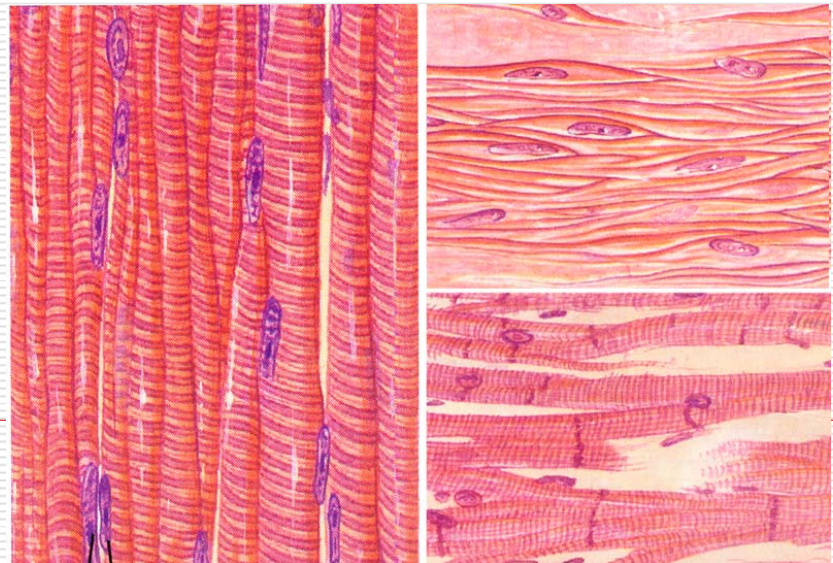
Chapter 7 Muscle Tissue

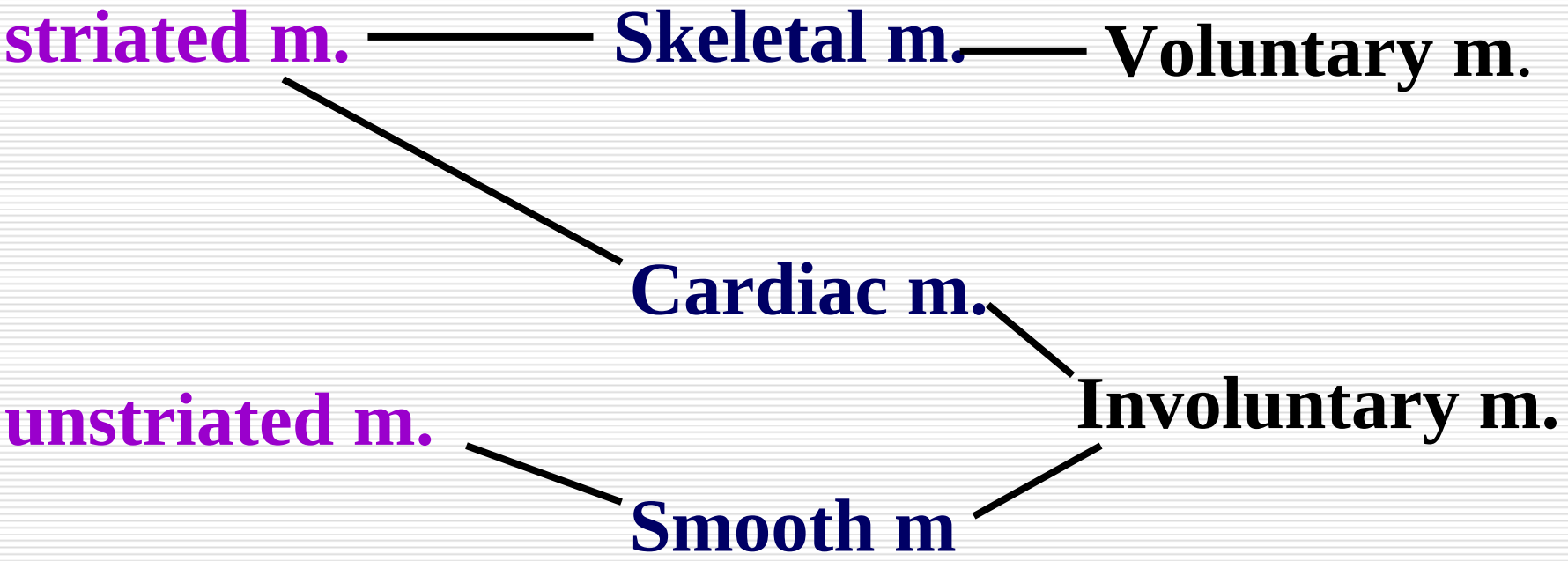
Liu Jiamei

Organization:

- Muscle cell----------muscle fiber
- Membrane of muscle C.---sarcolemma
- Cytoplasm of muscle C.----sarcoplasm
- Smooth endoplasmic reticulum--
  sarcoplasmic reticulum



Classification:



Ⅰ.Skeletal muscle

1.General structure of skeletal muscle

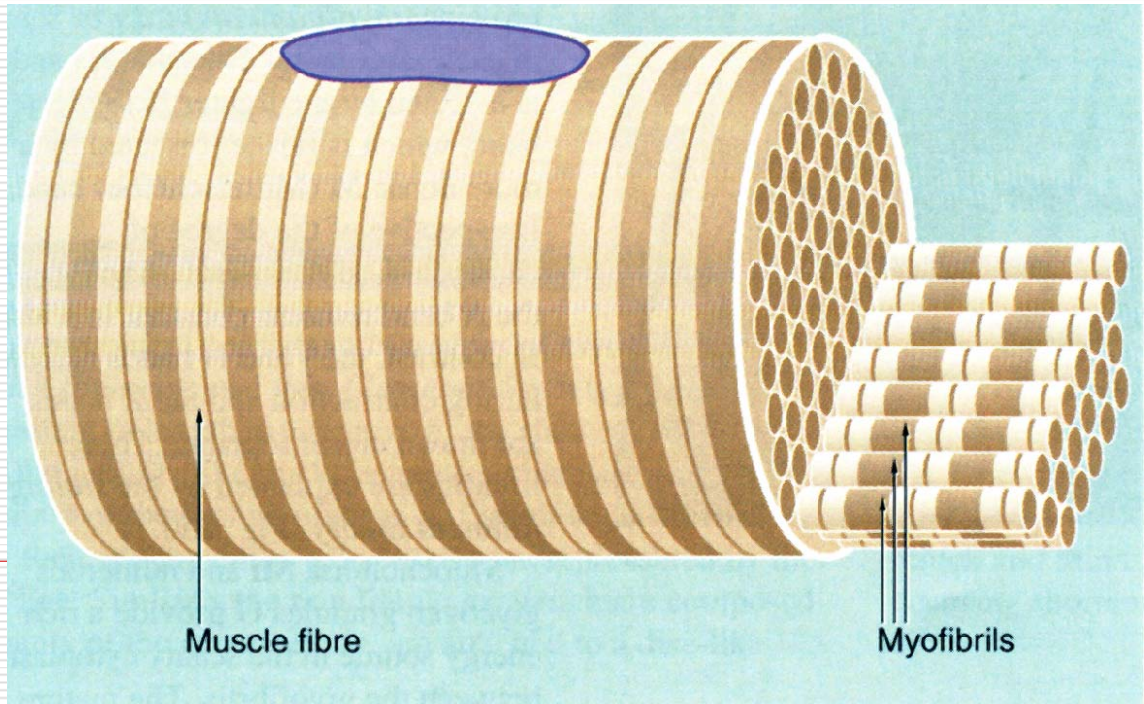
LM： long cylinder shape cell, multinucleated cell，

oval nuclei located under the sarcolemma, pale staining

Myofibril :

light bands (I band): Z line

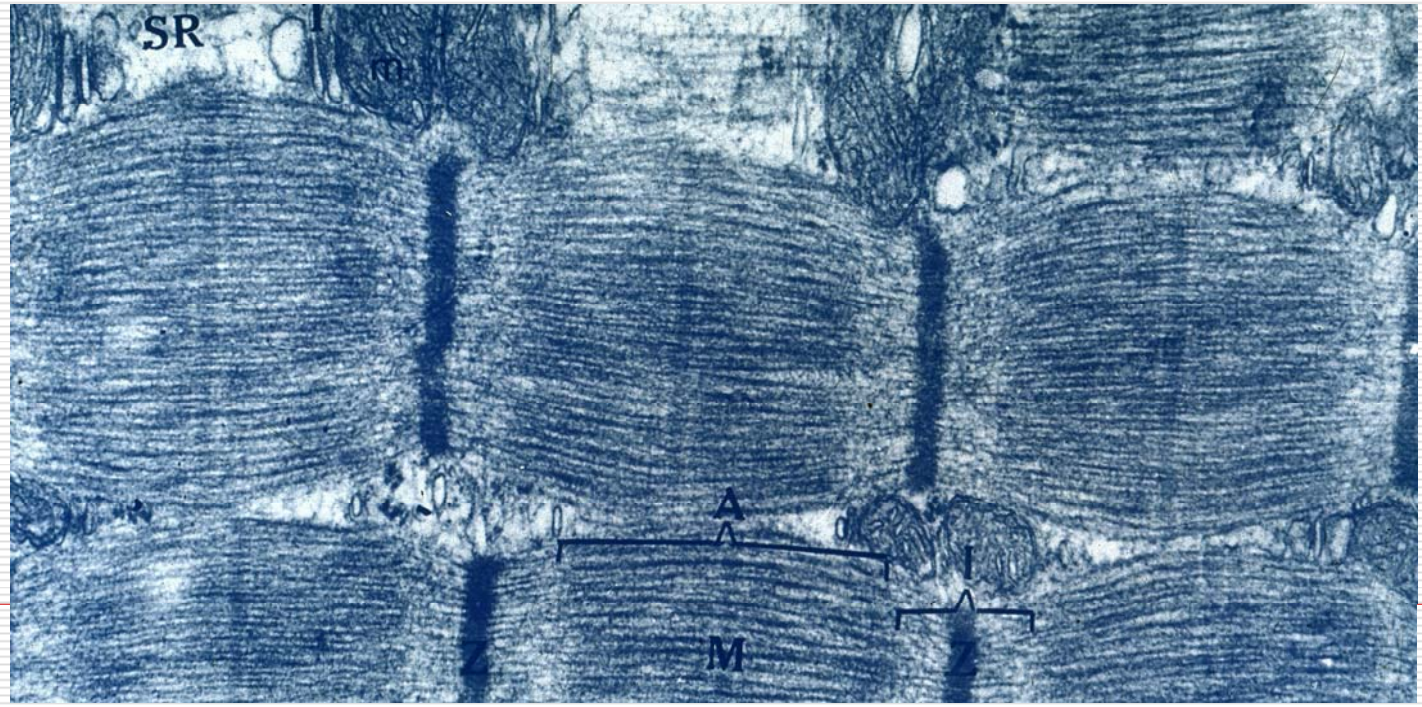
dark bands (A band)



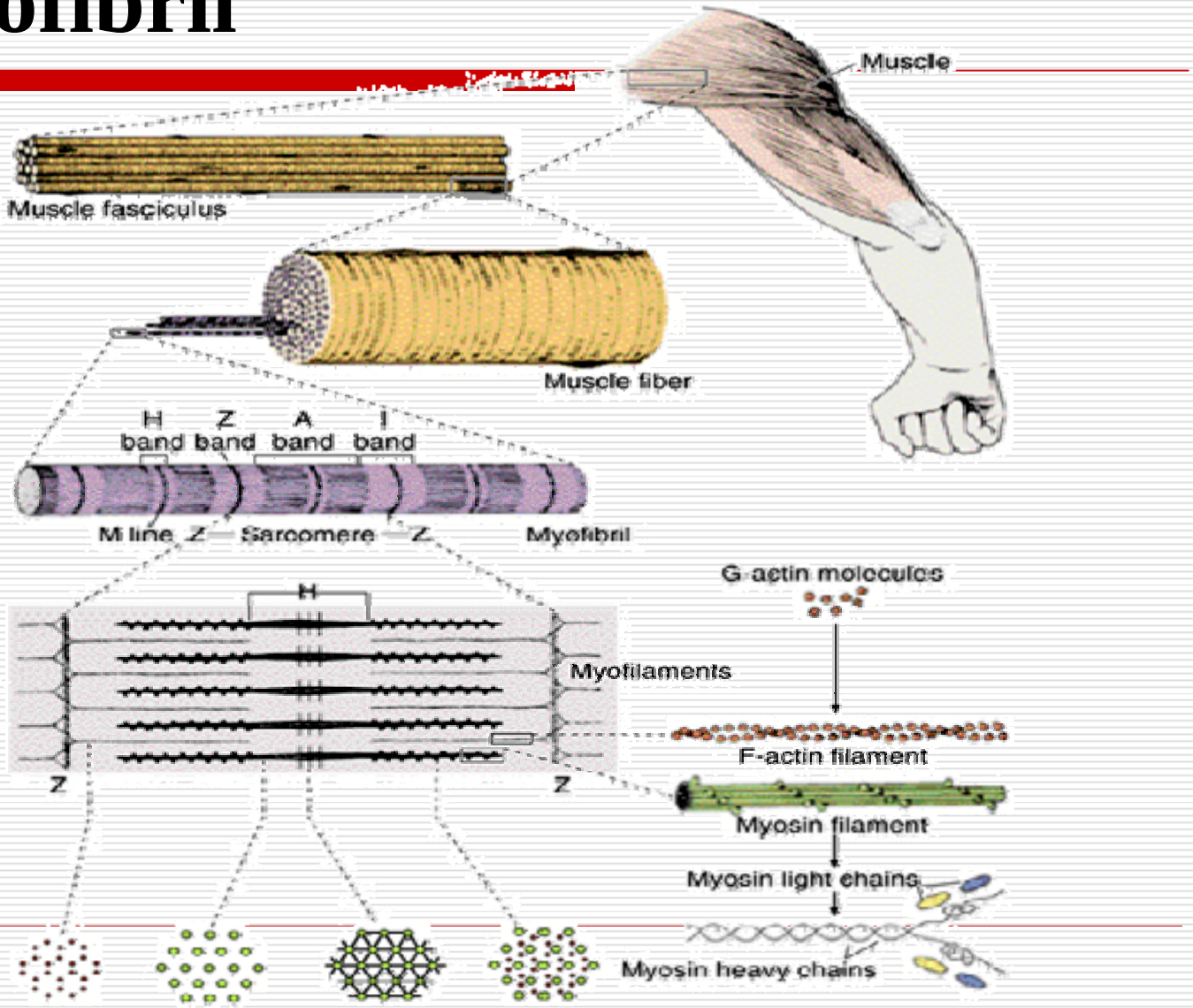
2. Ultrastructure of skeletal muscle

2.1 Myofibril

- long , parallel , cylindrical filamentous bundles
- consisting of two types of myofilament (thin & thick)



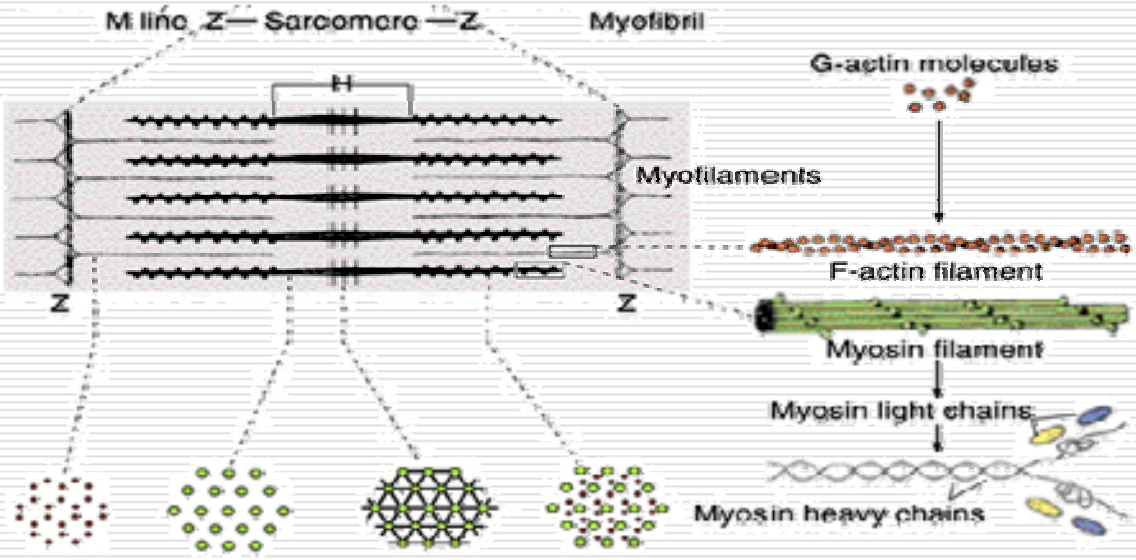
2.1 Myofibril



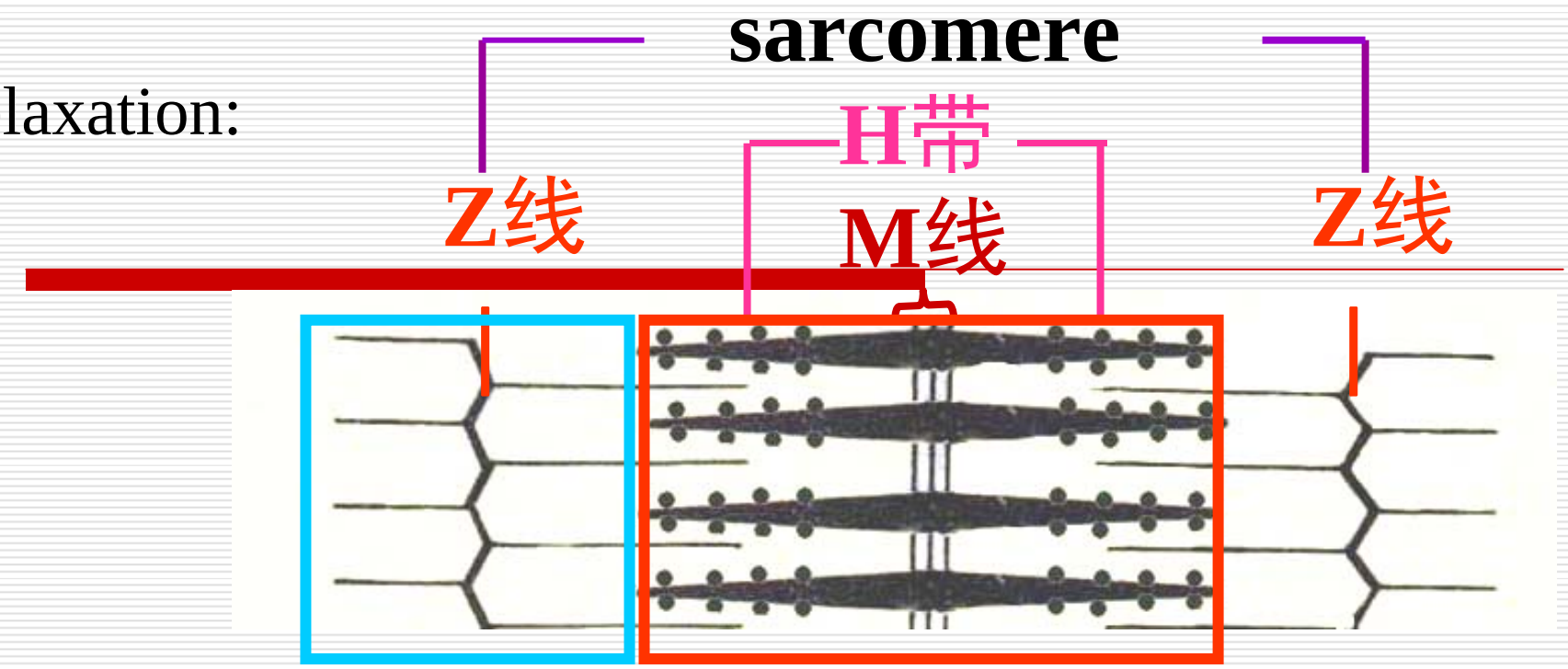
Sarcomere

the segment between two adjacent Z line

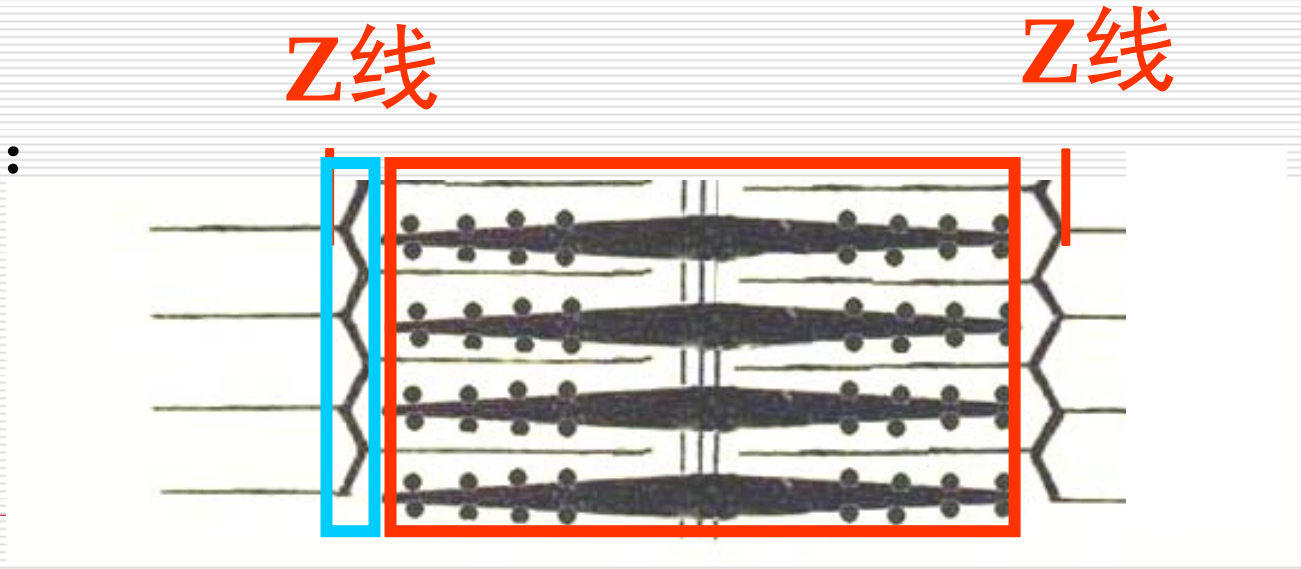
1/2 light band＋dark band＋1/2 light band



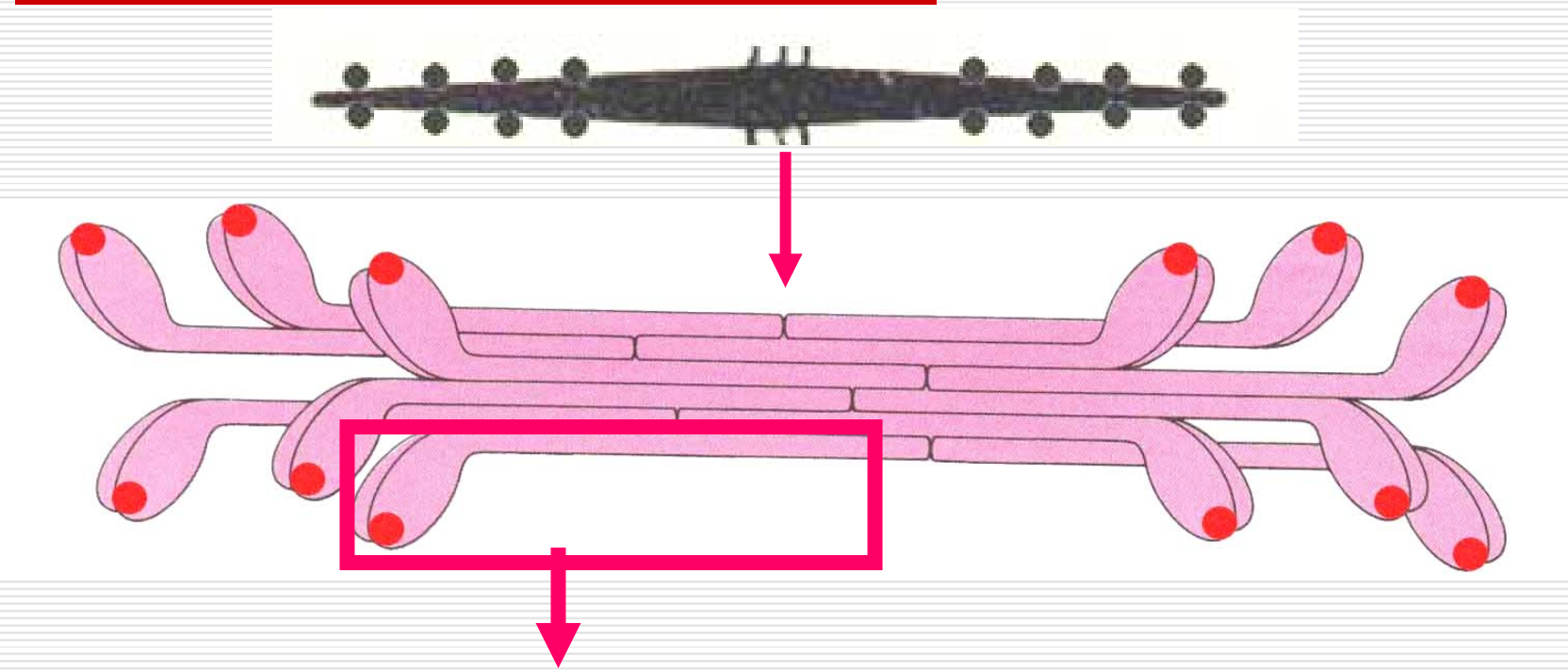
Relaxation:

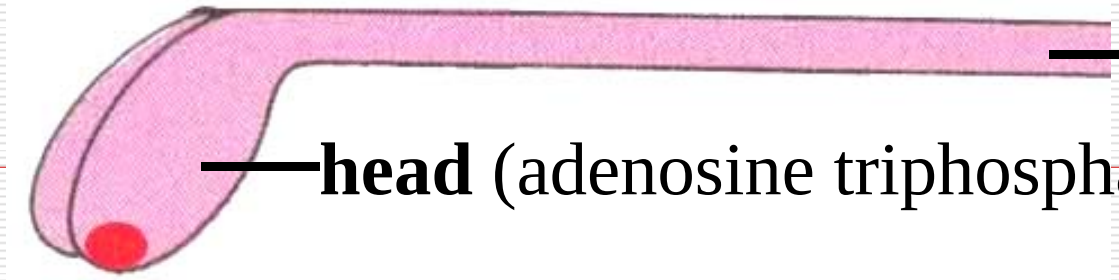


Contraction：



(1)Thick myofilament (myosin)

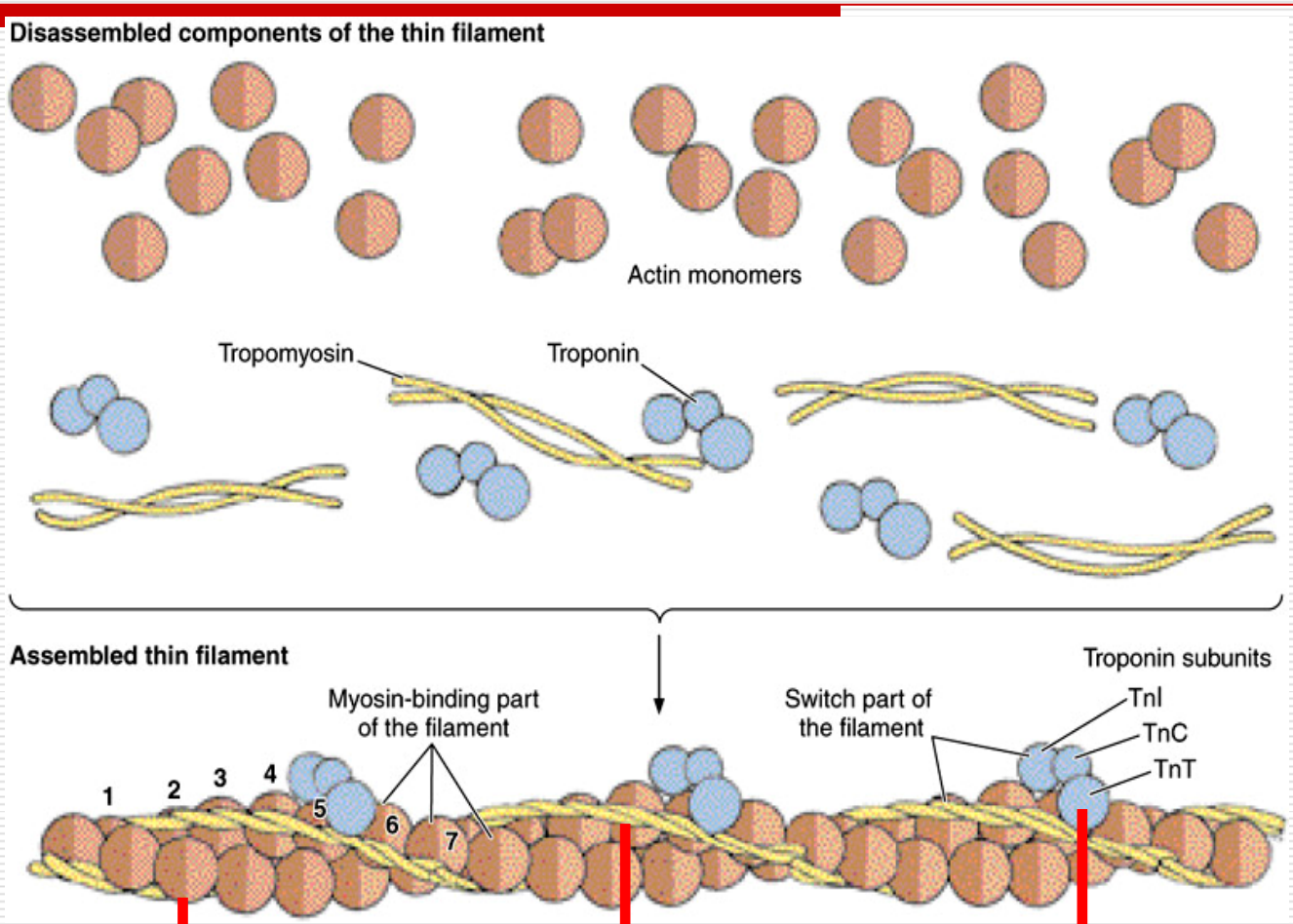




shalf (杆部)

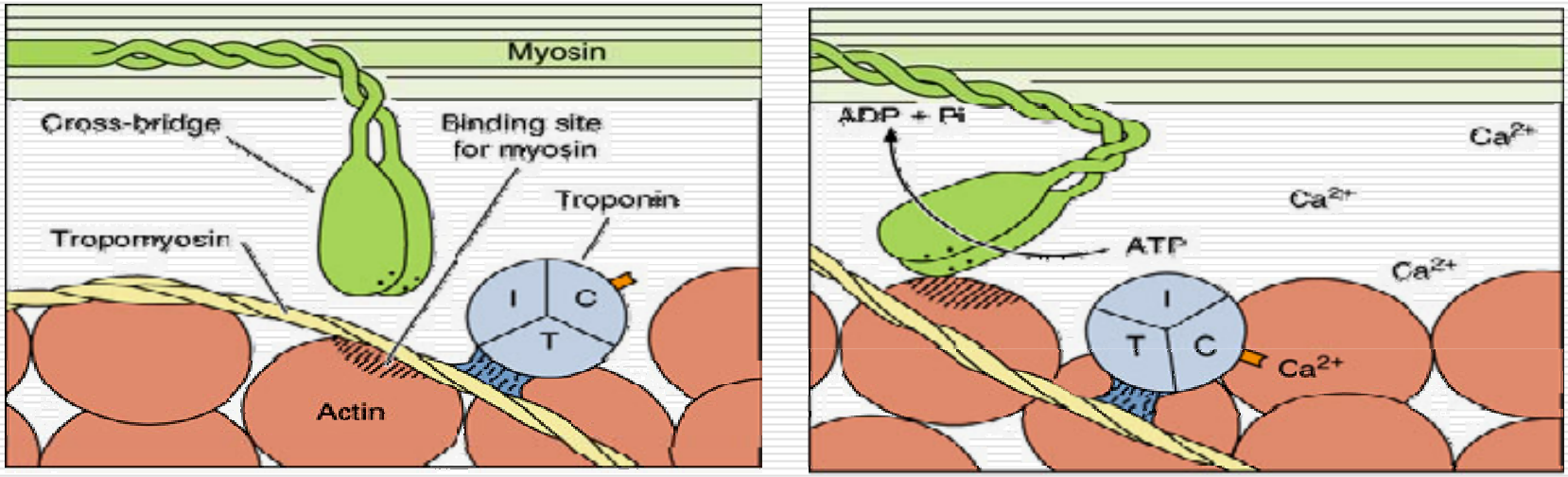
head (adenosine triphosphatase, ATPase）

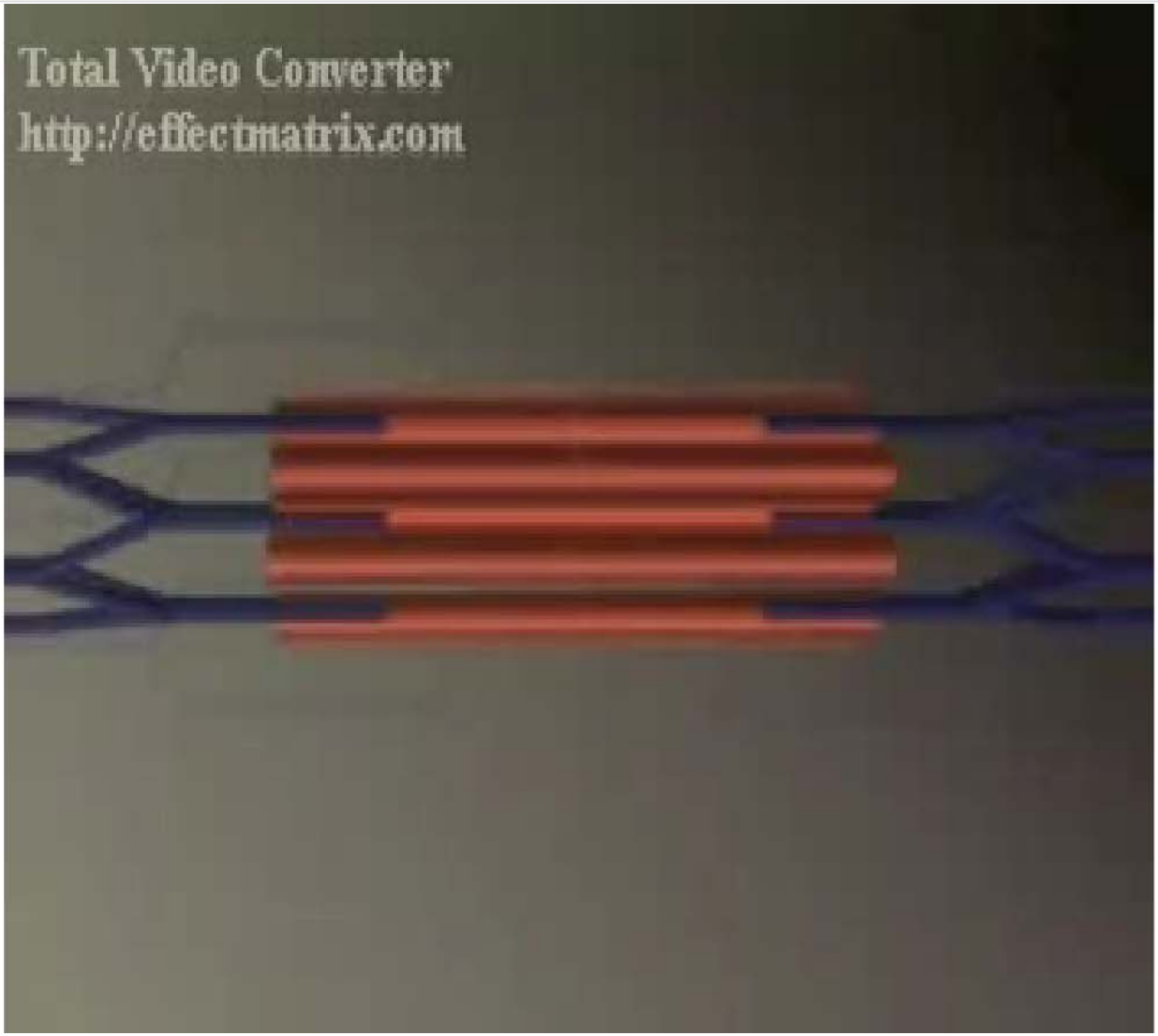
(2)Thin myofilament



肌动蛋白　原肌球蛋白　肌钙蛋白

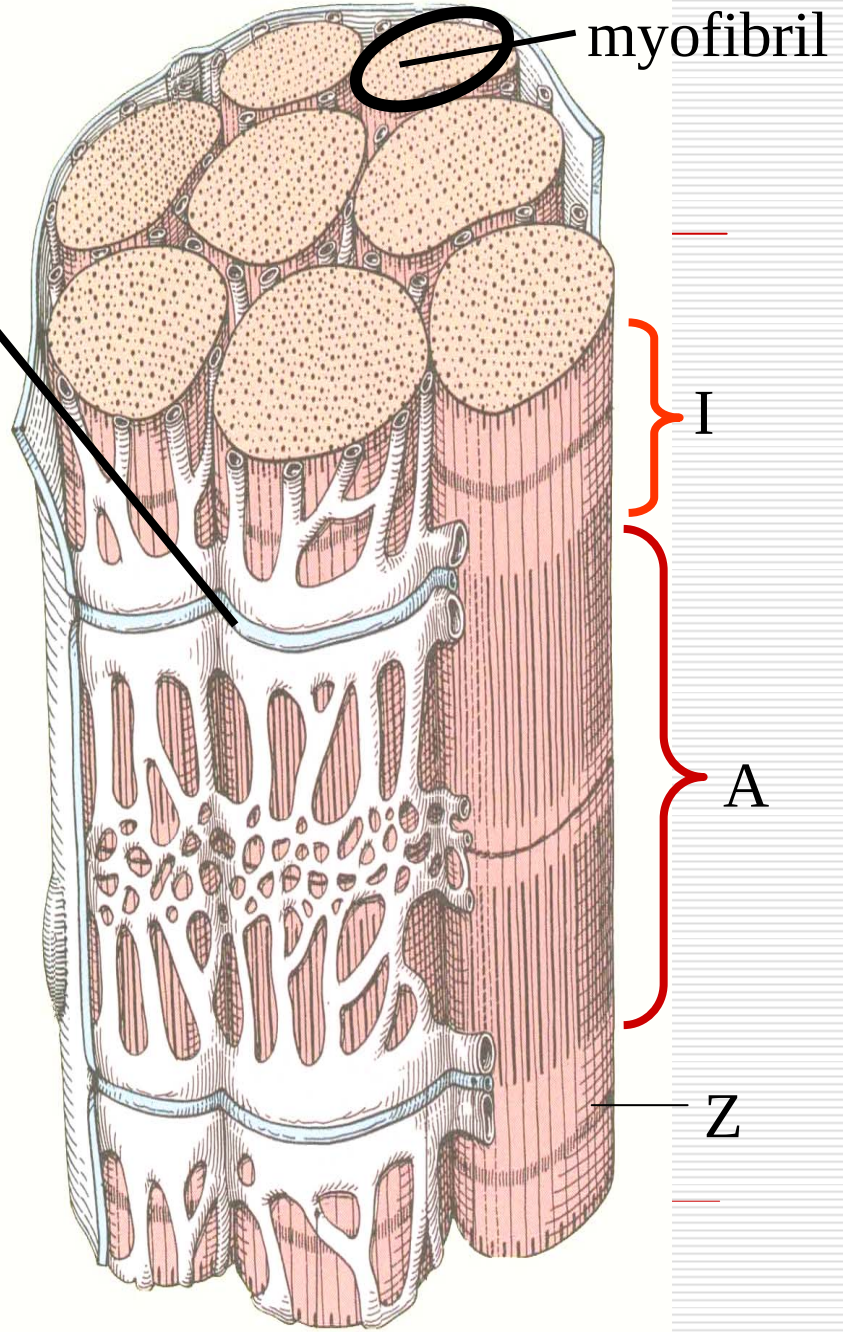
Contractile principle of skeletal muscle fiber




Total Video Converter
http://effectmatrix.com

2.2Transverse tubule

* invaginations of the surface sarcolemma
* lying as rings around each myofibril
* located at A-I junction
* providing for the rapid spread throughout the entire muscle fiber of surface membrane excitation.

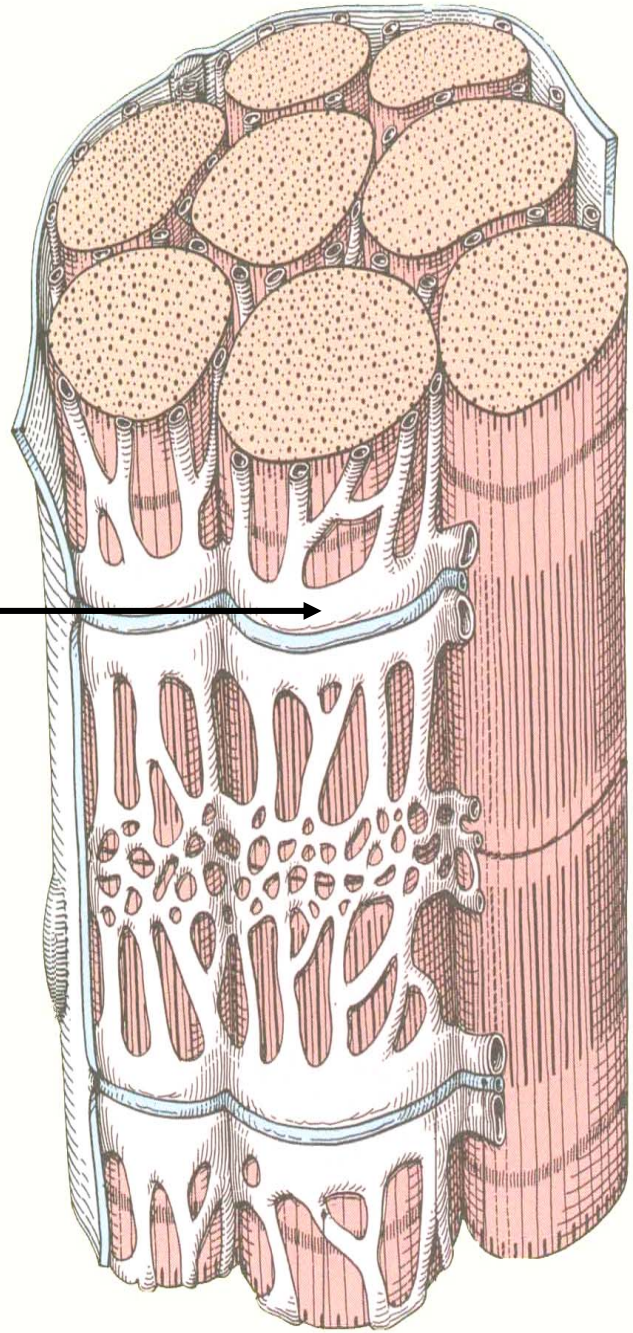


2.3 sarcoplasmic reticulun

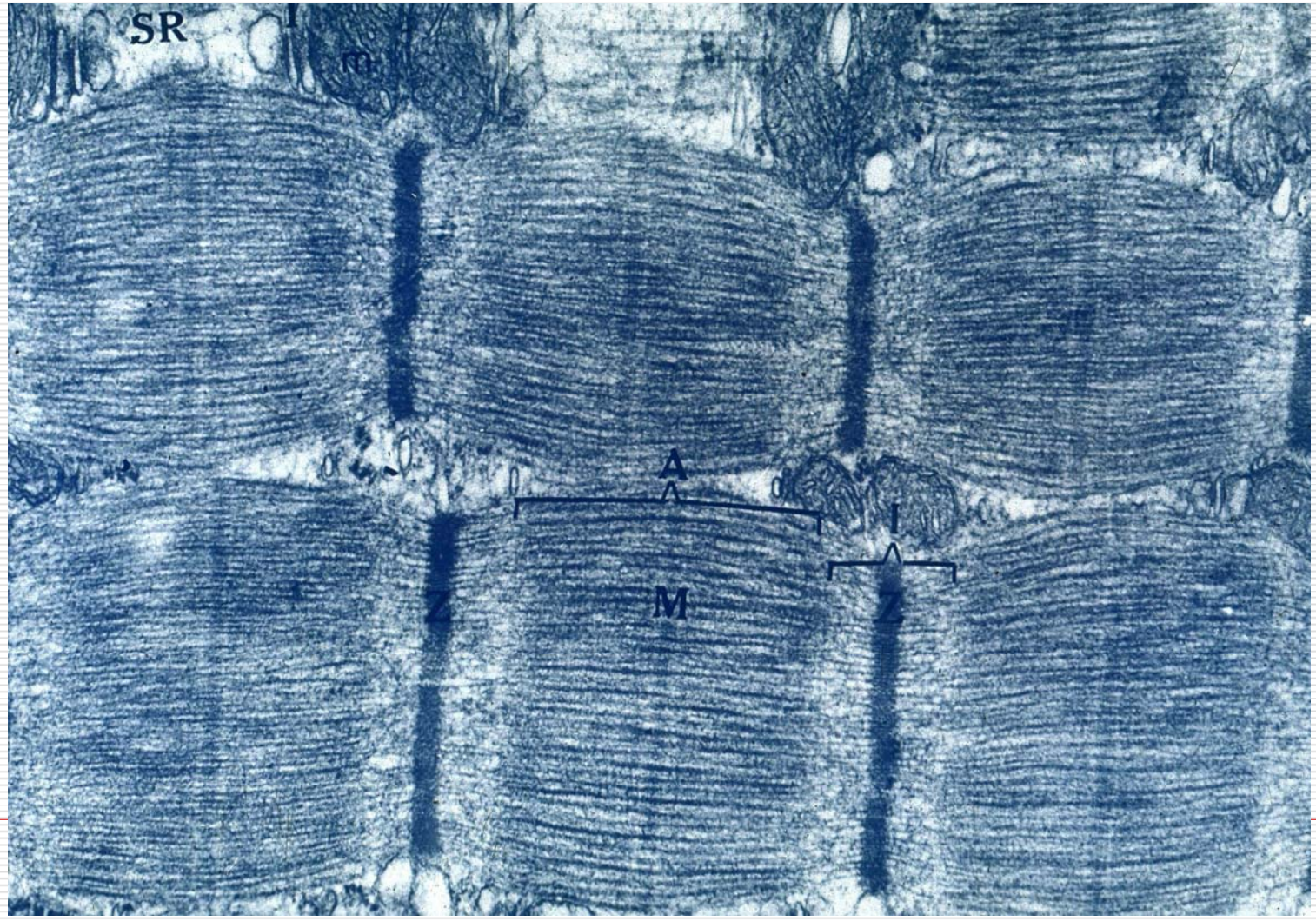
- longitudinal tubule
- terminal cisternae

Triad

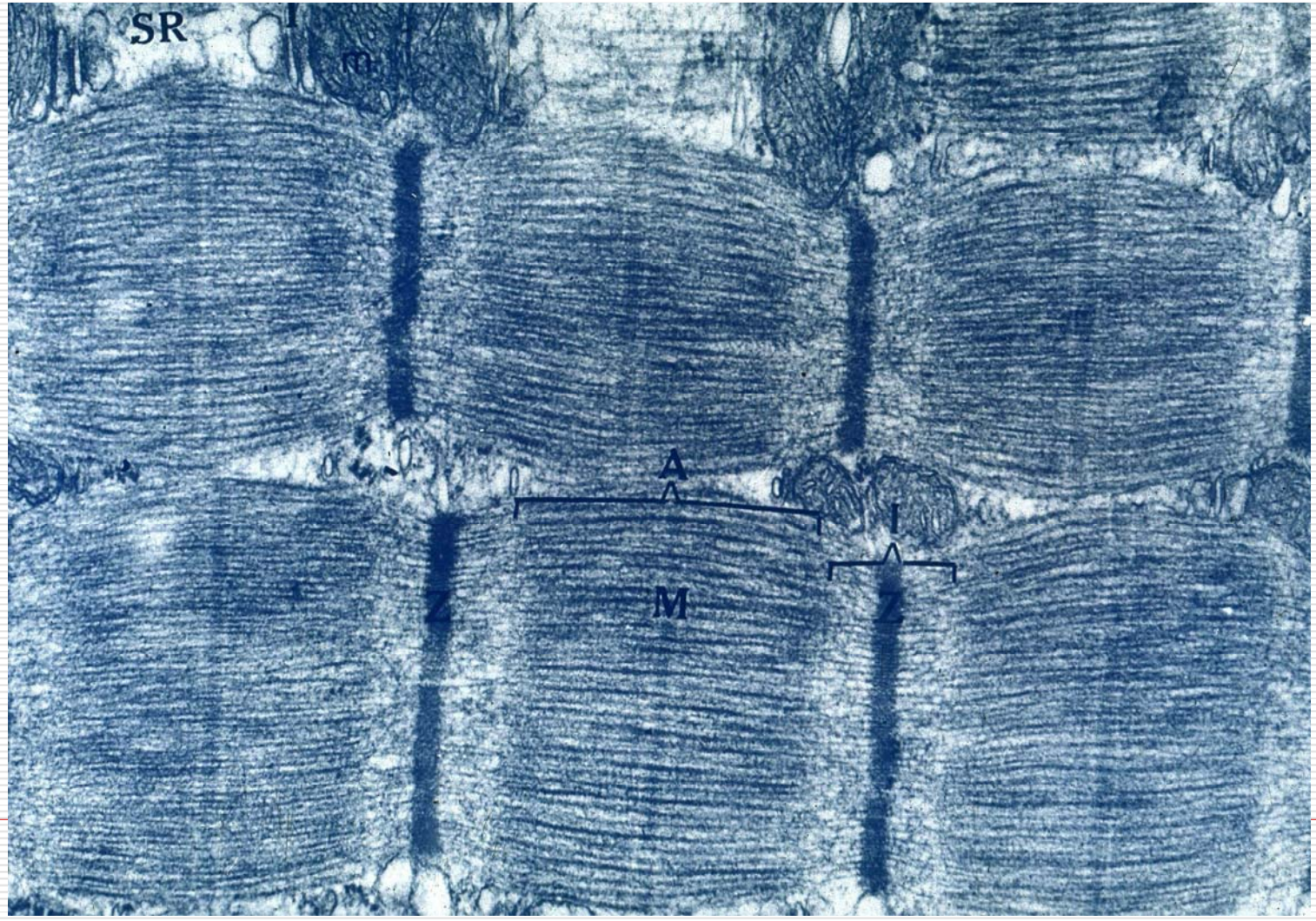
the T tubule is sandwiched between two terminal cisternae.



Triad



2.4 Mitochondria

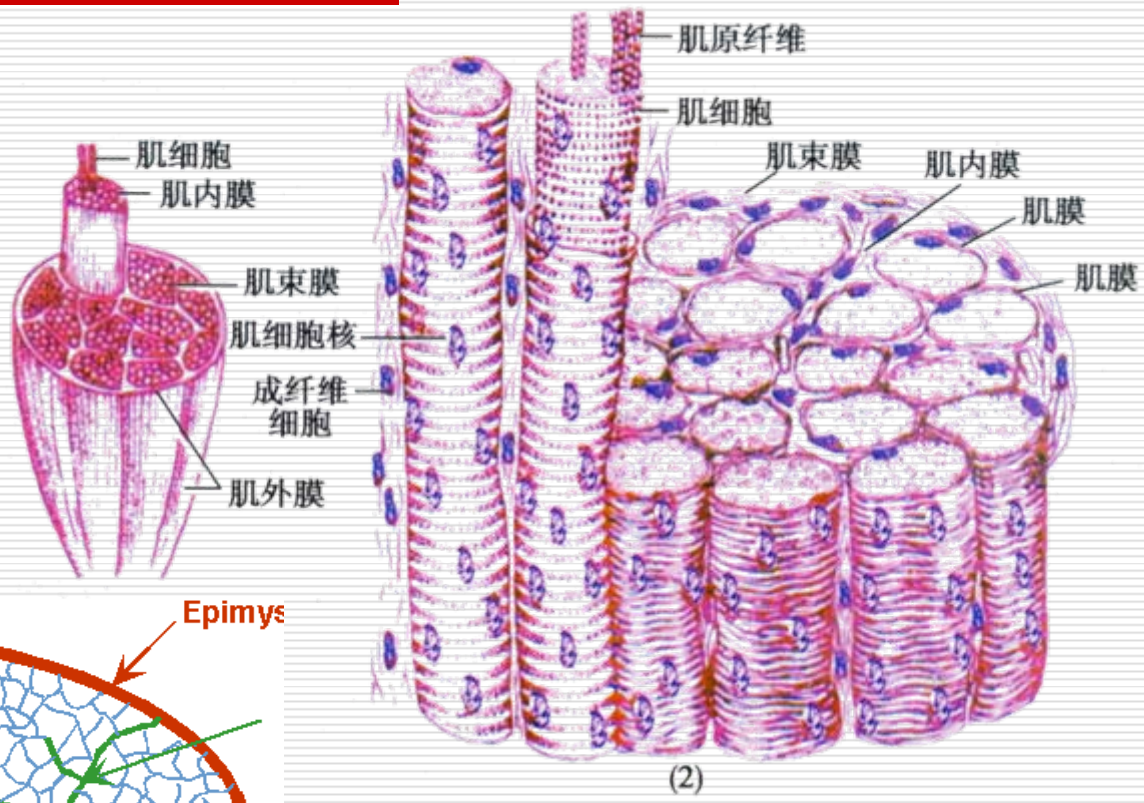


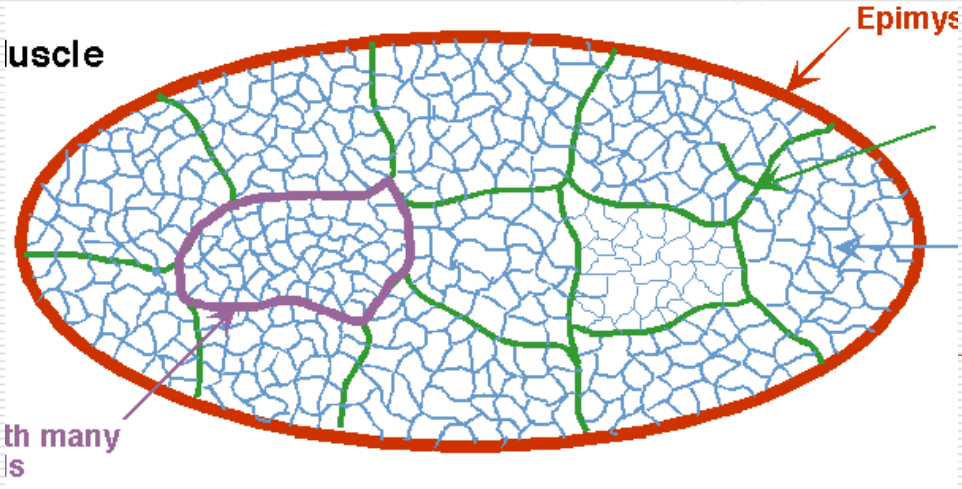
muscle

Epimysium

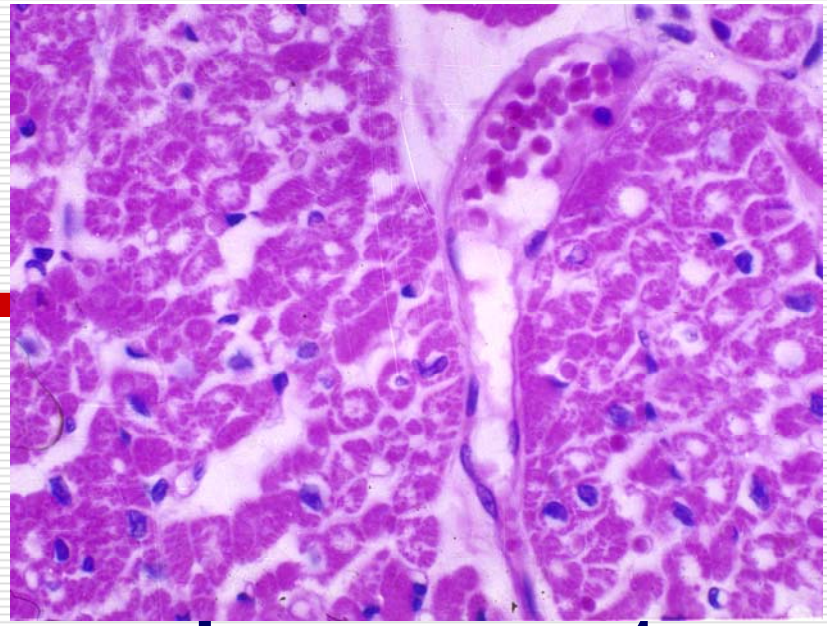
Perimysium

Endomysium





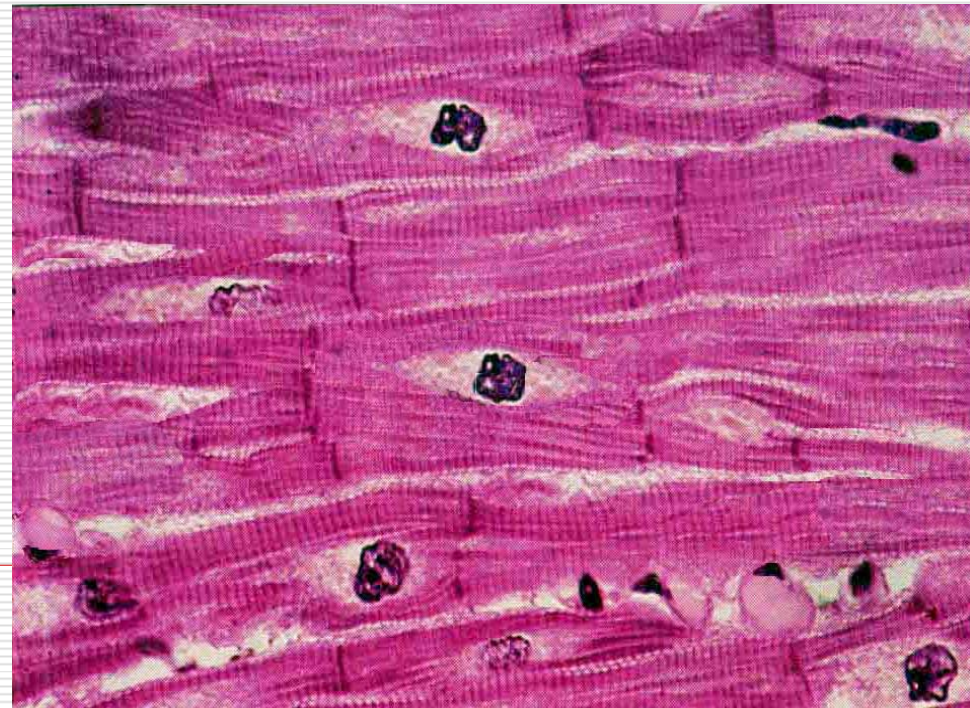
Ⅱ. Cardiac muscle



-short cylindrical shape

- to be branched

- the central location of the nucleus, one or two nucleus per fiber



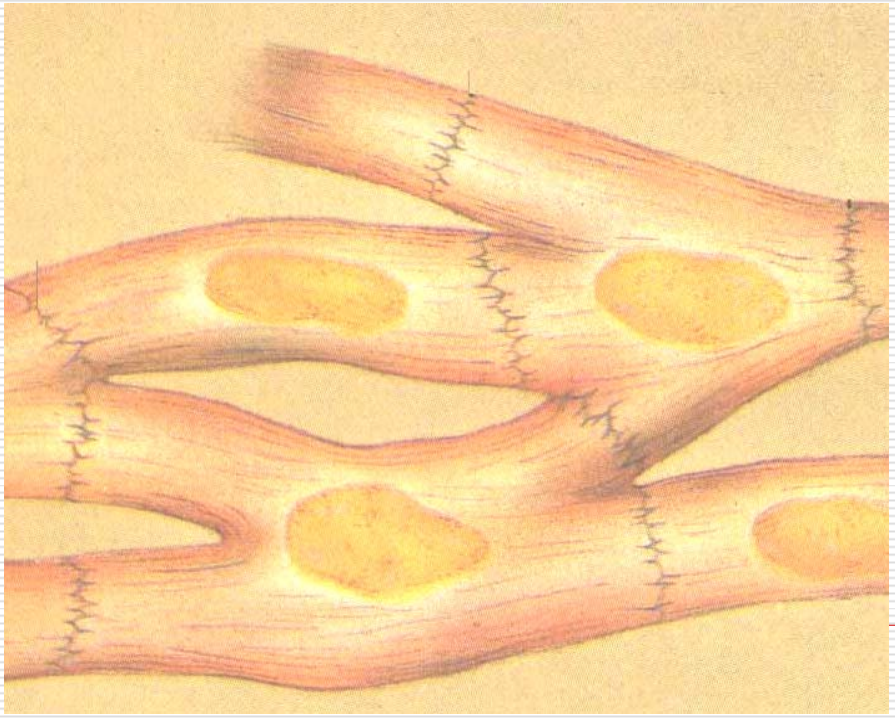
- cross striation

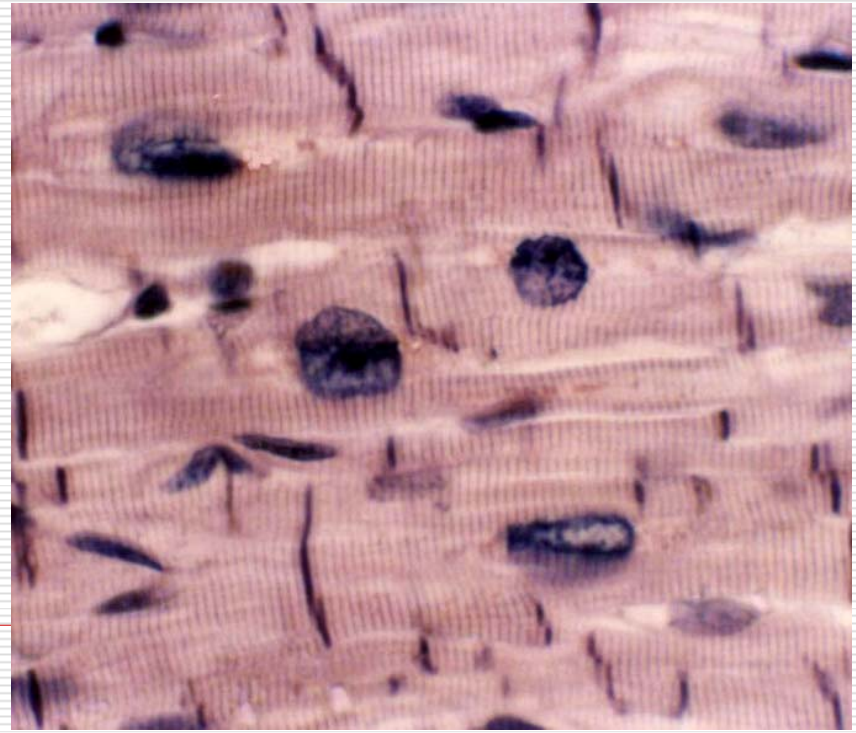
-myofibril

-intercalated disks

Intercalated disk:

Dark staining transverse lines between adjacent cardiac muscle cells





EM:

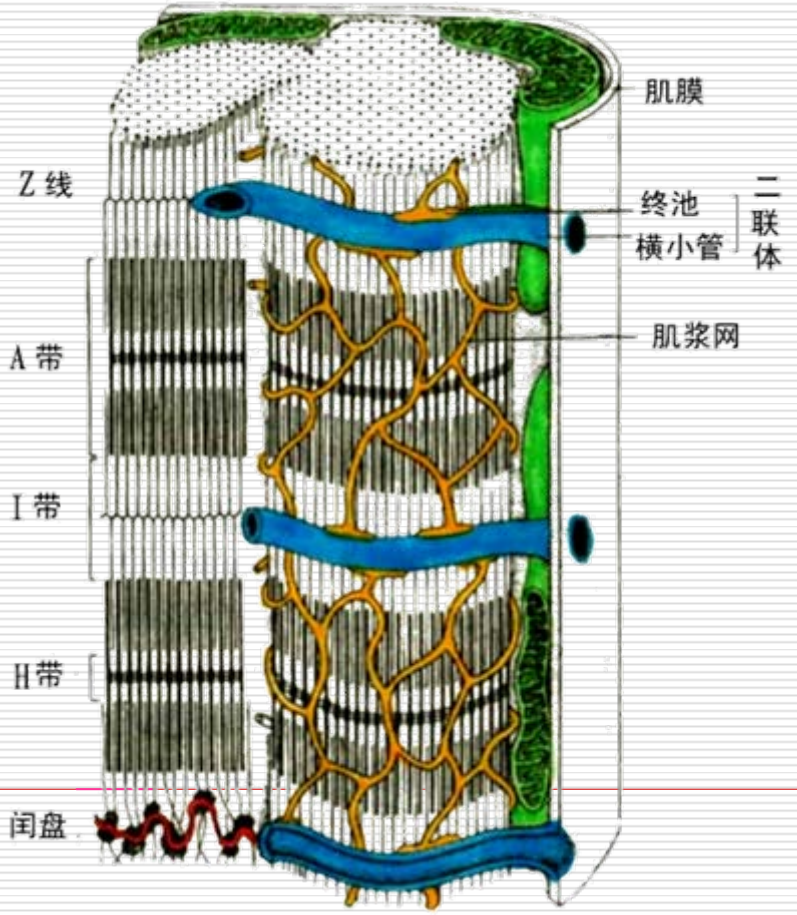
*containing myofilaments, but myofibril is not well defined

*sarcoplasmic reticculum is less developed

*T tubeles are much wider located in the Z lines.

*Diad

* intercalated disk

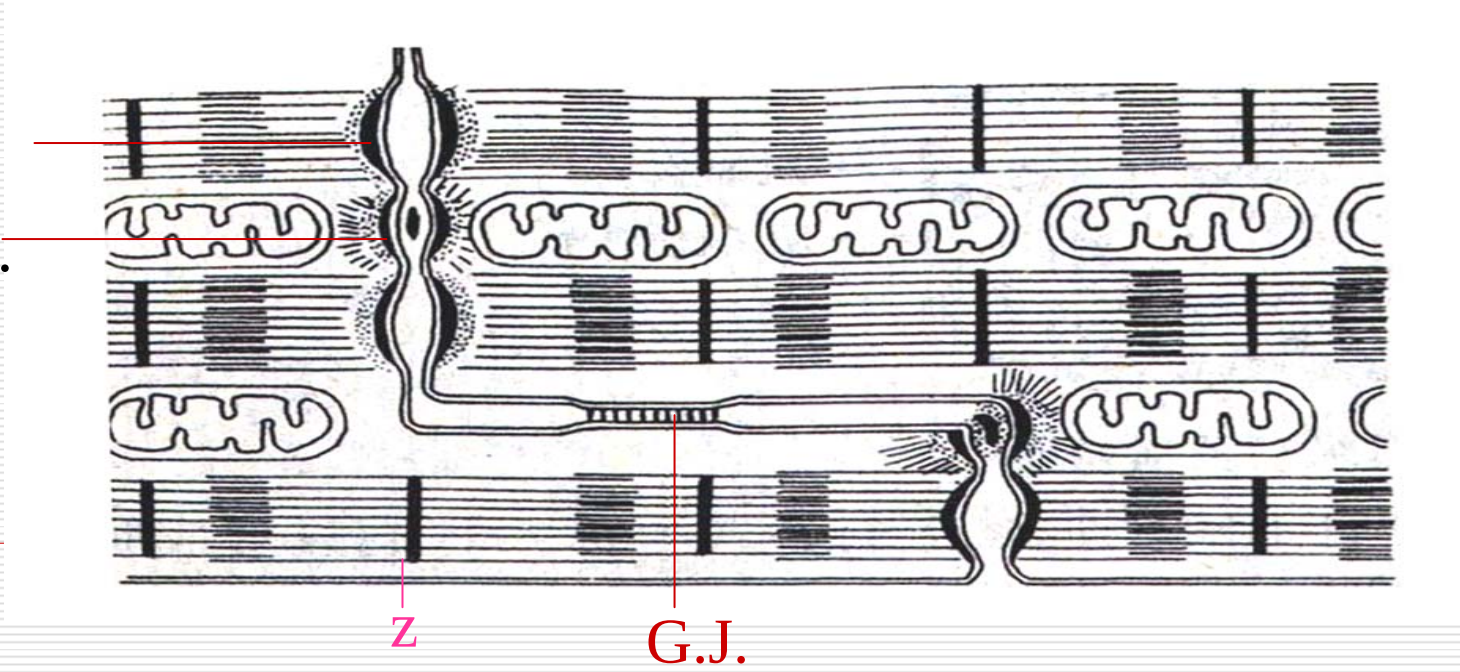


Intercalated disc

Specialized cell junctions located at Z lines

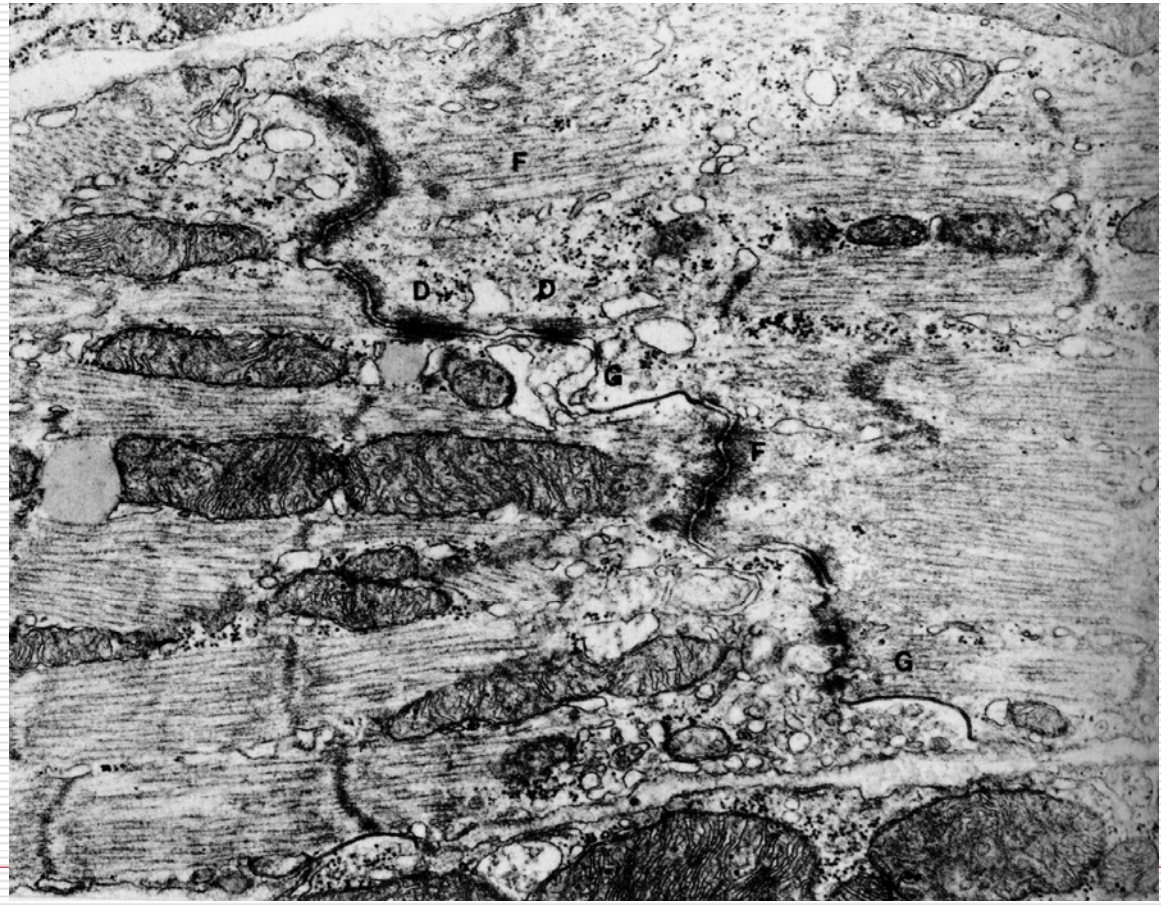
***transverse region:* intermidiate/desmosomes j.**

***longitudinal region:* gap junction**

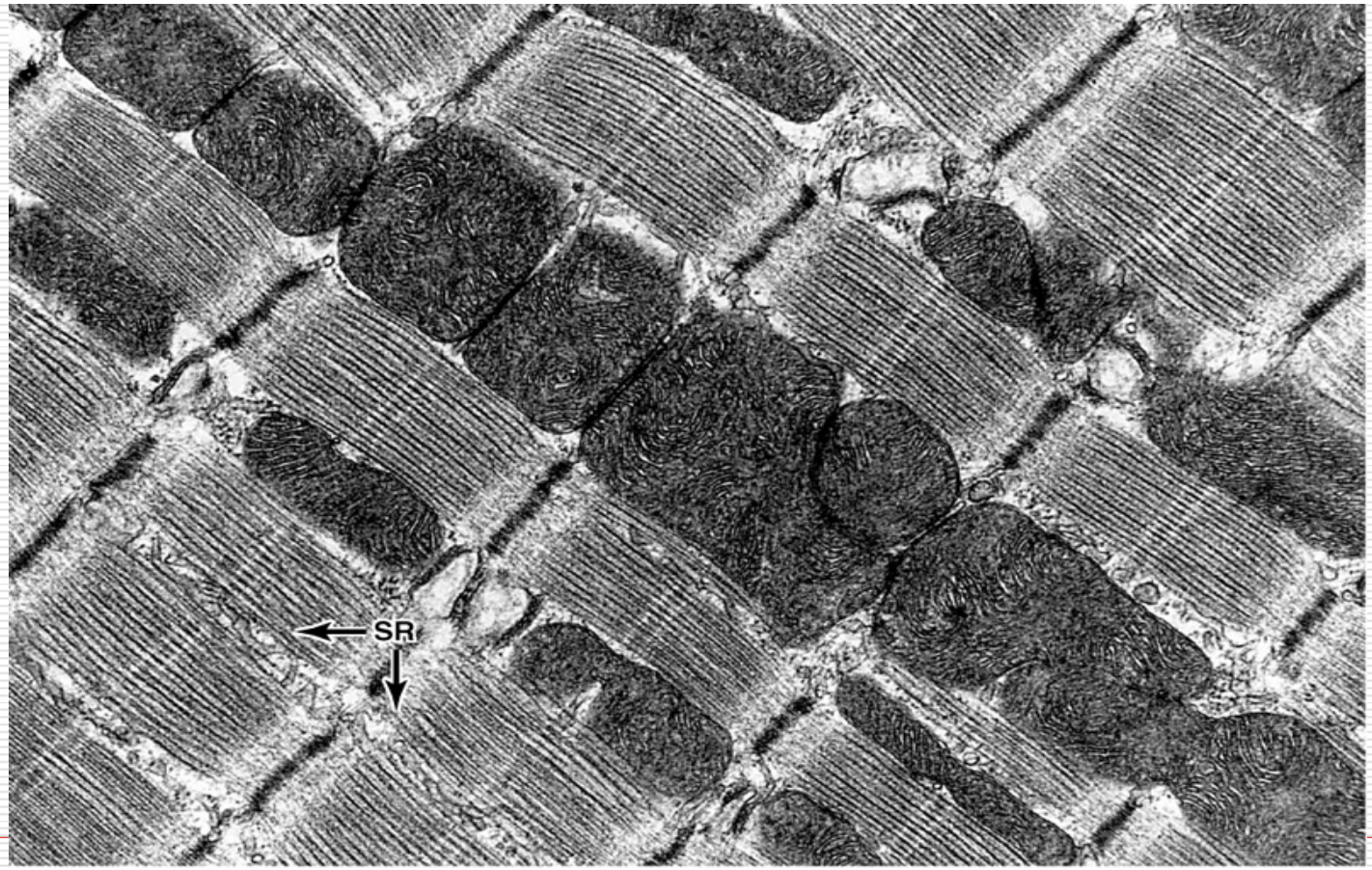


Intercalated disk

EM:



Very large and rich mitochondria



Different points:

1 Myofibril bundles

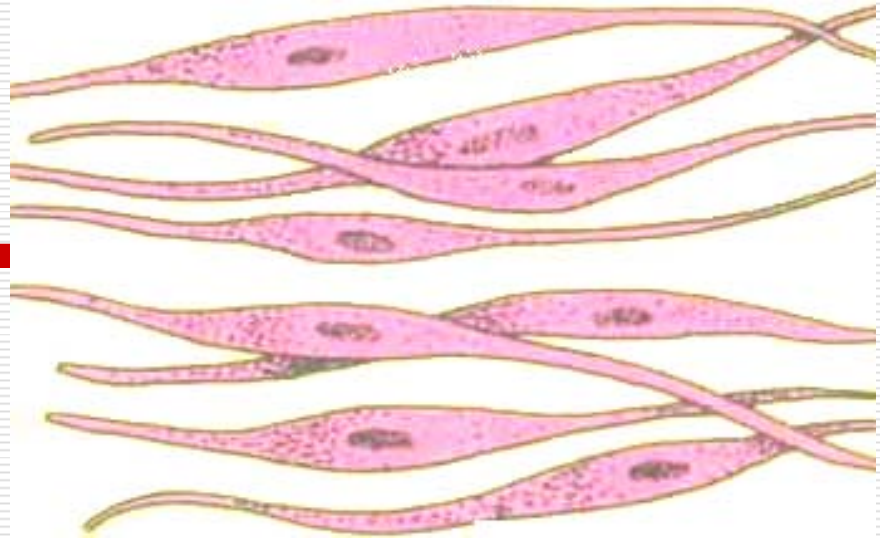
2 T tubule (Z line level)

3 Sarcoplasmic reticulum(diad)

4 Intercalated disk

5 Very large and rich mitochondria

Ⅲ.Smooth Muscle

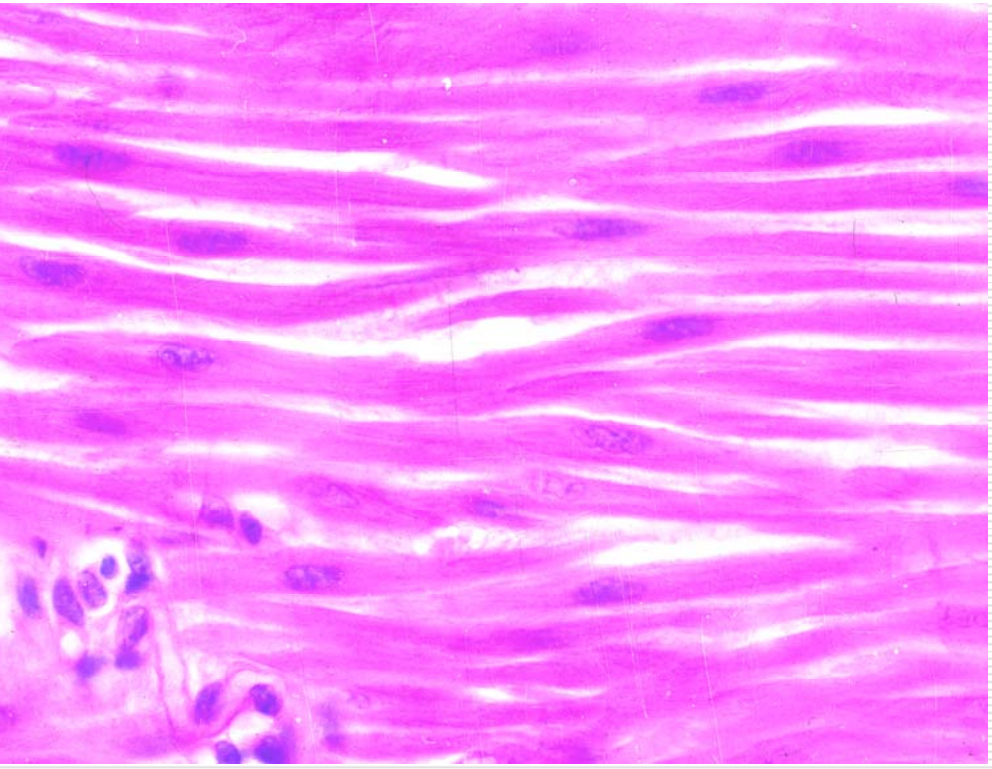


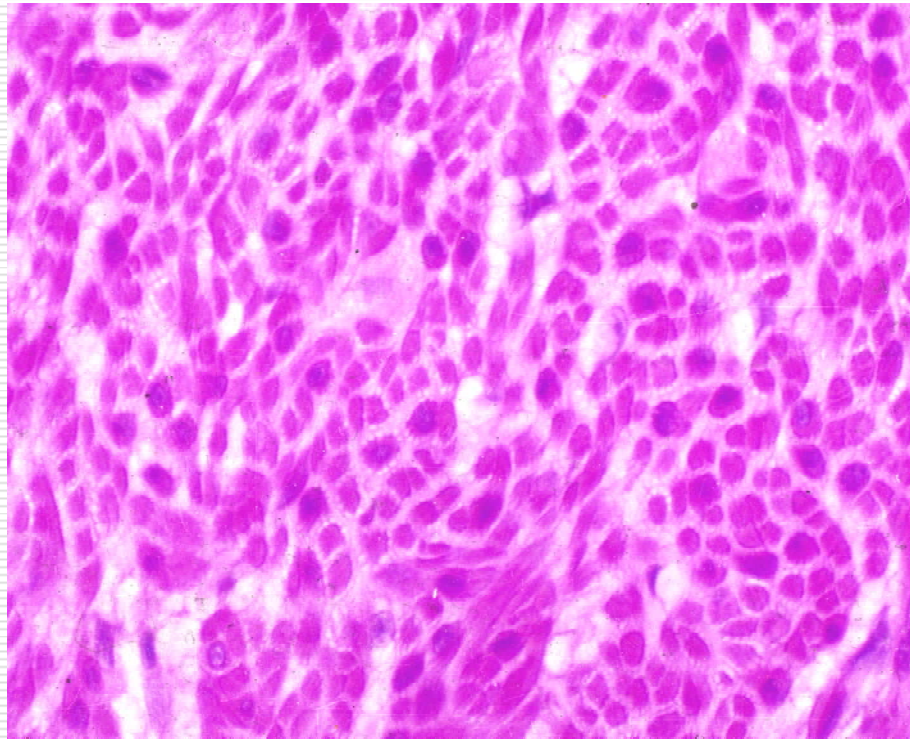
1.General structure

LM：Longer spindle shape cell，a single nucleus located in the center of cell (dark staining), eosinophilic and nonstriated cytoplasm

Ⅲ.Smooth Muscle

LM



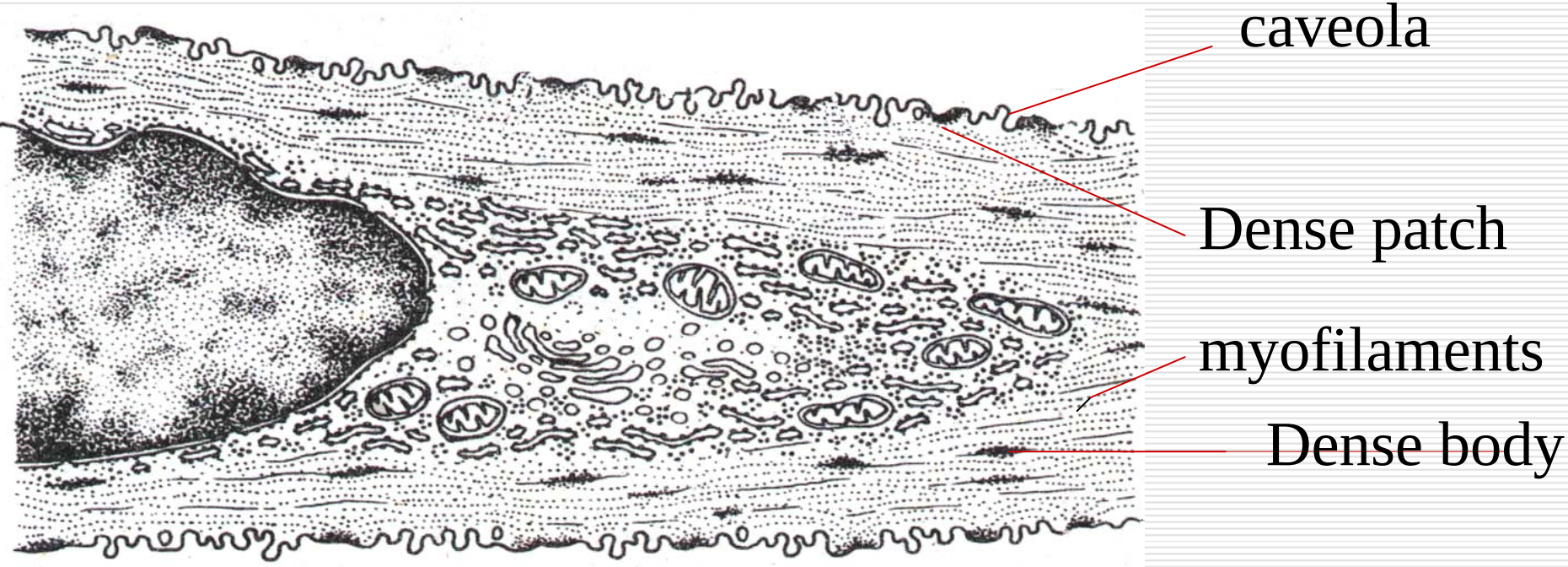


2.Ultrastructure of smooth muscle

①**dense area：　(equal to Z membrane)**

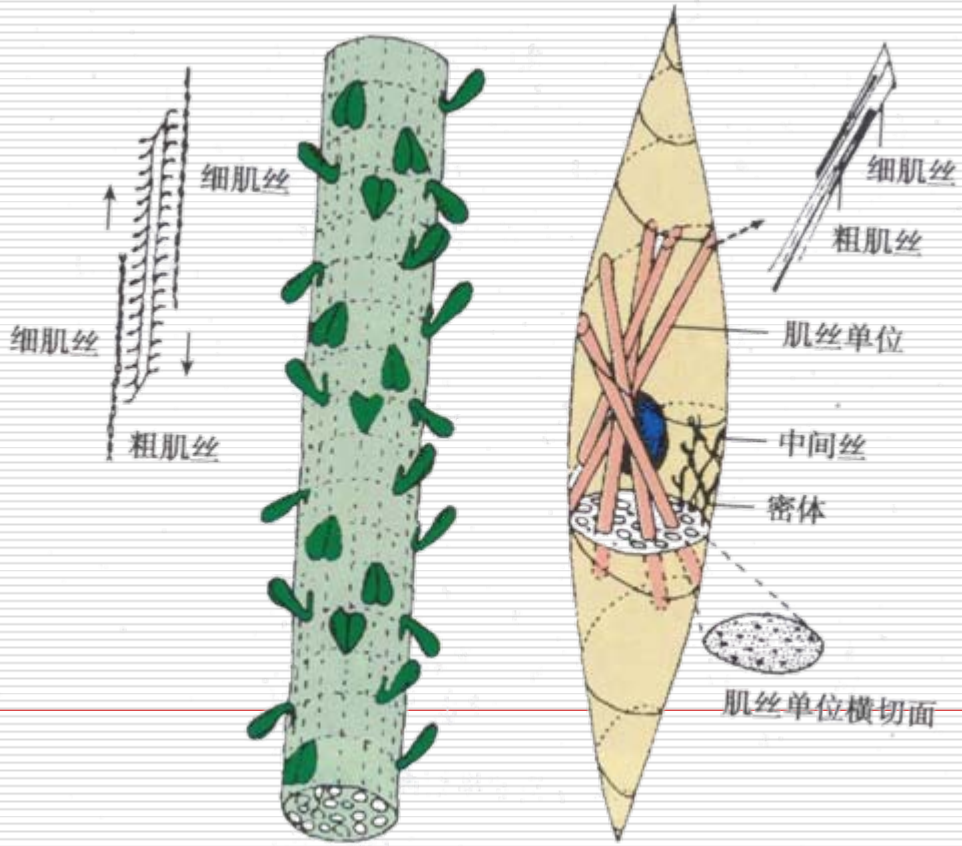
②**dense body：**

③ **caveola:**

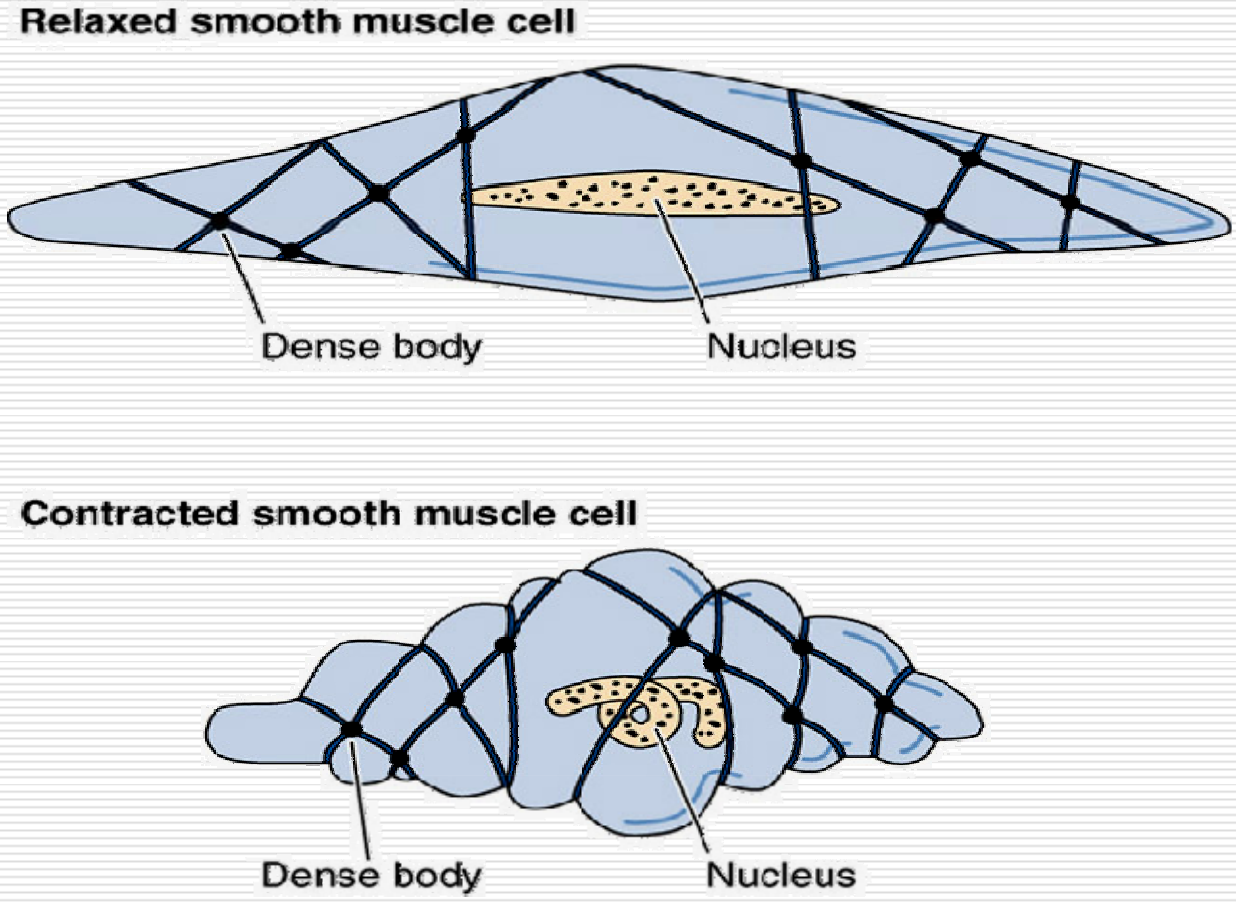


④ myofilament:

thick filament 、 thin filament



Contraction of smooth muscle fiber (model)



Compare with three kinds of muscle fibers under light microscope(model)