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Department of Biomedical Engineering

Vision Title 2

Vision Title 3

Course Name: 19BMT201 Anatomy & Physiology

II Year : III Semester

Unit I- Cell and Tissue Structure

Topic : Muscular Tissue and its function

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Muscle Tissue

A muscle tissue is made of contractile cells



Muscle Tissue

- **Types-**

- **1. Muscle tissue**
 - Skeletal muscle
 - Smooth muscle
 - Cardiac muscle

Cell unite

- myoepithelial cells
- myofibroblast cells



Muscle Tissue

Plasma membrane

-Sarcolema

Cytoplasm

-Sarcoplasm

Endoplasmic reticulum-Sarcoplasmic reticulum

Mitochondria-

-Sarcosome



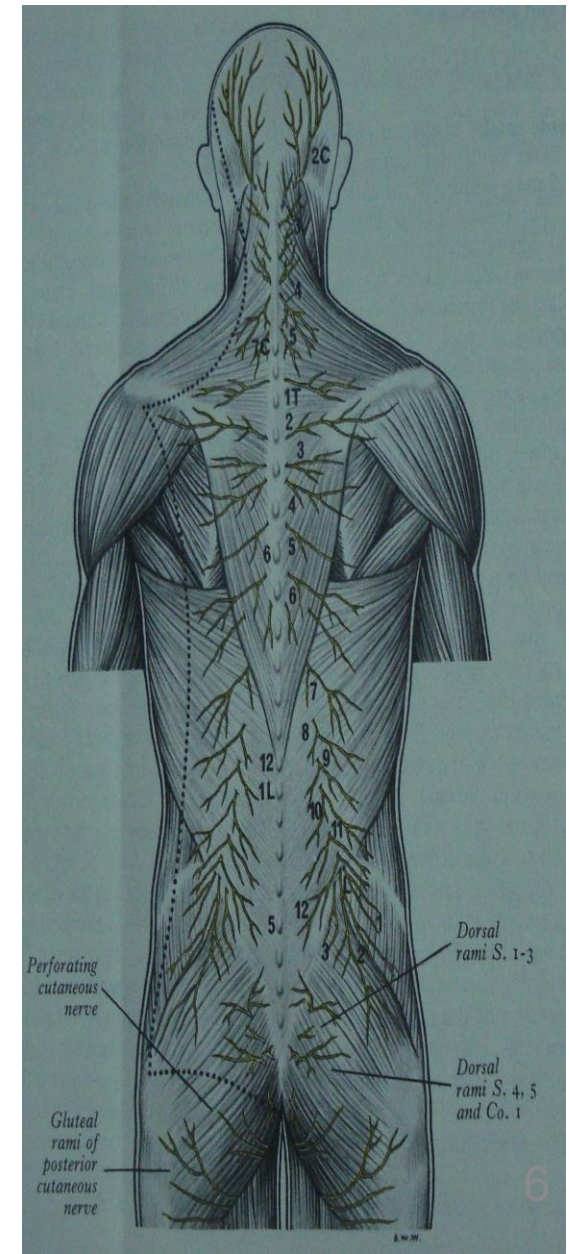
Skeletal muscle....

- Epi mysium
- Peri mysium
- Endo mysium

SKELETAL MUSCLE



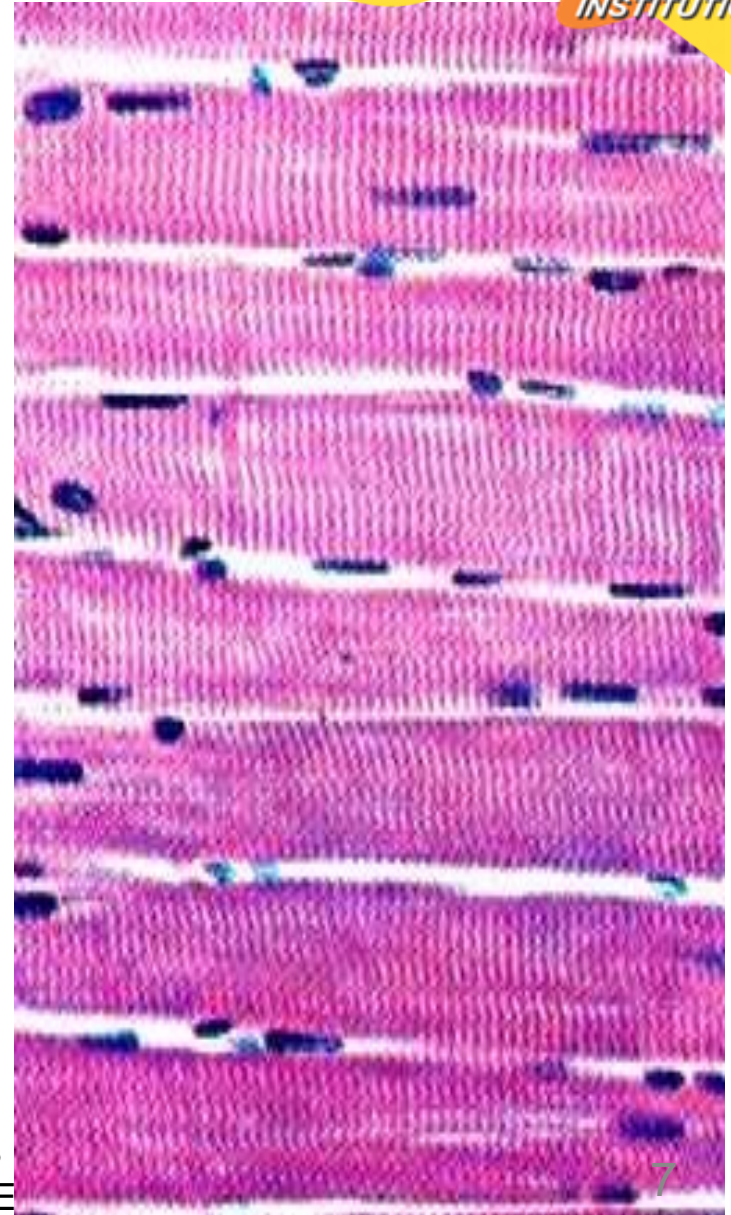
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Skeletal muscle

- features
- **Skeletal muscle composed of muscle fibres**
- **Each muscle fibre is an elongated unbranched cell, voluntary**
- **Nuclei present at periphery**
- **Striations, Alternative dark and light bands**





Skeletal muscle.....

E.M. Structure

- **Muscle fibre or Muscle cell**

A muscle fibre (muscle cell) contains bundle of **myofibril**

Myofibril

- myofibrils are made of **myofilaments**

Myofilament

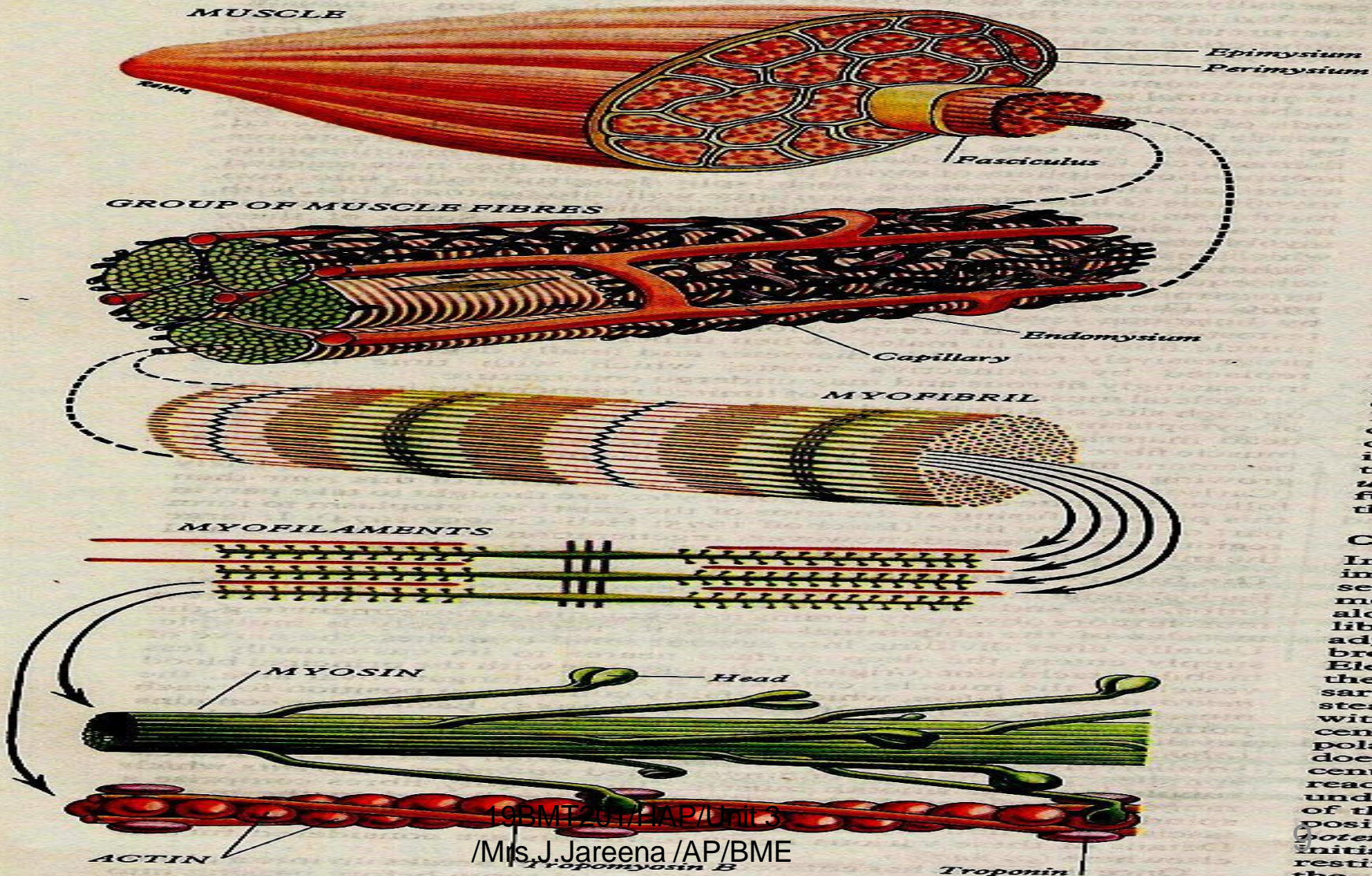
- Thick myofilaments- **myosin protein**
- Thin myofilaments- **actin protein**

Cross striations are the result of overlapping of myosin protein & actin protein

- **Transvers tubule system - triad**

Arrangement of myofibril

5 MYOLOGY

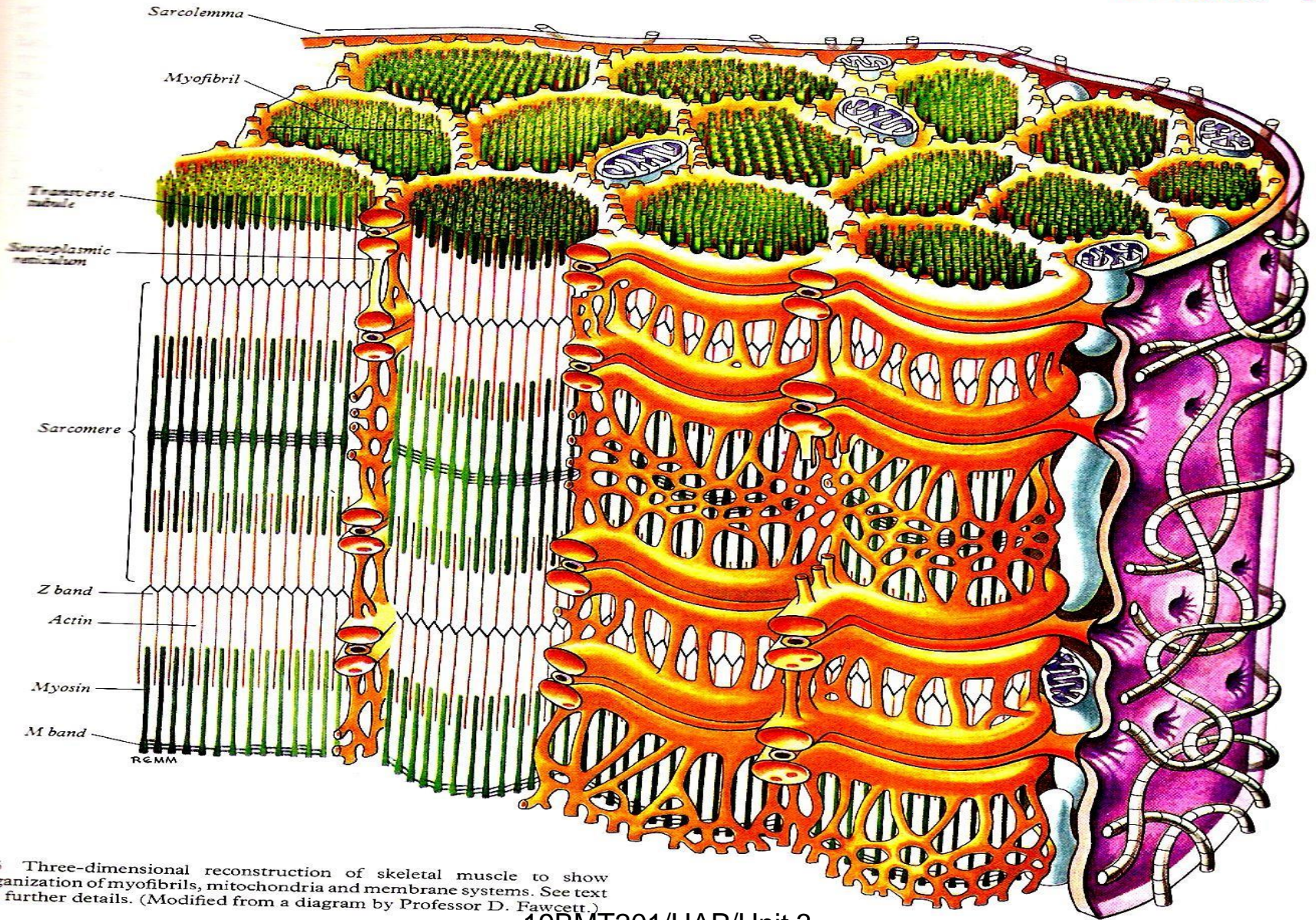


5.8A Diagram showing cross-section of a muscle fiber.

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SKELETAL MUSCLE



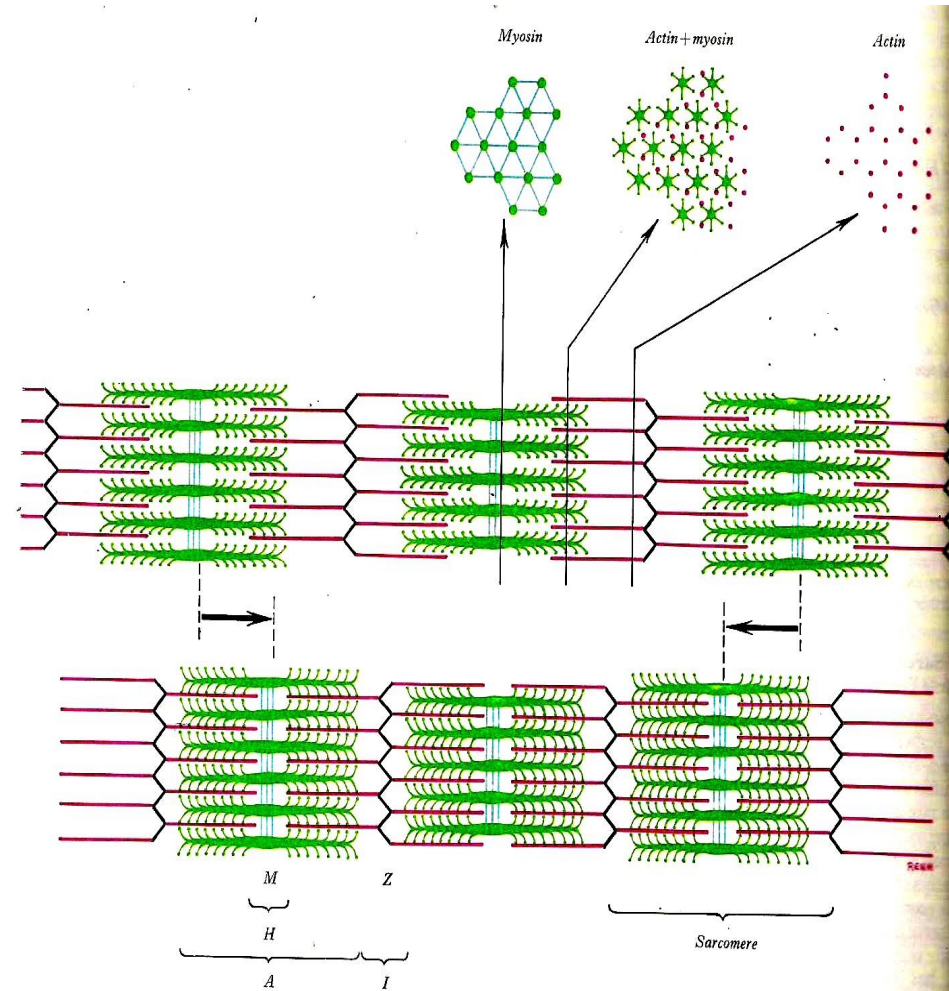
5-6 Three-dimensional reconstruction of skeletal muscle to show organization of myofibrils, mitochondria and membrane systems. See text for further details. (Modified from a diagram by Professor D. Fawcett.)

The Sarcomere

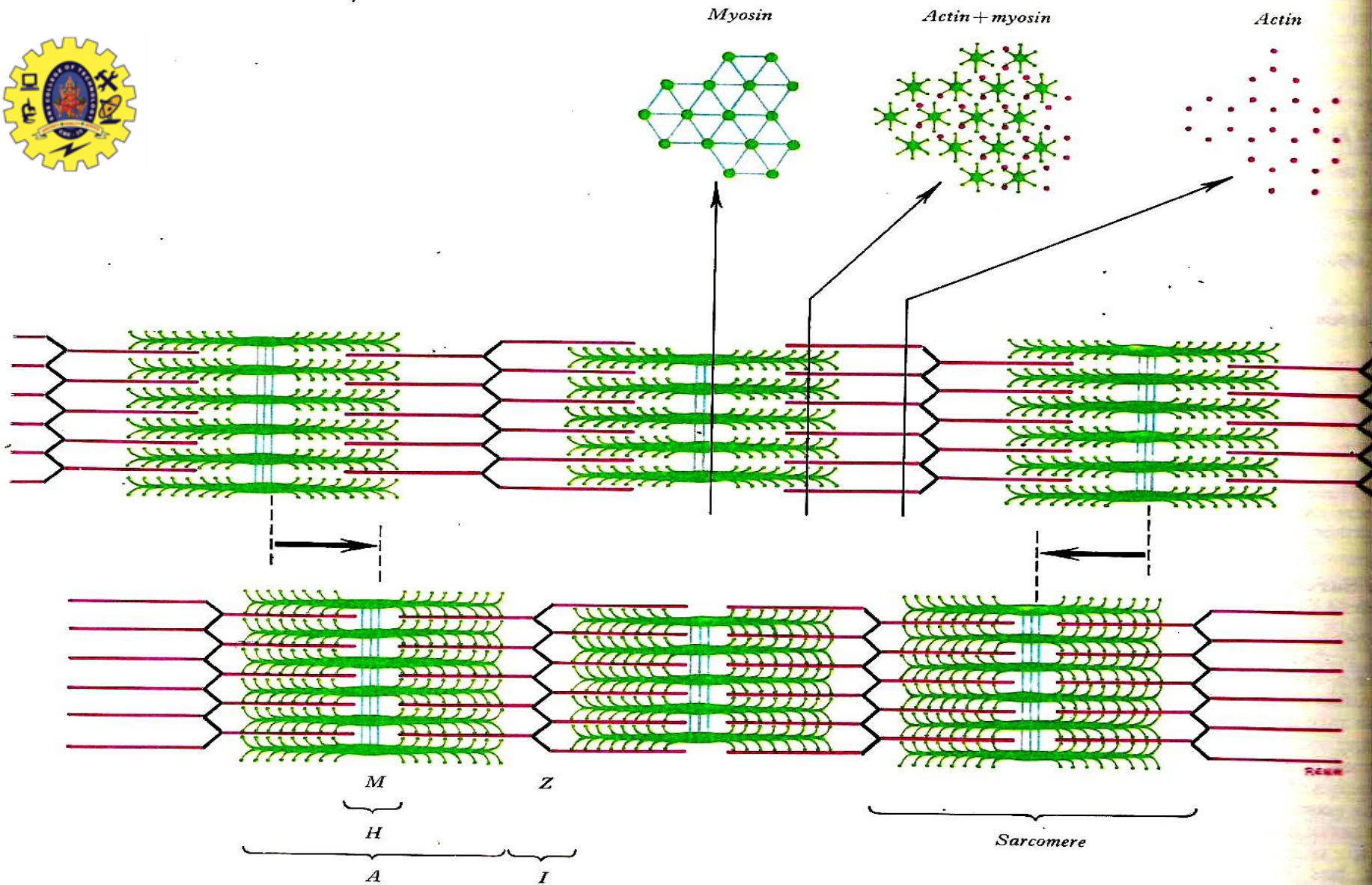


Arrangement of Myofilament

- **Dark band-'A' band** or anisotropic band
- Light band-'I' band** or isotropic band
- **H band-Hensen line**-clear zone in A band
- **M line**-dark line in H band
-
- **Z disc**- dark line in light band
- **Sarcomere**-part between two Z Disc

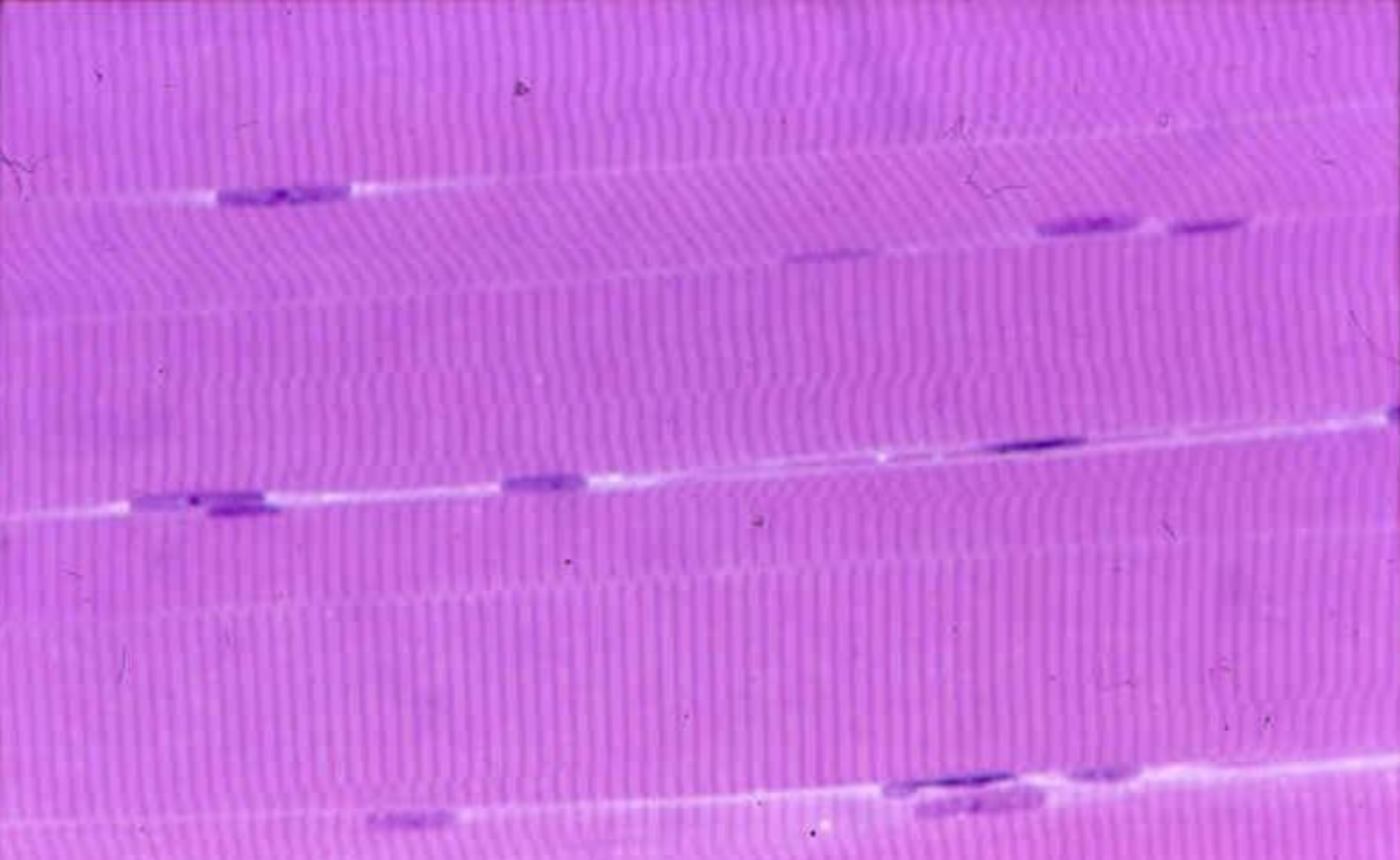


5.7 Diagram showing the organization of sarcomeres in skeletal and cardiac muscle and the changes occurring during shortening. Transverse sections are shown at various levels and indicate the packing of actin and myosin filaments. Compare with 5.4 and see text for a description.

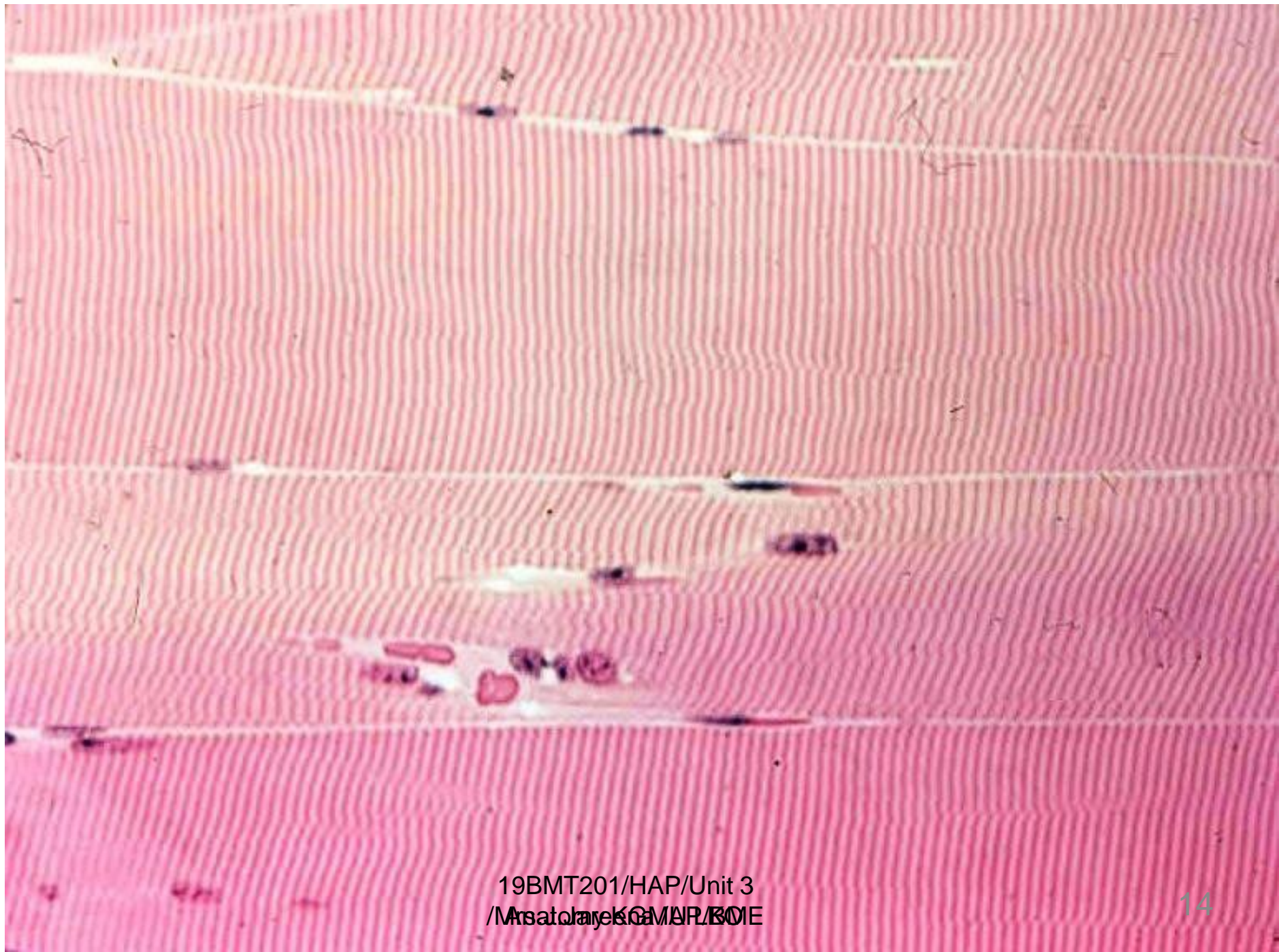


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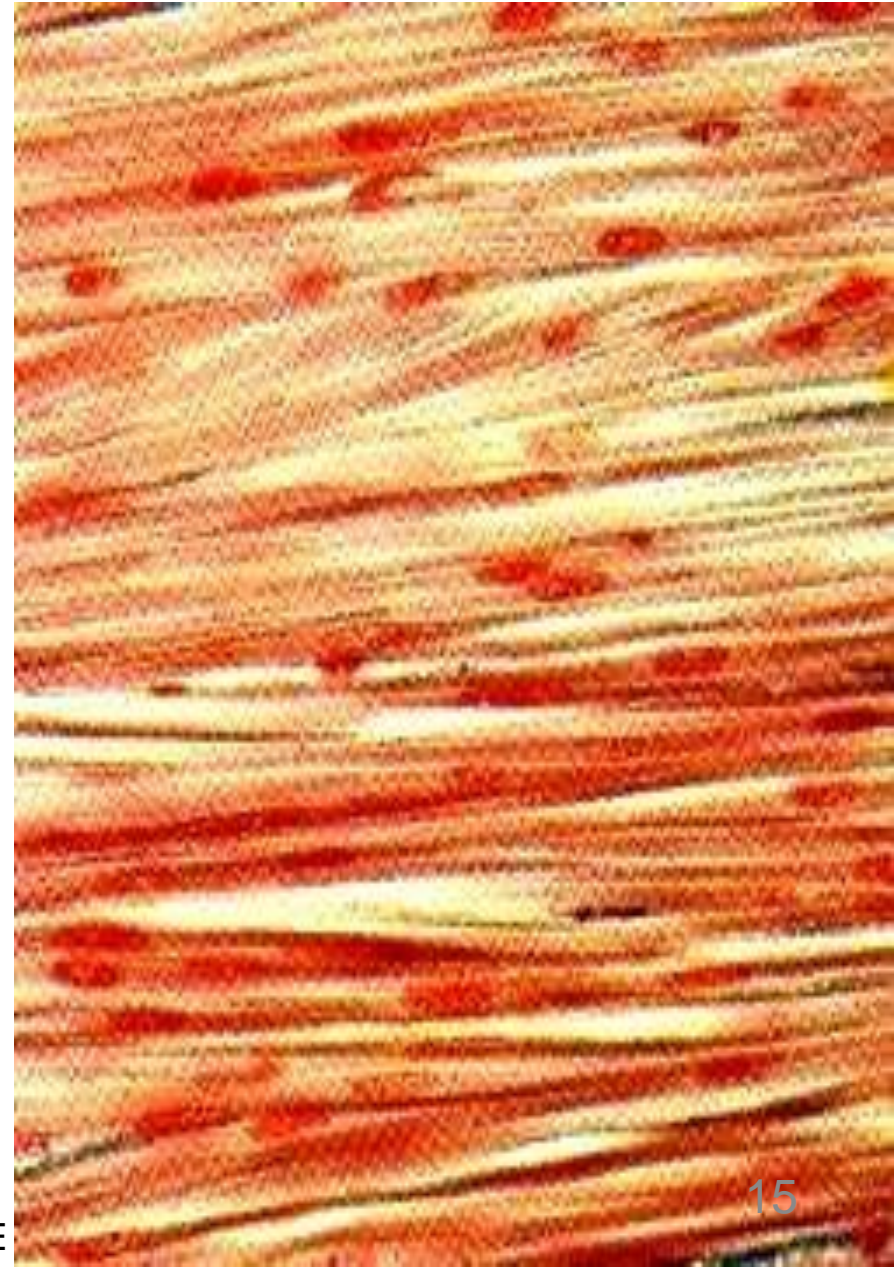
L.S Skeletal muscle

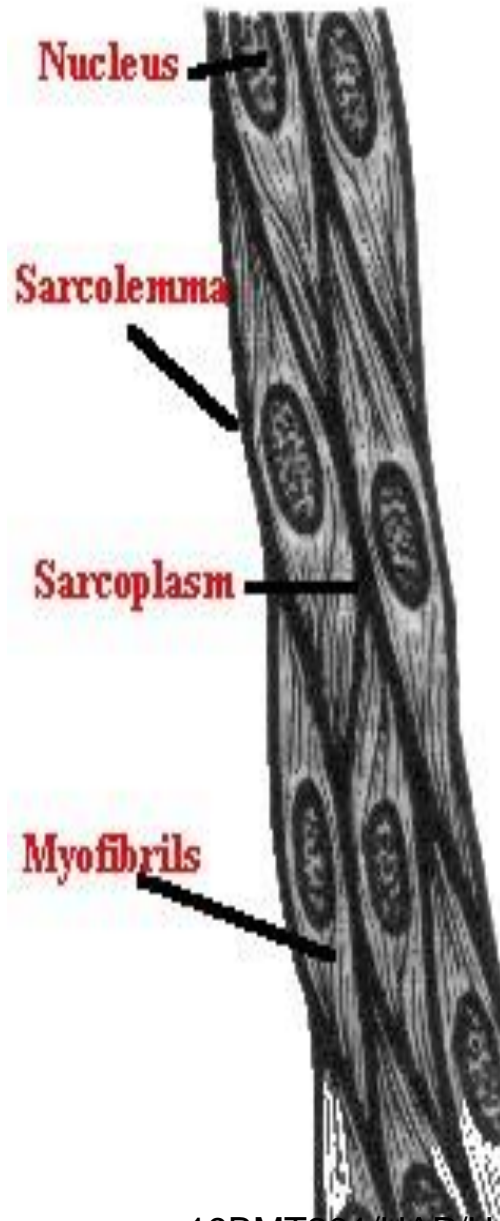




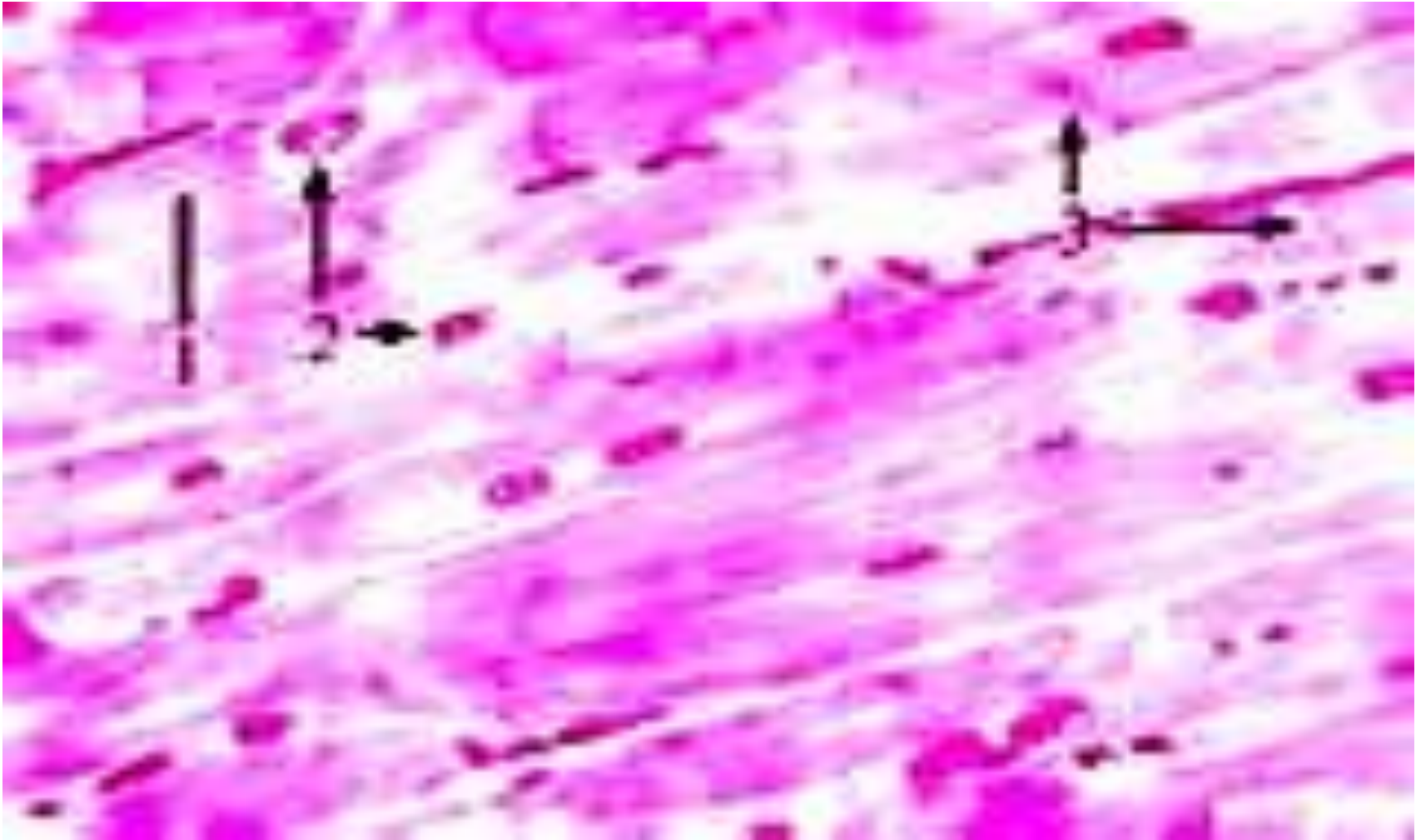
Smooth muscle

- **Spindle shaped** muscle cell
- **Single central nucleus**
- Involuntary, non striated
- **no cross striations**
- longitudinal striations may present
- **Caveolae** instate of T tubule
- Present in viscera usually
- Involuntary ,autonomic innervations
- Myofilaments **obliquely** disposed
- **slow, wave like contractions**





Smooth muscle







Cardiac muscle

Similar as skeletal muscle

- -elongated muscle fibre with fibrils
- Cross striations present

Dissimilar from skeletal muscle

- Muscle fibre are not as parallel but **branched & anastomosing**

Nucleus placed centrally

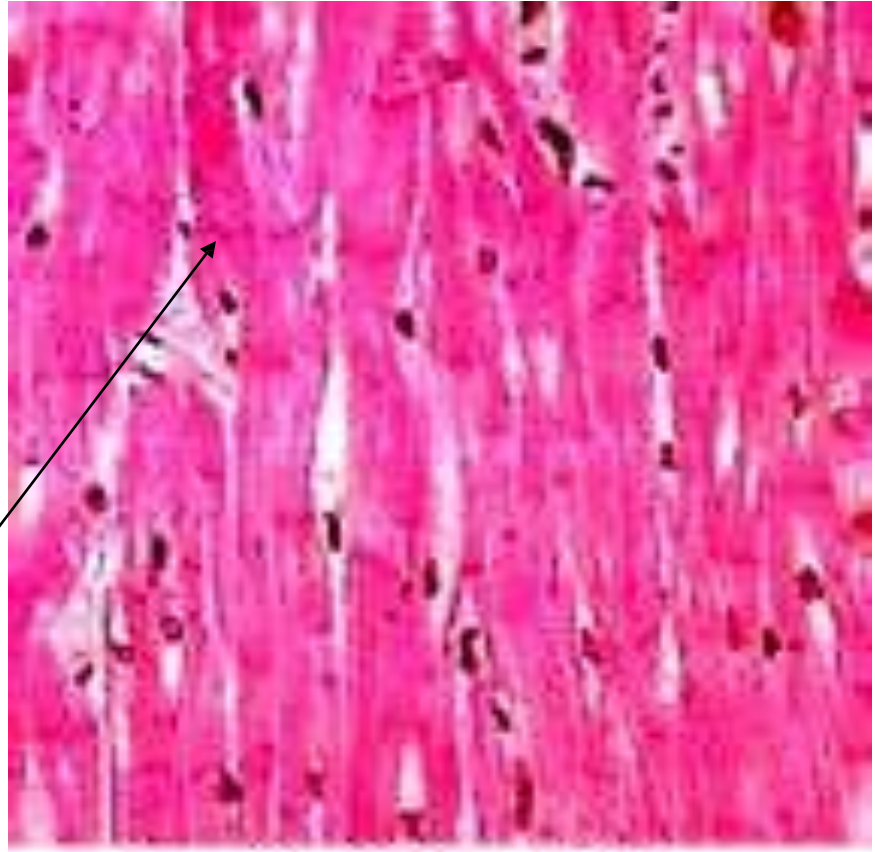
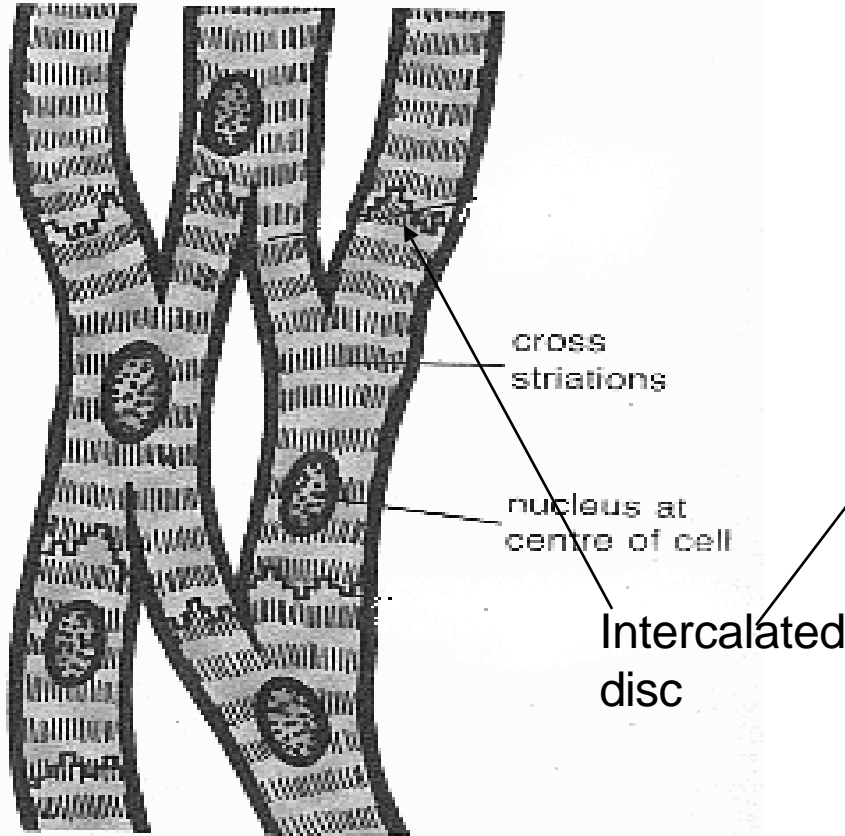
Intercalated disc at the junction of two cells

Cardiac muscle is striated

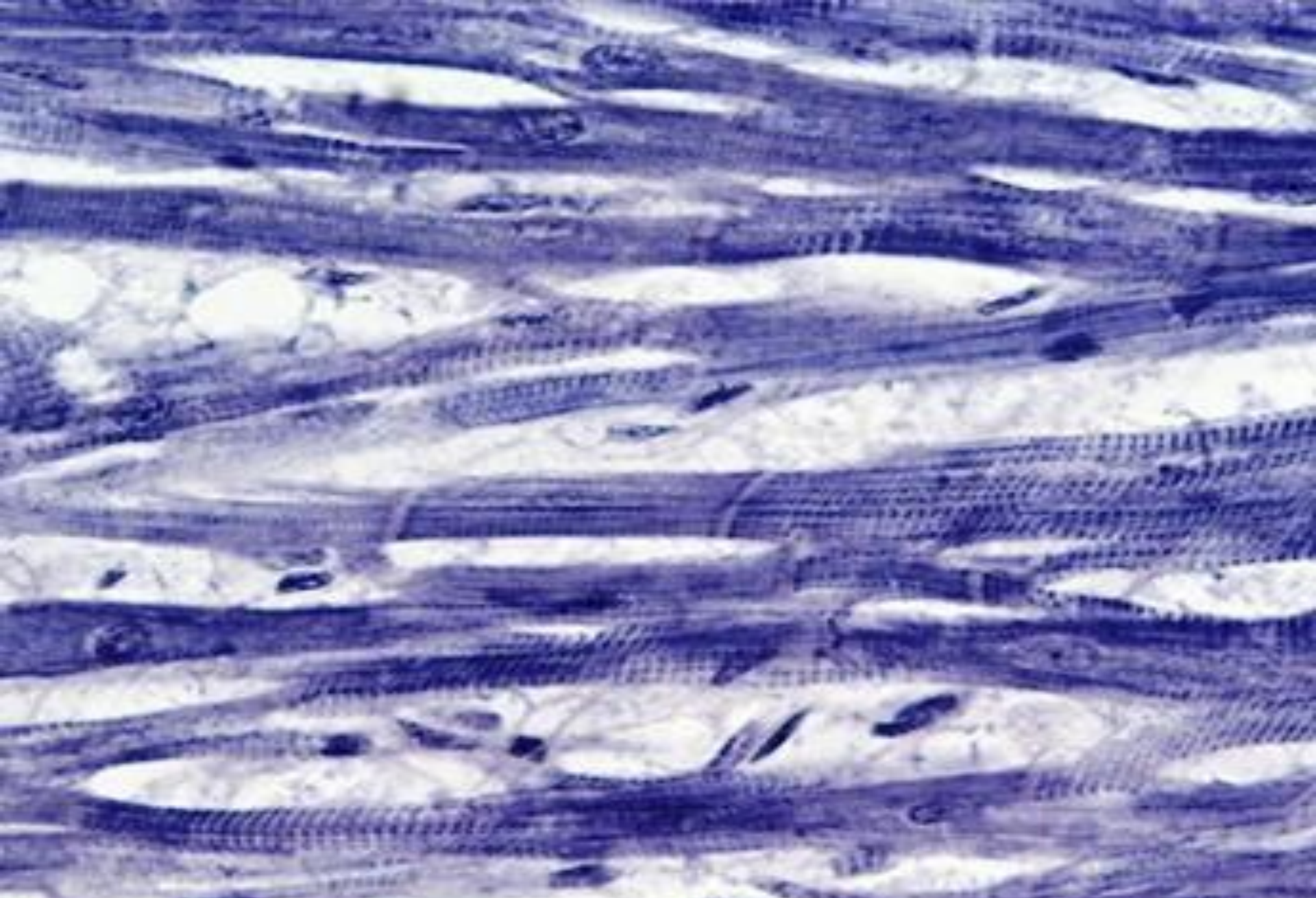
Cardiac muscle is involuntary



Cardiac muscle



Cardiac Muscle 100x



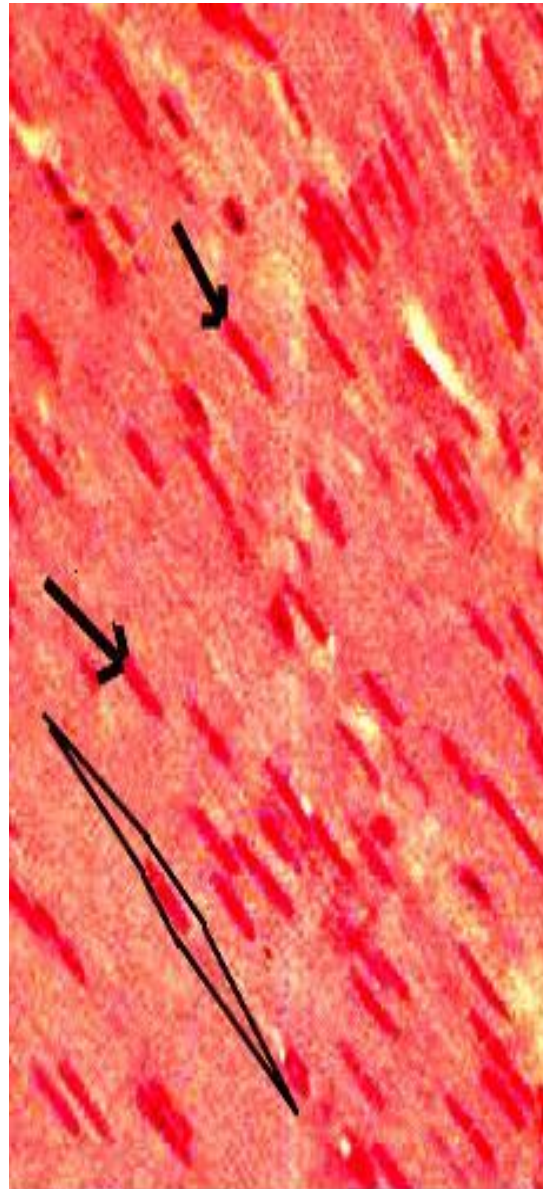


L.S. cardiac muscle

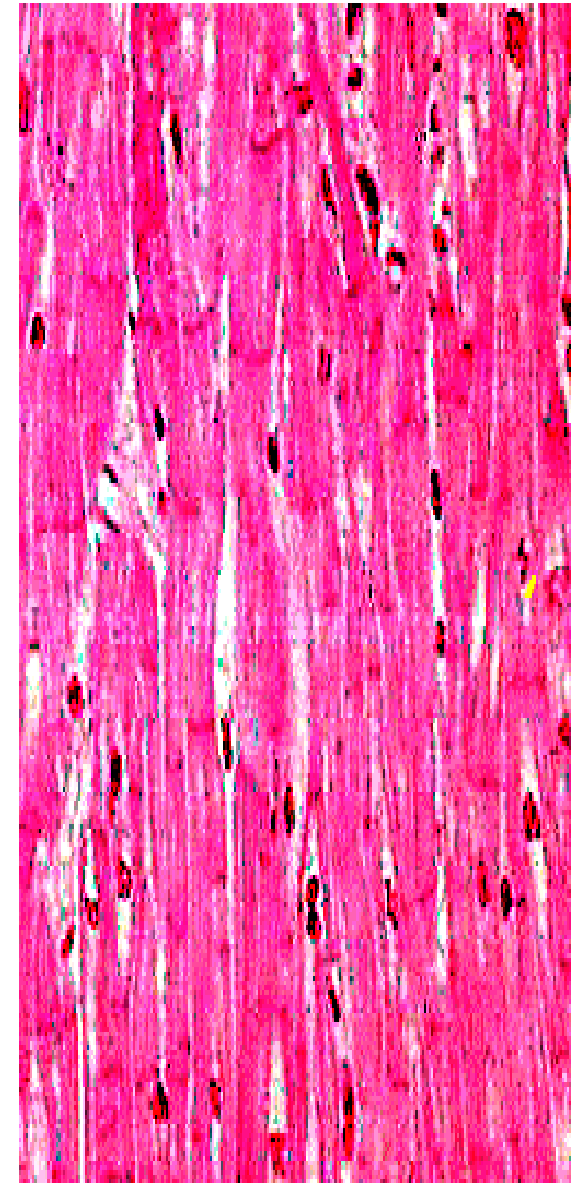
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Skeletal Muscle 100x



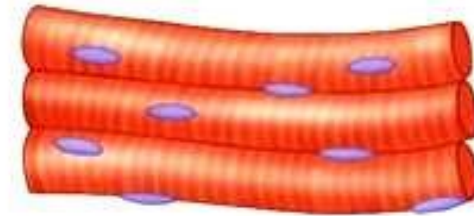
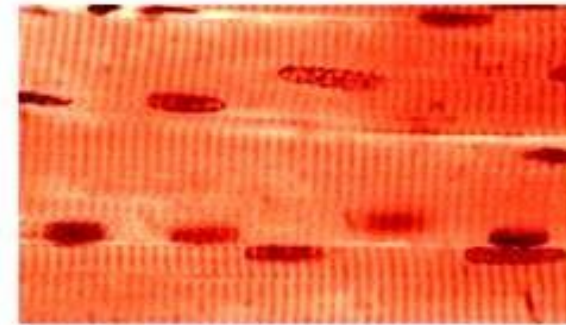
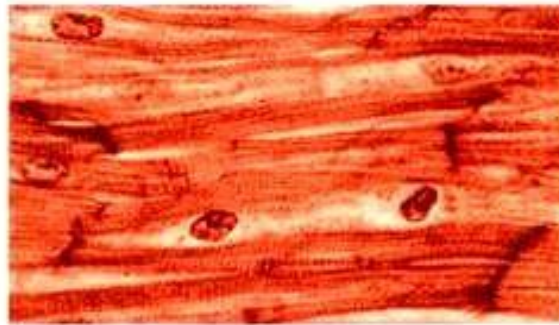
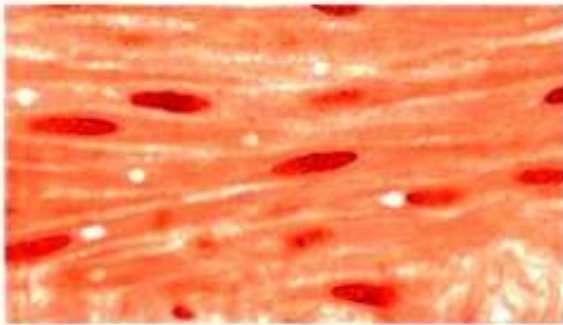
Smooth Muscle 100x
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Cardiac Muscle 100x



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Smooth muscle

- has spindle-shaped, nonstriated, uninucleated fibers.
- occurs in walls of internal organs.
- is involuntary.

Cardiac muscle

- has striated, branched, generally uninucleated fibers.
- occurs in walls of heart.
- is involuntary.

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Skeletal muscle

- has striated, tubular, multinucleated fibers.
- is usually attached to skeleton.
- is voluntary.



Thank you