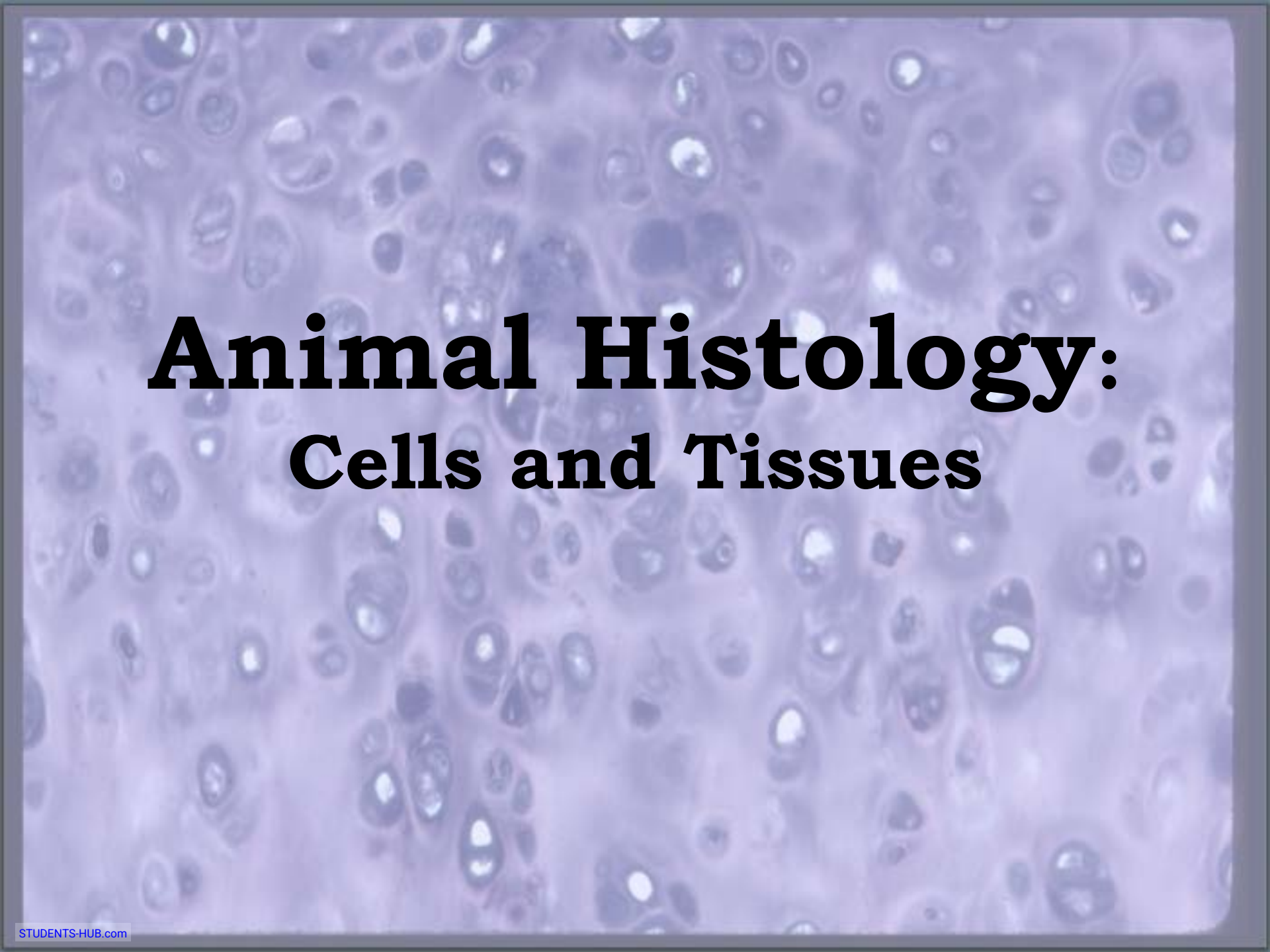


A microscopic view of animal cells, showing numerous cells with prominent nuclei and varying shapes, typical of a tissue section. The cells are stained, likely with hematoxylin and eosin (H&E), giving them a pinkish-purple appearance. The nuclei are dark purple, and the cytoplasm and extracellular matrix are lighter pink.

Animal Histology: Cells and Tissues

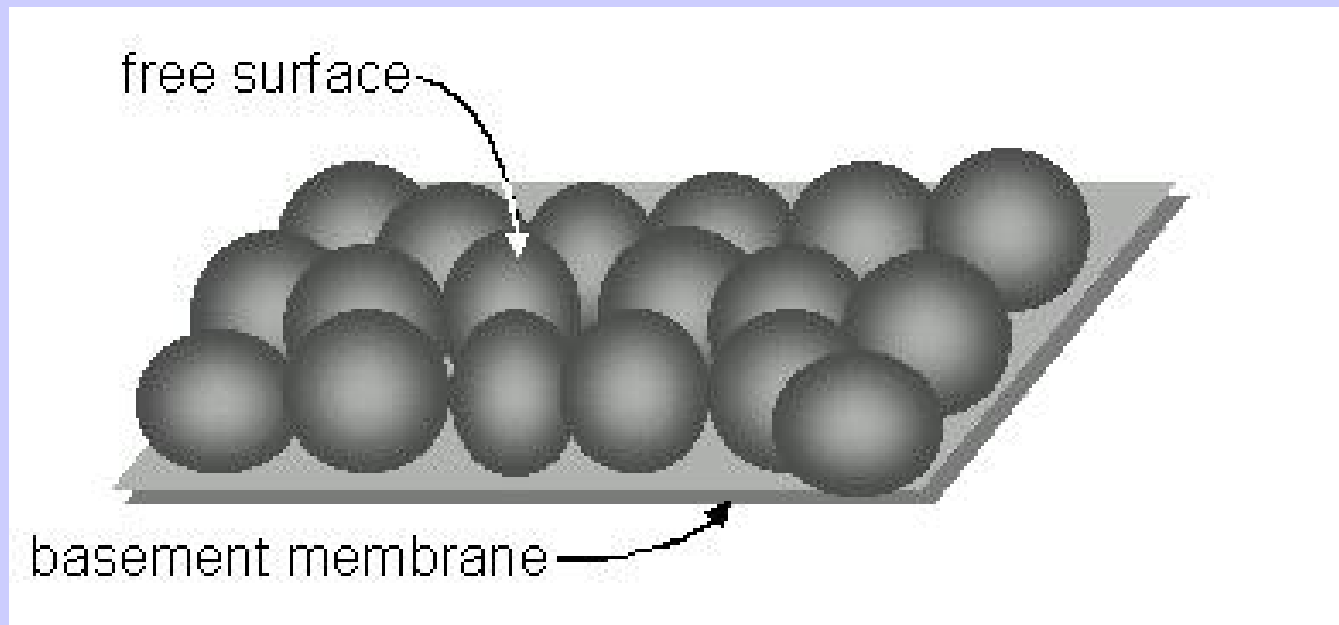
Tissues

- How do we define ***tissue***?
- Tissues are groups of specialized cells that work together for a particular function.
- There are four types of tissue.
 - **Epithelial** (covering)
 - **Connective** (support)
 - **Muscle** (movement)
 - **Nervous** (control)

1. Epithelial Tissues

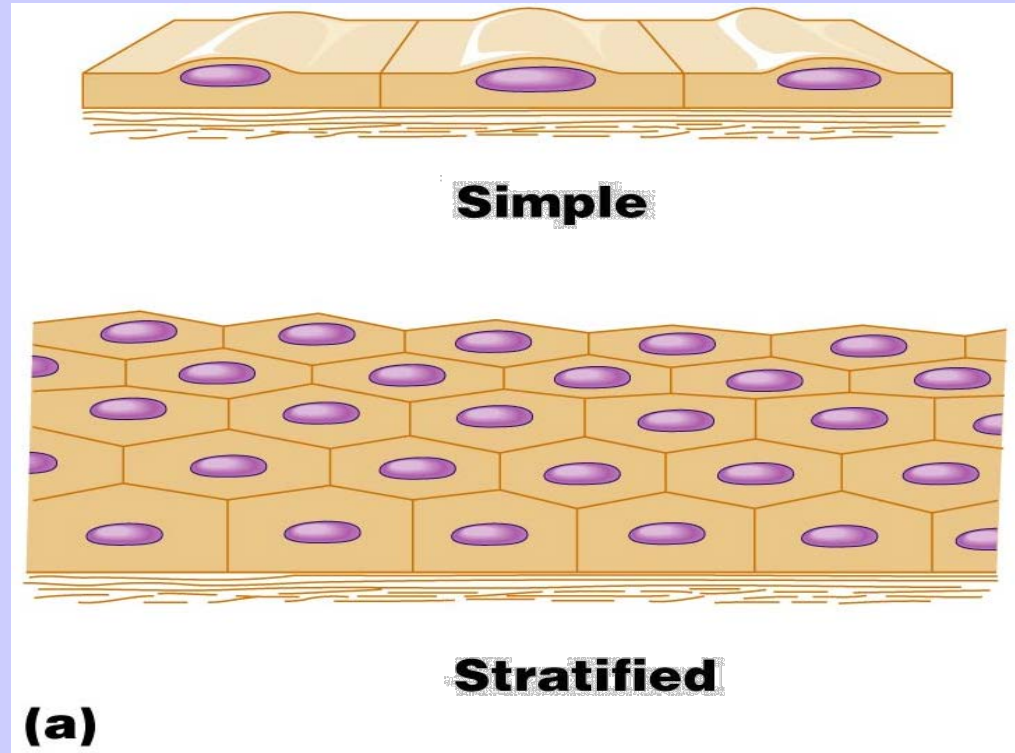
- Epithelial tissue is made of closely-packed cells arranged in flat sheets.
- Epithelia form the surface of the skin, line the various cavities and tubes of the body, and cover the internal organs.

- One surface of the tissue is free and the other adheres to a basement membrane.



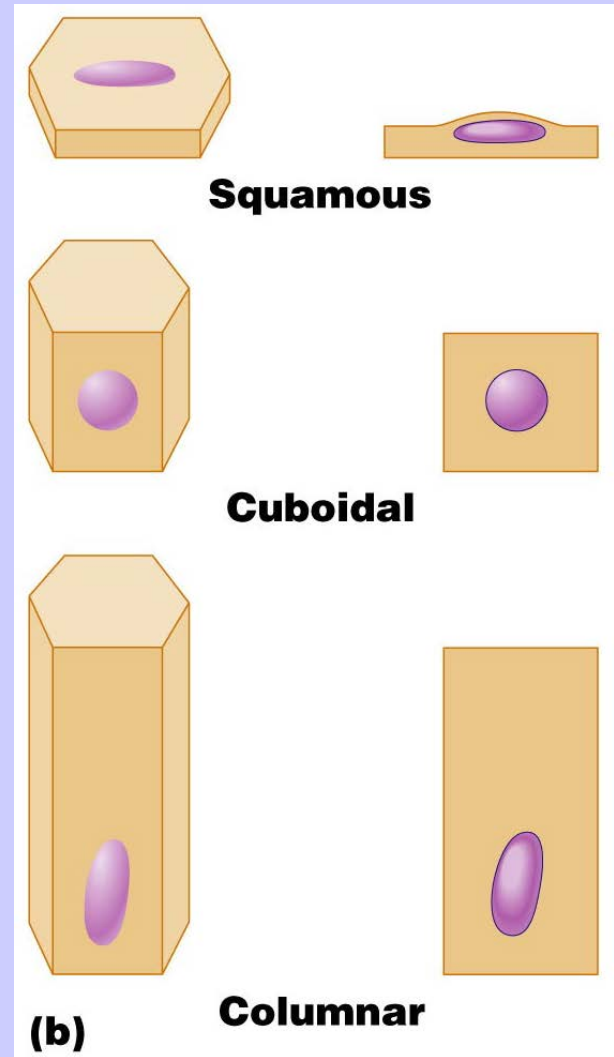
Classification of Epithelium

- Each epithelium is given 2 names
- *First*: indicates relative number of cell layers
 - **Simple** (one layer of cells)
 - **Stratified** (more than one cell layer)



Classification of Epithelium

- *Second:*
describes the shape of cells
 - **Squamous**
(cells flattened like scales)
 - **Cuboidal**
(cube-shaped)
 - **Columnar**
(shaped like columns)

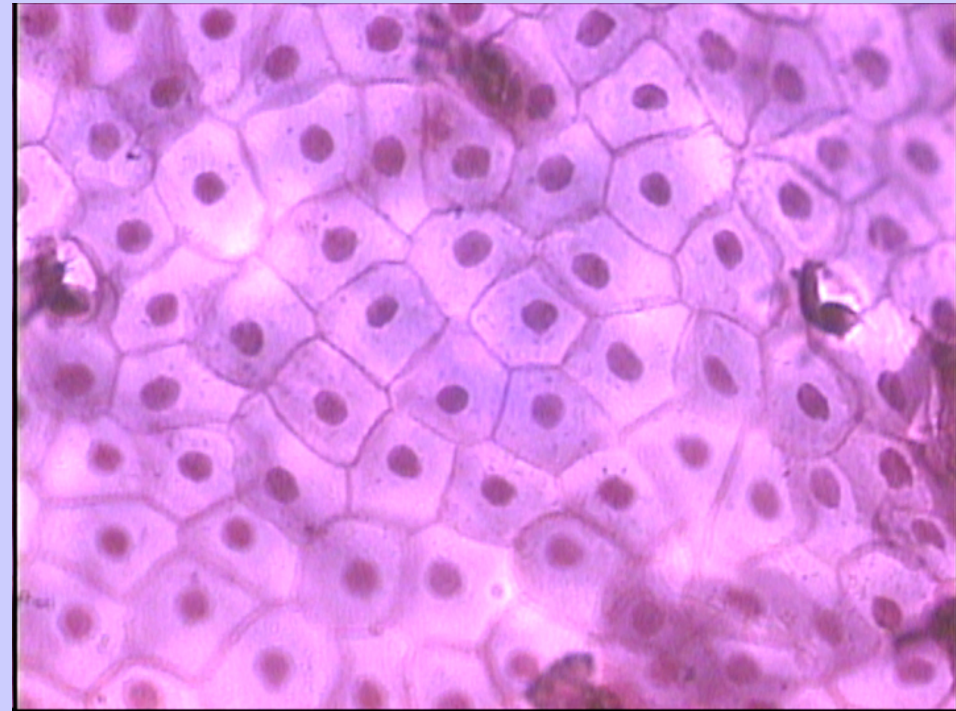


Simple Squamous Epithelium

- Simple squamous (SS) tissue is composed of flat, scale-like cells that usually forms membranes
- It lines the walls of blood vessels, pulmonary alveoli (shown here), and the lining of the heart, lung.

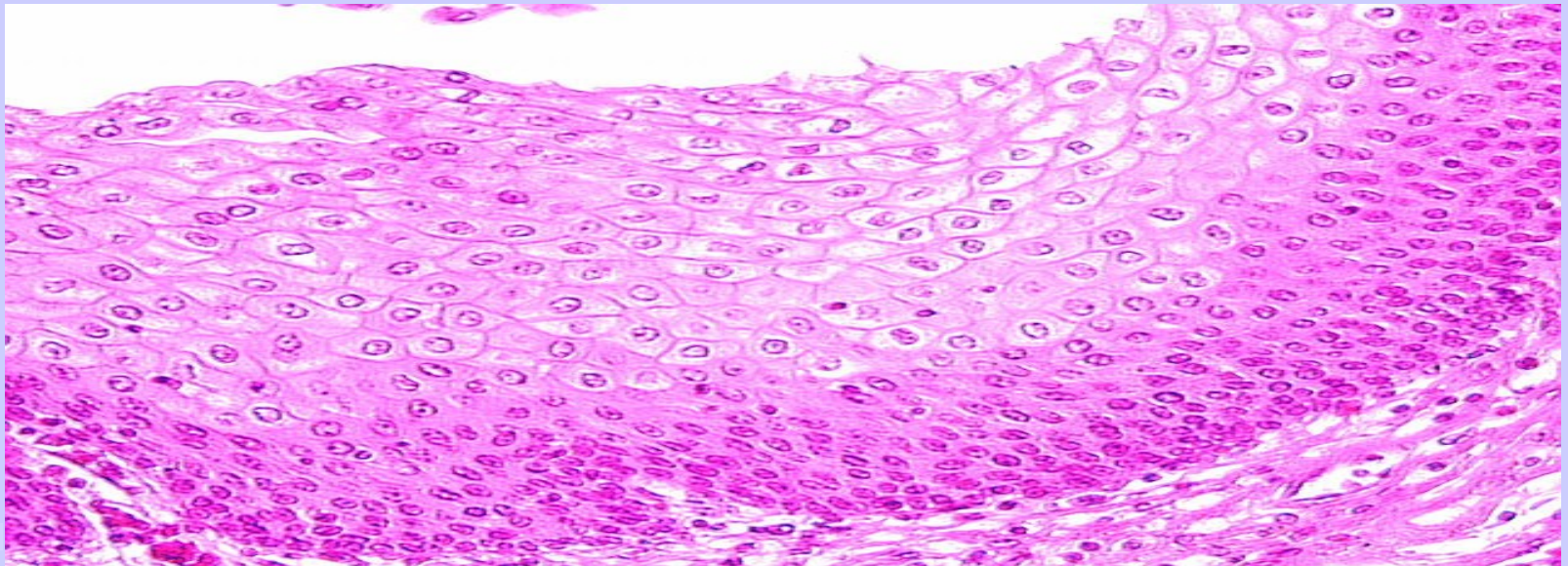


Simple squamous



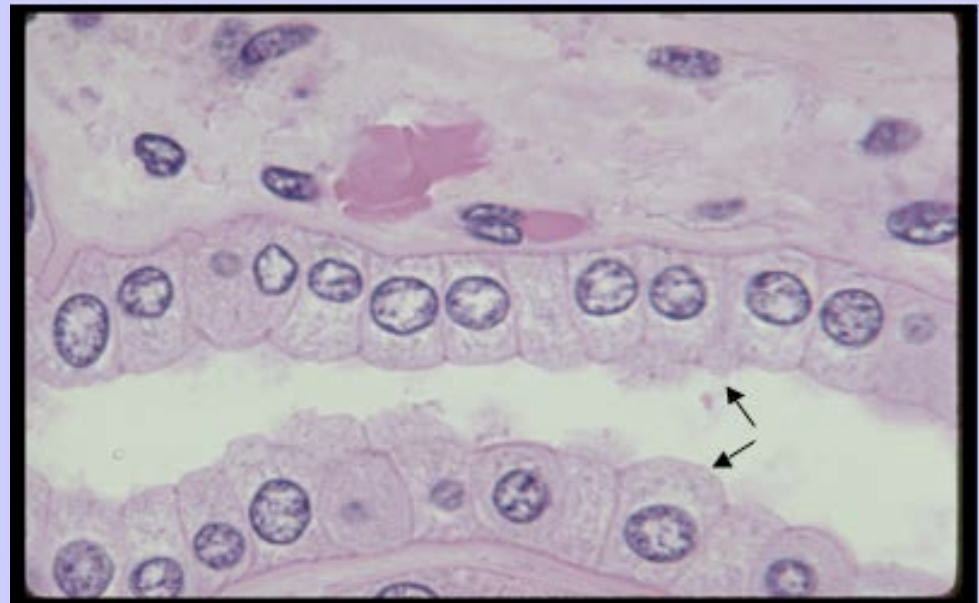
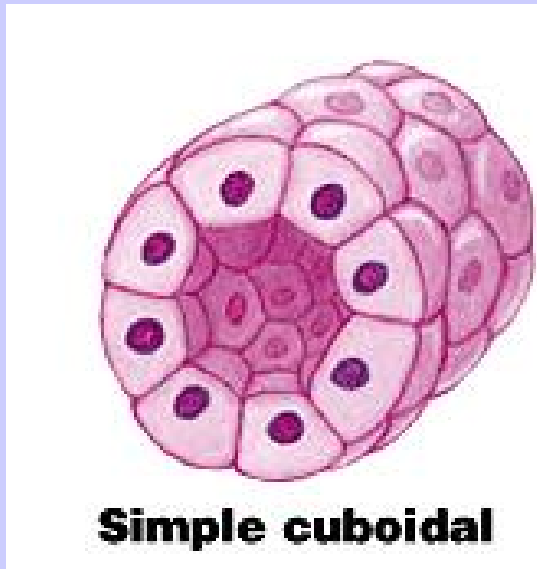
Stratified Squamous Epithelium

- The term “stratified” refers to the layered arrangement of cells.
- The outer layers of cells appear flat, but the inner cells vary in shape from cuboidal to columnar.
- Stratified squamous epithelium serves as a barrier to the outside environment in locations such as the skin, mouth, and esophagus.



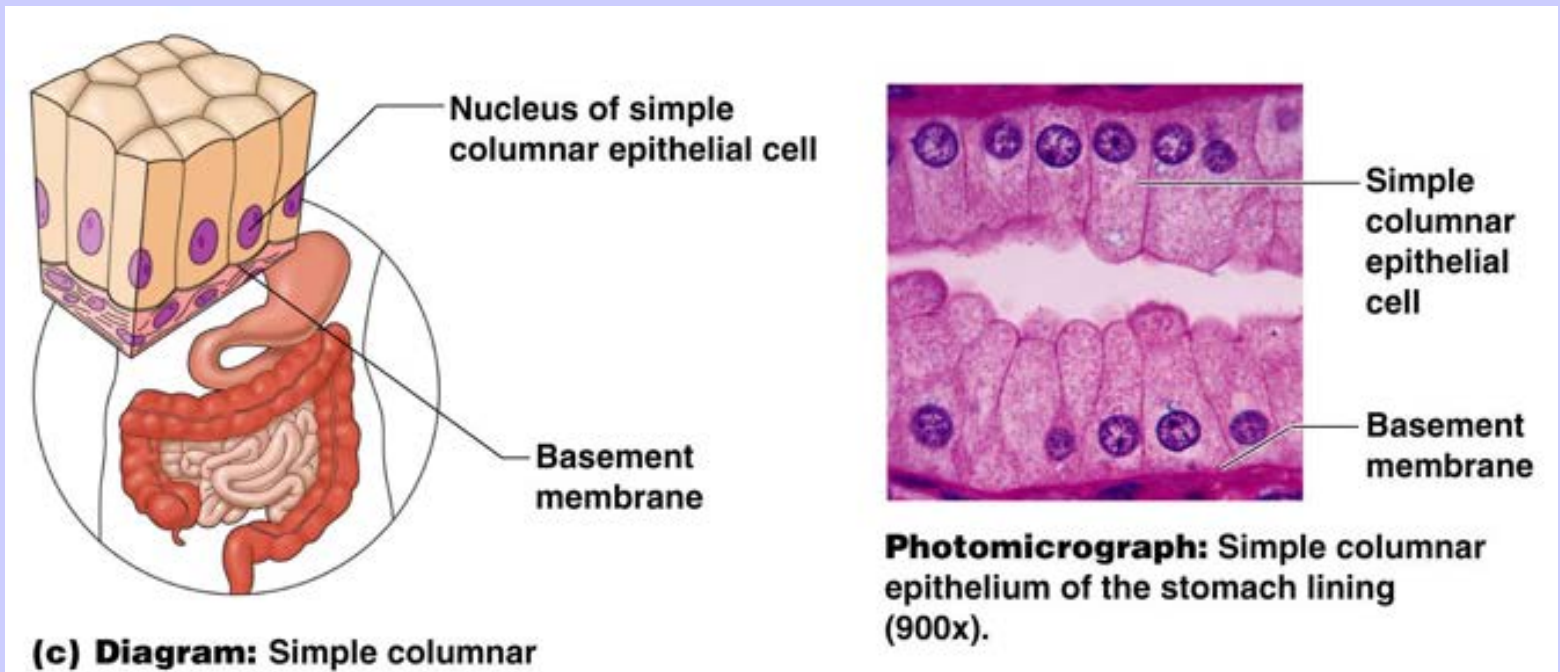
Simple Cuboidal Epithelium

- This tissue is composed of a single layer of cube-like cells.
- It lines the walls of kidney tubules, covers the surface of ovaries, and is common in glands and their ducts.



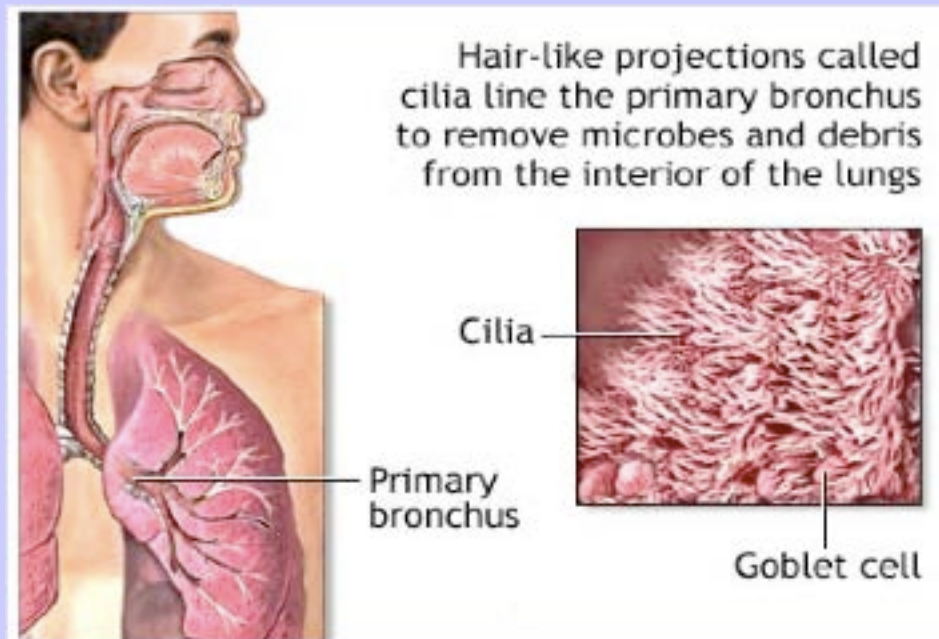
Simple Columnar Epithelium

- This tissue is composed of a single layer of tall cells.
- It often includes mucus-producing **goblet cells**.
- It often lines the digestive tract.



Ciliated Epithelium

- Some epithelial membranes are made up of cells with cilia, tiny projections that beat in harmony to move mucus along the surface.
- Ciliated epithelia in the trachea, for example, sweep debris out of the respiratory tract.



2. Connective Tissue

- The cells of connective tissue are embedded in a great amount of extracellular material. This matrix is secreted by the cells.

Connective Tissue

- Connective tissues function to
 - bind other tissues together
 - provide support
 - provide nourishment
 - store wastes
 - repair damaged tissues

Types of Connective Tissue

A. Proper connective tissue

- **(Dense) Binding connective tissue:**
 - Tendons: connect muscle to bone.
 - Ligaments: attach one bone to another.
 - Fibrous.
- **Loose connective tissue**
 - Areolar
 - Adipose

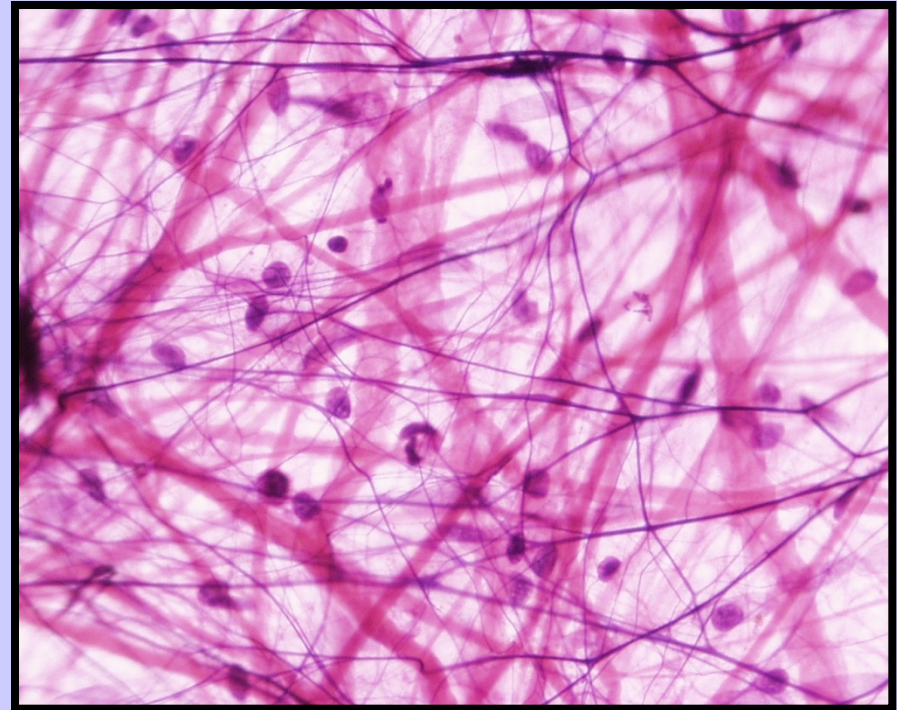
B. Liquid connective tissues: Blood, Lymph

C. Cartilage

D. Bone

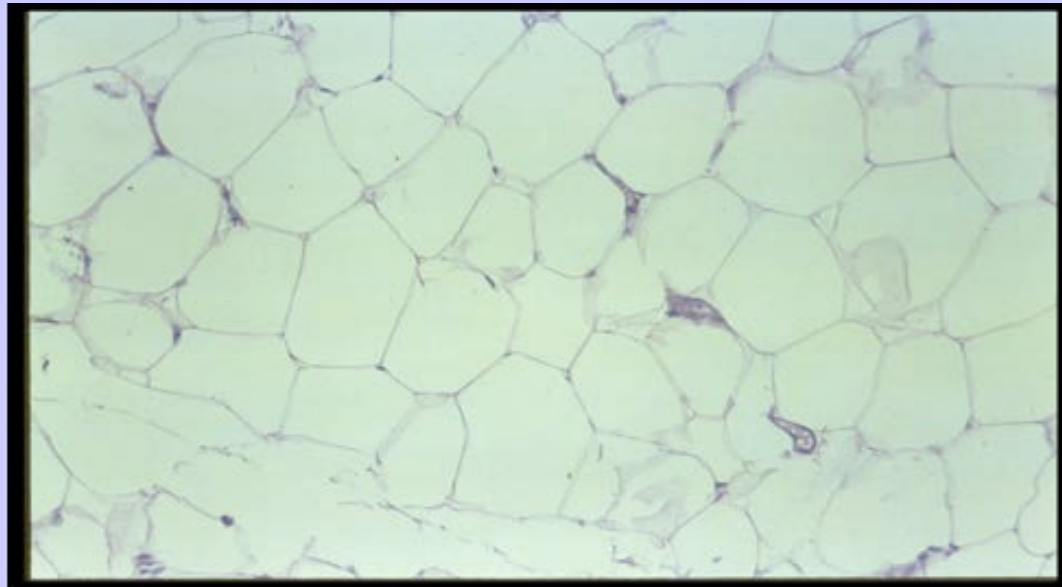
Areolar Tissue

- Most widely distributed connective tissue
- Soft tissue that cushions and protects the body's organs it wraps
- Holds internal organs together and in their proper positions
- Under microscope: matrix appears as empty space, reservoir of water and salts



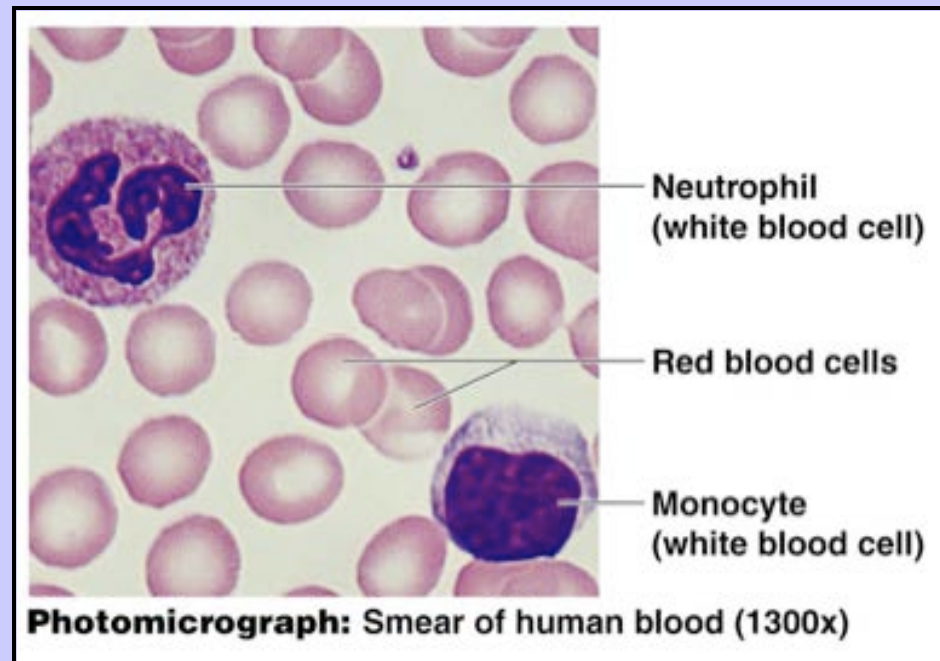
Adipose Tissue

- Adipose cells are bundled together by connective tissue.
- Each cell appears as a clear space, representing the site of the large drop of lipid (fat) before it dissolved during preparation of the microscope slide.
- The nuclei appear as small disks on the periphery of cells.
- Functions to insulate the body, protect organs, and fuel storage



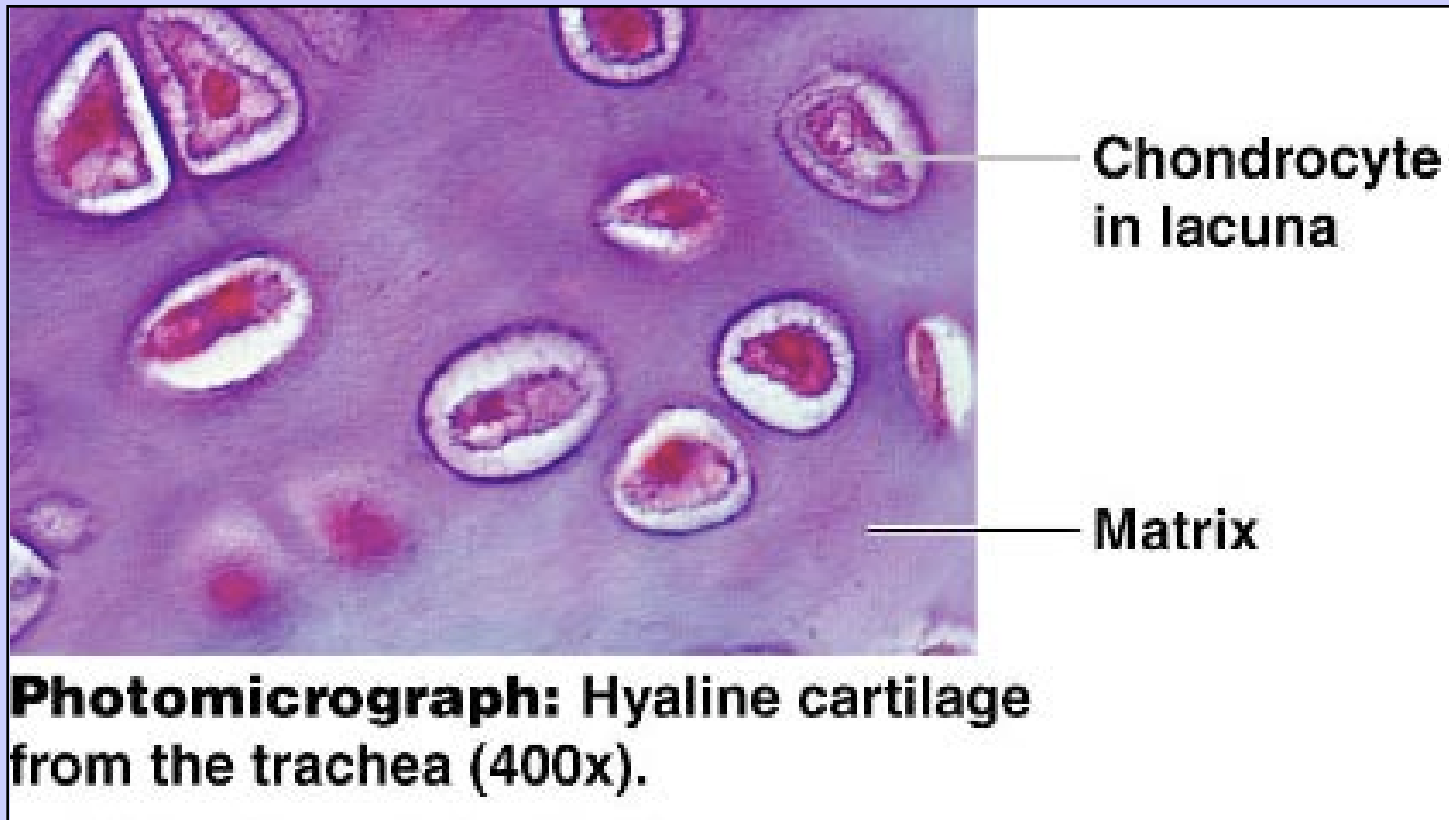
B. Blood (Vascular Tissue)

- Consists of blood cells surrounded by nonliving, fluid matrix called **blood plasma**
- ‘Fibers’ only visible during blood clotting
- Functions as a transport medium for materials



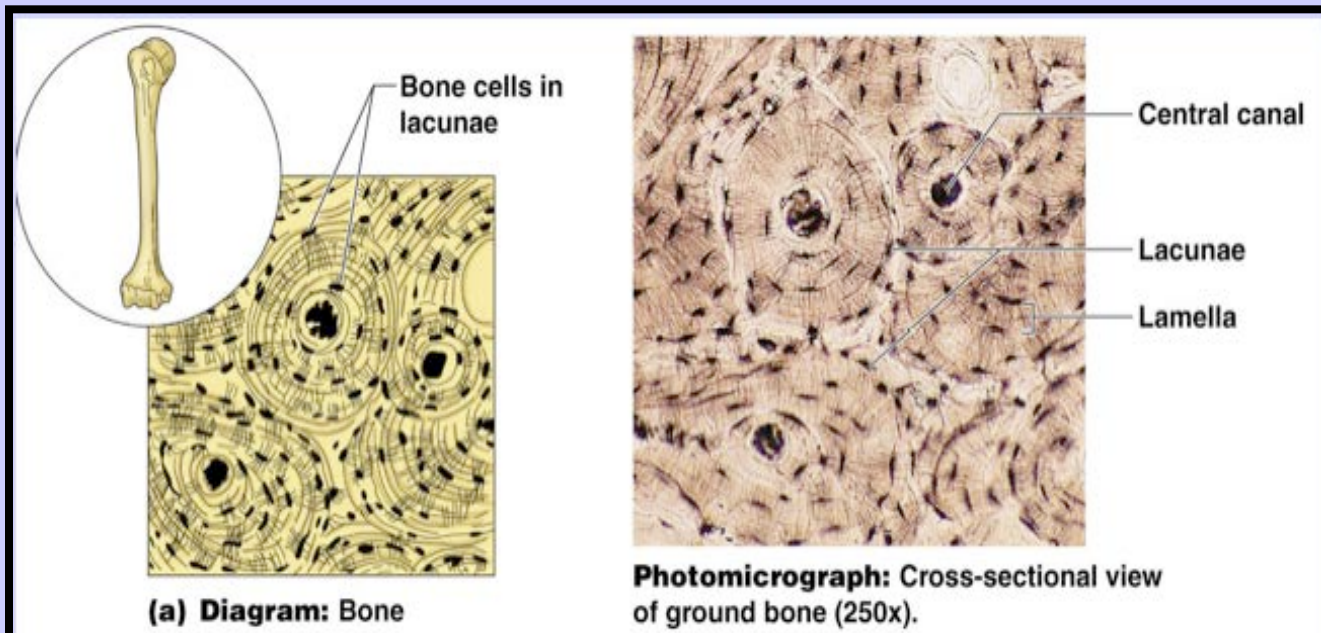
C. Cartilage

- Group of cells in a mass of intercellular substance (Matrix)
- External ears, nose, larynx, trachea, bronchi.



D. Bone

- Composed of
 - Hard matrix of calcium salts
 - Large numbers of collagen fibers
- Used to protect and support the body
- Sponge or dense/ compact
- **(Haversian (central) canal – Haversian system)**

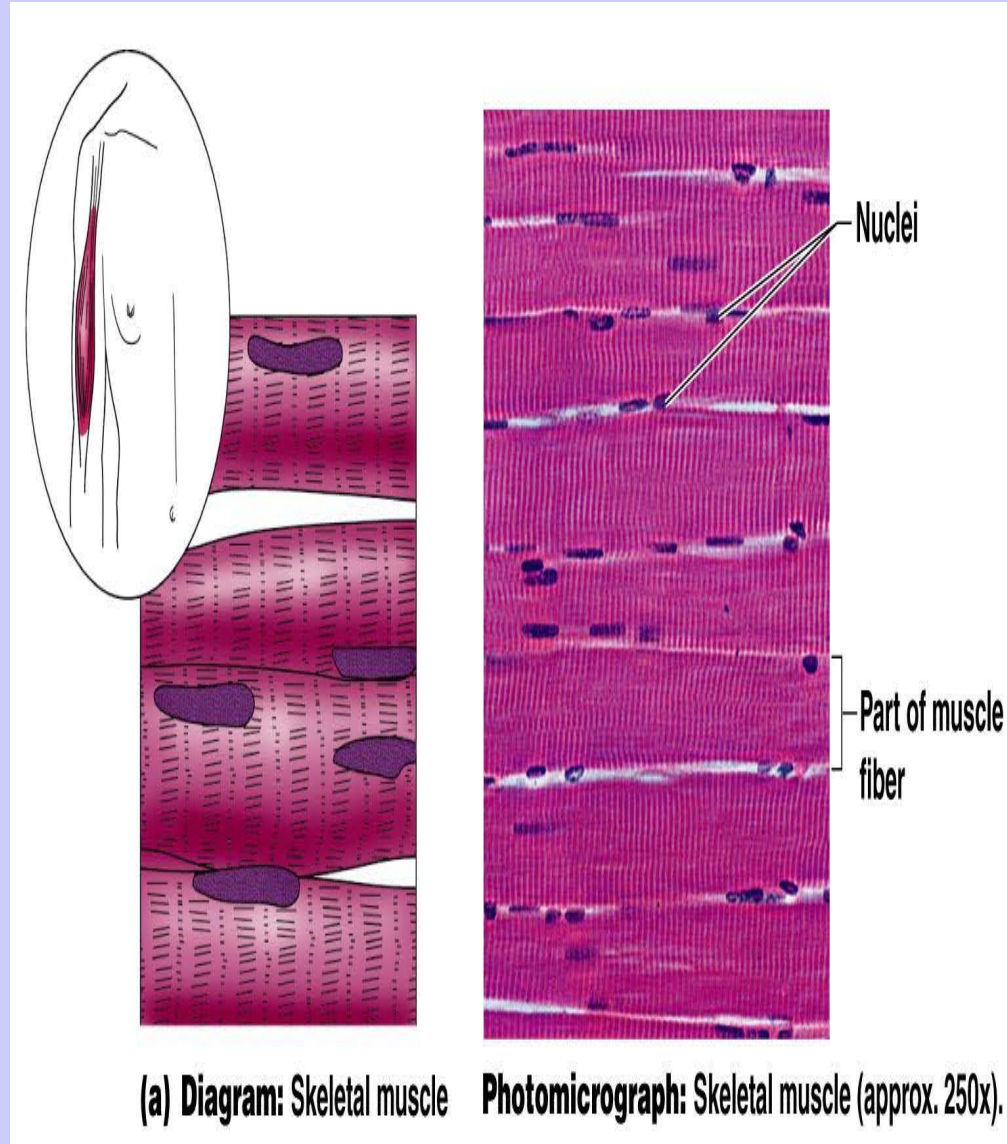


3. Muscle Tissue

- Muscle is a contractile tissue.
- There are three types of muscle:
 - Skeletal/ striated
 - Cardiac
 - Smooth / nonstriated
- Main function is to produce movement/ locomotion

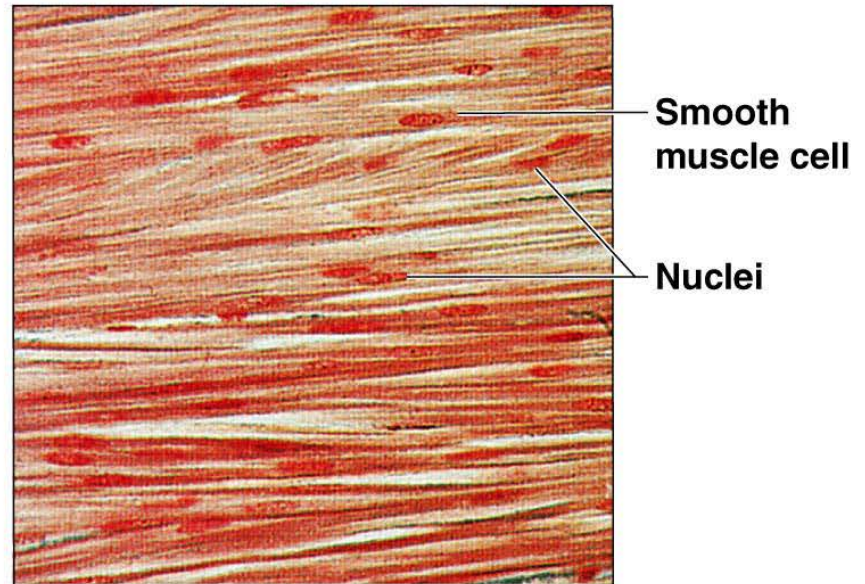
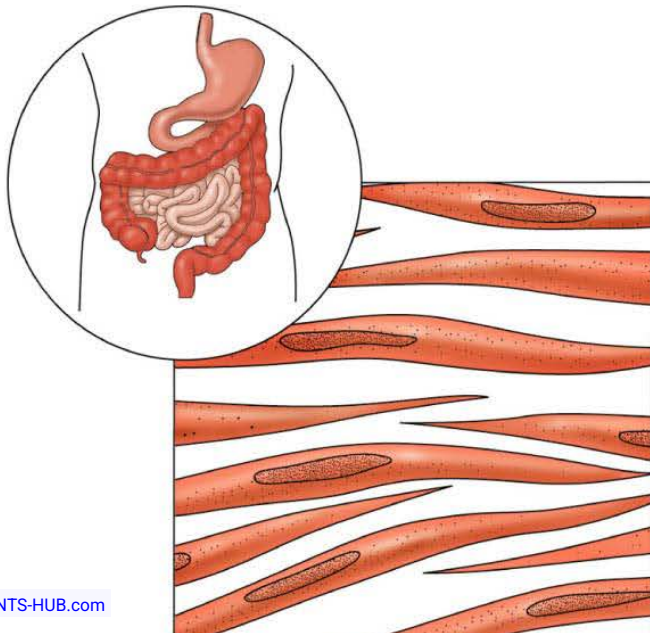
Skeletal Muscle

- Under **voluntary** control
- Characteristics of skeletal muscle cells
 - Striated (stripe-like pattern)
 - Multinucleate (more than one nucleus)
 - Long, cylindrical



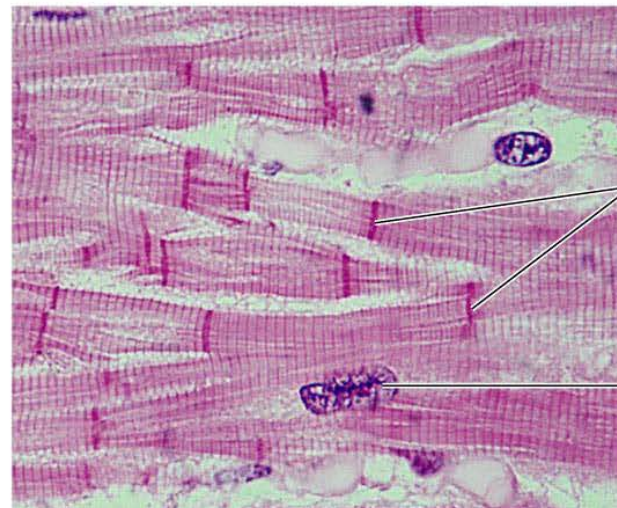
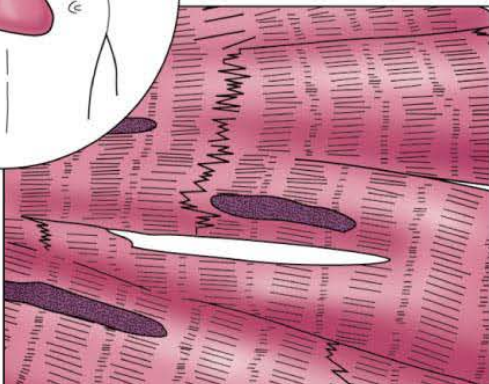
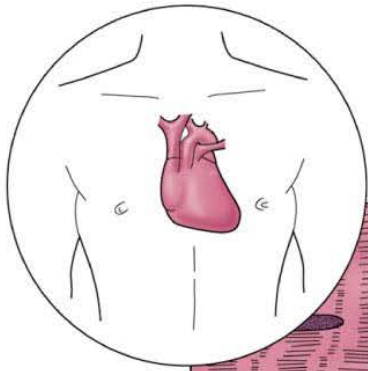
Smooth Muscle

- Under **involuntary** muscle
- Found in walls of hollow organs such as stomach, uterus, and blood vessels
- Characteristics of smooth muscle cells
 - No visible striations - One nucleus/cell - Spindle-shaped cells



Cardiac Muscle

- Under **involuntary** control
- Found only in the heart
- Characteristics of cardiac muscle cells
 - Cells are attached to other cardiac muscle cells at **intercalated discs**
 - Striated -One nucleus/cell



Intercalated discs

Nucleus

4. Nervous Tissue

- Structural units are **neurons**.
- Nervous tissue also consists of **glia**, which are the various types of supporting cells in the nervous system.

