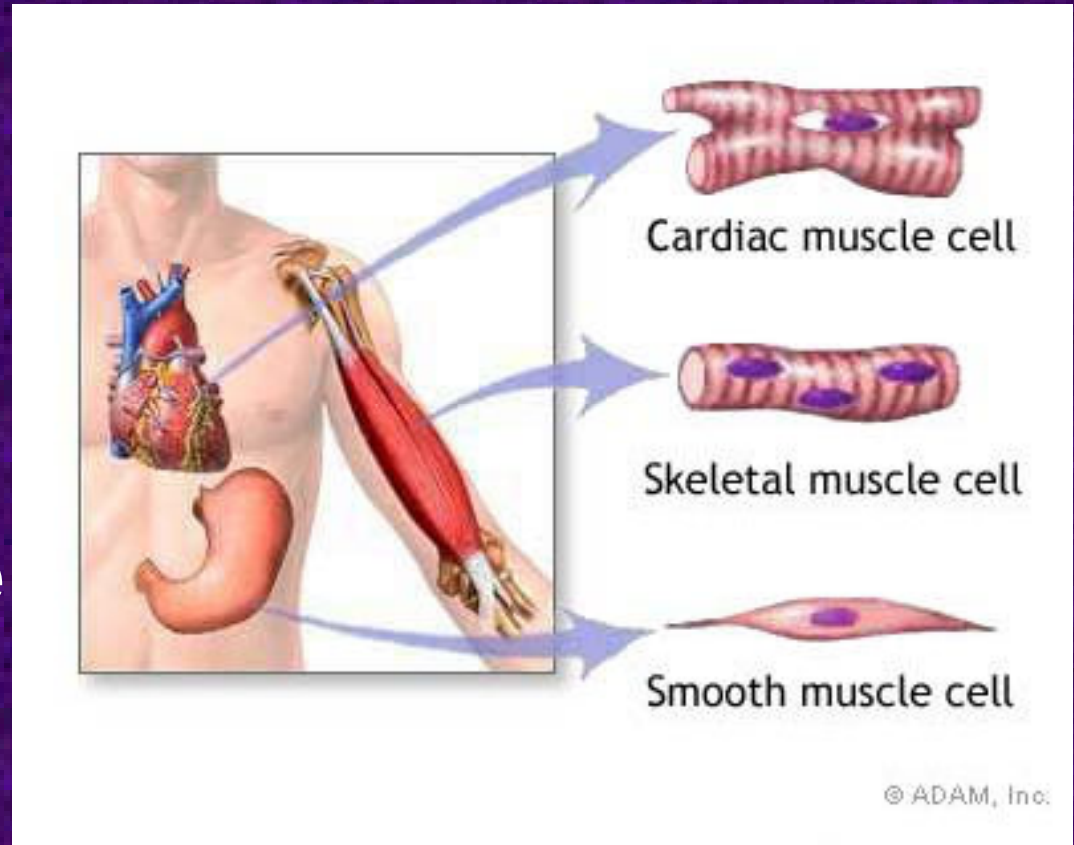


# Muscle Structure



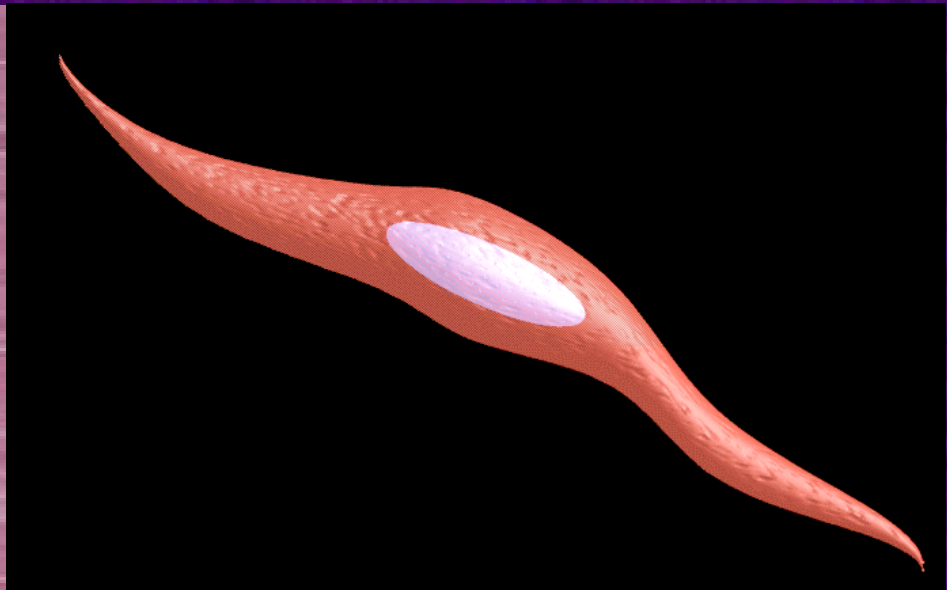
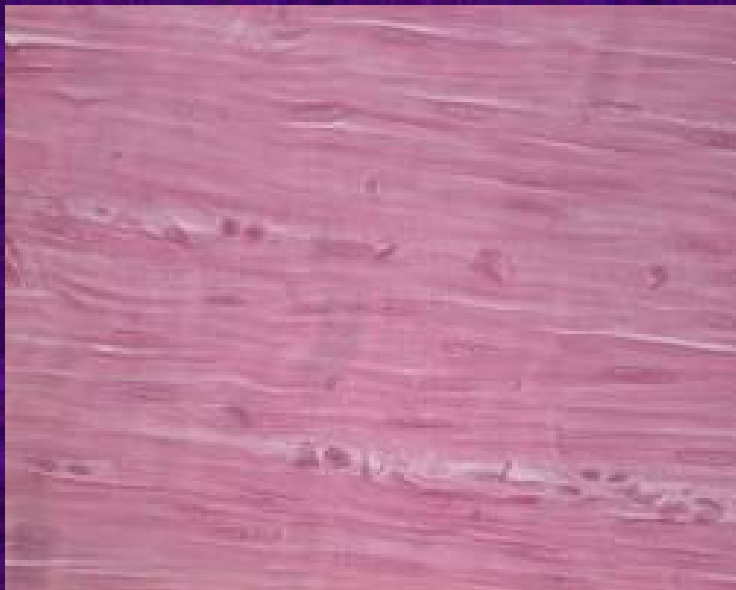
# What are the types of muscle?

- Smooth Muscle
- Cardiac Muscle
- Skeletal Muscle

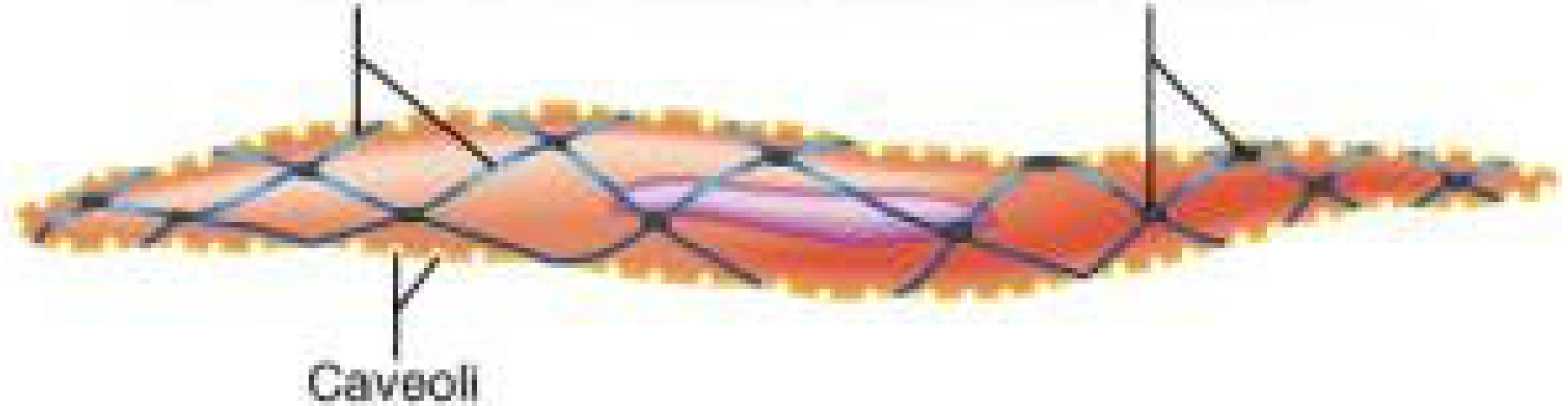


# Smooth Muscle

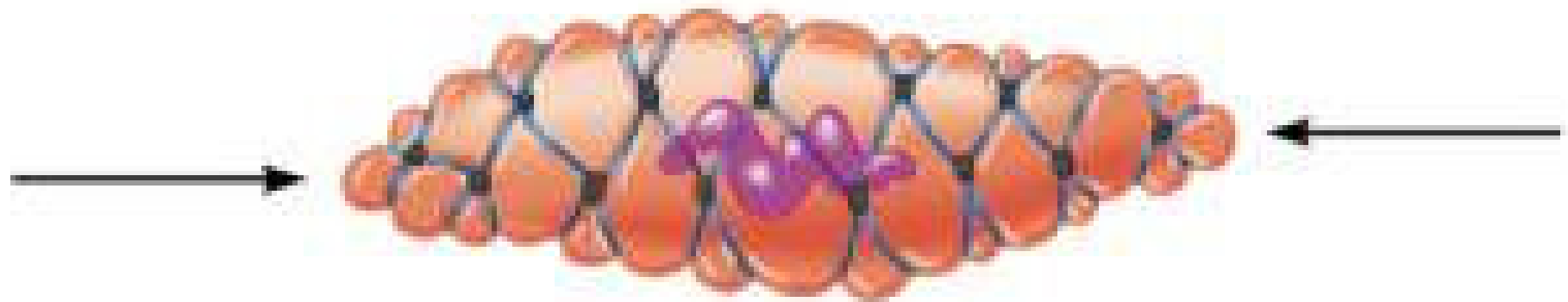
- **Smooth Involuntary**
  - Not striated
  - Single nuclei
  - Digestive, respiratory, & vascular tissues
  - Extremely elastic & pliable



Intermediate filament bundles attached to dense bodies



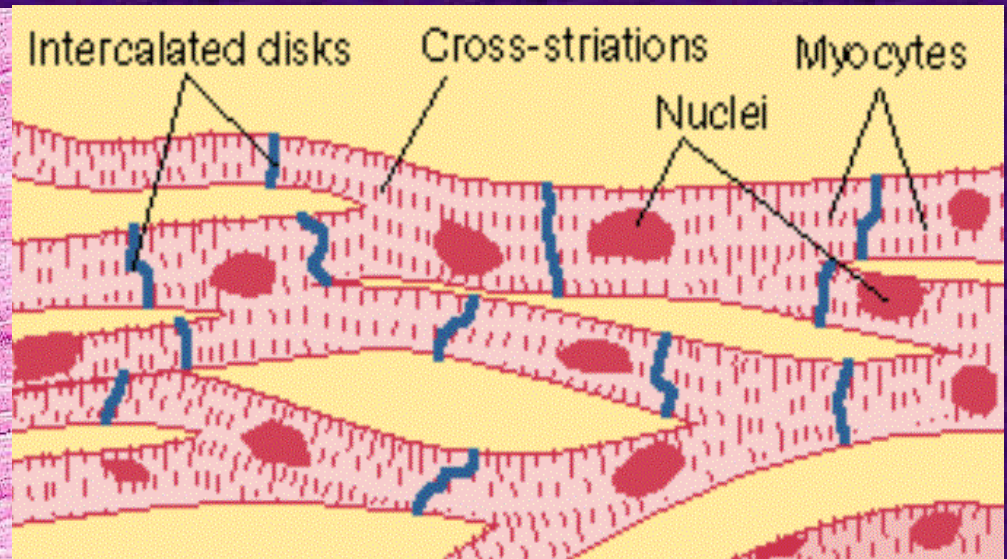
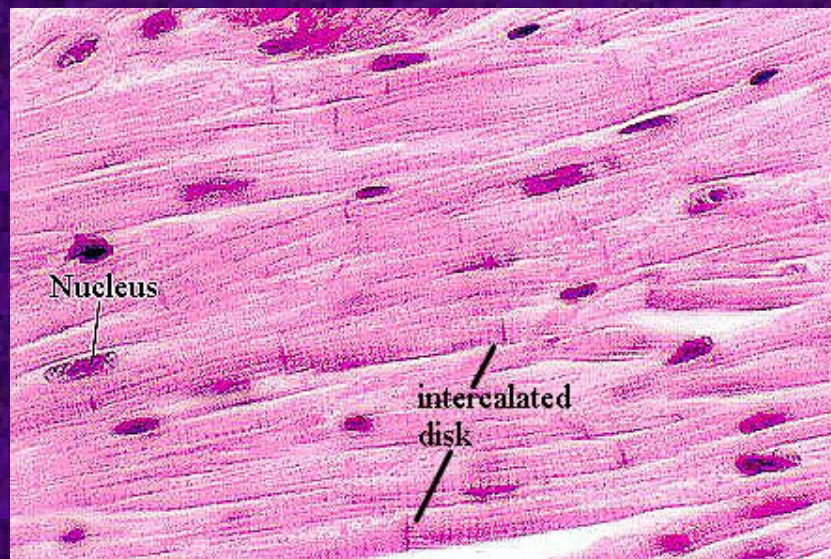
**(a) Relaxed smooth muscle cell**



**(b) Contracted smooth muscle cell**

# Cardiac Muscle

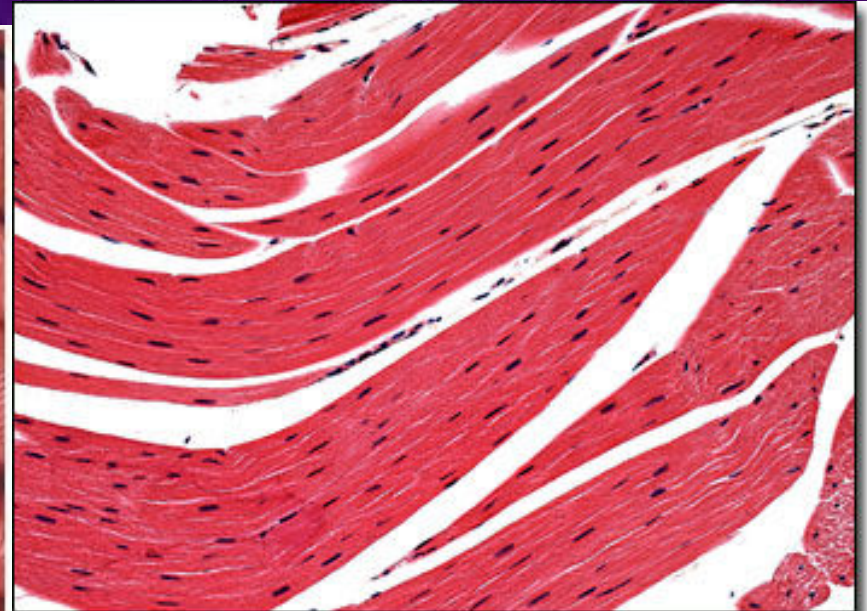
- **Striated Involuntary**
  - Cardiac muscle
  - Branched structure
  - Intercalated discs
  - 1 to 2 nuclei/ cell





# Skeletal Muscle

- **Voluntary Striated**
  - Skeletal muscle
  - Multi-nucleated
  - Most abundant form



# Muscle Tasks

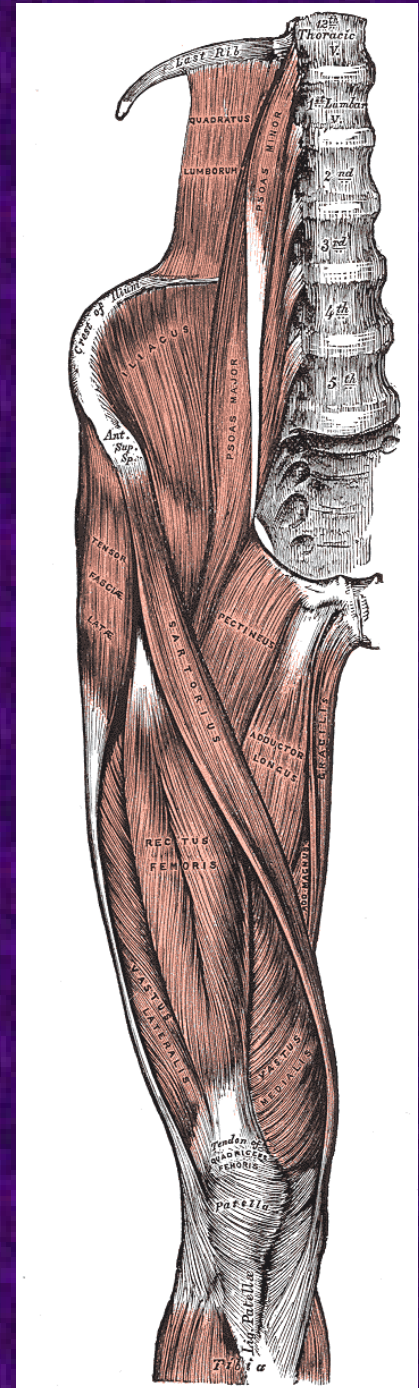
- Muscles have specific tasks they perform
- Some are:
- Prime Movers
- Antagonists
- Fixation Muscles
- Synergists





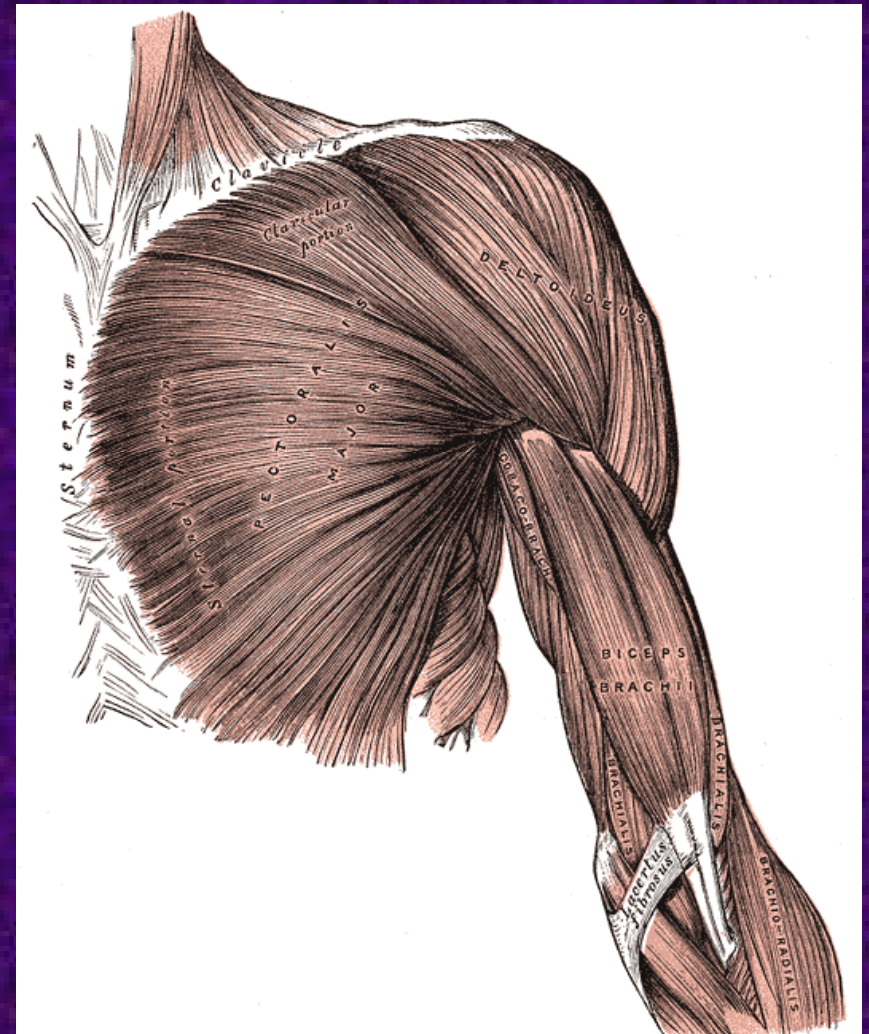
# Muscle Tasks

- Prime Movers
  - Accomplish a specific movement



# Muscle Tasks

- **Antagonists**
  - Must relax in order for prime movers to perform their function

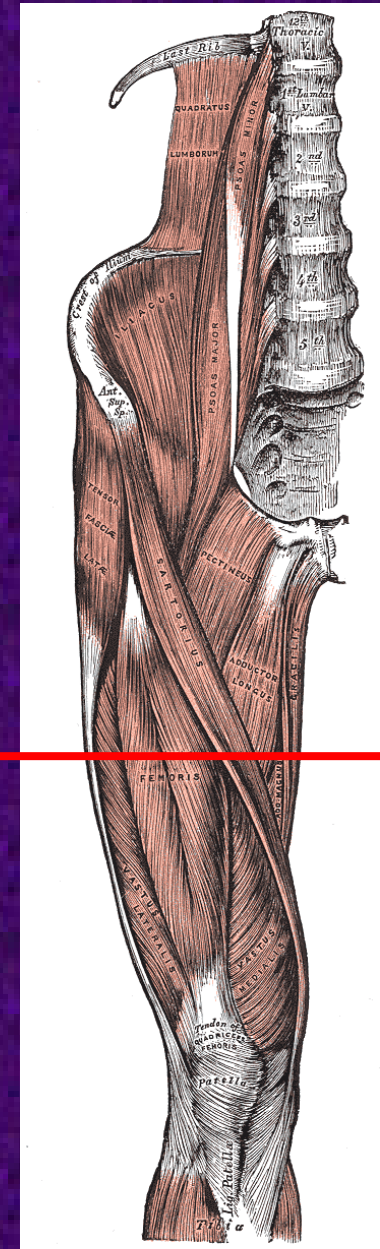
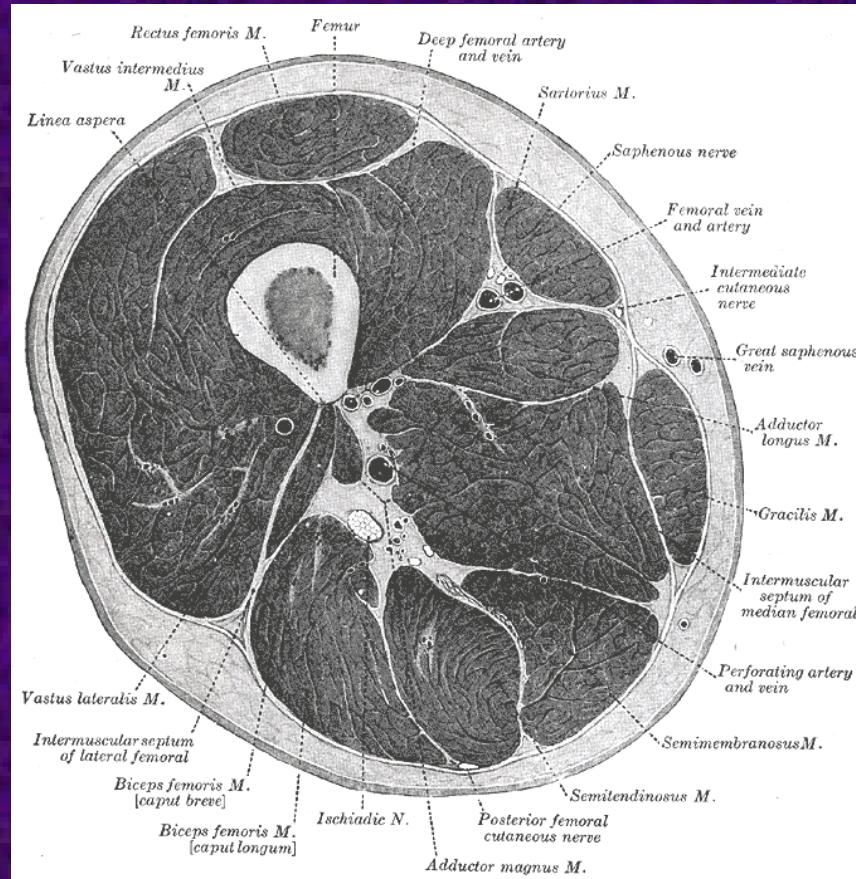






# Muscle Tasks

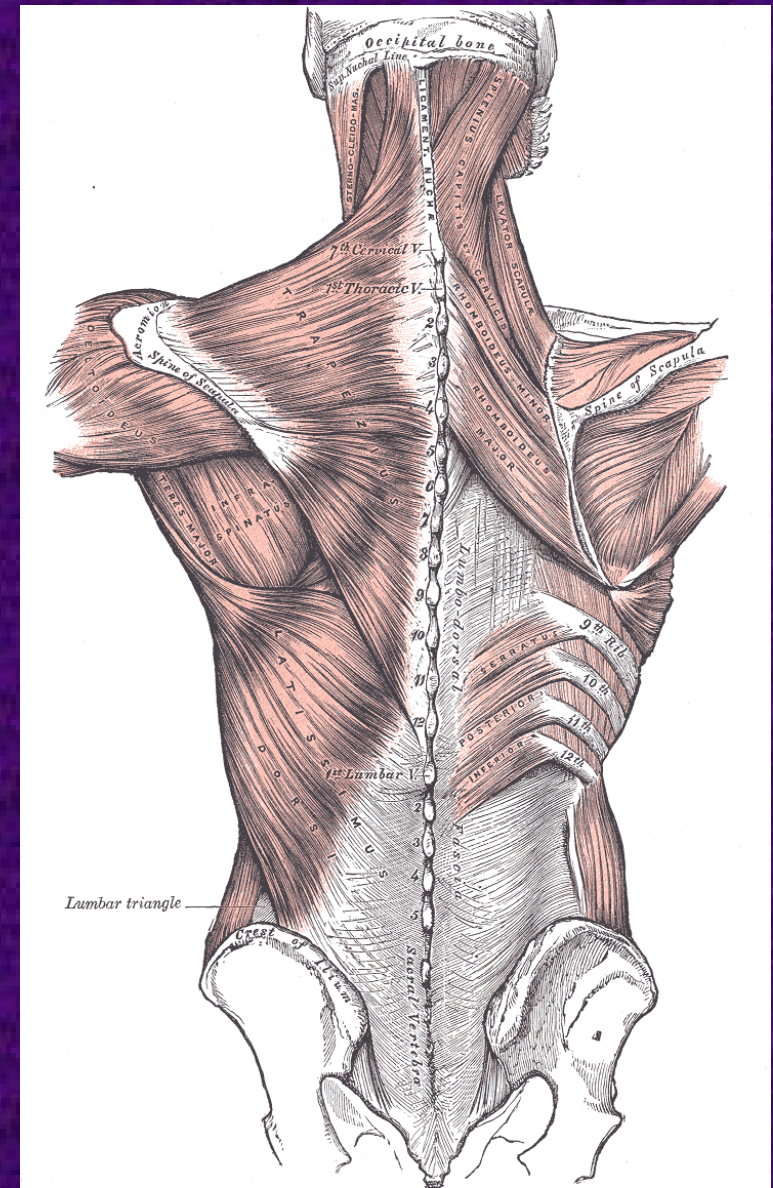
- Synergists
  - Stabilize in opposition to gravity



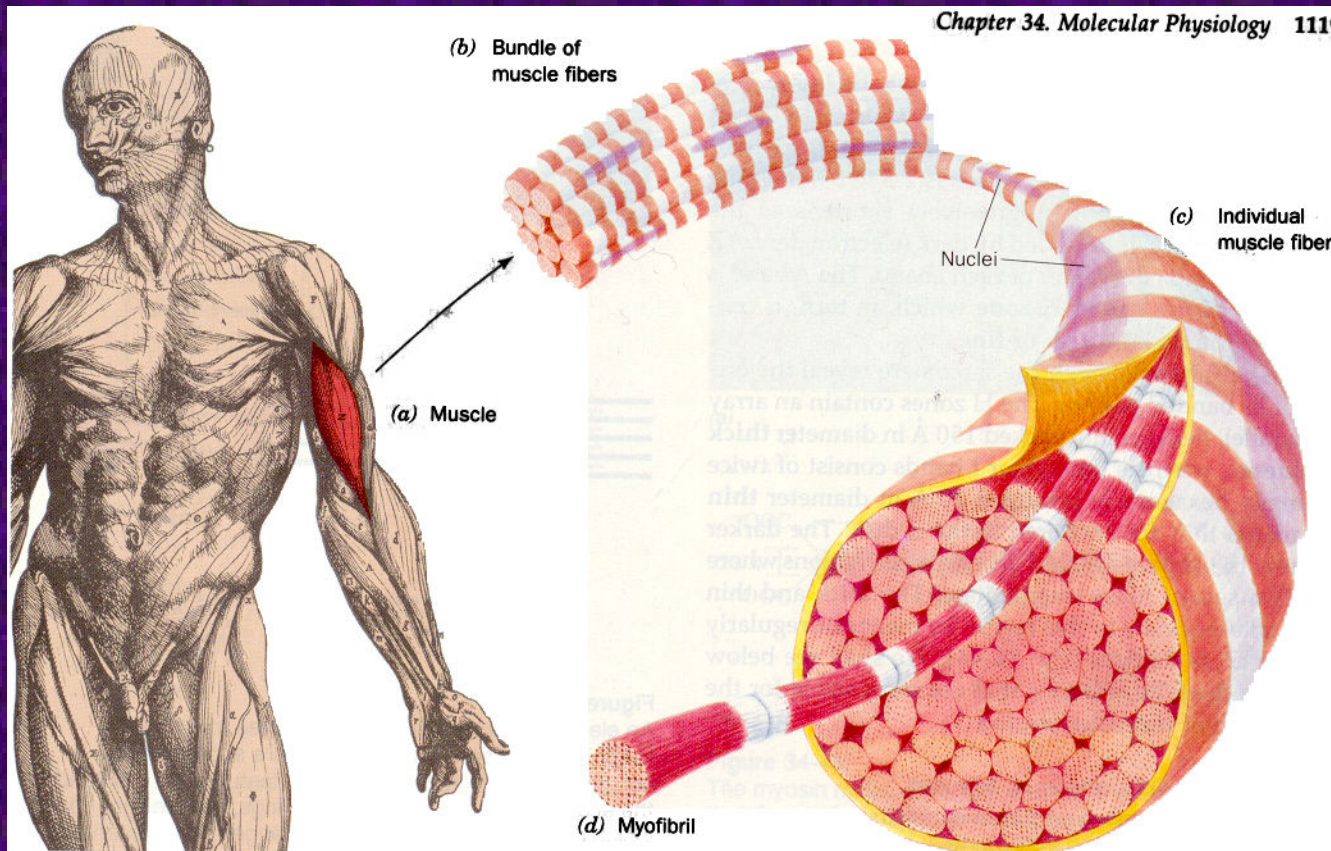


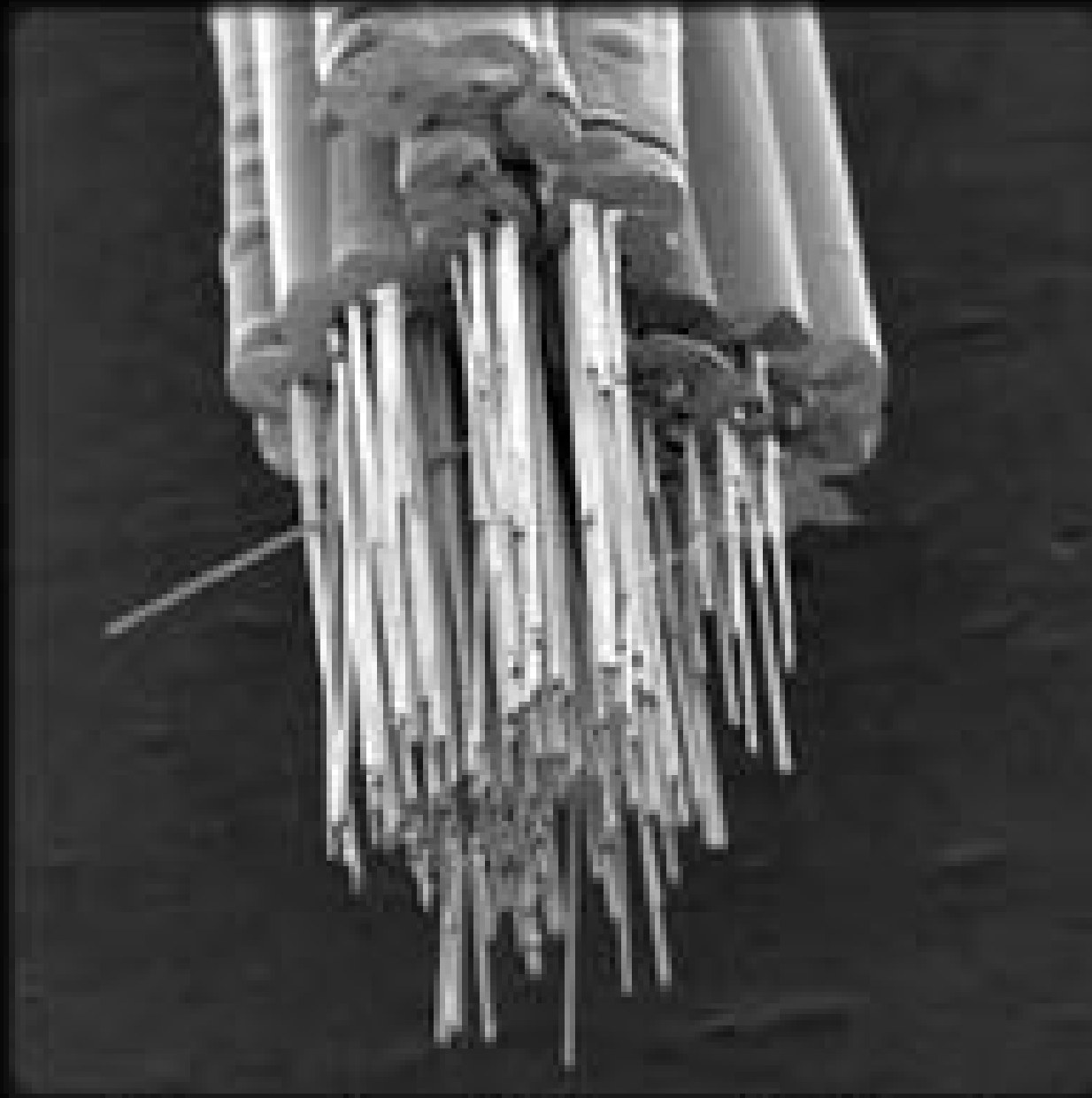
# Arrangement of Muscle Fibers

- **Origin to insertion**
  - Small muscles (Intercostae)
- **Angular**
  - Angular to longitudinal section of the muscle (Longissimus dorsi)
- **Fusiform**
  - Fibers run parallel to the muscle (Biceps brachii)
- **Pinnate (uni, bi, multi)**
  - Originate from connective sheaths in leaf array (Deltoid)



# Levels of Muscle Structure

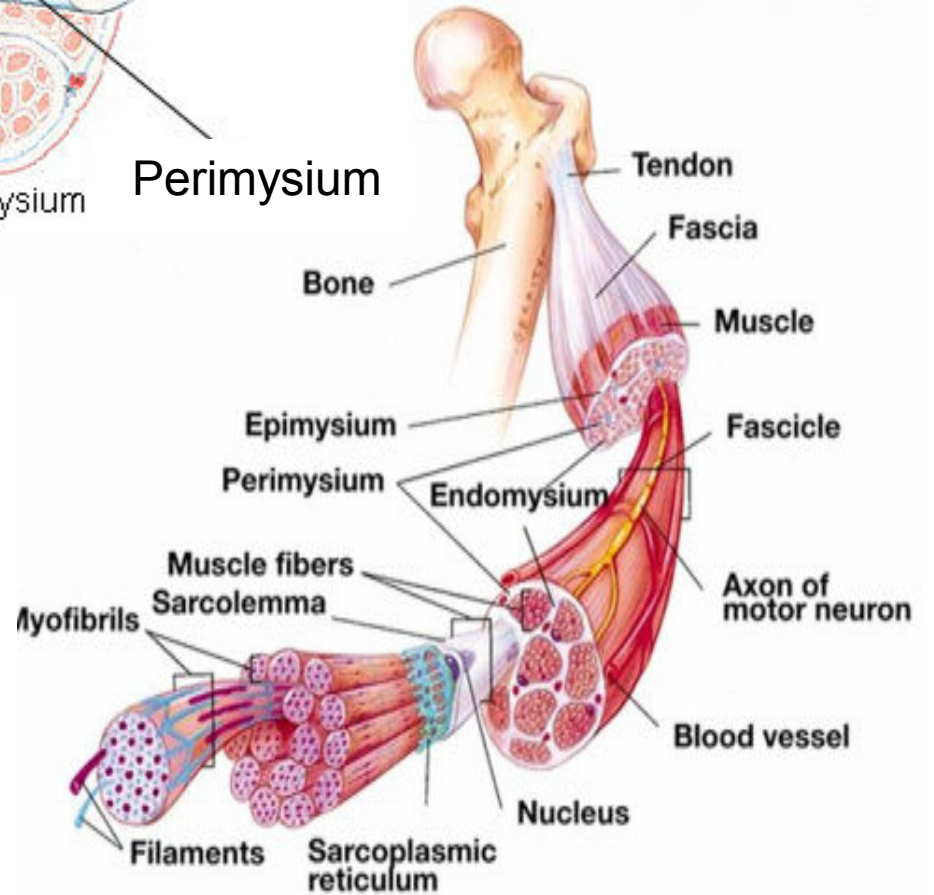
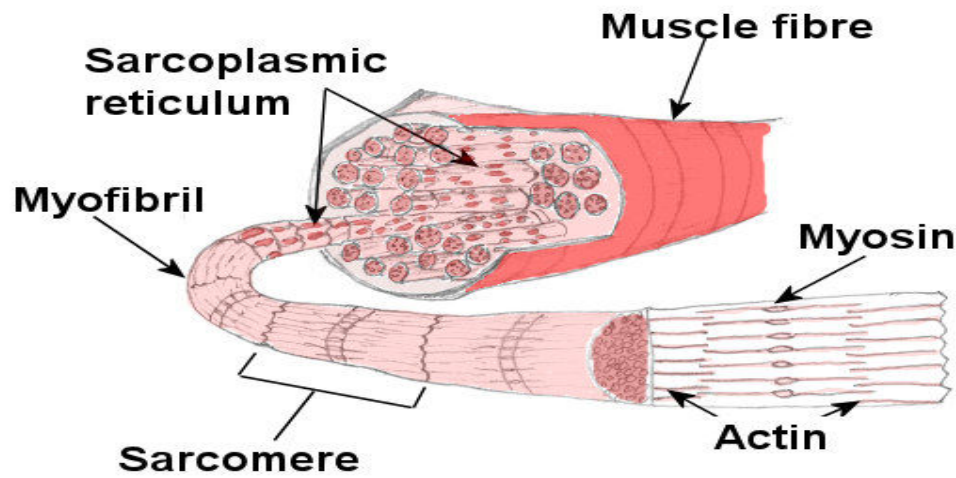
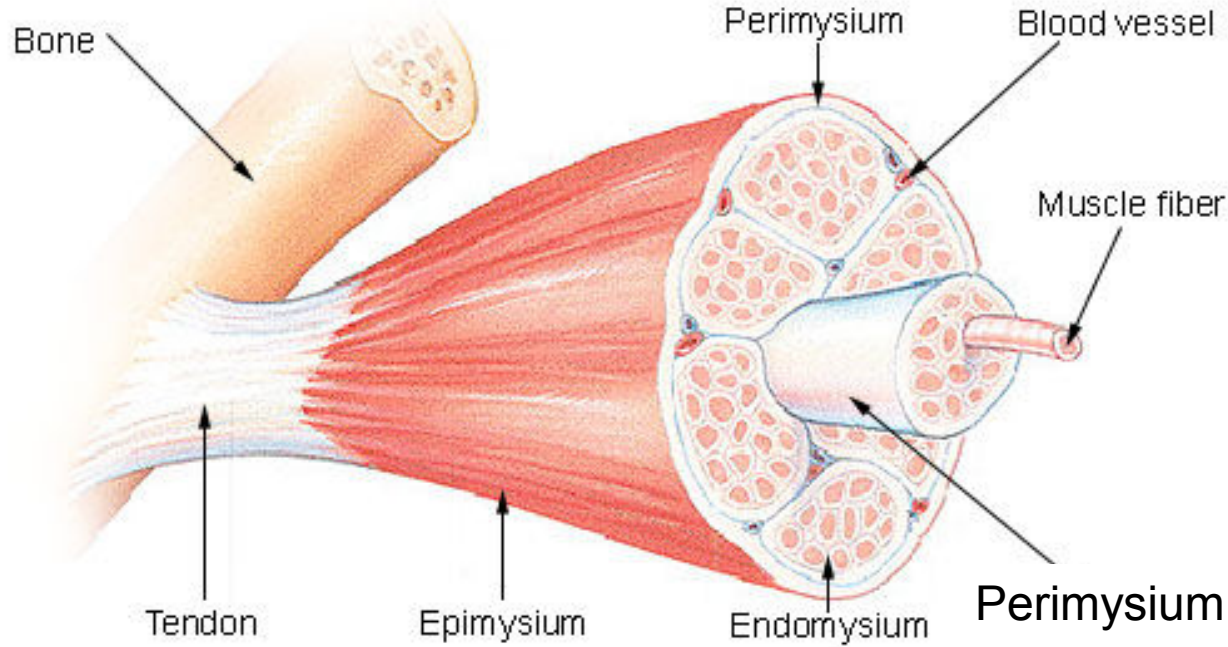




Muscle Fiber (150x)



# Structure of a Skeletal Muscle





# What holds all of this together?

- **Connective Tissue**
- **Epimysium**
  - around muscle body
- **Perimysium**
  - around muscle bundles
- **Endomysium**
  - around myofibers

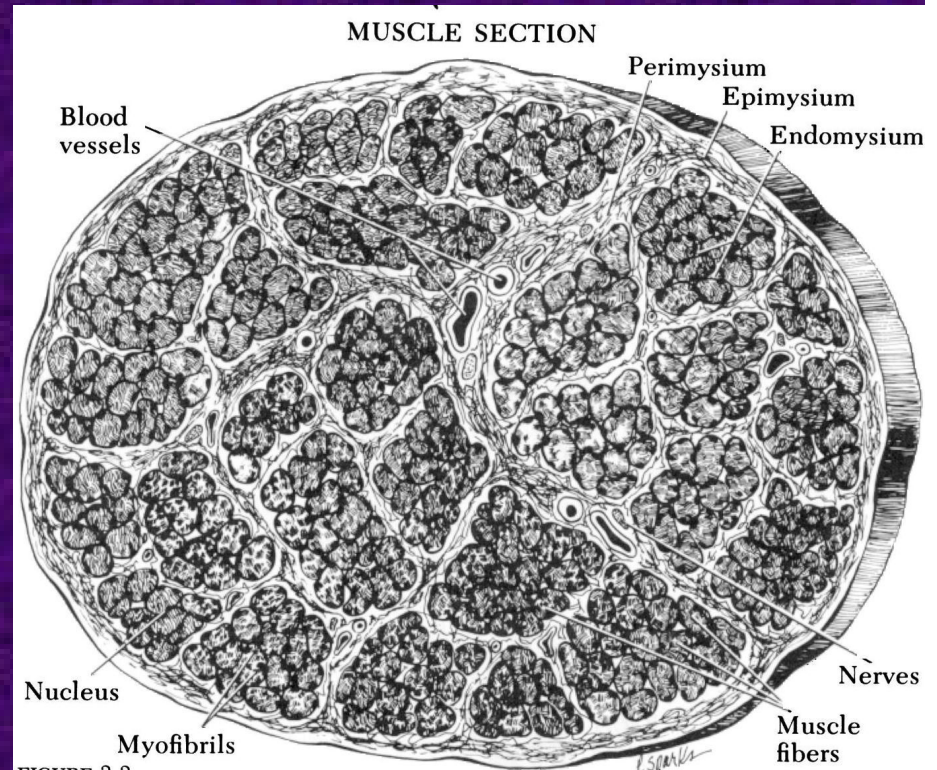


FIGURE 3-3

Drawing of a skeletal muscle in cross section showing muscle fibers, bundle arrangement, pervading connective tissues, nerves, and blood vessels. [Modified from J. E. Crouch, *Functional Human Anatomy*, 2nd ed. 1972. Lea & Febiger, Philadelphia.]

# Other types of Connective Tissue

- Your body and an animals body actually has 3 types of connective tissue
- **Collagen**
  - Most abundant protein (20 – 30%)
  - H<sub>2</sub>O soluble
  - Inelastic
- **Elastin**
  - Very elastic
  - Not H<sub>2</sub>O soluble
  - Blood vessels, tendons, & ligaments
- **Reticular Fibers**
  - Small and Delicate
  - Surrounds many organs