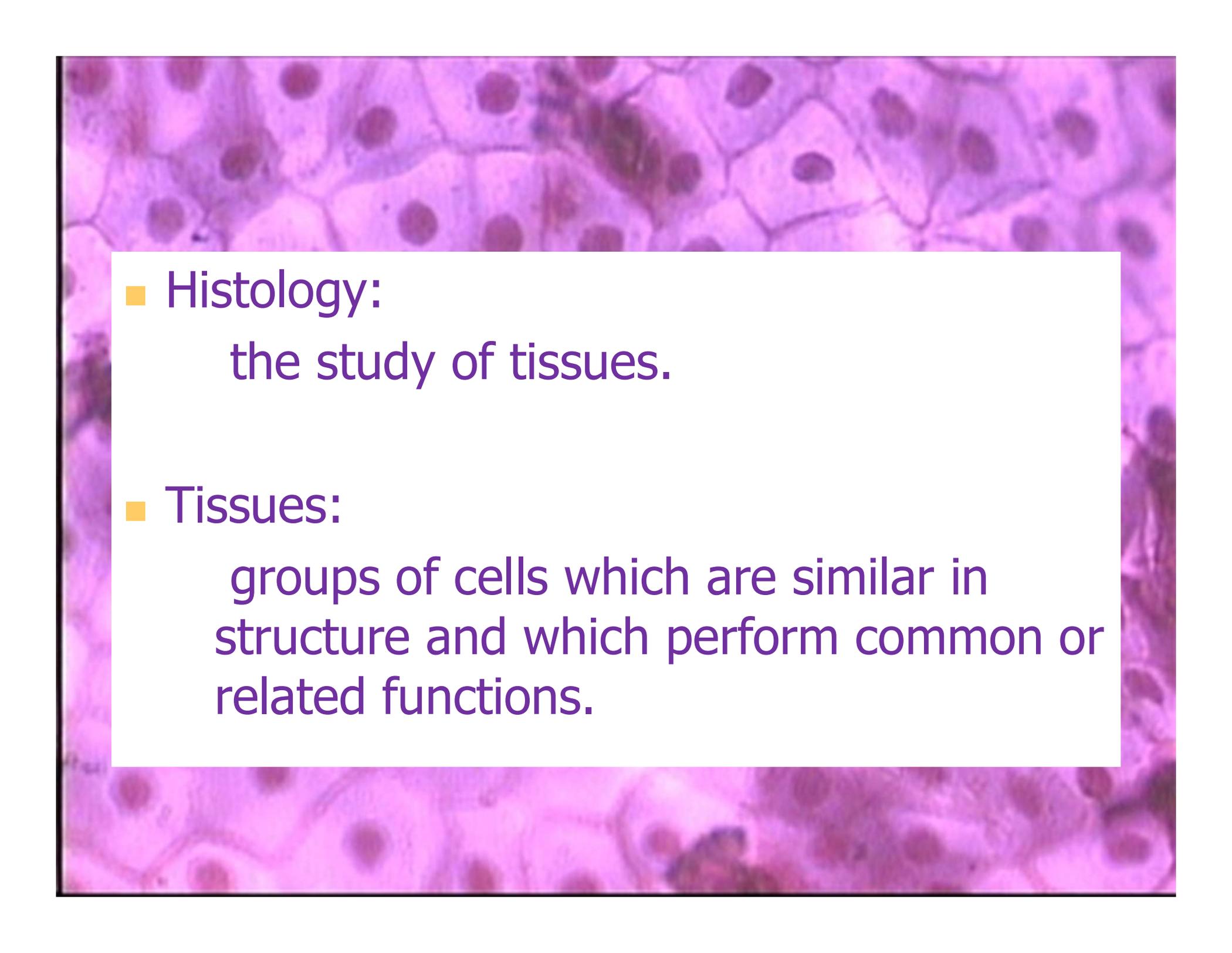
A histological micrograph showing a cross-section of stratified squamous epithelium. The tissue consists of multiple layers of cells. The surface layer is composed of flattened, squamous cells. The underlying layers are thicker and contain many more cells, with nuclei stained dark purple. The overall appearance is dense and layered.

Anatomy and Physiology I

Tissue Types



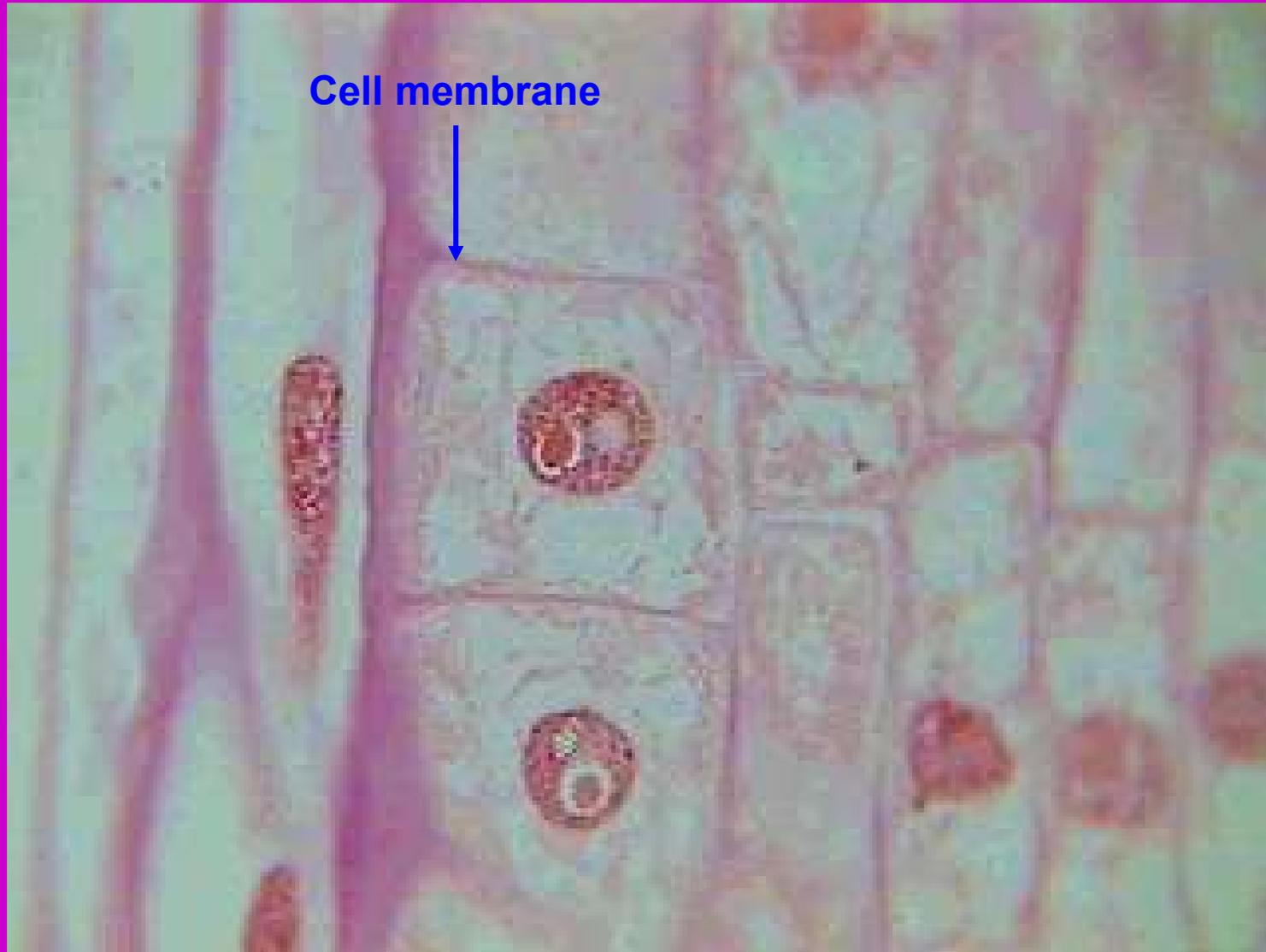
- Histology:
the study of tissues.

- Tissues:
groups of cells which are similar in structure and which perform common or related functions.

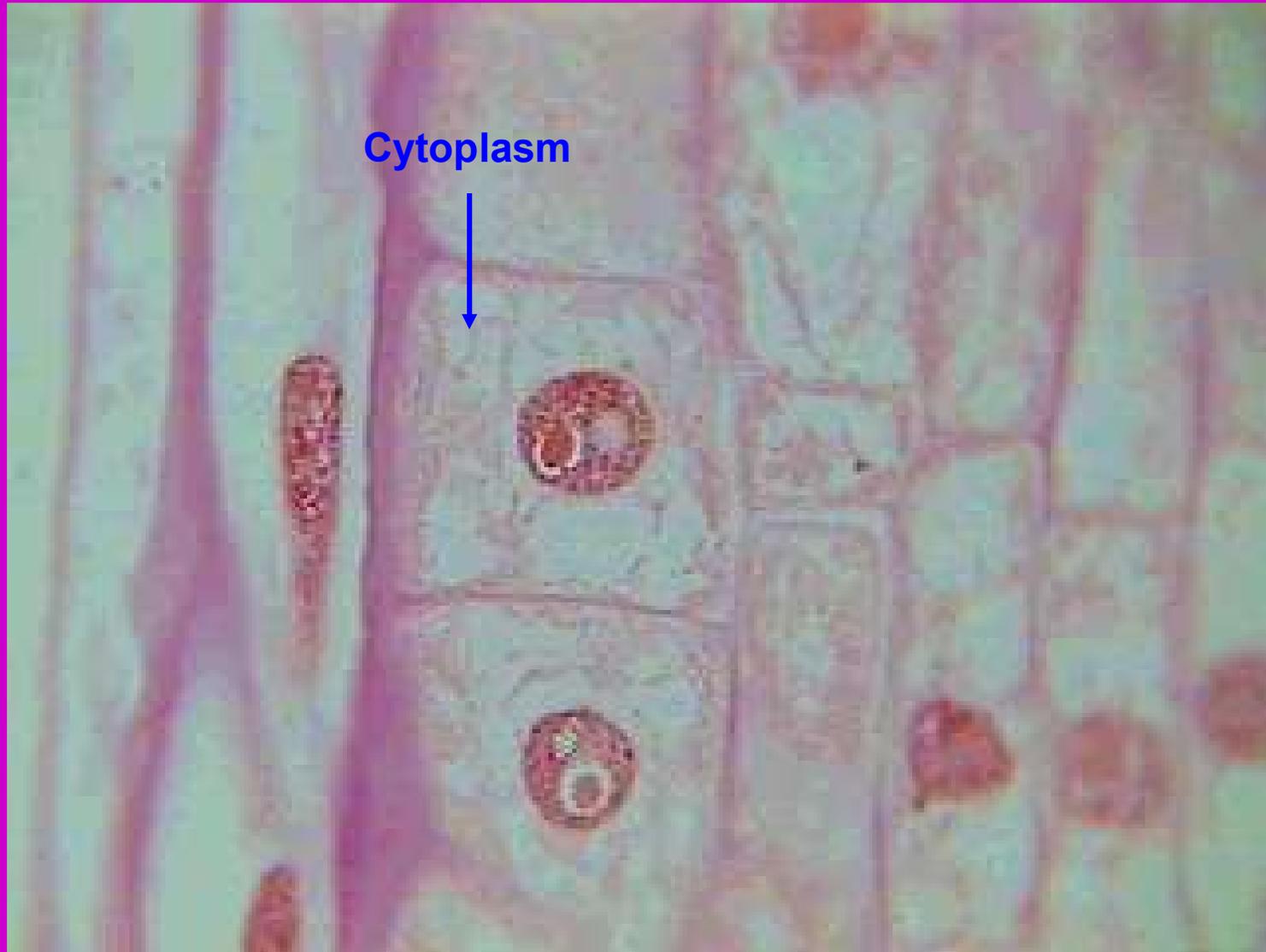


Cell Part Review

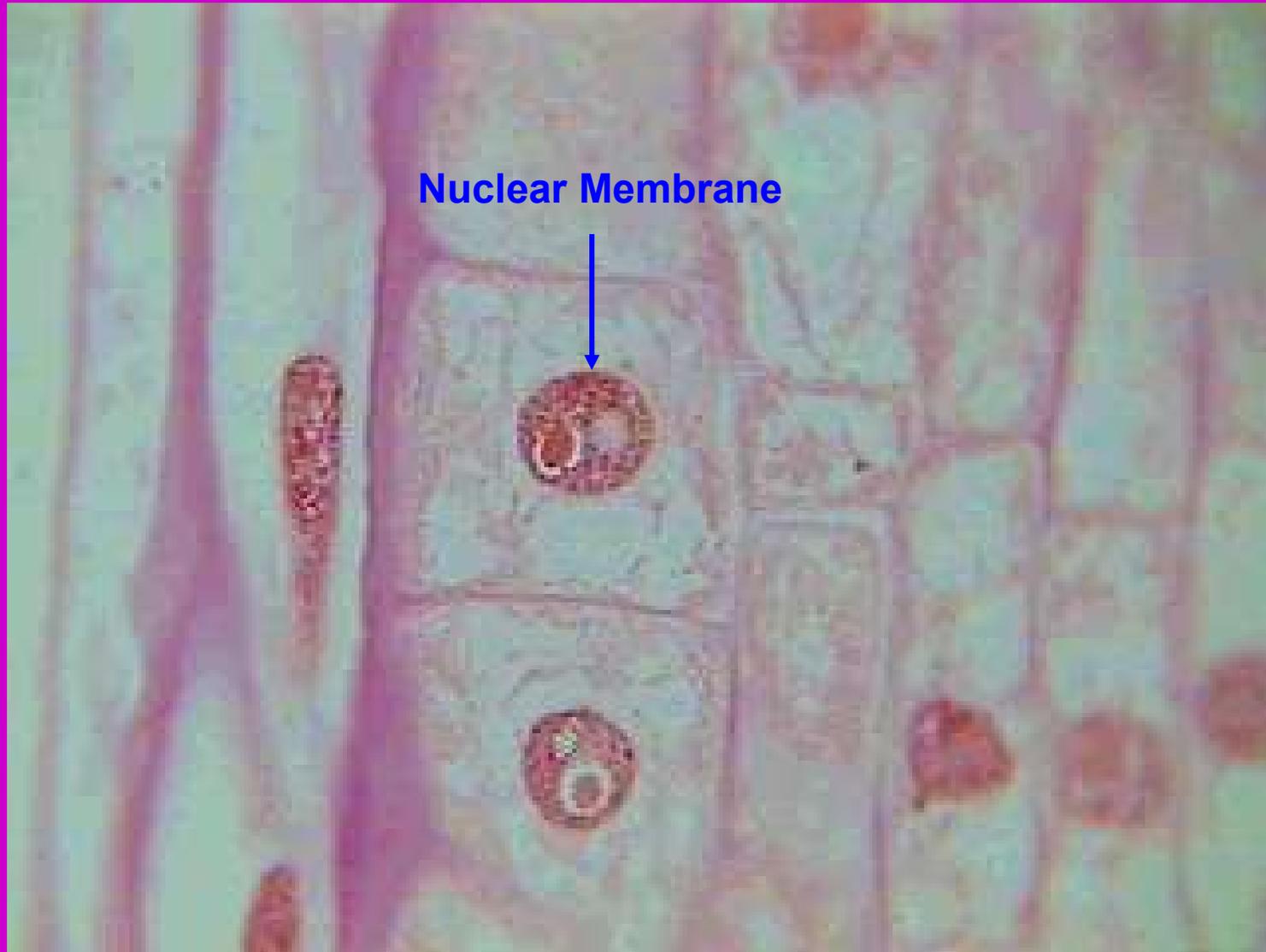
Cell Organelles - Onion



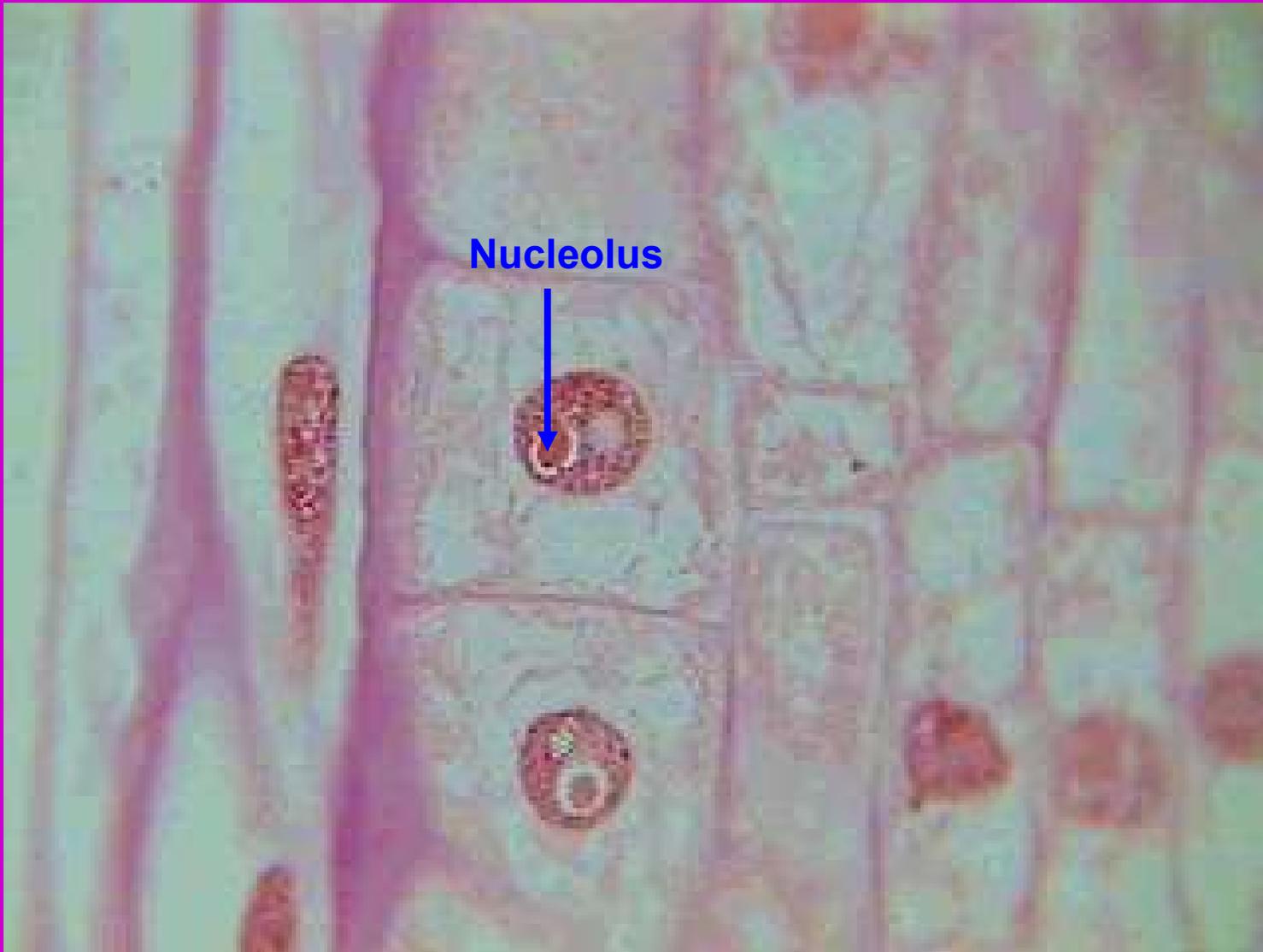
Cell Organelles - Onion



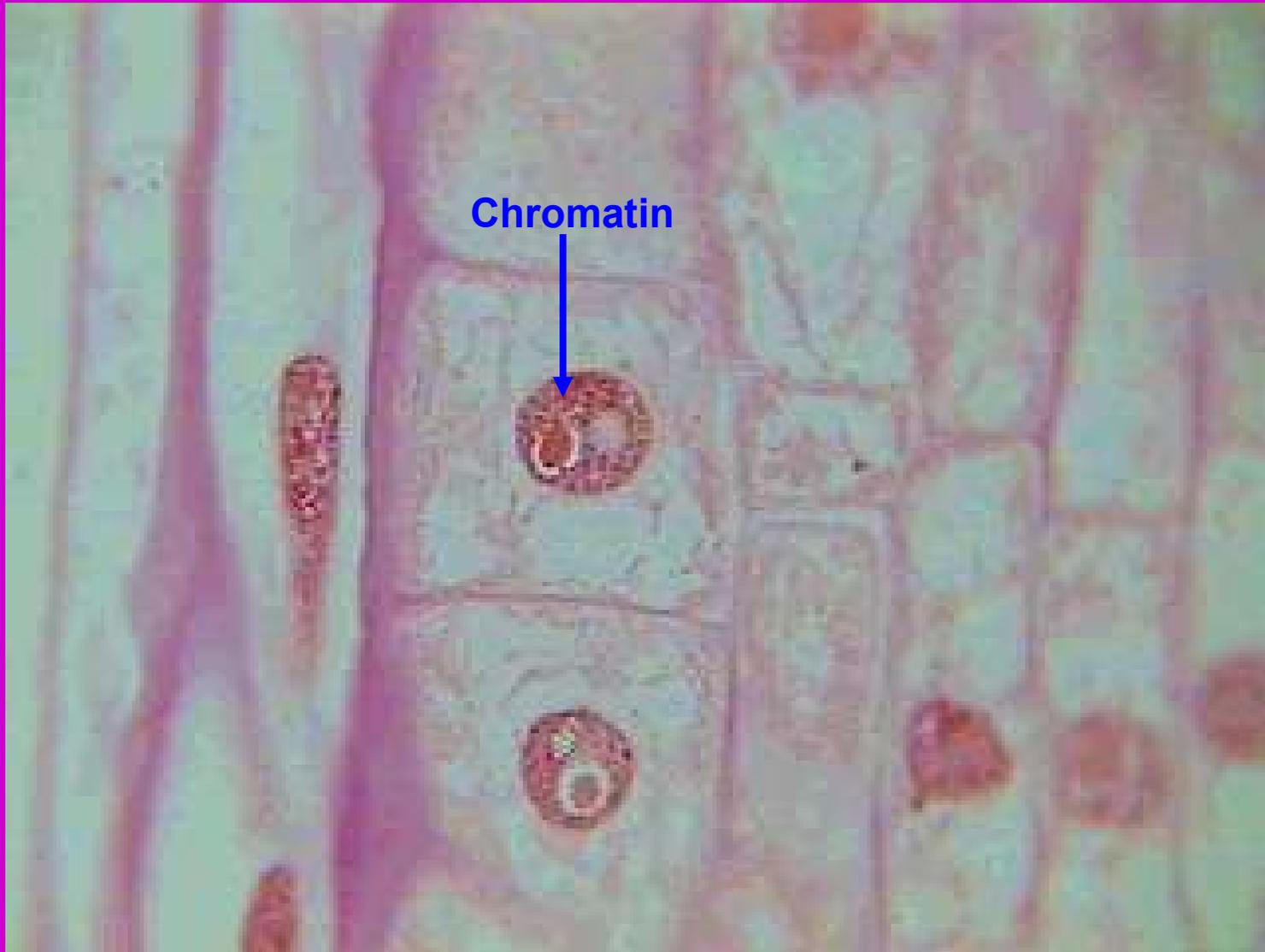
Cell Organelles - Onion



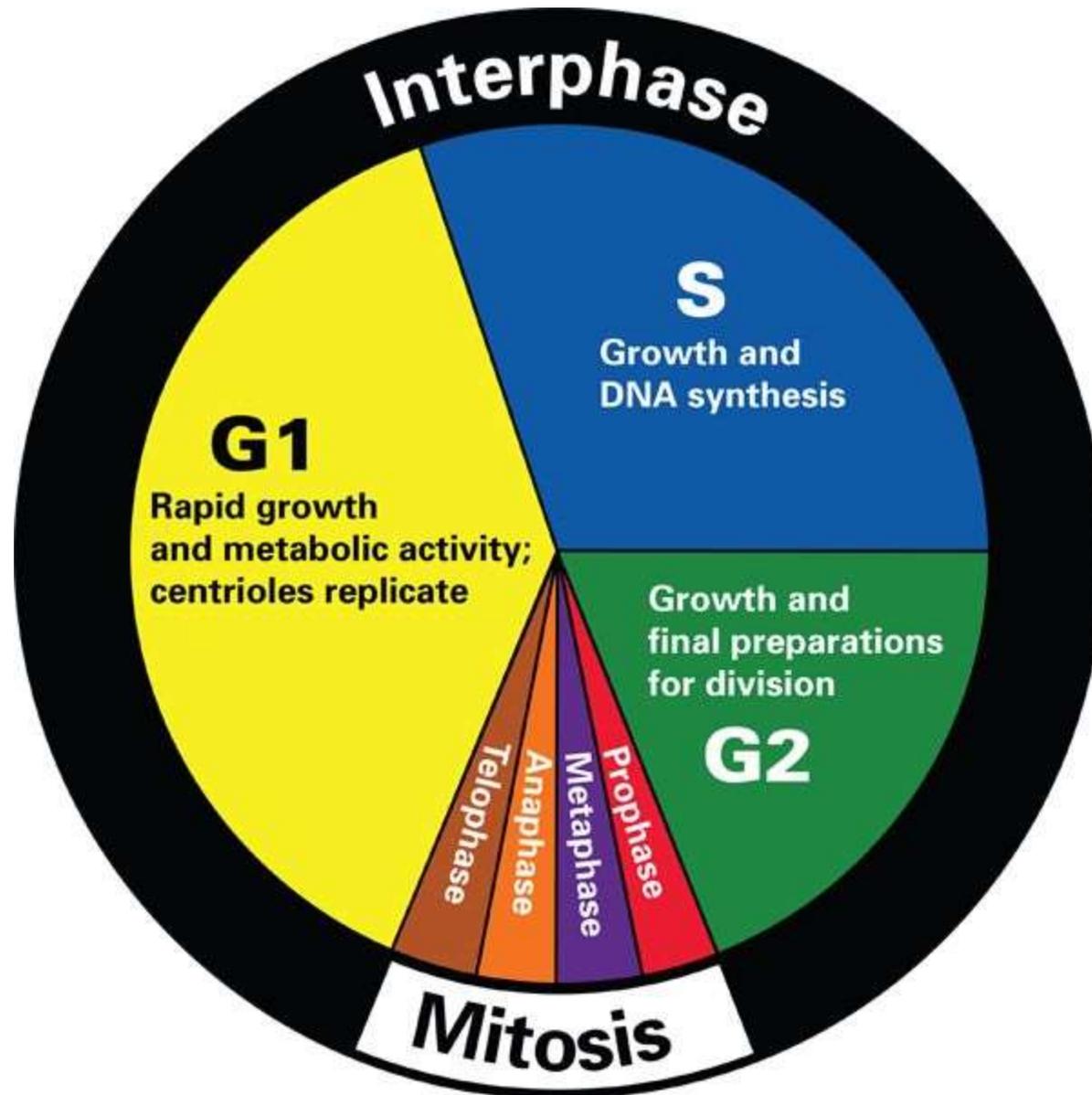
Cell Organelles - Onion



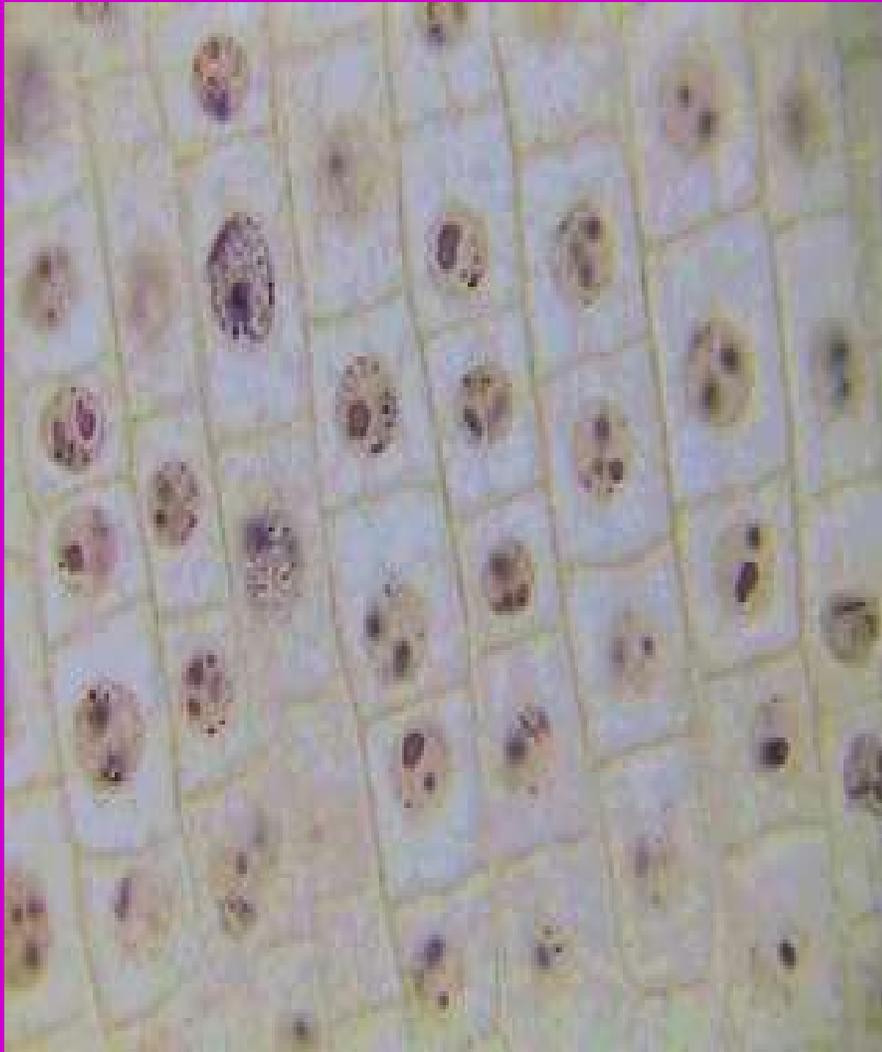
Cell Organelles - Onion



Cell Cycle

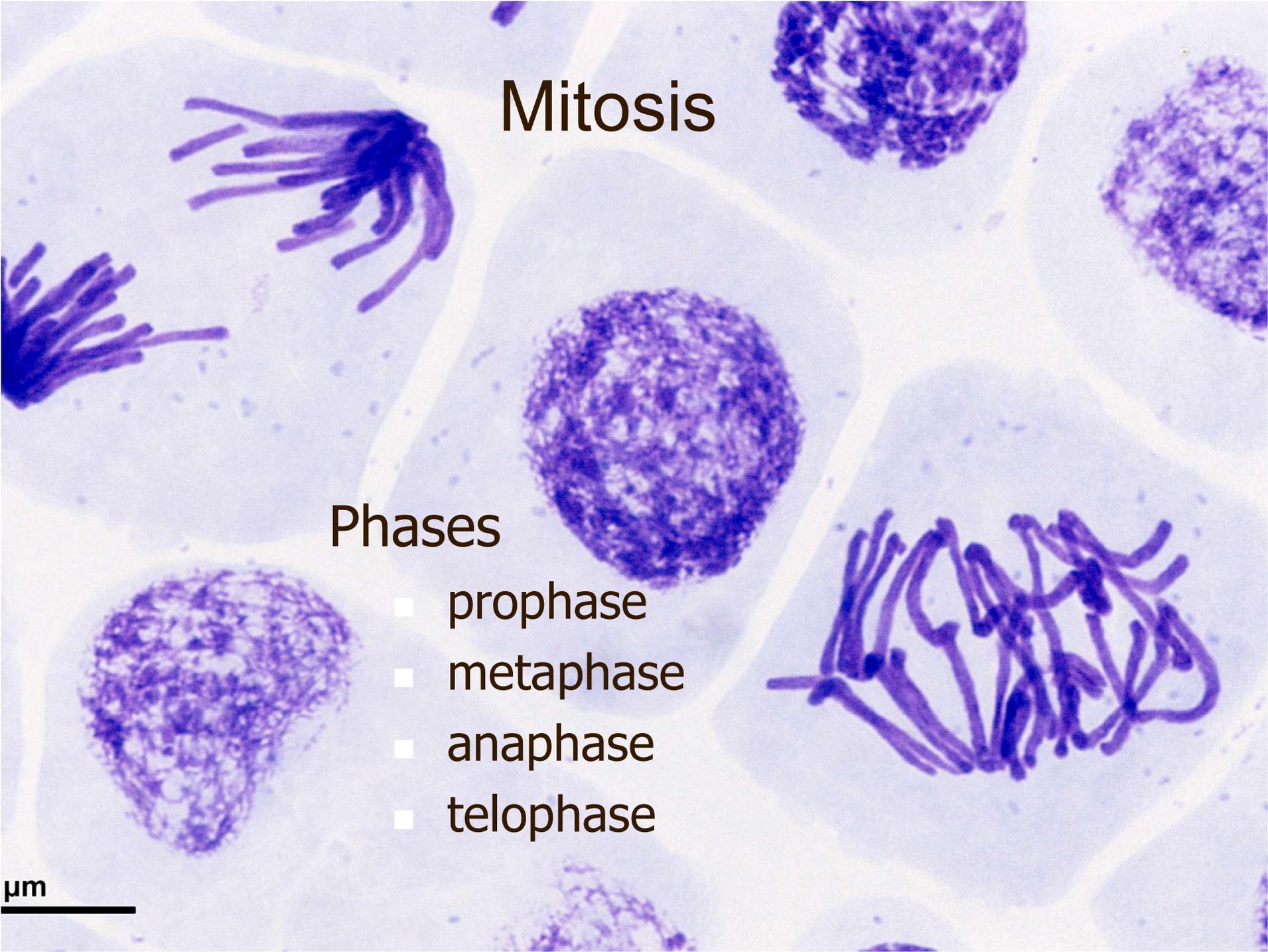


Interphase



- Metabolic phase
- Cell growth
- DNA replication
- Centriole replication
- Protein Synthesis
- Visible Nucleus & nuclear membrane
- Visible nucleoli
- Chromatin

Mitosis

A light micrograph showing several plant cells in various stages of mitosis. The cells are stained purple. One cell in the center shows a dense, spherical nucleus. To its right, another cell shows chromosomes aligned in a row. In the upper left, a cell shows spindle fibers pulling chromosomes apart. In the lower left, a cell shows two distinct nuclei forming. The background is a light blueish-purple color.

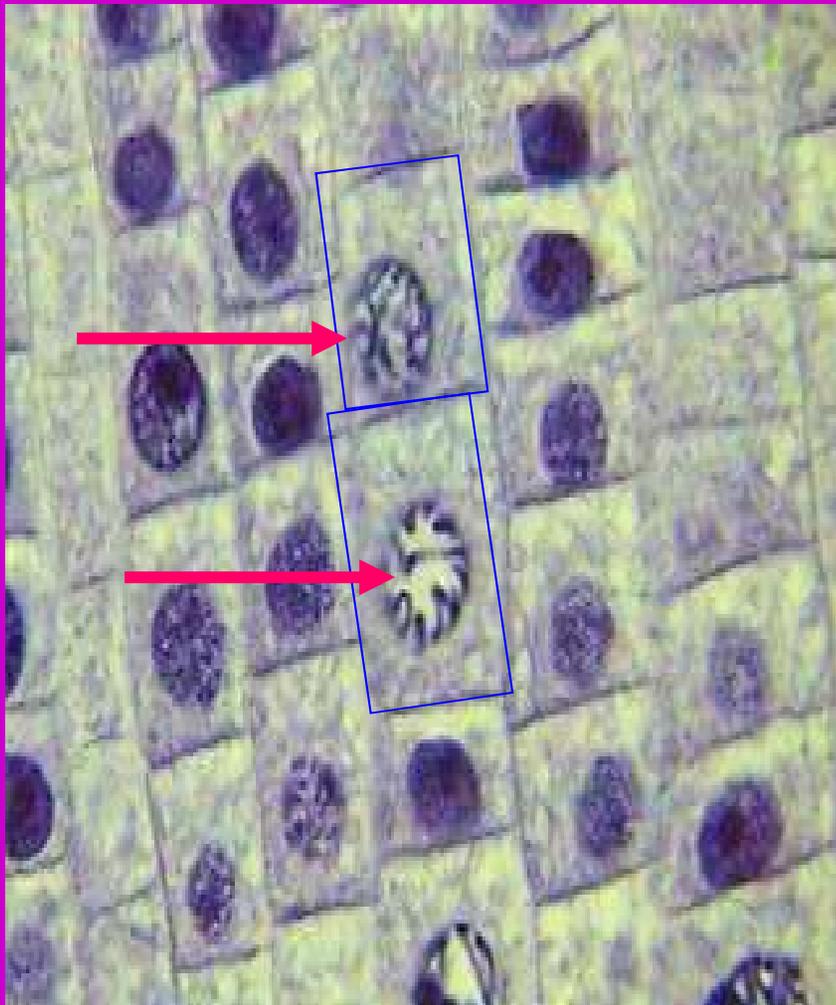
Phases

- prophase
- metaphase
- anaphase
- telophase

µm

A horizontal black scale bar located at the bottom left of the image.

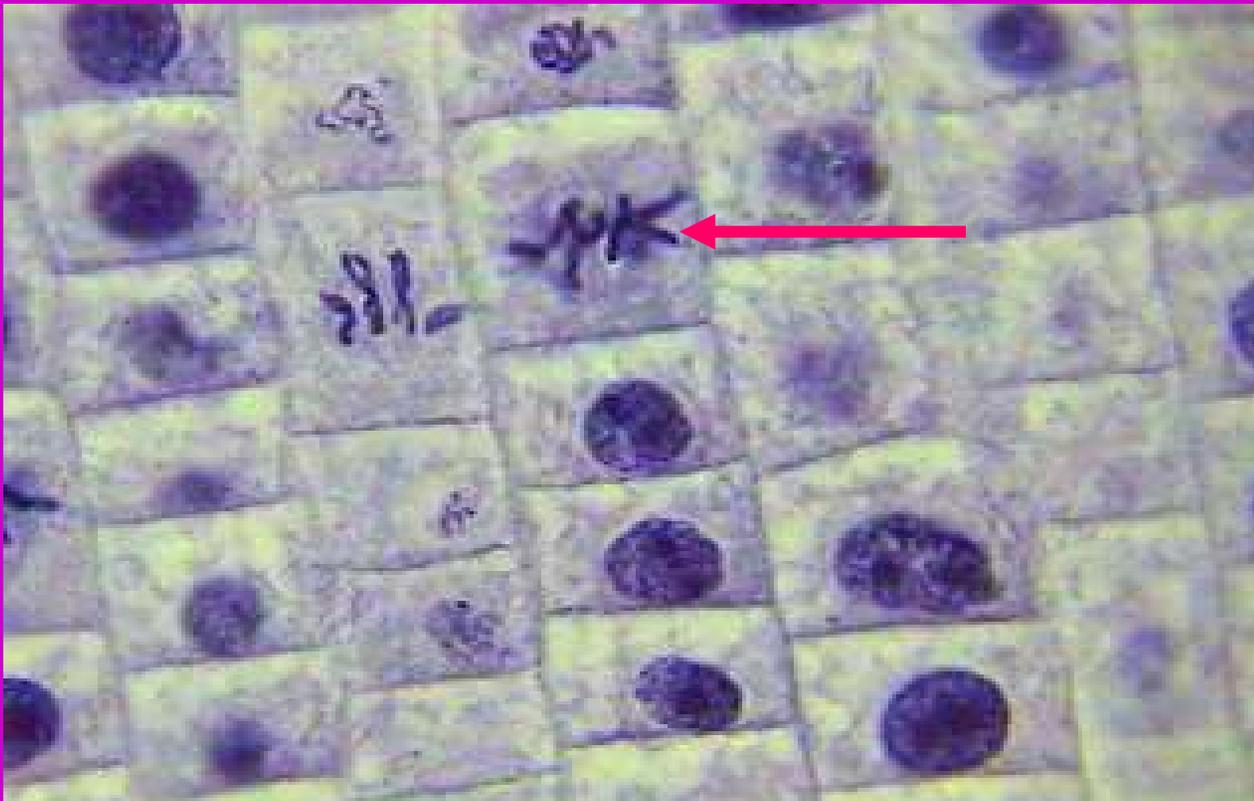
Prophase



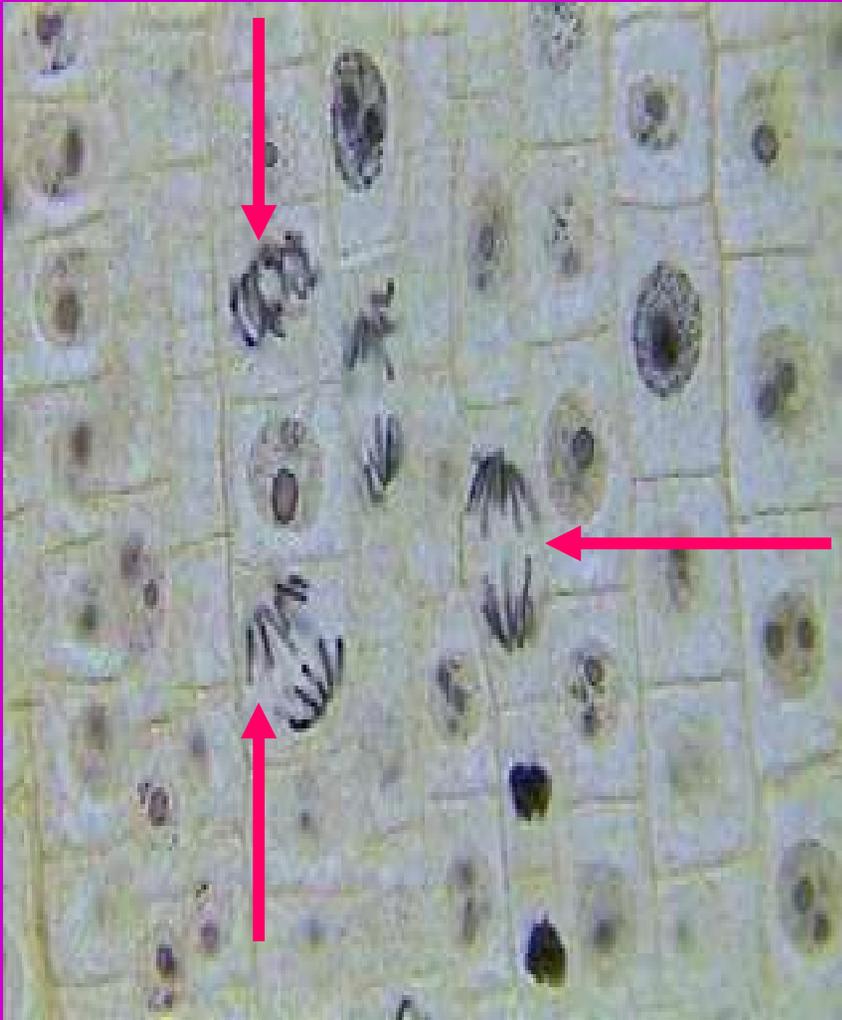
- Nuclear membrane disappears
- Nucleoli disappear
- Chromosomes appear
- Centrioles move to opposite sides of cell
- Spindle fibers from centrioles connect with chromosomes

Metaphase

- Chromosomes line up on equator of the cell

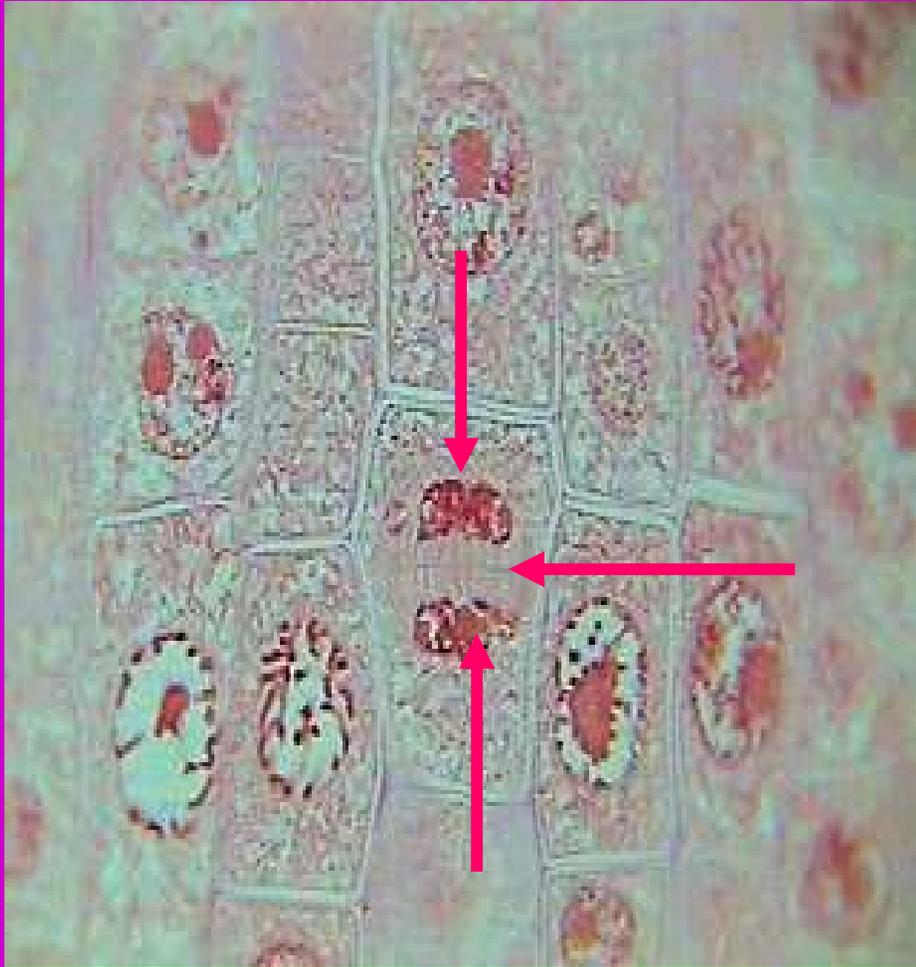


Anaphase



- Chromatids from each chromosome separate & are pulled to opposite sides of the cell.

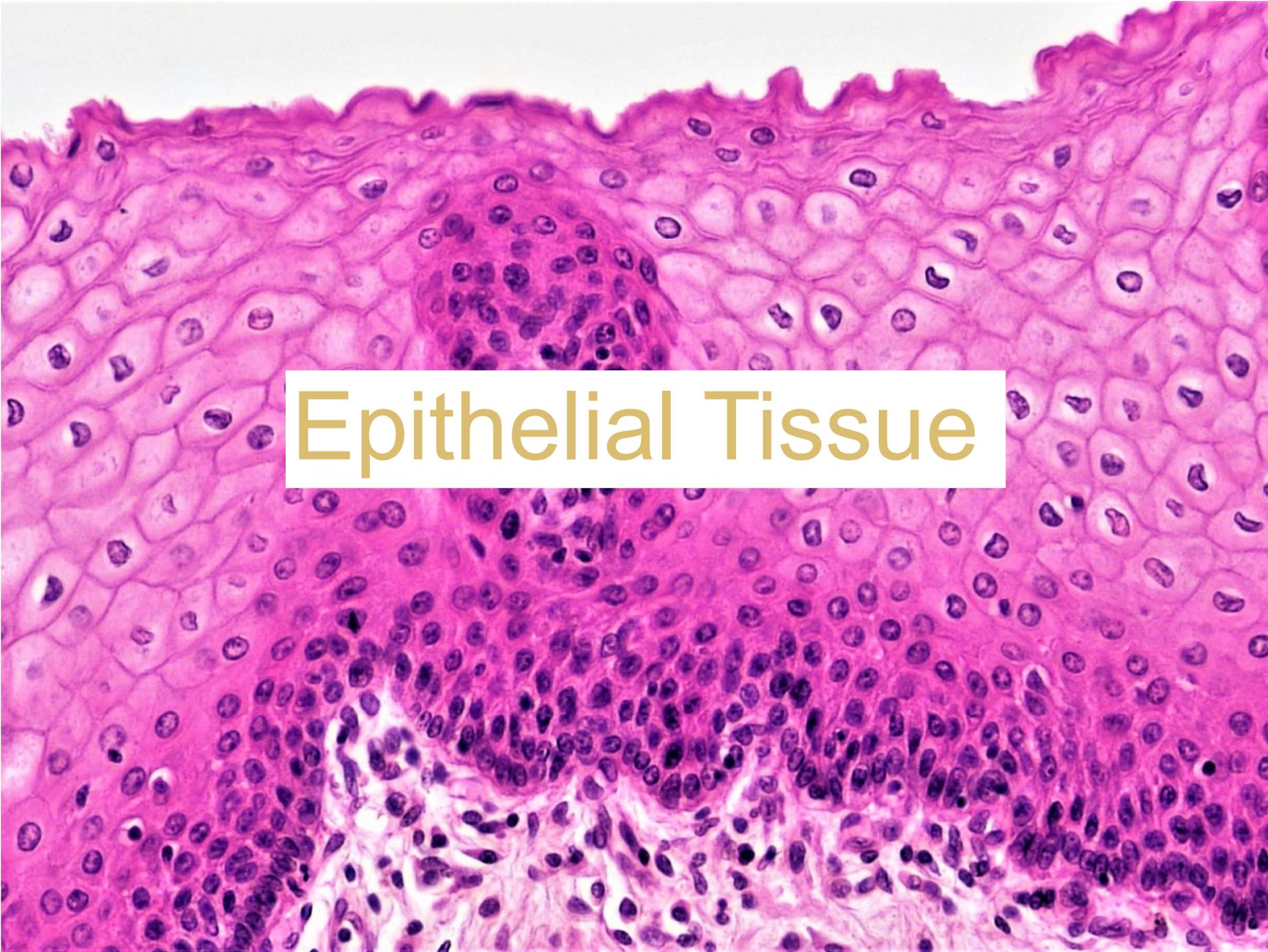
Telophase



- Chromatids reach extremes of cell
- Nuclear membrane reappears around each chromatid cluster
- Nucleoli reappear
- Cell plate appears between nuclei
- Cytokinesis occurs

Four Basic Kinds of Tissues

- Epithelial Tissue
- Connective Tissue
- Muscle Tissue
- Nervous Tissue

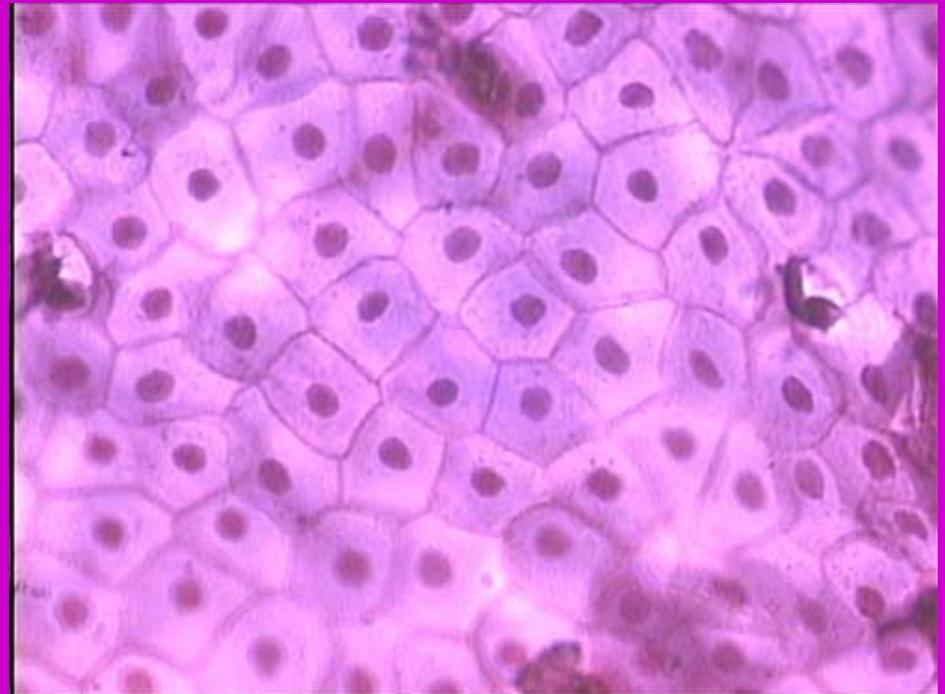


Epithelial Tissue

This histological image displays a cross-section of stratified epithelial tissue. The surface is characterized by a wavy, undulating border. The tissue consists of multiple layers of cells. The superficial layer is composed of a single layer of cells, while the underlying layers are densely packed with cells. The nuclei of the cells are stained dark purple, and the cytoplasm and extracellular matrix are stained pink. The overall structure is organized into a well-defined, multi-layered arrangement.

Epithelial Tissue Location

- Covers the body
- Lines the cavities, tubes, ducts and blood vessels inside the body
- Covers the organs inside body cavities



Epithelial Tissue Function

- Protects from physical & chemical injury,
- Protects against microbial invasion,
- Contains receptors which respond to stimuli,
- Filters, secretes & reabsorbs materials and
- Secretes serous fluids to lubricate structures.

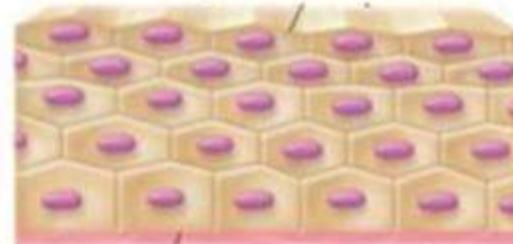
CLASSIFICATION OF EPITHELIUM

On the basis of :

NUMBER OF LAYERS



SIMPLE (made of single cell layer)



STRATIFIED (made of many cell layer)

CELL SHAPE



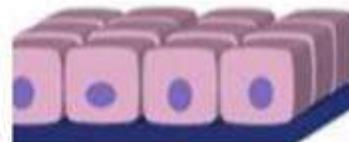
Squamous



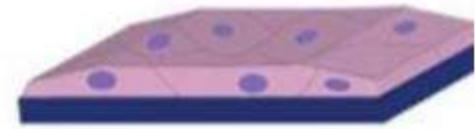
Cuboidal



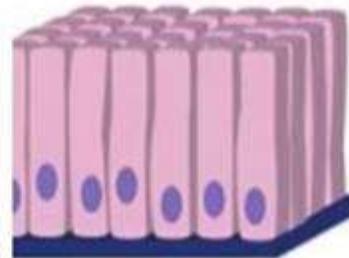
Columnar



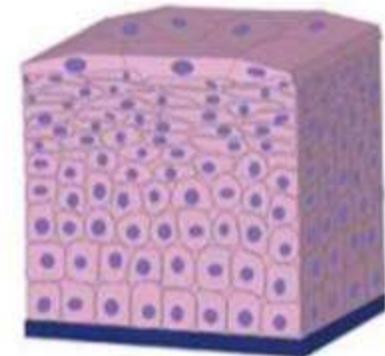
Simple Cuboidal



Simple Squamous



Simple Columnar



Stratified Squamous

Epithelial Tissue

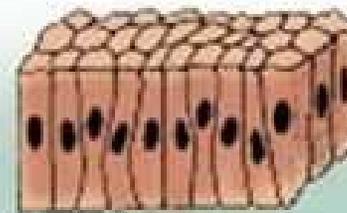
www.onlinebiologynotes.com



Simple squamous

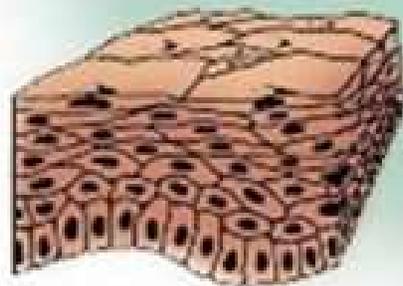
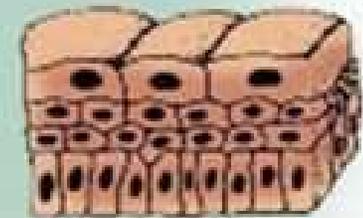


Simple cuboidal



Simple columnar

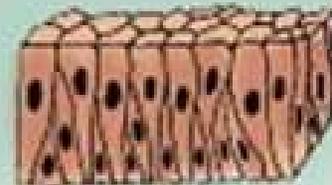
Transitional



Stratified squamous



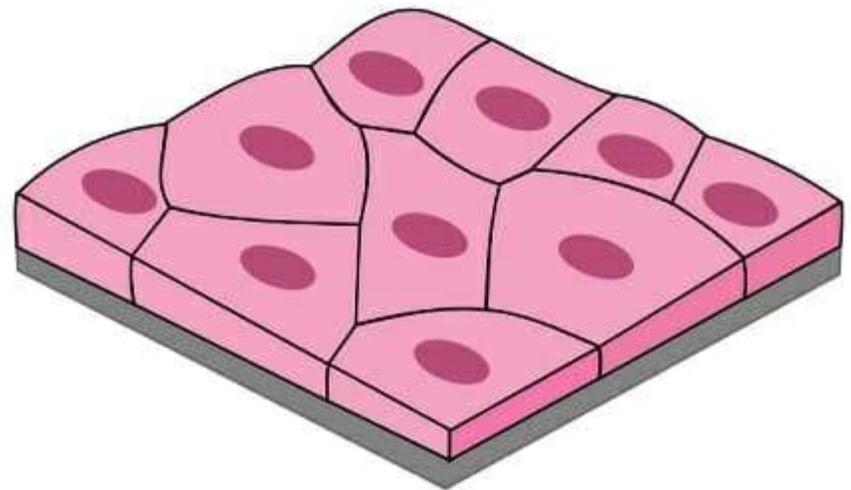
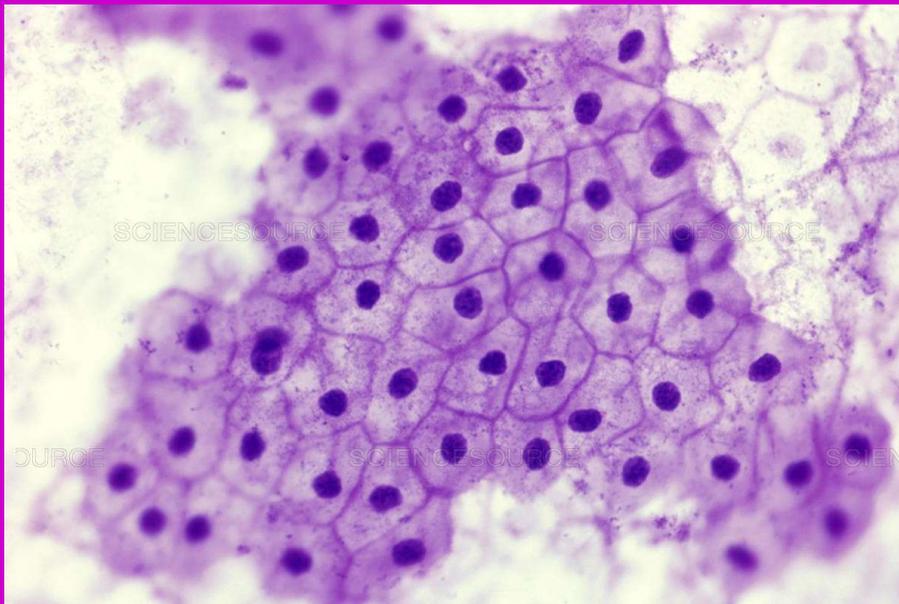
Stratified cuboidal



Pseudostratified columnar

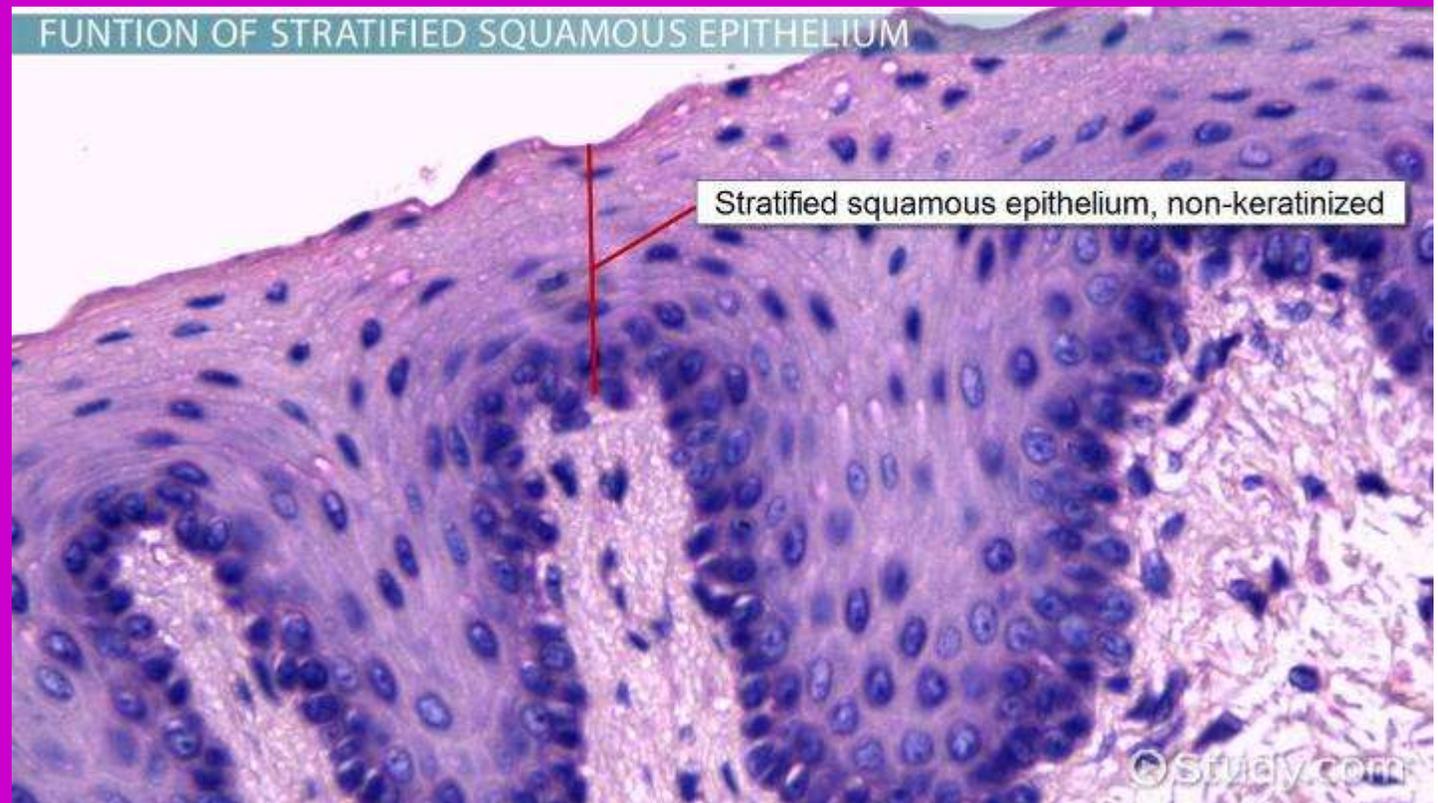
1) Simple Squamous

- Simple – one cell thick
- Flat and Wide
- Forms solid layer of cells which line blood vessels, body cavities & cover organs in body cavities

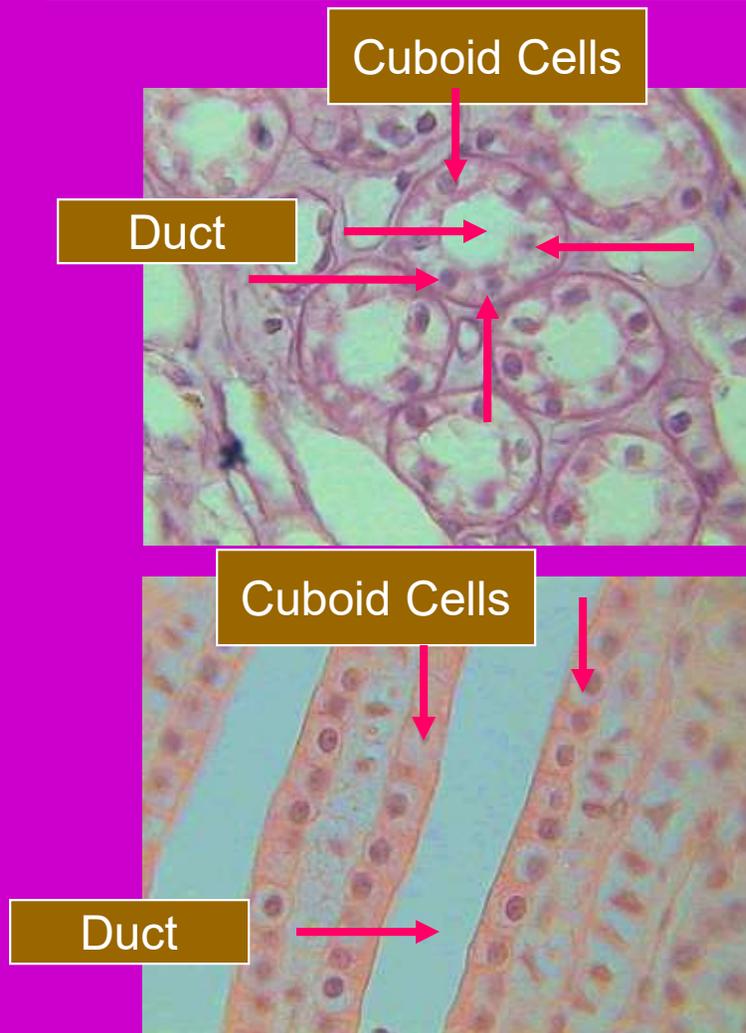


2) Stratified Squamous

- Stratified – multiple layers
- Forms epidermis

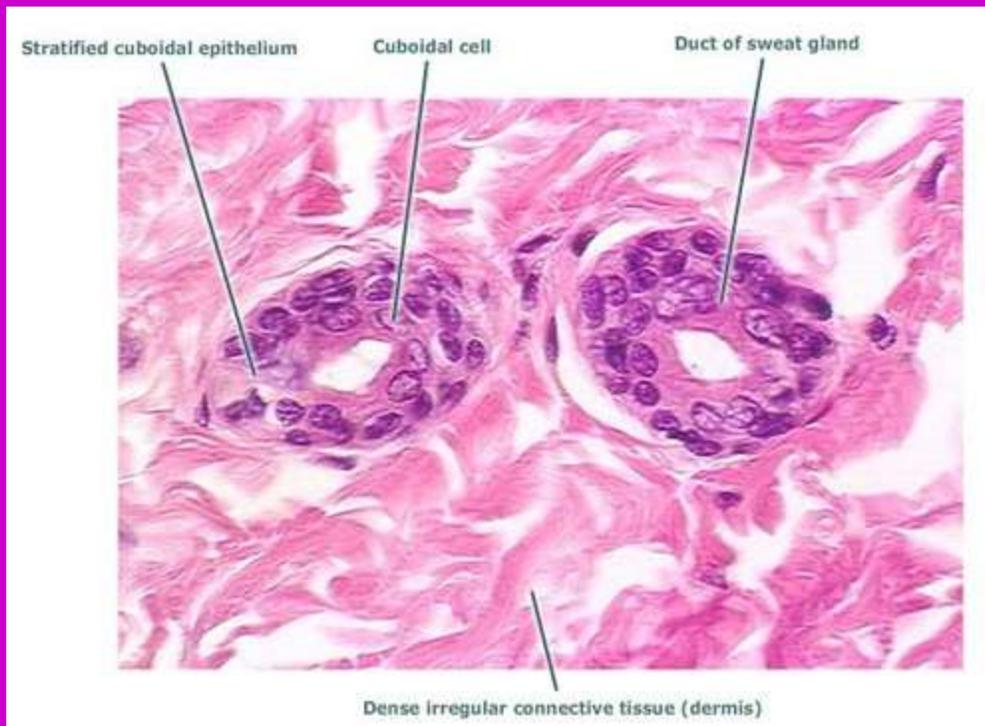


3) Simple Cuboidal Epithelium



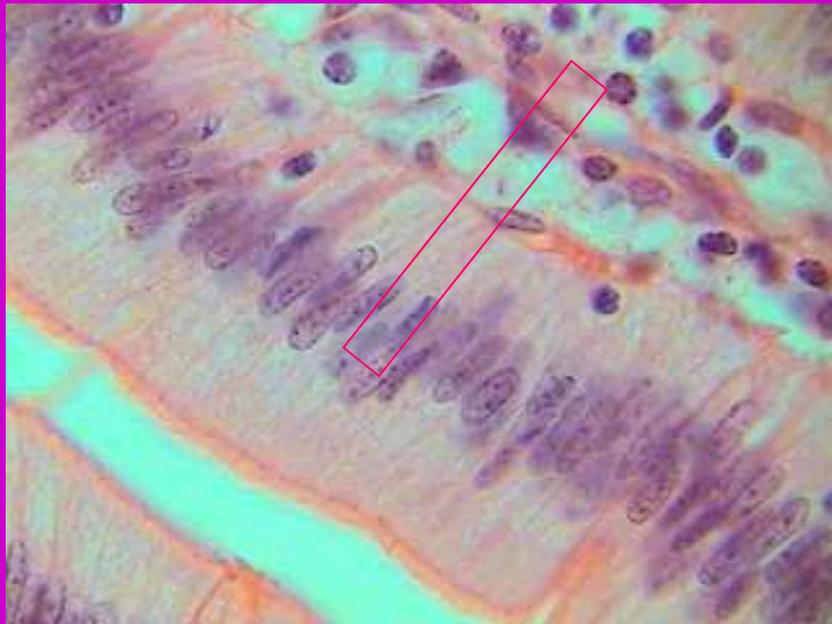
- Simple – one cell thick
- Roughly cube shaped
- Line ducts in kidneys, etc, where reabsorption and secretory activities take place.

4) Stratified Cuboidal



- Stratified- more than one layer
- Roughly cube shaped
- Make up glands

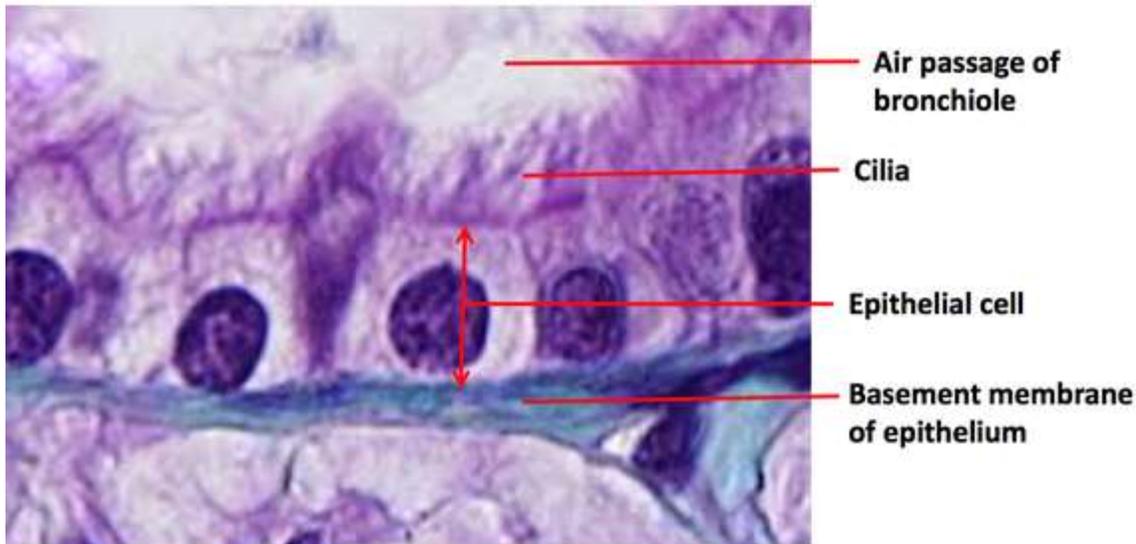
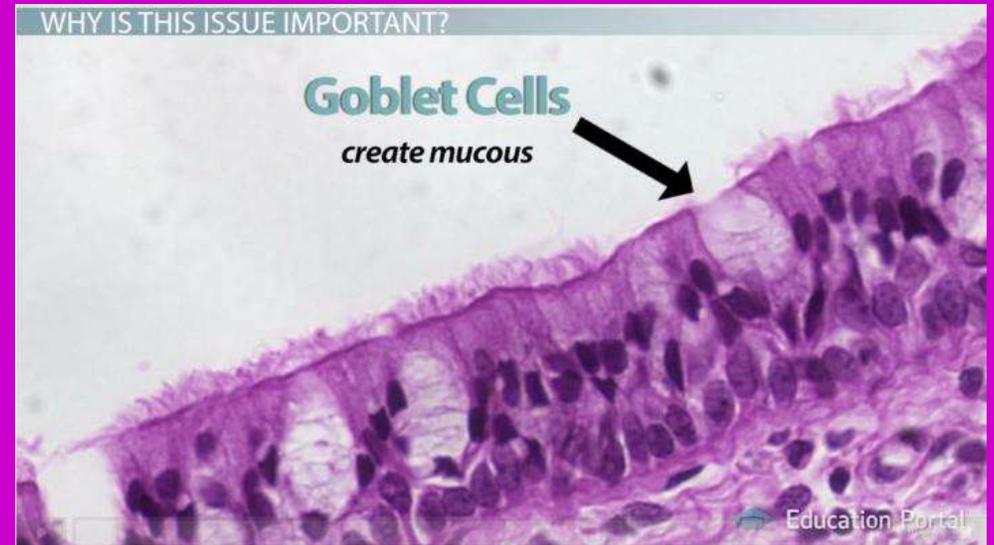
5) Simple Columnar Epithelium



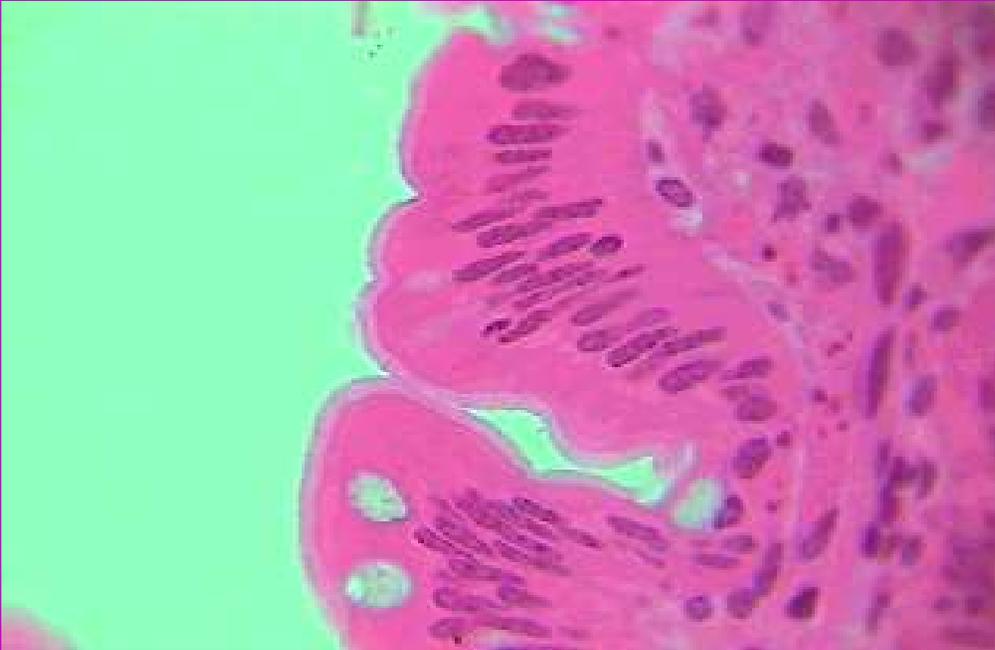
- Simple – one cell thick
- Column shaped (long & narrow)
- Line digestive tract where reabsorption & secretion occurs.

Ciliated Columnar Epithelium

- Contain cilia
- Found in the respiratory tract
- Some secrete mucous



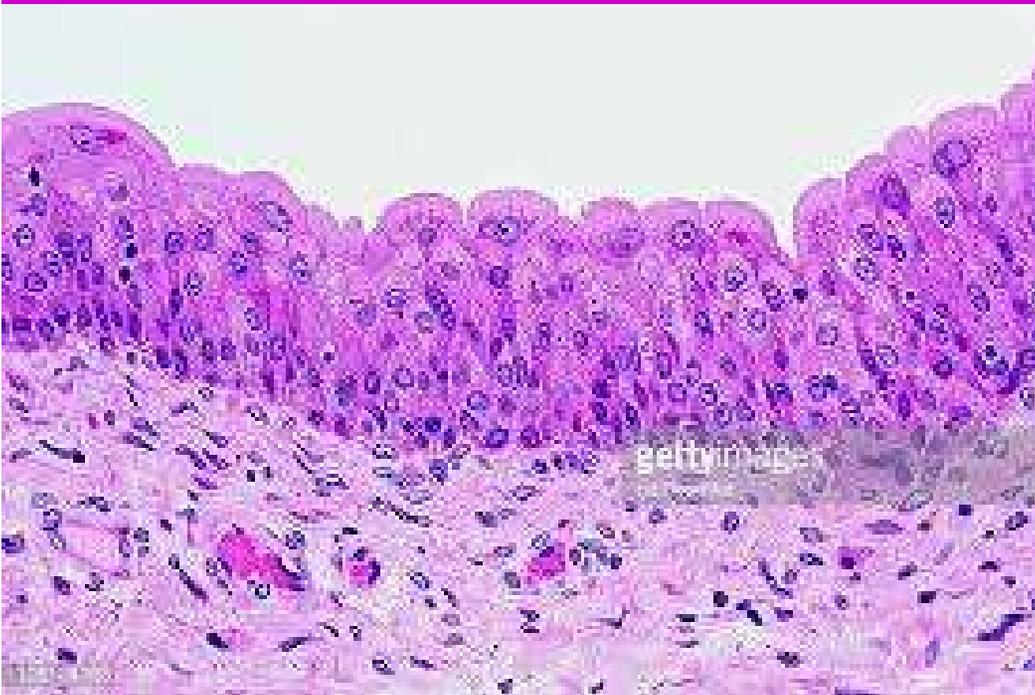
6) Pseudostratified Epithelium



- Pseudostratified – gives the appearance of more than one layer of columnar epithelial cells
- Form respiratory epithelium

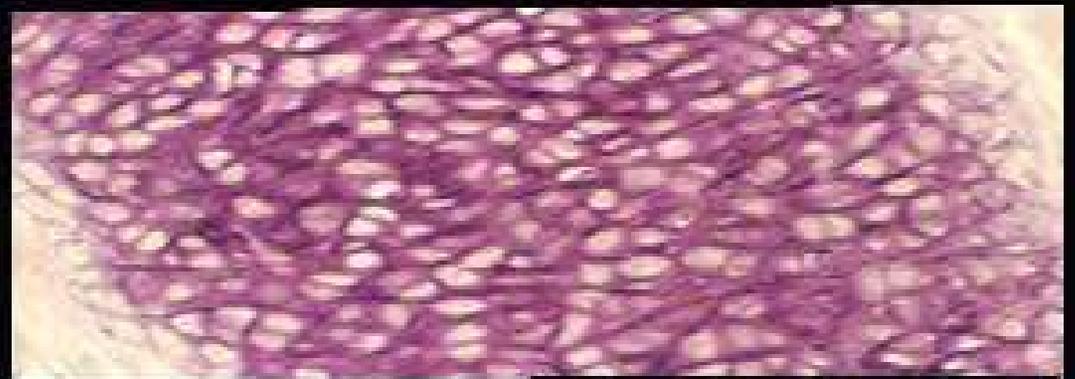
7) Transitional Epithelium

- Make up urinary tract.
- Stretchy

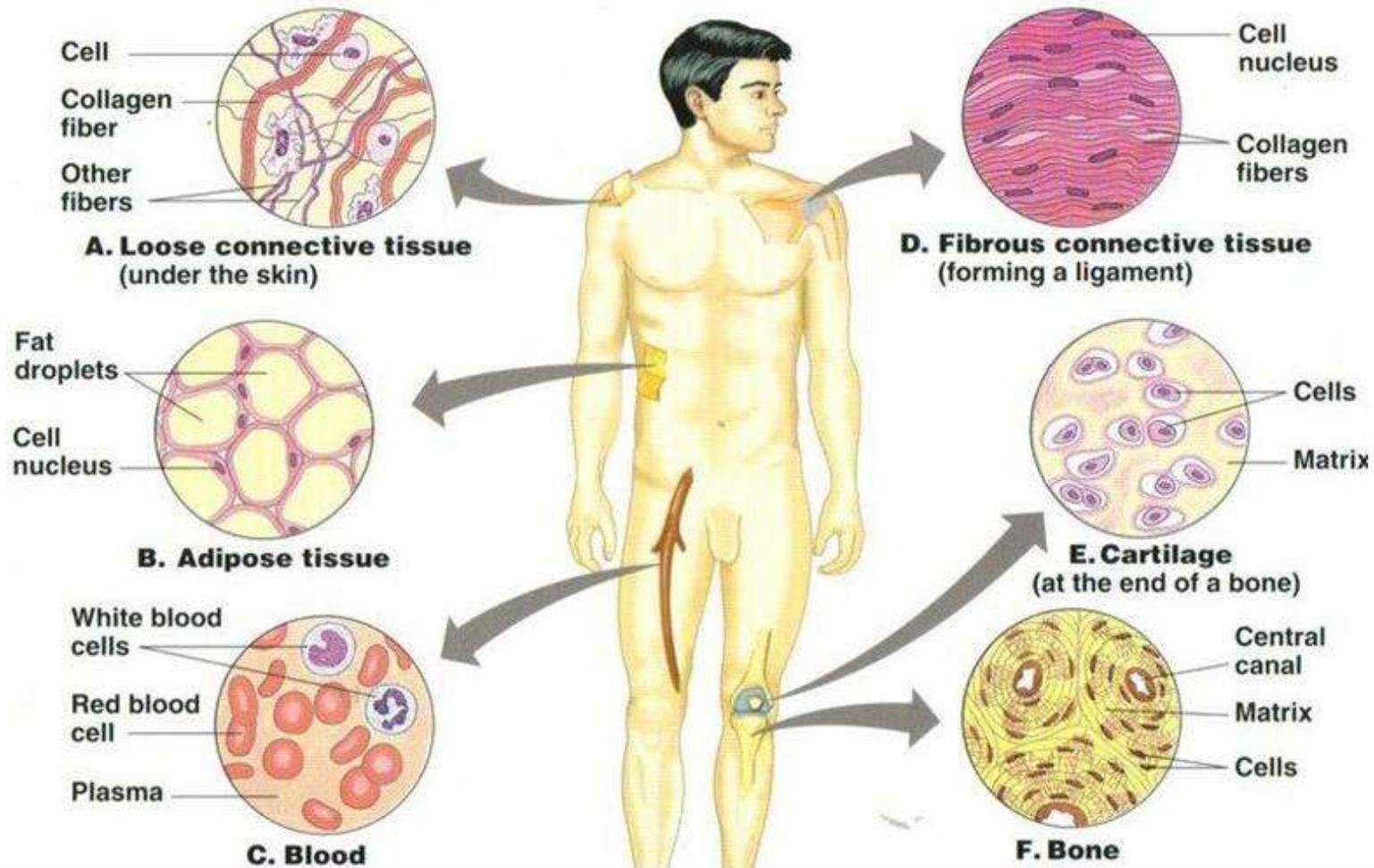


Connective Tissue

Most abundant and
widely distributed
tissue!



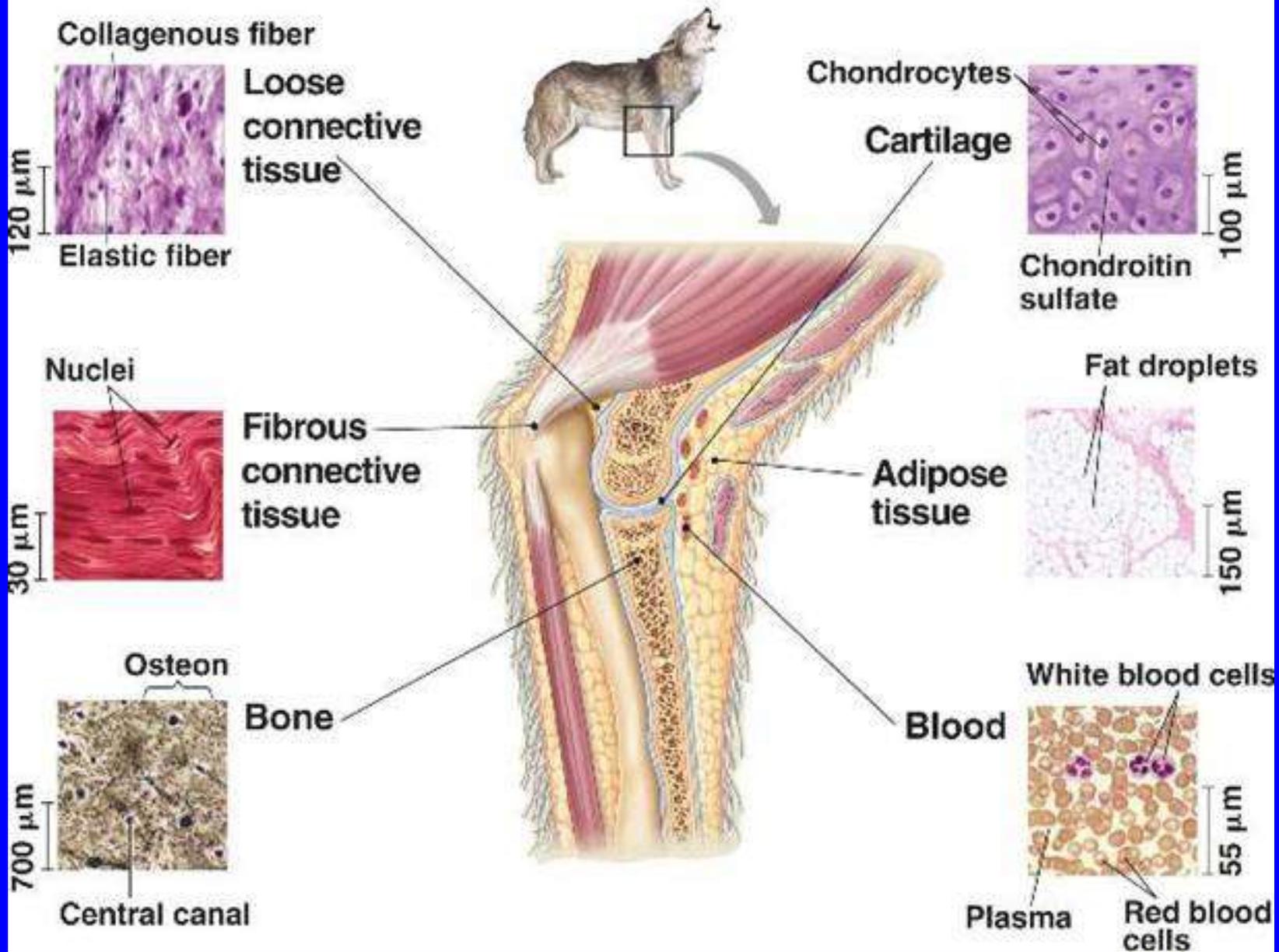
Connective tissue



Connective Tissue Functions

- Connects, binds, and supports structures
- Protects and cushions
- Insulates
- Transports substances

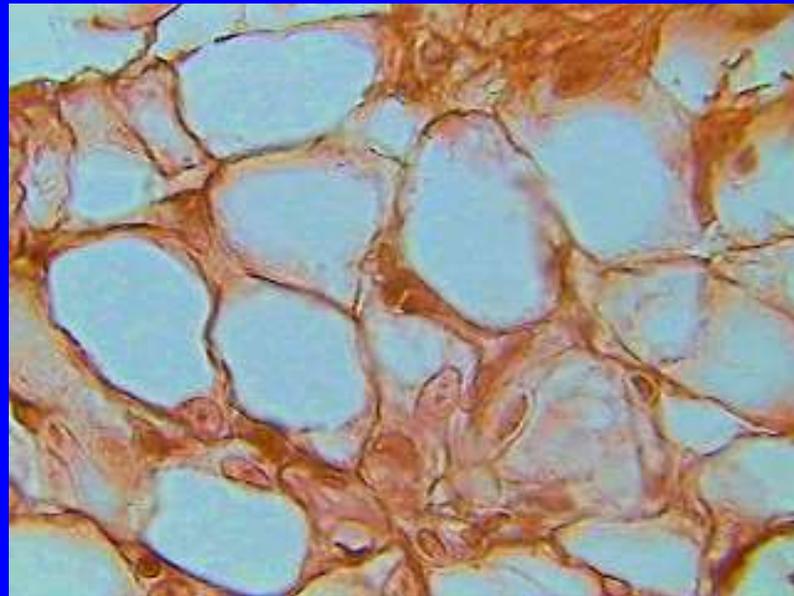
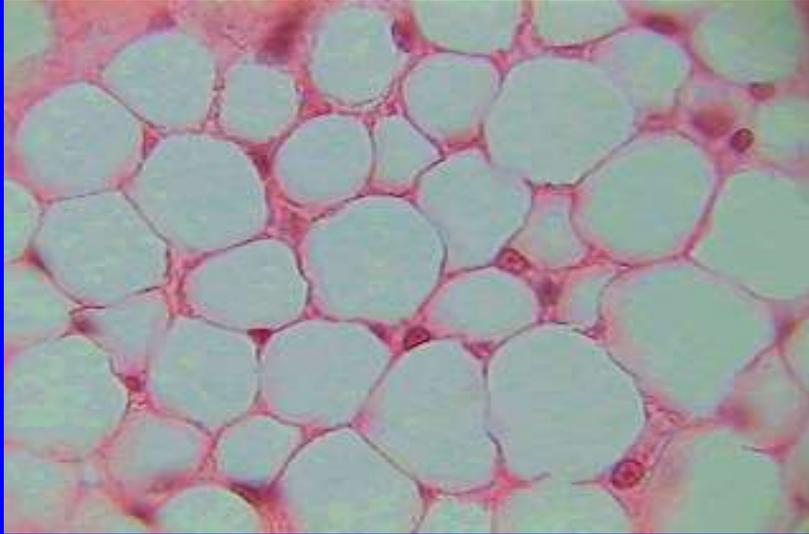
Connective Tissue



Connective Tissue Types

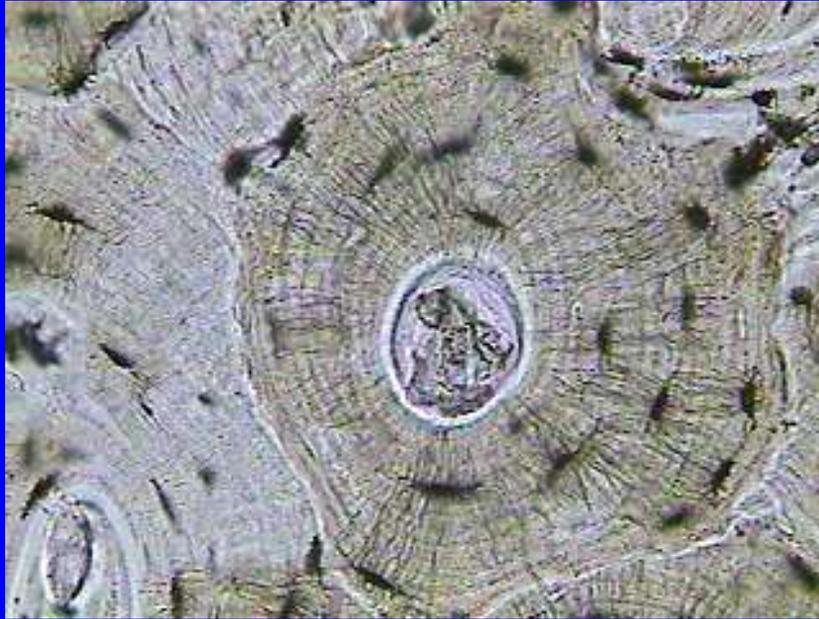
- 1) Adipose
- 2) Bone
- 3) Hyaline cartilage
- 4) Loose connective tissue, Areolar
- 5) Dense connective tissue

Connective - Adipose



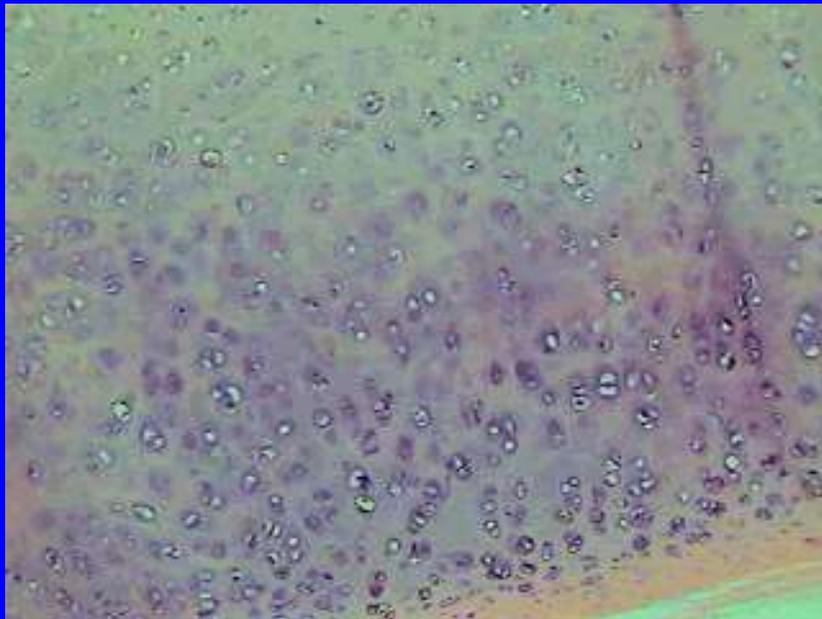
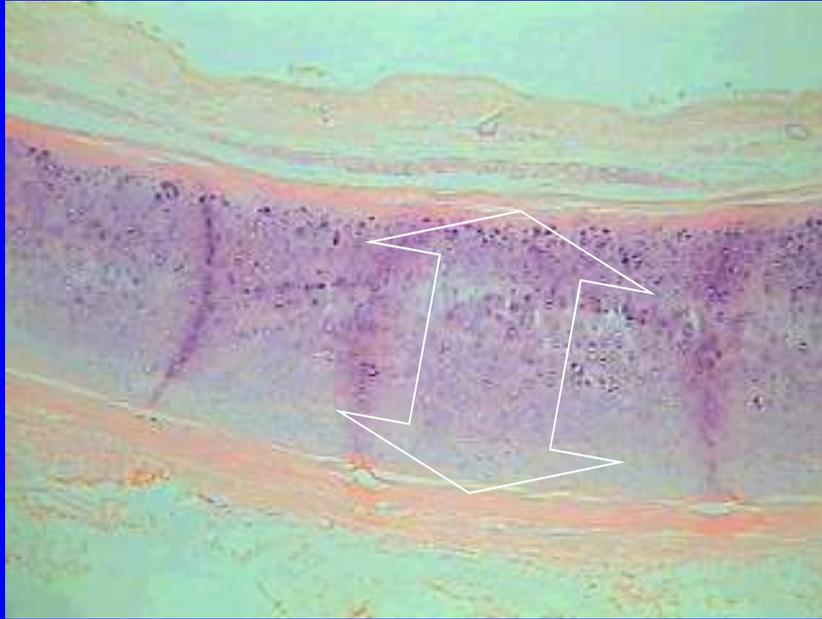
- Honeycomb or chickenwire appearance
- Stores energy (fat)
- Insulates
- Supports & protects organs

Connective - Bone



- Tree ring-like appearance
- Supports & protects
- Mineral storage
- Fat storage
- Blood cell production

Connective – Hyaline Cartilage



- Supports while providing flexibility
- Absorbs compression between bones in joints (articular cartilage)
- Holds open respiratory passages
- Most abundant type of cartilage in body

Loose Connective Tissue

Figure 3.14a Histology of Loose Connective Tissues

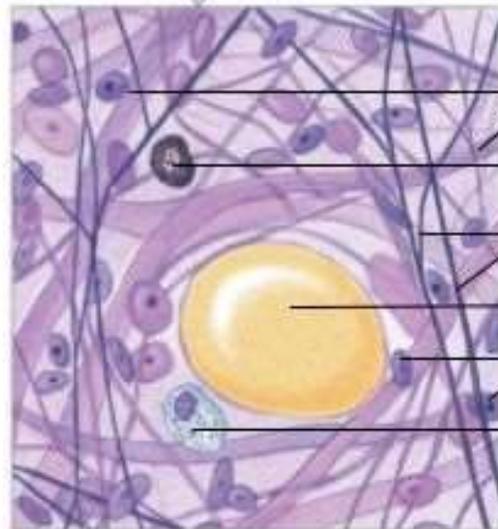
Areolar Tissue

Areolar tissue from pleura

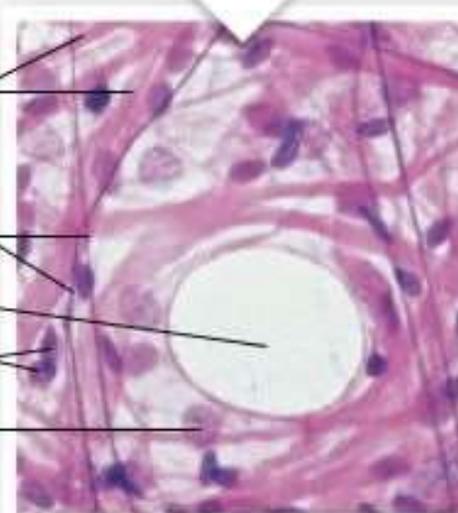


LOCATIONS: Within and deep to the dermis of skin, and covered by the epithelial lining of the digestive, respiratory, and urinary tracts; between muscles; around blood vessels, nerves, and around joints

FUNCTIONS: Cushions organs; provides support but permits independent movement; phagocytic cells provide defense against pathogens



Collagen fibers
Mast cell
Elastic fibers
Adipocyte
Fibrocytes
Macrophage

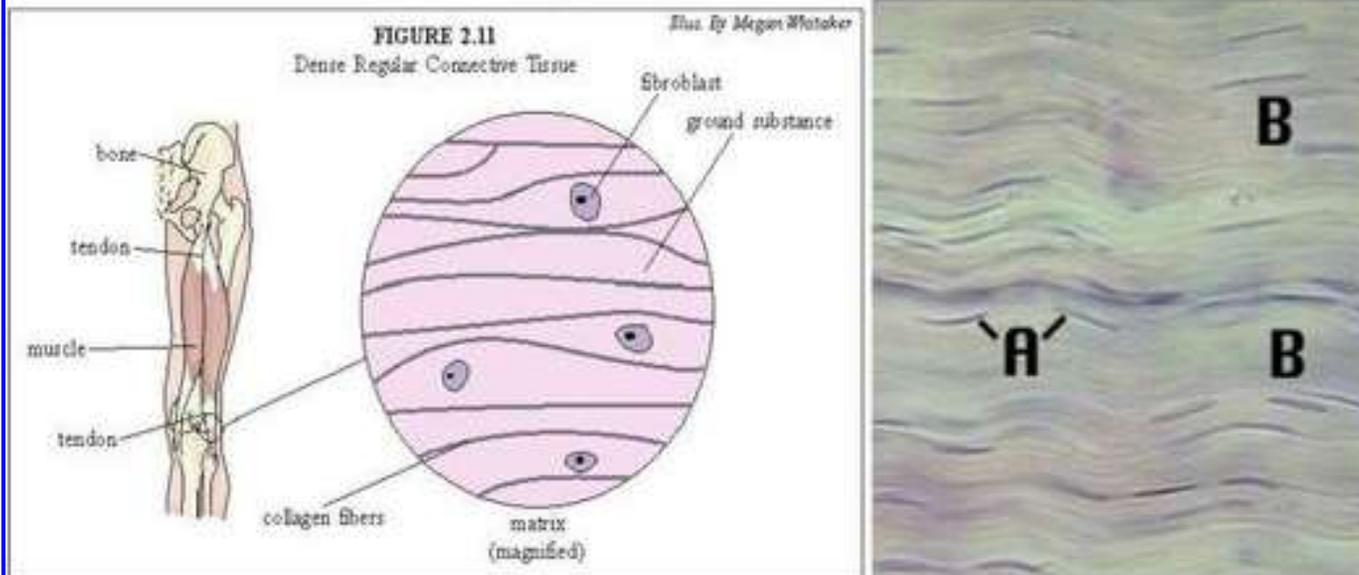


LM x 380

a Areolar tissue. Note the open framework; all the cells of connective tissue proper are found in areolar tissue.

Dense Connective Tissue

Dense Regular Connective Tissue



the fibroblasts (A) are more clearly observed between the parallel collagenous fibers (B).

Characteristics

More collagen

Ordered fiber orientation

No elastic protein fibers

Location

tendons - hold muscle to bone

ligaments - hold bone to bone

Function

strong flexible support providing tensile "pulling" strength

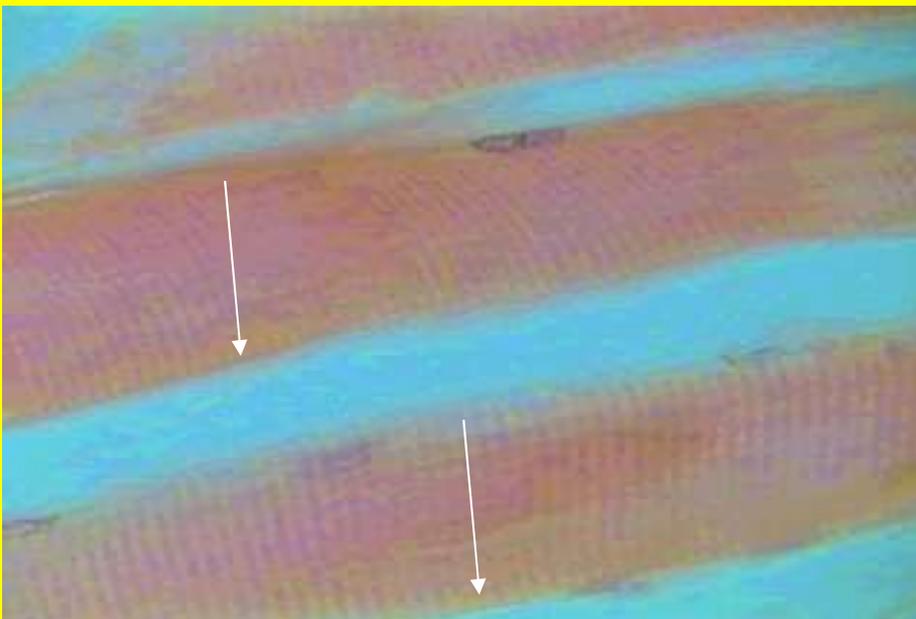
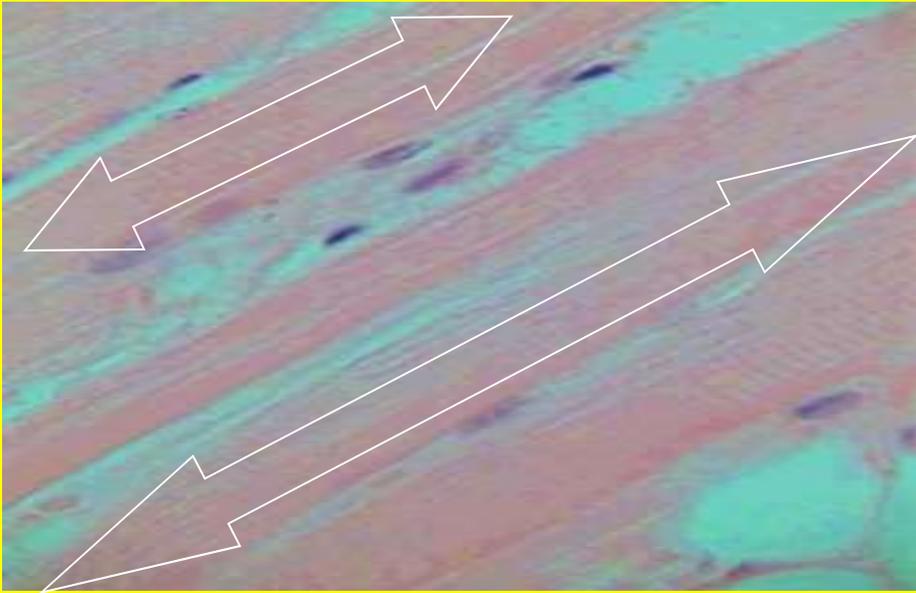
Muscle Tissue

- Muscle Tissue:
 - Associated with the bones of the skeleton, the heart and in the walls of the hollow organs of the body.
- Muscle Tissue Functions:
 - Movement
 - Locomotion
 - Maintains posture
 - Produces heat
 - Pumps blood
 - Peristalsis

■ Muscle Tissue Types:

- 1) Skeletal
- 2) Cardiac
- 3) Smooth

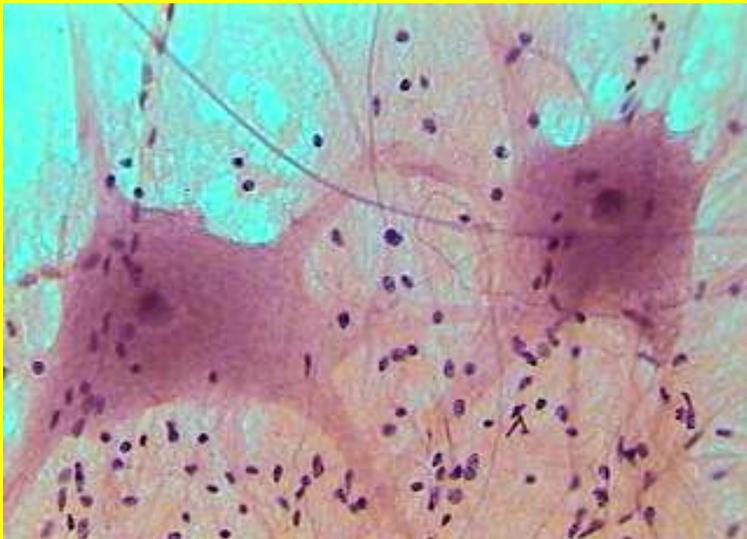
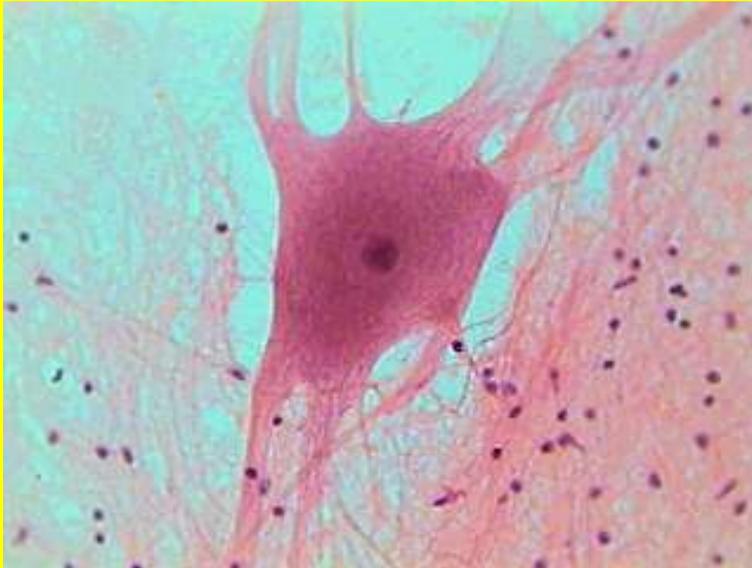
Muscle - Skeletal



- Muscle fibers (cells) long, parallel & cylindrical
- With many nuclei (multinucleate)
- Striations (cross stripes run perpendicular to the cells)
- Produce voluntary movement
- Locomotion
- Heat

Specific Nervous Tissue Types

Nervous – Neuron



- Branching cells with many long processes
- Large central nucleus
- Transmit impulses from one area of the body to other areas
- Regulate activities through neuron impulses

Nervous Tissue

- Nervous Tissue:
 - Main component of the nervous system, ie., brain, spinal cord & nerves.
- Nervous Tissue Functions:
 - Regulates & controls body functions
 - Generates & transmits nerve impulses
 - Supports, insulates and protects impulse generating neurons.

- **Specific tissue types we learned**
 - **epithelial**
 - **Squamous**
 - **Cuboidal**
 - **Columnar**
 - **connective**
 - **Adipose**
 - **Bone**
 - **Hyalaine cartilage**
 - **muscle**
 - **nervous**