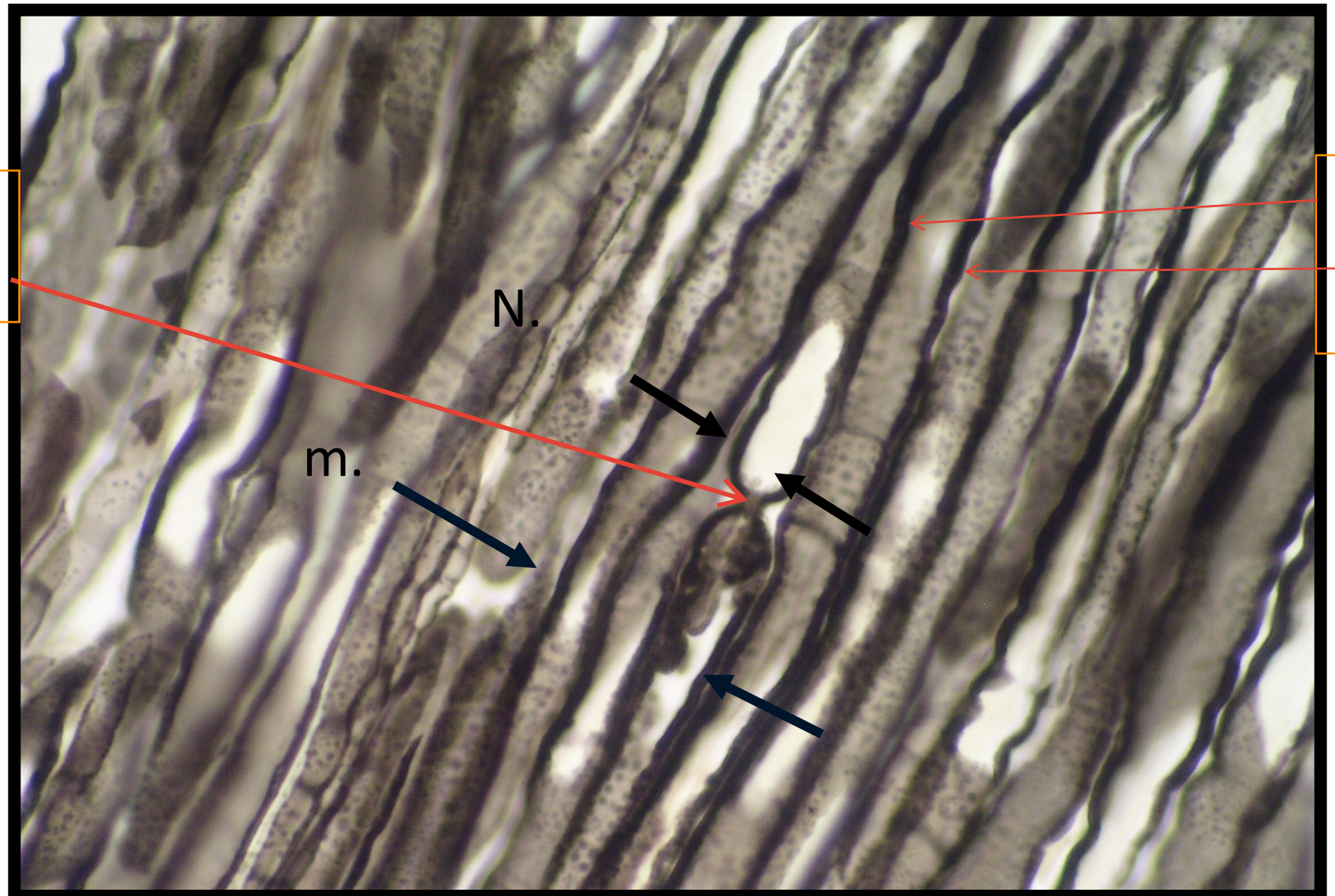
حاولت أوضح الي حكته
الدكتورة عن هاي الصورة قد ما
اقدر ان شاء الله انها تكون
مفهومة لانه انا نفسي يدوب
لقطت شو حكت الدكتورة هون
🥲

myelin- axon- Schwan cell



L.S. in nerve fibers (osmium tetraoxide) myelin- **Node of Ranvier**

It's a stain for fat (it dissolves in fat).

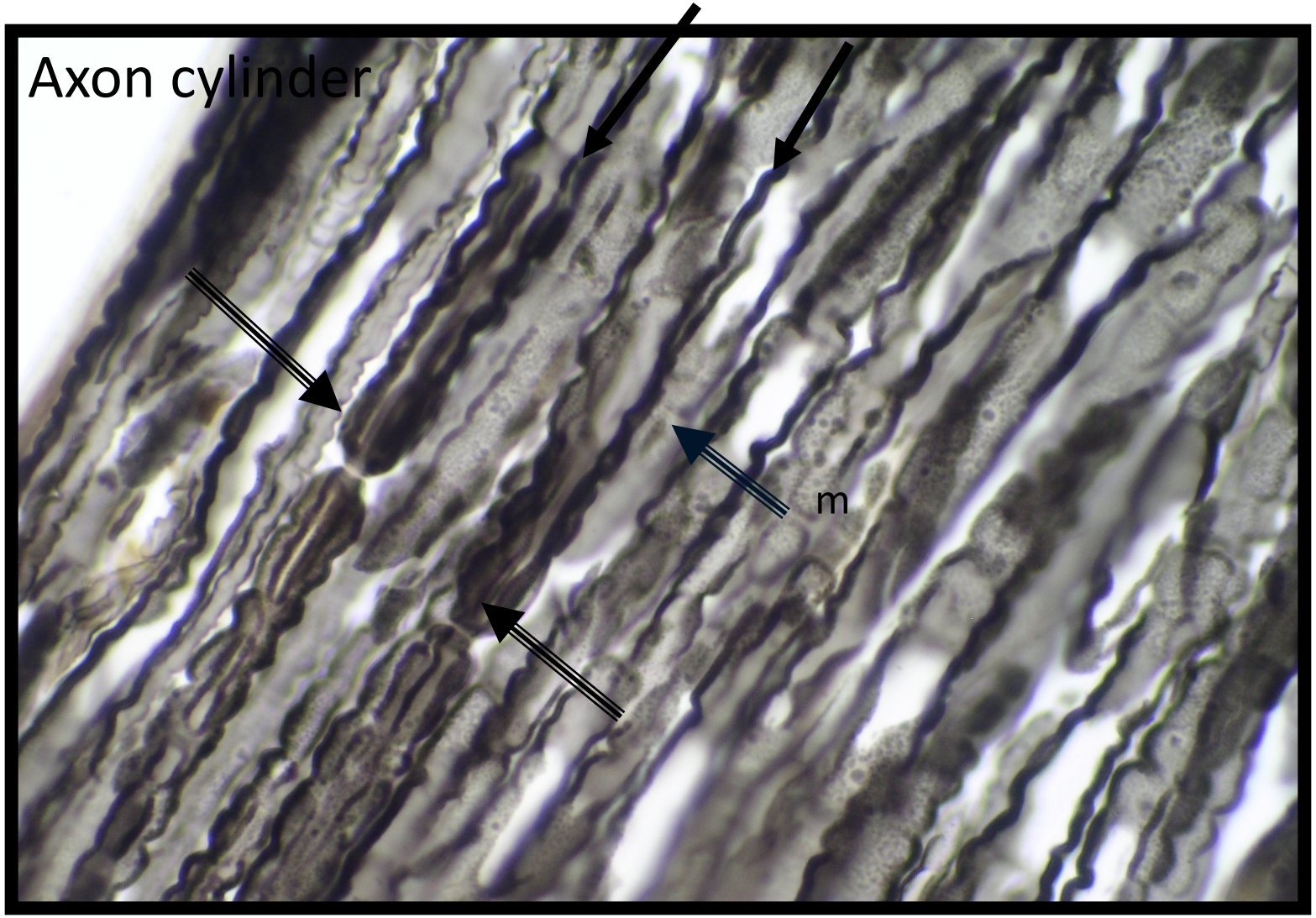


Nodes of Reanvier

They are constricted regions that avoid the myelin.

axons with mylein (more black)

Axon cylinder



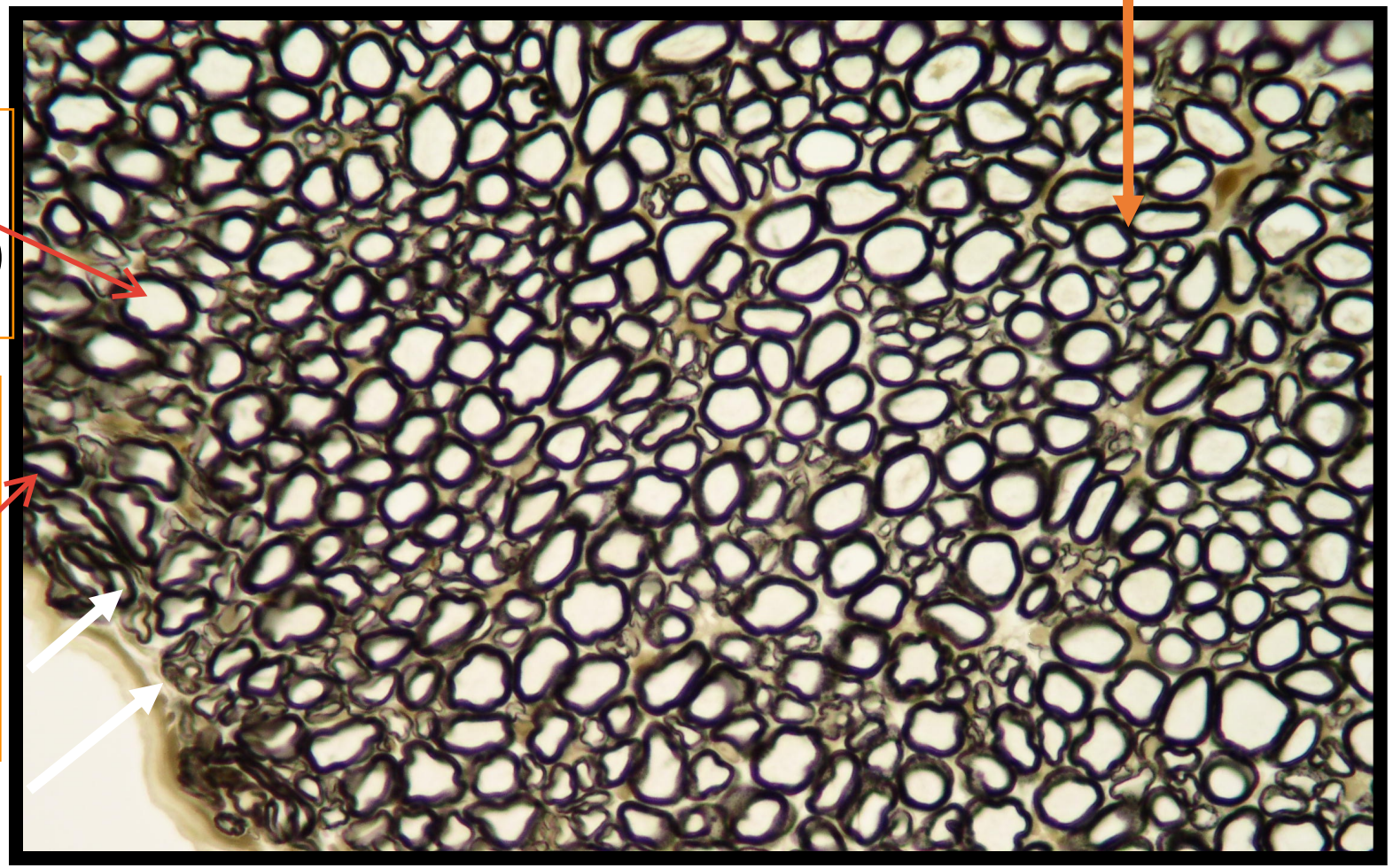
T.s.in nerve fibers (osmium tetraoxide)

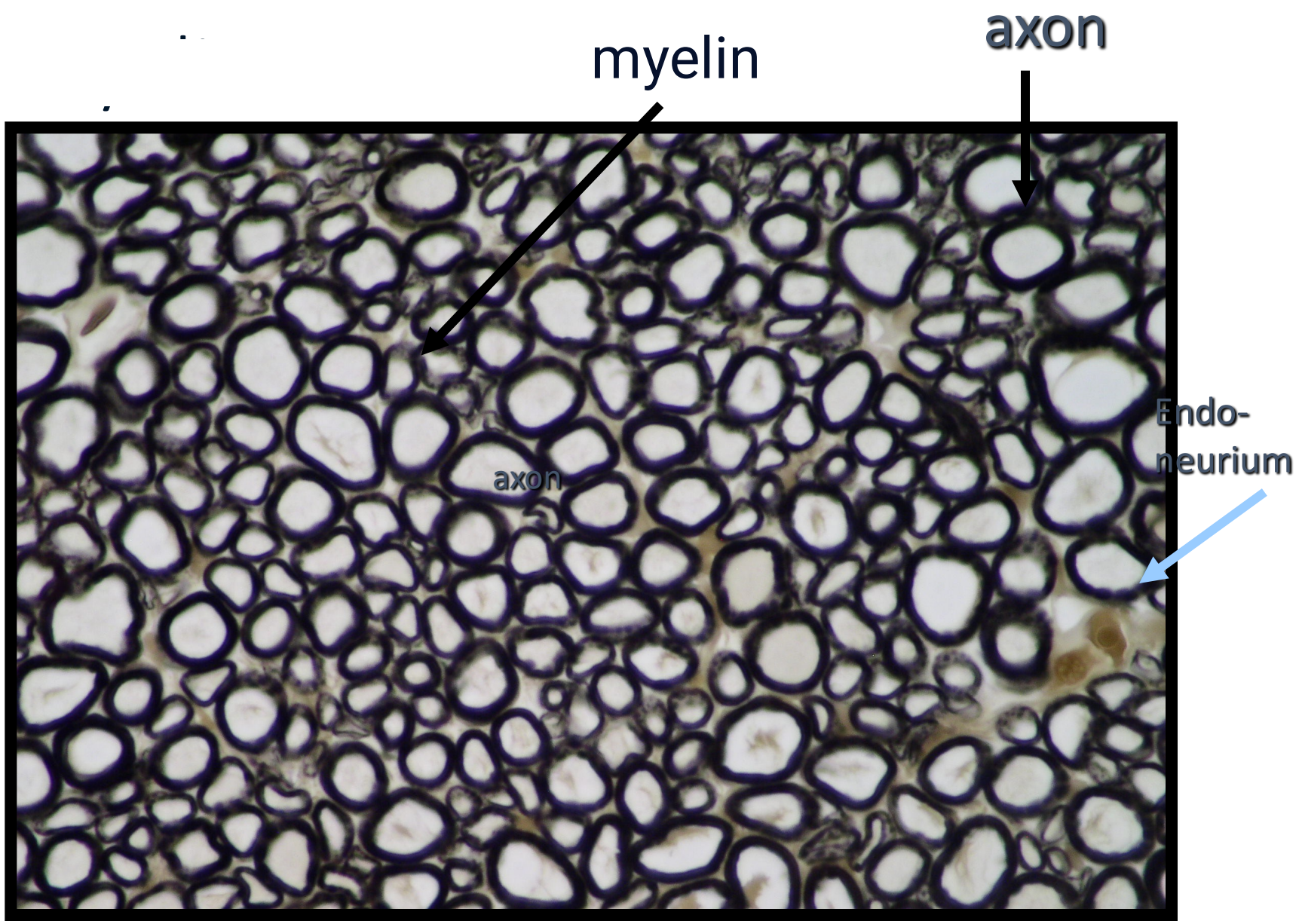
endoneurium perineurium

endoneurium around every axon.

Axons in the middle (white)

mylein around the axons (in black).




myelin
axon
axon
Endo-
neurium

☆ There are three connective tissues that cover the nerve to protect it:

1. Epineurium is the outermost layer of dense irregular connective tissue surrounding a peripheral nerve.

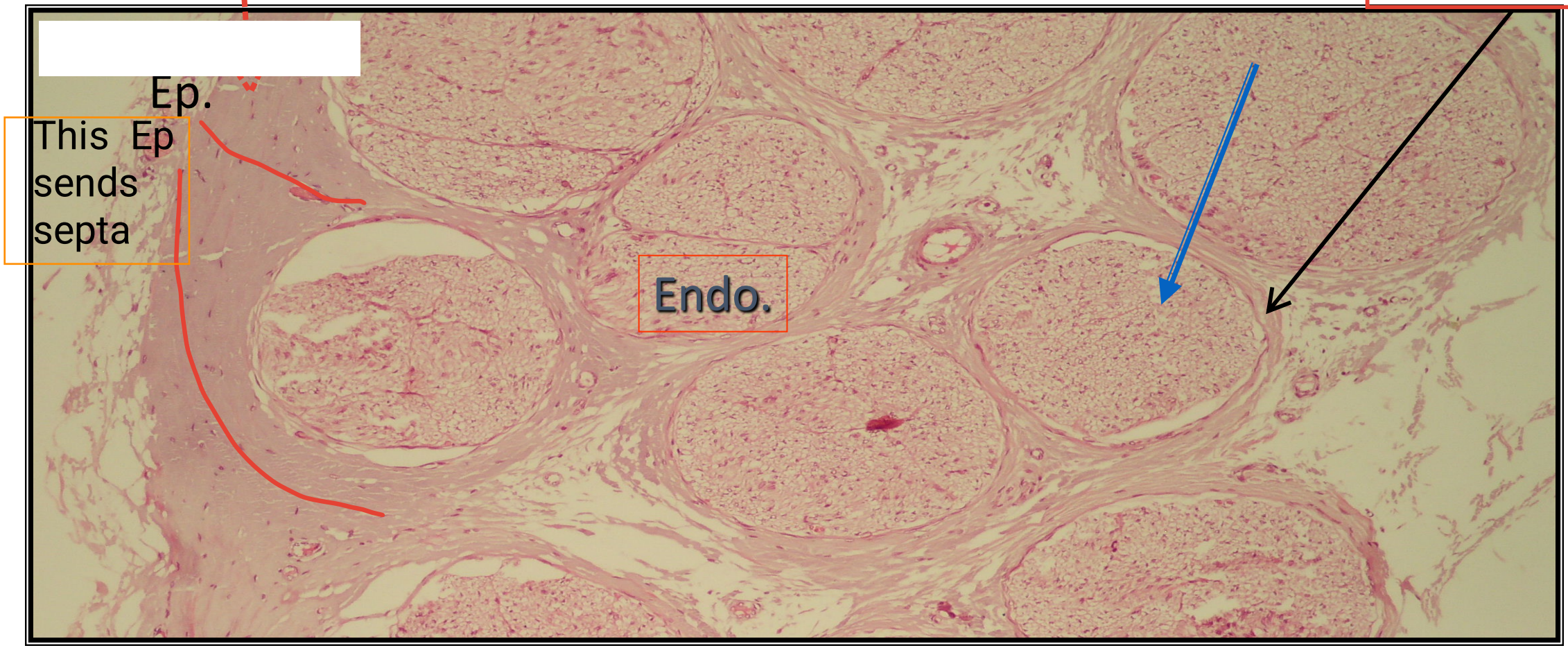
2. Perineurium is a protective sheath that surrounds a nerve fascicle.

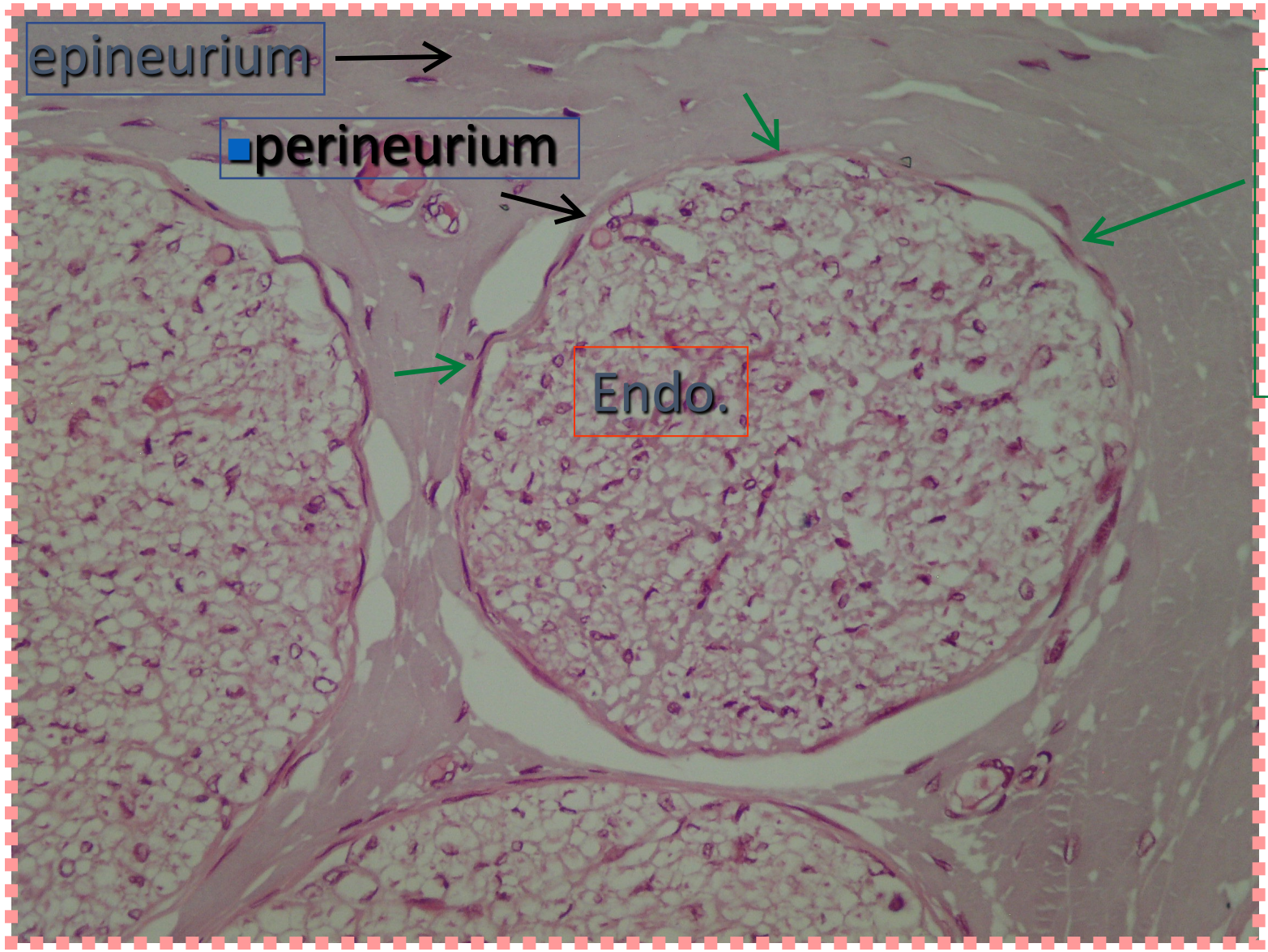
3. endoneurium is a delicate connective tissue around the mylein.

H&E- Fascicles of nerve fibers

There are colleges and fibroblasts.

perineurium



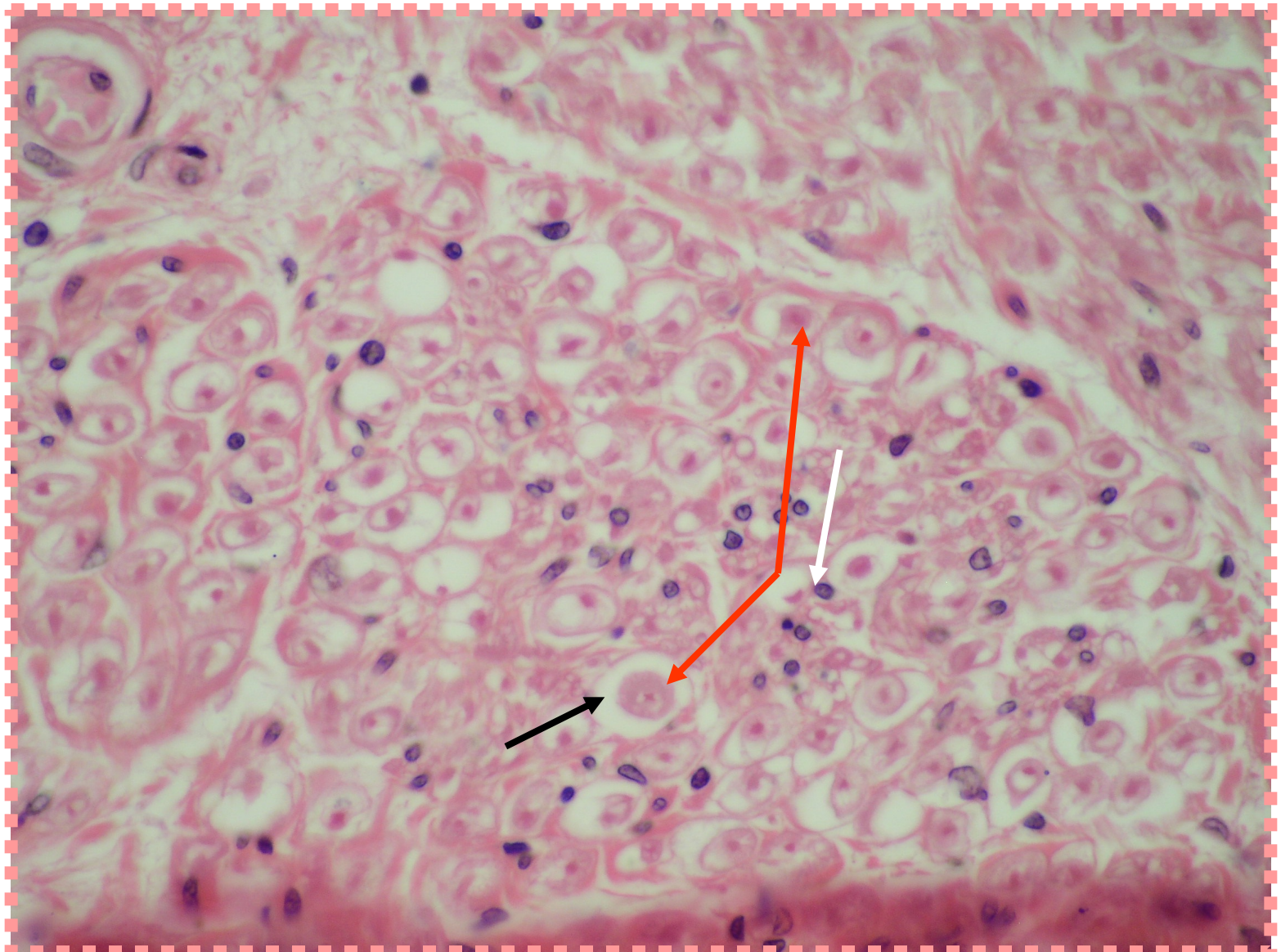


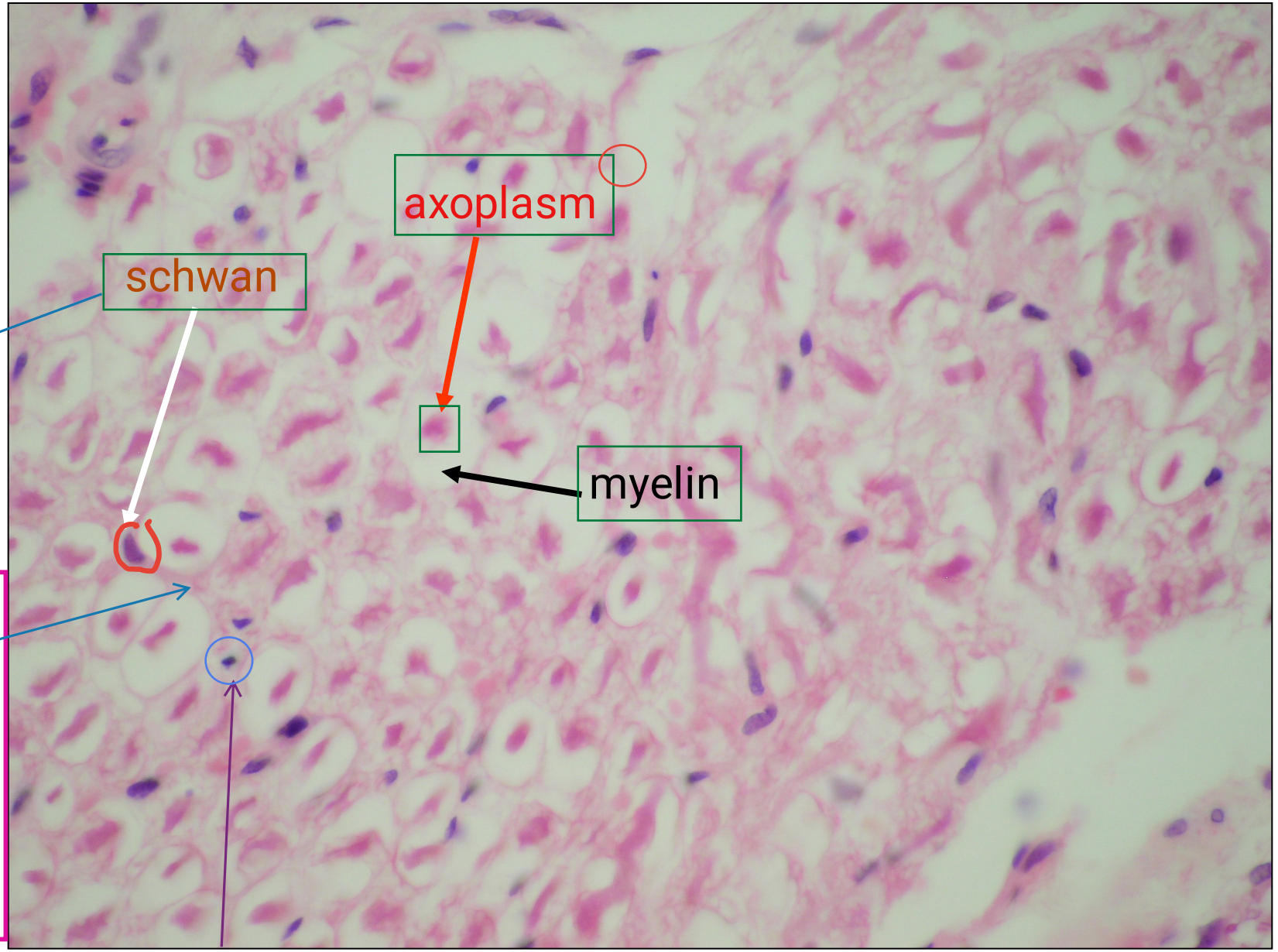
There are basophilic structures. They are nuclei.

The white area was filled with mylein , which dissolved during sample preparation, leaving an empty space in its place.

In the center is axoplasm (cytoplasm of axon)

axon, myelin,schwan





It's a nucleus that directly outside.

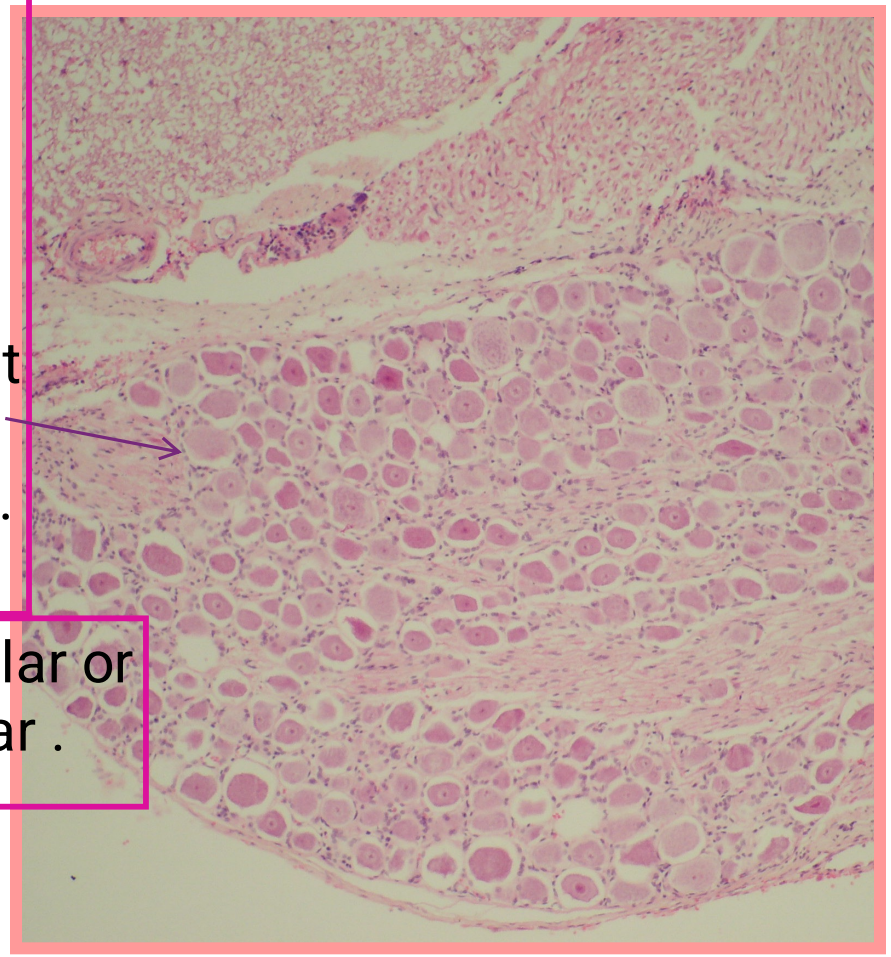
around the schwan, there is an endoneurium which is rich with reticular fibers.

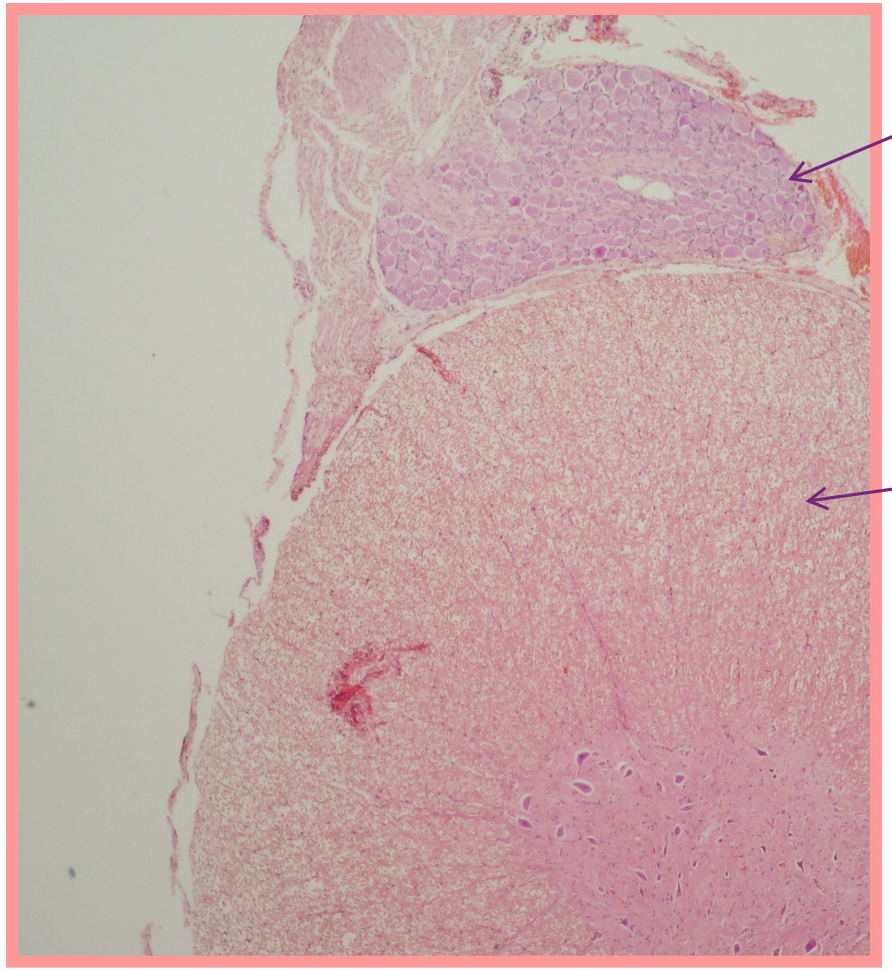
This is a different nucleus (even the stain is different) it is a fibroblast.

Spinal (dorsal) root ganglia

we can see many organized circular structures that they don't resemble the previous one .

they are unipolar or pseudounipolar .

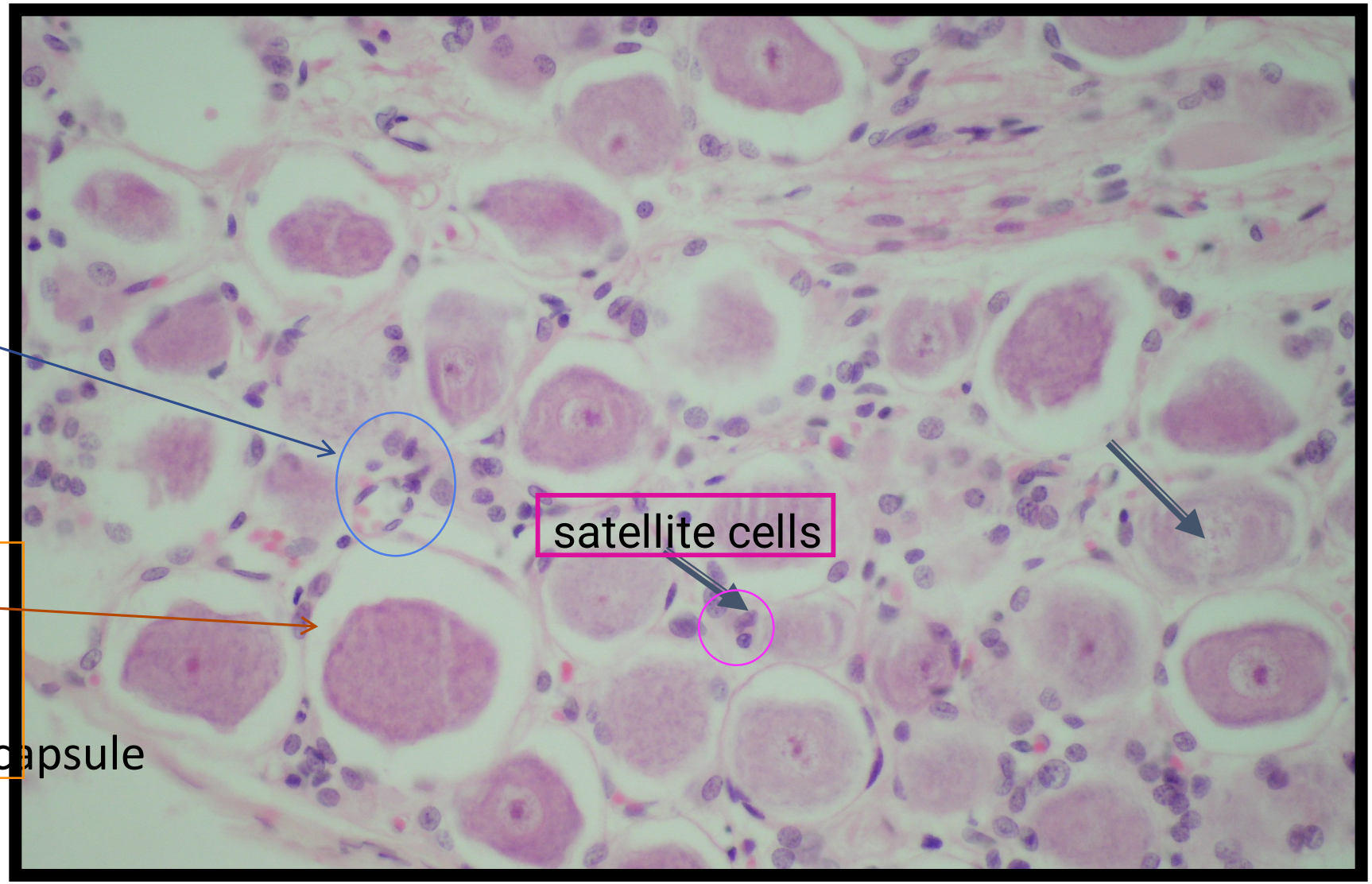




The cell bodies of sensory neurons outside the spinal cord are located dorsal root ganglia.

Sensory ganglion.
: neuronal cell bodies

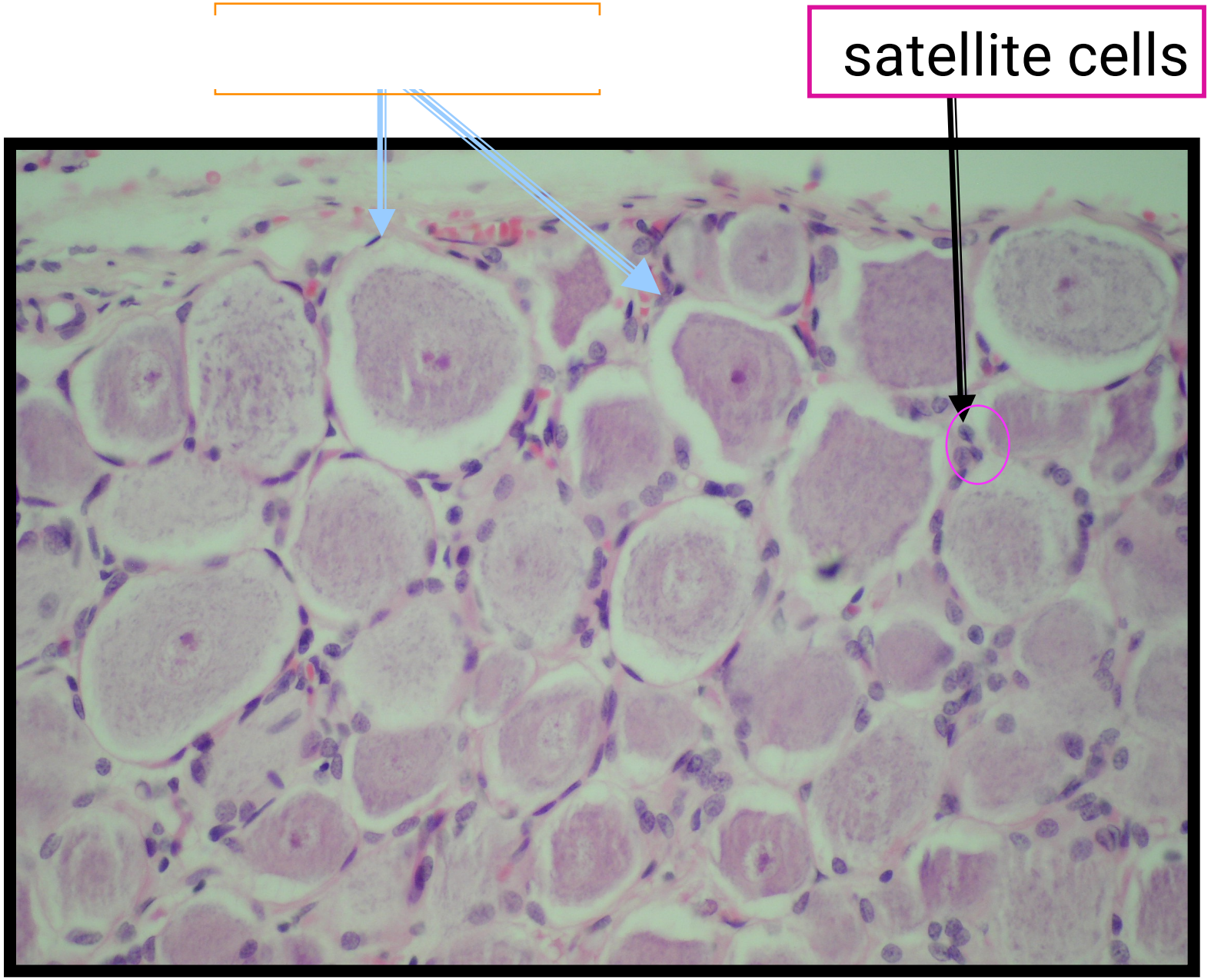
This is pseudounipolar



blood vessel

The cell body is rounded with one process.

The origin of satellite cells is the neuronal crest like the schwan.

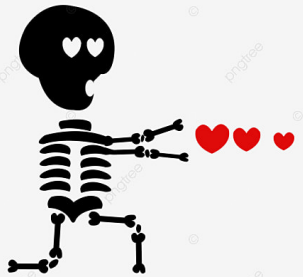

satellite cells

شعور اخر امتحان حلو صح ! يلا هانت يومين و خلص بنودع الجامعة لأسبوعين صحيح مش كتار بس حلويين انبسطوا فيهم و غيروا جو 🥳😅

بالعلمِ سادَ الناسُ في عصرِهم واخترقوا السبعَ الطباقَ الشداد

أيطلبُ المجدَ ويبغي العلا قومٌ لسوقِ العلمِ فيهمْ كساد ؟

ما أصعبَ الفعلَ لمن رامَه وأسهلَ القولَ على من أراد



سامحوني على اي خطأ أو نقص و بالتوفيق دفعتي العزيزة 🫶