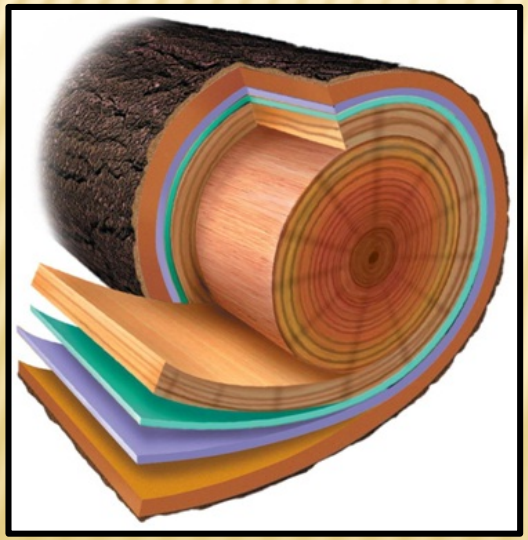
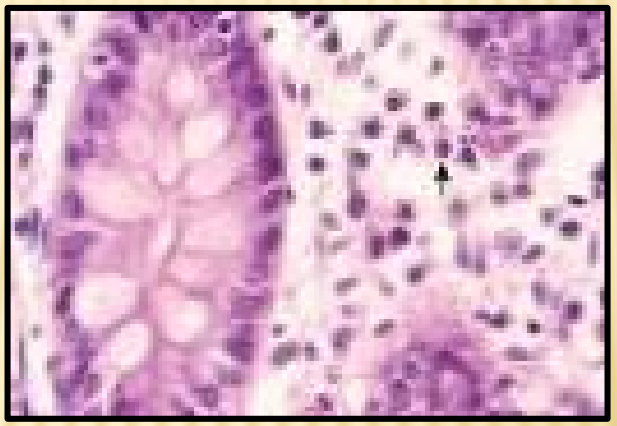
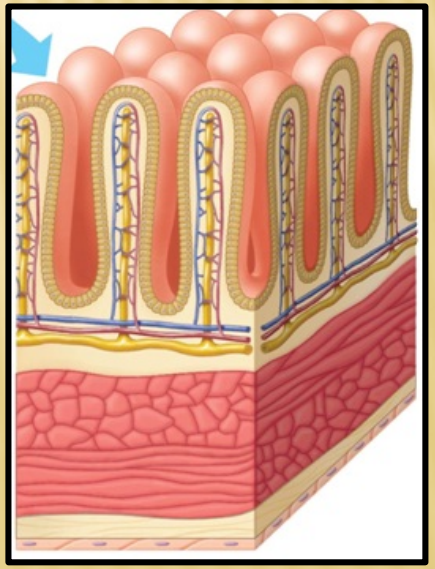
CHAPTER 5

TISSUES







ANIMAL TISSUES

Tissue

- **A group of similarly specialized cells**
- **Associated to perform one or more functions**

A

Cellular level
Muscle cell

An example of structural hierarchy in a pelican

A

Cellular level
Muscle cell

B

Tissue level
Muscle tissue

An example of structural hierarchy in a pelican

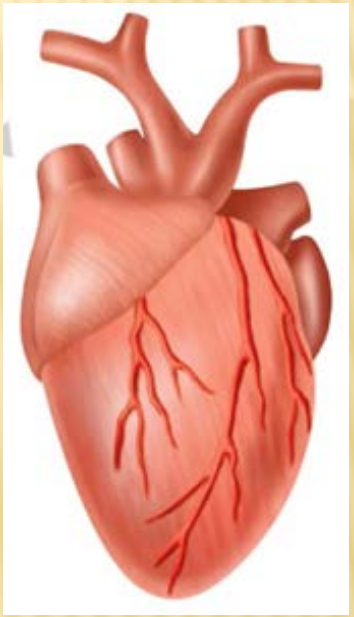
A

Cellular level
Muscle cell

B

Tissue level
Muscle tissue

C



Organ level
Heart

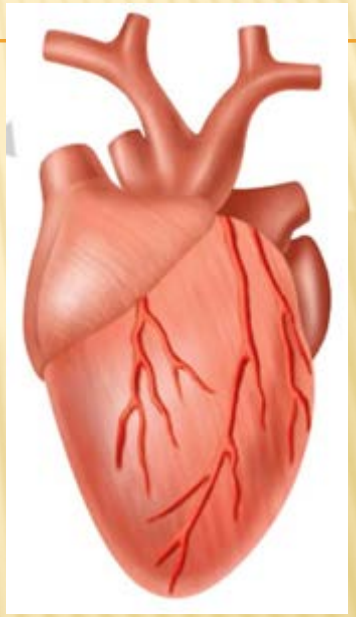
An example of structural hierarchy in a pelican

A

B

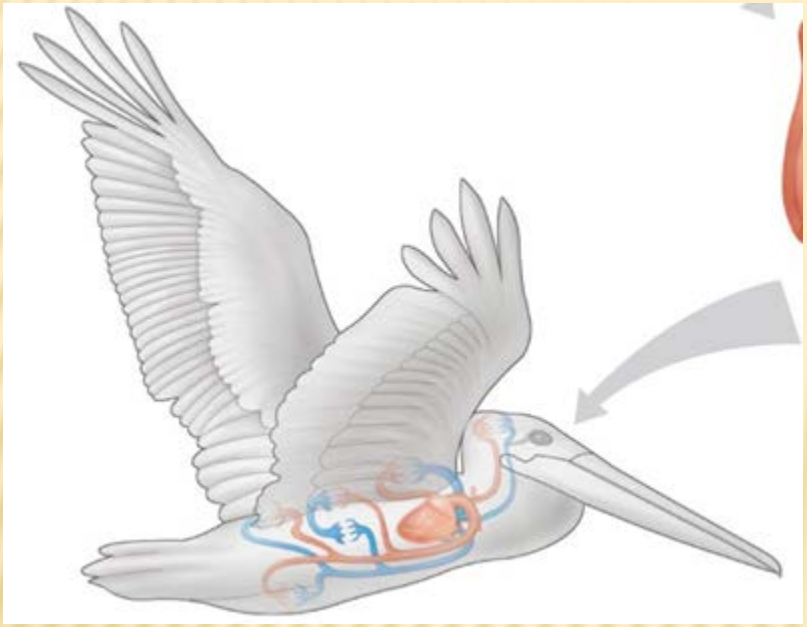
Cellular level
Muscle cell

Tissue level
Muscle tissue



C

Organ level
Heart



D

Organ system level
Circulatory system

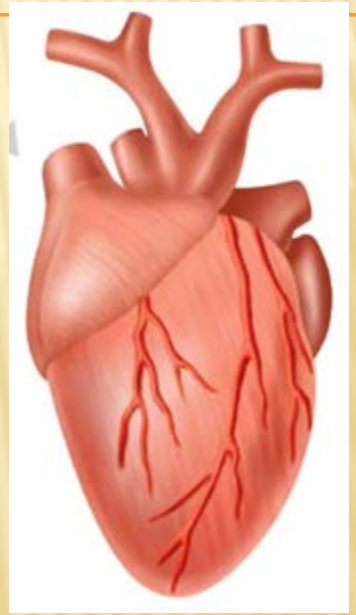
An example of structural hierarchy in a pelican

A

Cellular level
Muscle cell

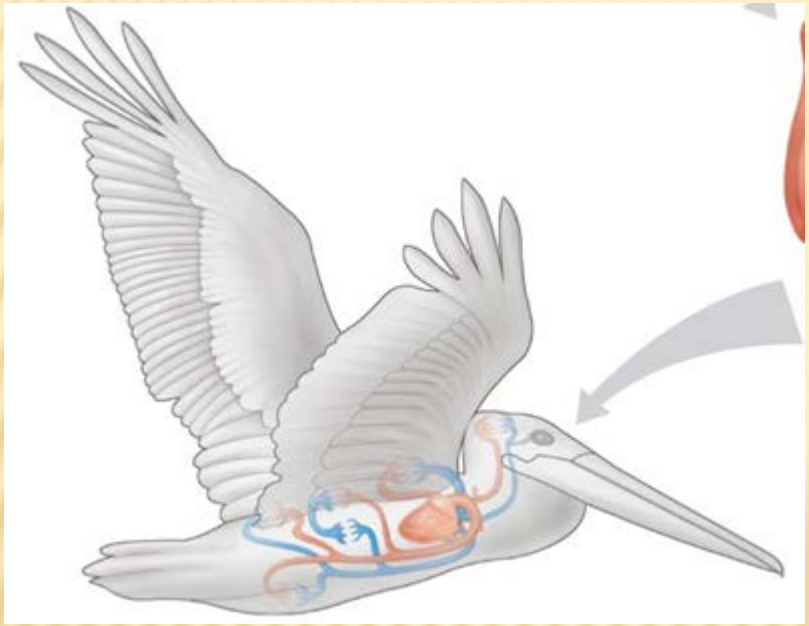
B

Tissue level
Muscle tissue



Organ level
Heart

C



D

Organ system level
Circulatory system

E

Organism level
Many organ systems functioning together

Structure fits function

Animals consist of a hierarchy of levels of organization

Structure fits function at all levels of organization in the animal body

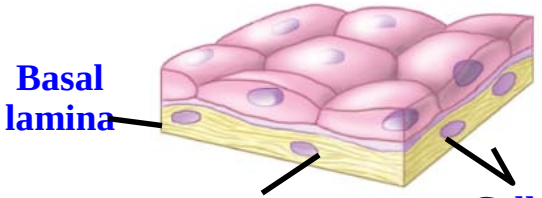
Tissues are groups of cells with a common structure and function

- **Animals have four main categories of tissues**
  1) **Epithelial tissue**
  2) **Connective tissue**
  3) **Muscle tissue**
  4) **Nervous tissue**

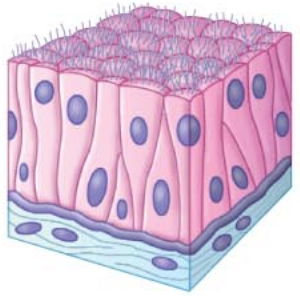
1. Epithelial Tissue (Epithelium)

- **A continuous layer (sheet) of cells**
  - **covering a body surface**
  - **lining a body organs and cavity**

- **Functions in protection, absorption, secretion, or sensation**

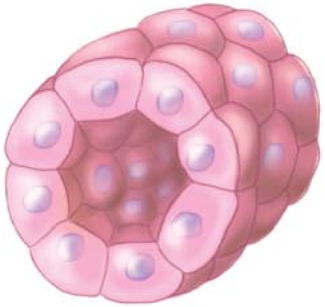


A Simple squamous epithelium

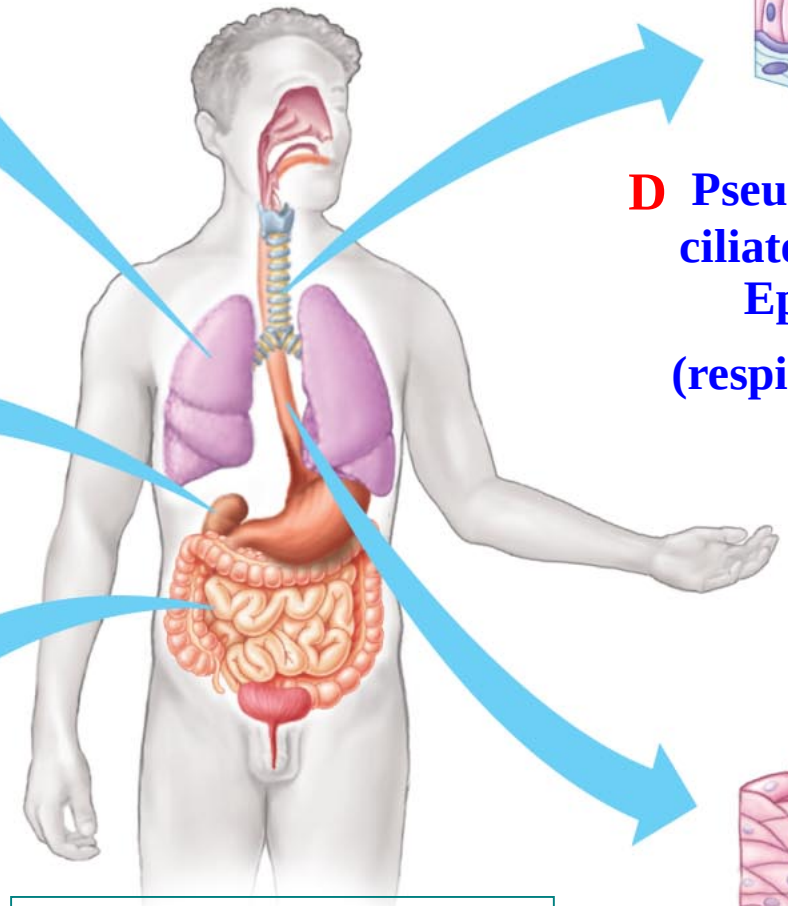


D Pseudostratified ciliated columnar Epithelium

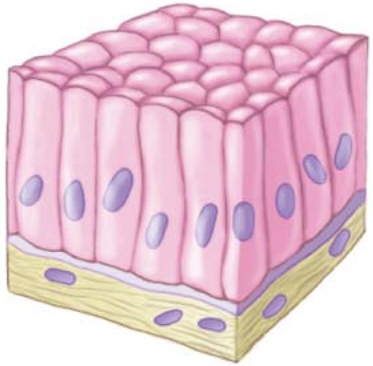
(respiratory tract)



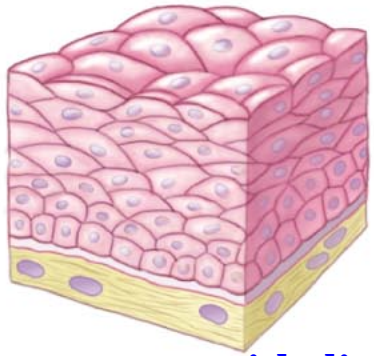
B Simple cuboidal epithelium (kidney)



Types of epithelial tissue

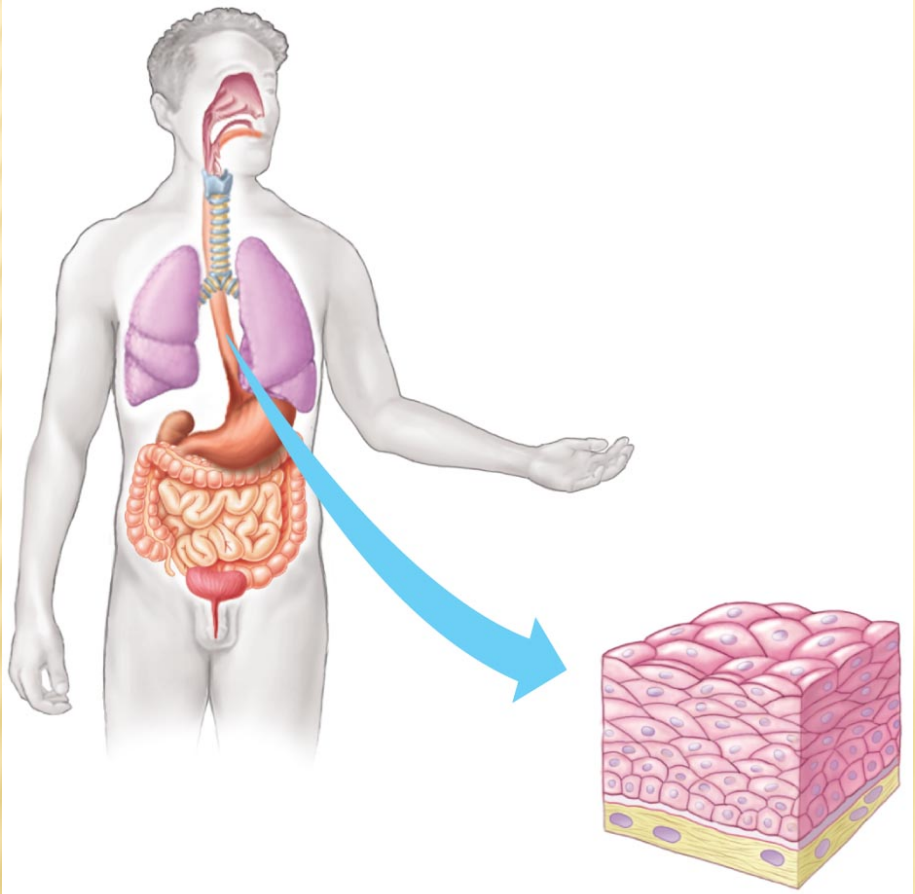


C Simple columnar epithelium (intestine)



E Stratified squamous epithelium (esophagus)

Epithelial tissue covers the body and lines its organs and cavities



Stratified squamous epithelium (esophagus)

- **Stratified epithelial cells are stacked on top of each other**

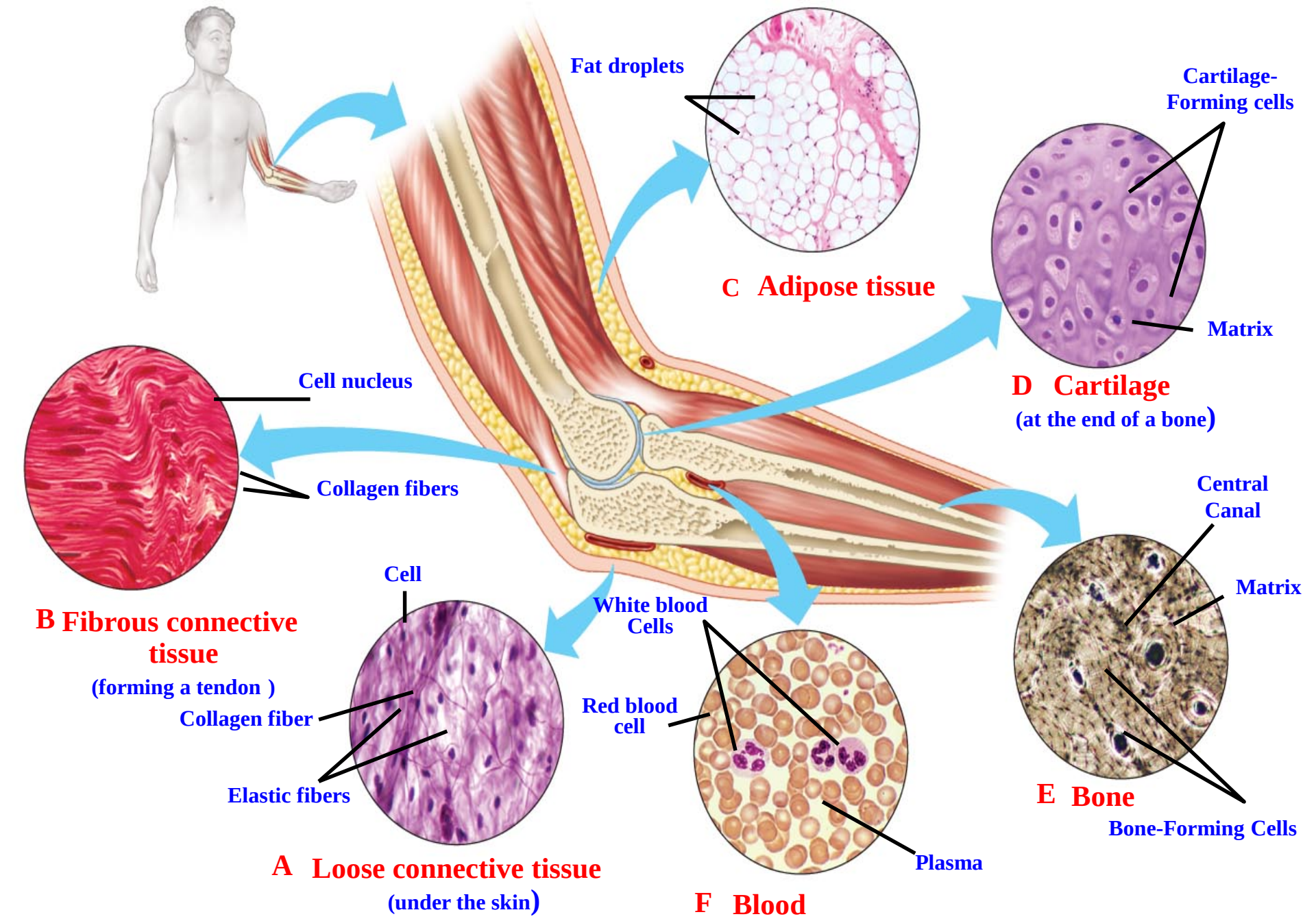
Types of epithelial tissue; Stratified squamus epithelium (lining the esophagus)

Connective Tissues

- **Cells embedded in intercellular substance**
  - **Microscopic collagen fibers, elastic fibers, reticular fibers (thin branched fibers)**
  - **Scattered through a matrix (thin gel of polysaccharides)**

Connective tissue

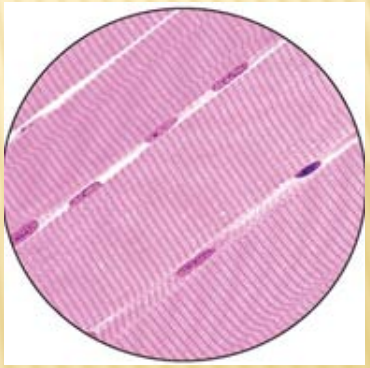
- **Connective tissue can be grouped into six major types**
  1. **Loose connective tissue (under the skin)**
  2. **Fibrous connective tissue (forming a tendon)**
  3. **Adipose tissue**
  4. **Cartilage (at the end of a bone**
  5. **Bone - Bone-Forming Cells**
  6. **Blood**



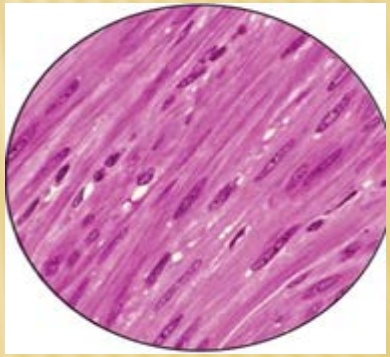
Types of connective tissue

Muscle tissues; function in movement

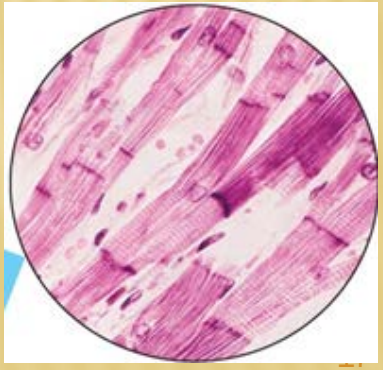
A. **Skeletal muscle** causes voluntary movements. Striated and under voluntary control, move parts of the body

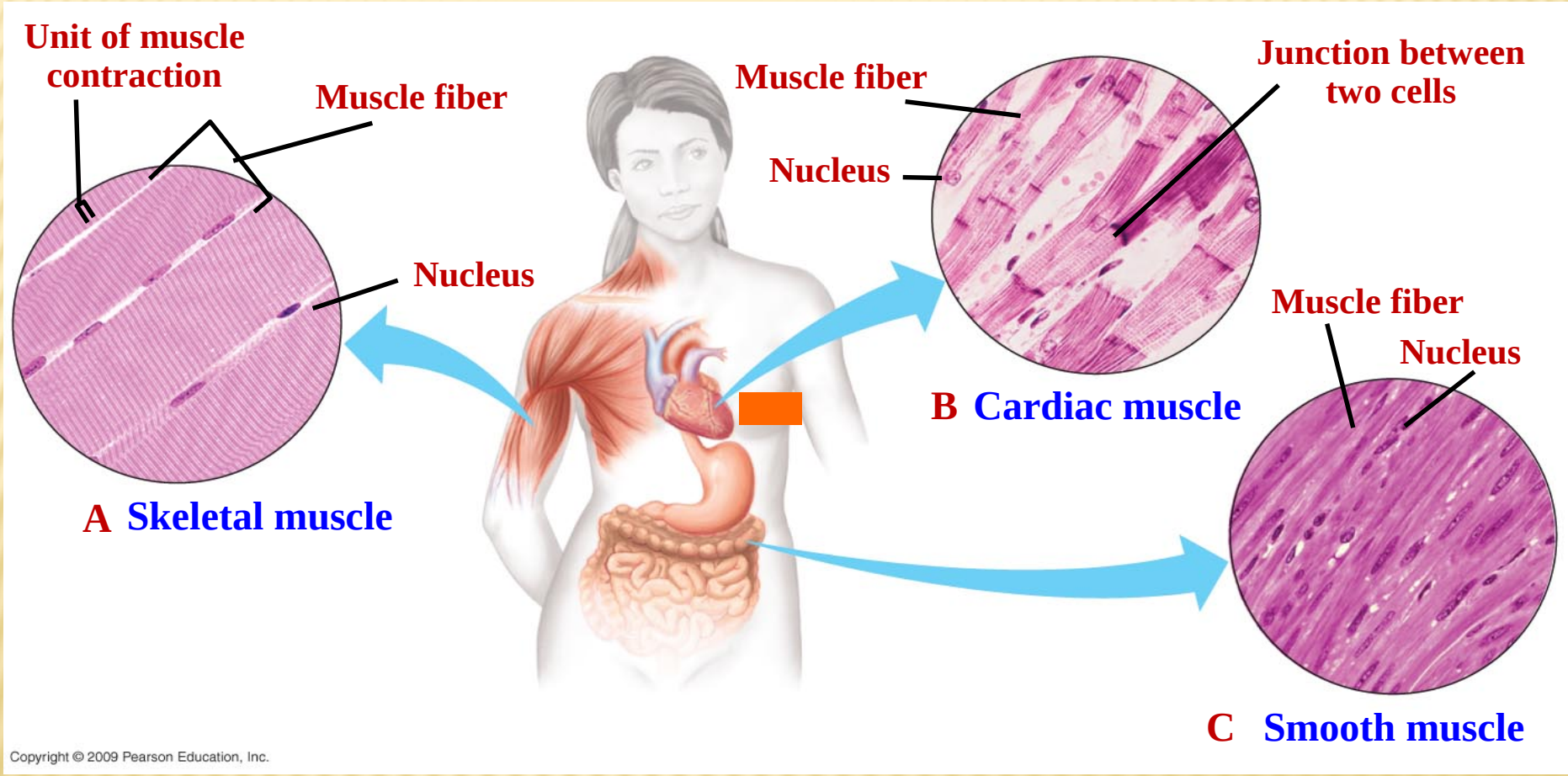


B. **Smooth muscle** moves walls of internal organs, such as the intestines. No striations, contractions involuntary



C. **Cardiac muscle** pumps blood. Striated, contractions are involuntary. Muscle contracts, heart pumps blood





The three types of muscle

Nervous tissue (Neuron cells)

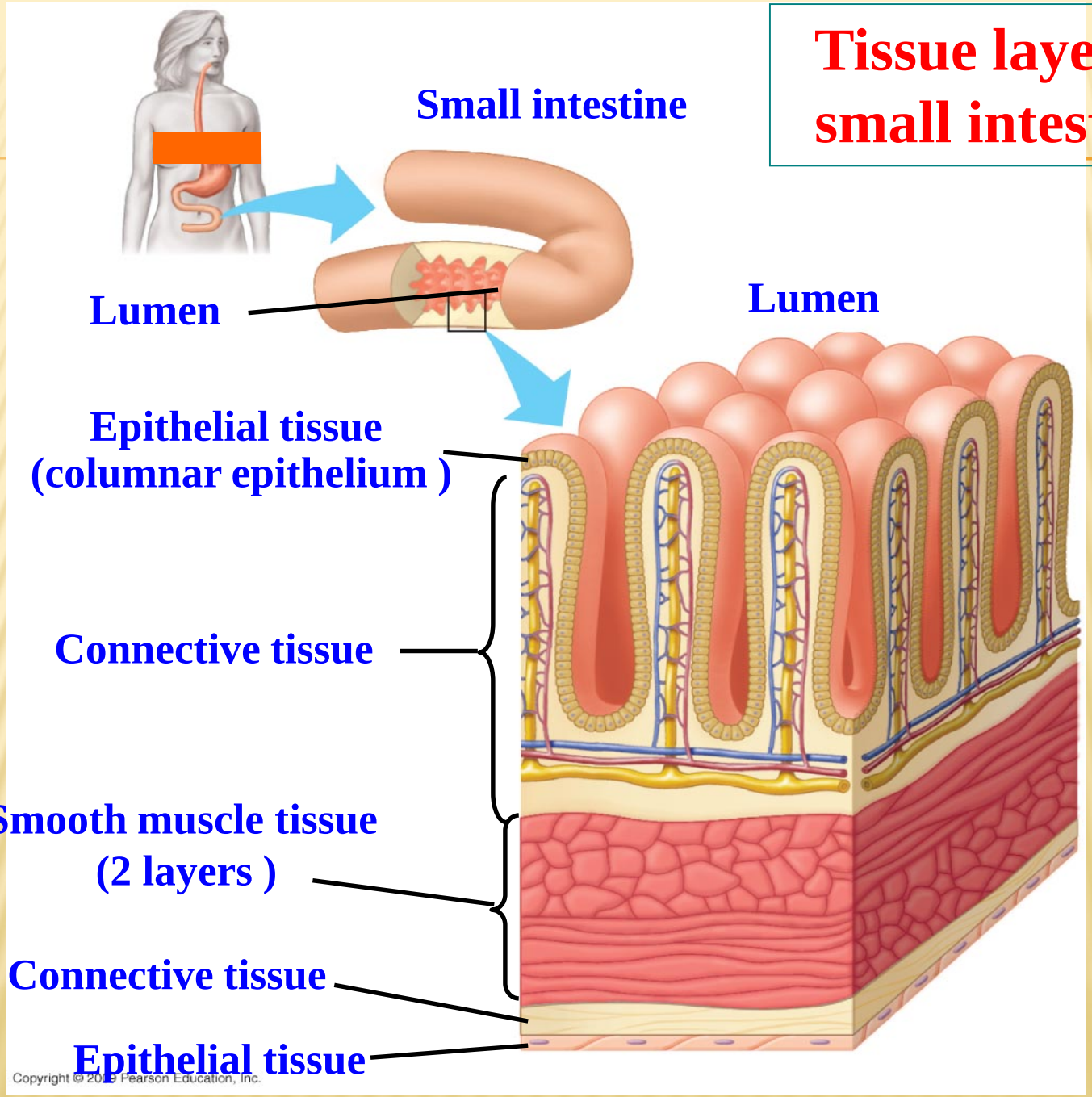
- **Neurons**
  - **Carry signals by conducting electrical impulses**
  - **Elongated cells**
  - **Receives and transmits information**
- **Synapse**
  - **A junction between neurons**

Organs are made up of tissues

- Each tissue performs specific functions

- The heart has epithelial, connective, and nervous tissues
  - Epithelia line the heart chambers
  - Connective tissues make the heart elastic
  - Neurons regulate contractions

Tissue layers of the small intestine wall



PLANT TISSUES

Three tissue systems make up the plant body

1. Dermal tissue

- Layer of tightly packed cells called the epidermis
- First line of defense against damage and infection
- Waxy layer called cuticle, lies on the top of epidermis, and reduces water loss.

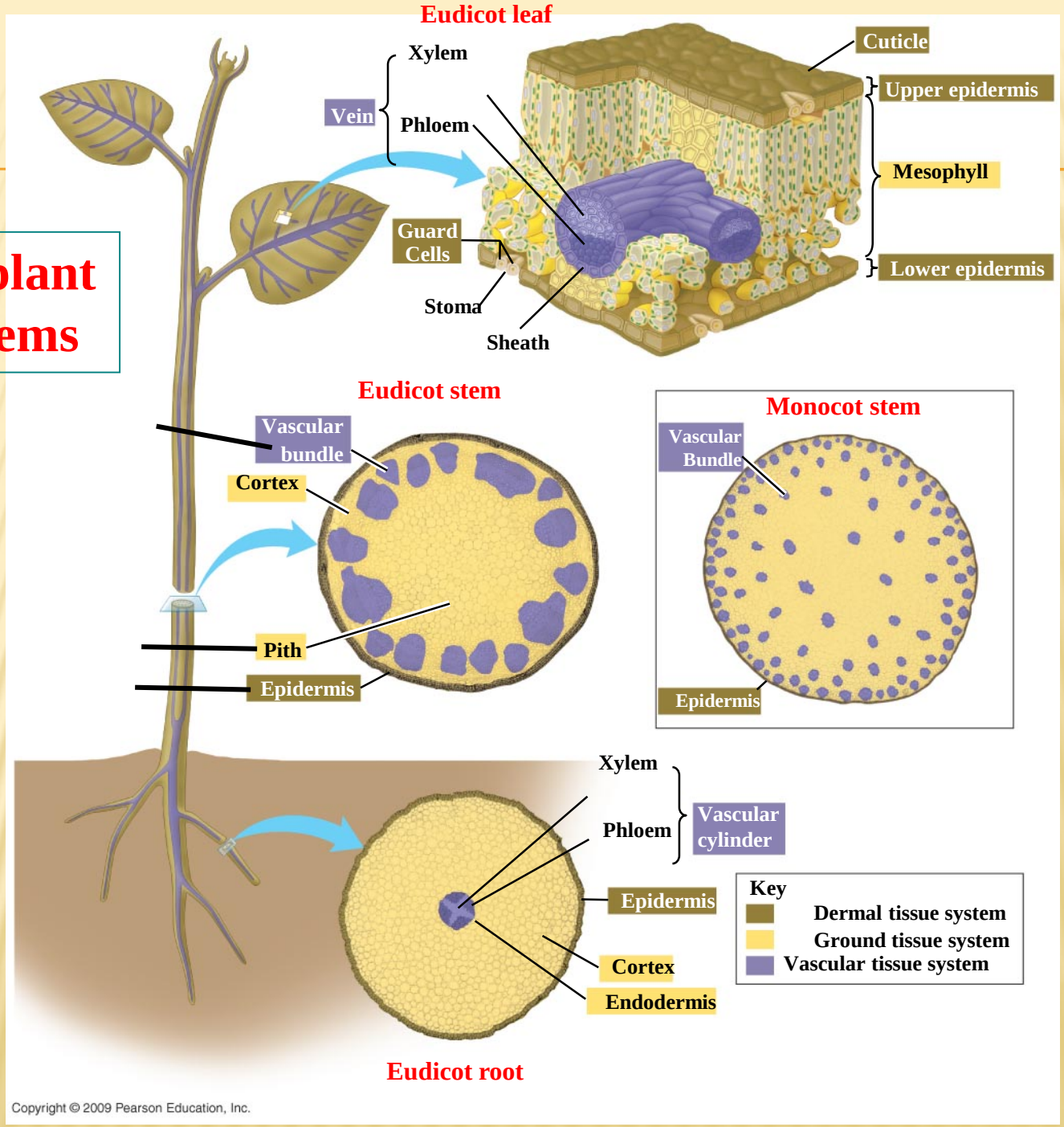
2. Vascular tissue

- Support and long-distance transport
- Composed of xylem and phloem
- Arranged in bundles

3. Ground tissue

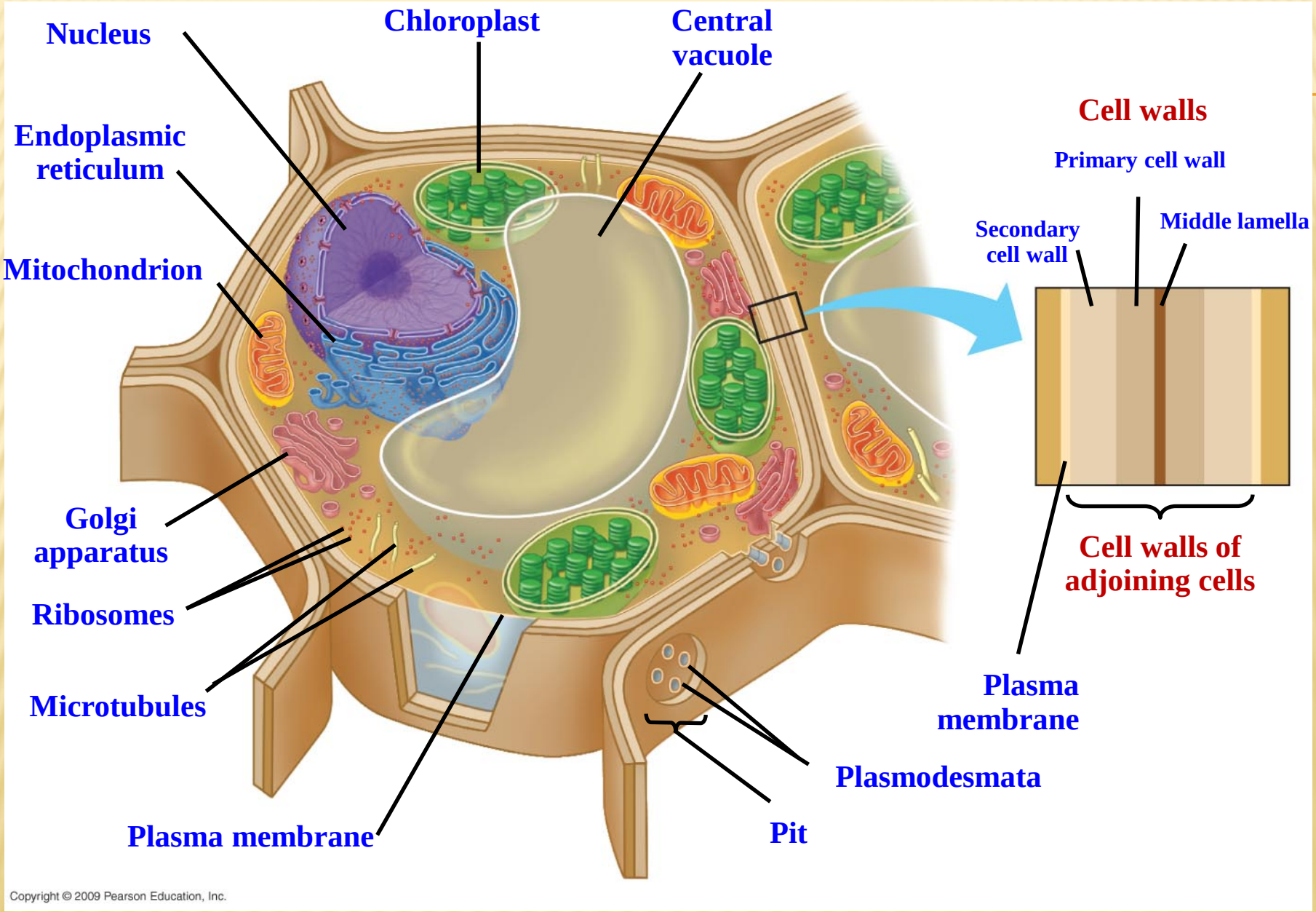
- The bulk of the plant body
- Food production, storage & support
- Lies between dermal and vascular tissue
- In Eudicot stem ground tissue is divided into pith and cortex
- Leaf ground tissue is called mesophyll

The three plant tissue systems



Plant cells and tissues are diverse in structure and function

- **Plant cell wall**
  - **Some plant cell walls have two layers**
    - **Primary cell wall — outermost layer**
    - **Secondary cell wall — tough layer inside primary wall**
  - **A sticky layer called the middle lamella lies between adjacent plant cells**
  - **Openings in cell walls called plasmodesmata allow cells to communicate and exchange materials easily**



The structure of a plant cell

Plant Tissue Systems

1. Ground Tissue System consists of 3 tissues,

- **Parenchyma tissue**
- **Collenchyma tissue**
- **Sclerenchyma tissue**

2. Vascular Tissue System consists of 2 tissues

- **Xylem tissue**
- **Phloem tissue**

Plant cells and tissues

- Plant cell structure is related to function
- There are five major types of plant cells

1- Parenchyma cells making parenchyma tissue.
Function in photosynthesis, food and water storage

2- Collenchyma cells making collenchyma tissue.
Provide flexible support

3- Sclerenchyma cells making sclerenchyma tissue.
Provide rigid support.

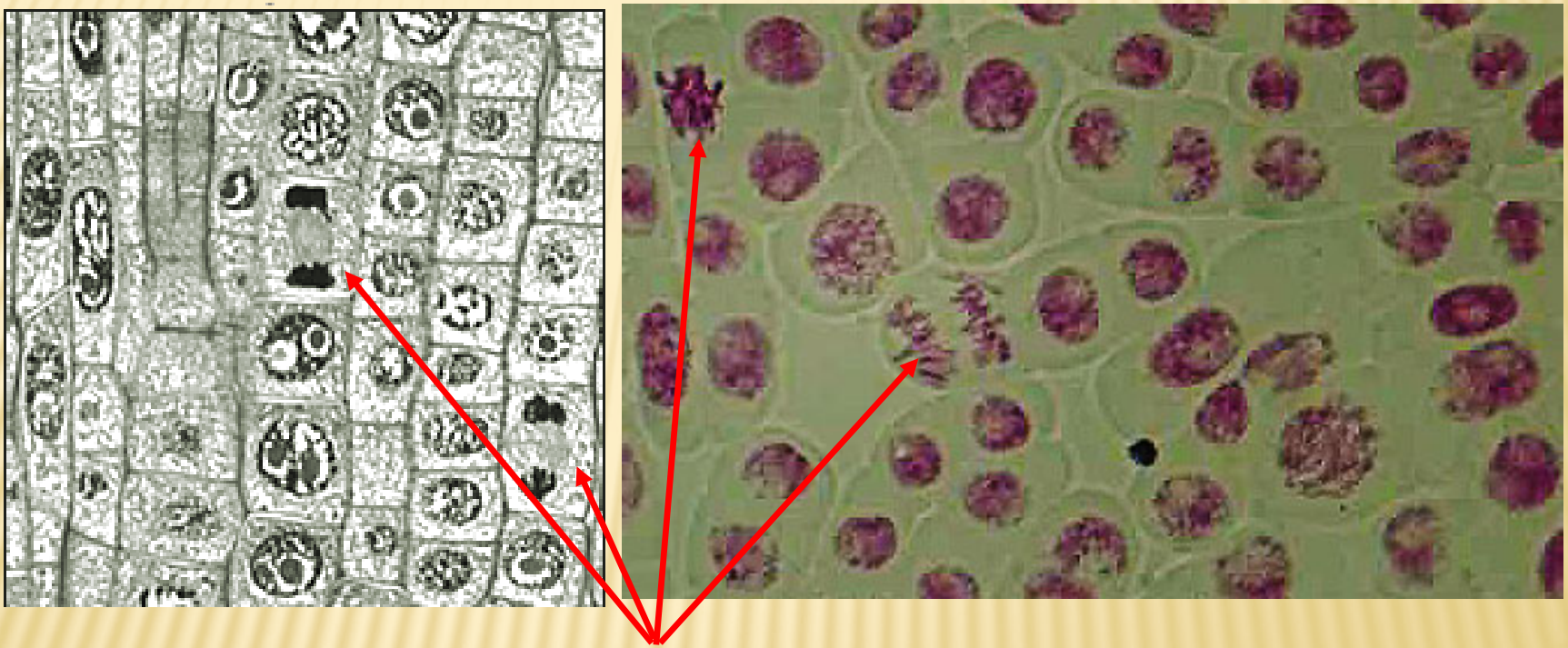
4- Water-conducting cells making xylem tissue.

5- Food-conducting cells making phloem tissue.

Plant Meristematic tissues

- They are located at the tips of roots and stems, between the water- and food-conducting tissues of stems, and at various other places in plant bodies.
- capable of producing new cells by cell-division.
- Source of differentiation: they give rise to all other kinds of tissues

Plant Meristematic tissues



Microscopic photographs of the meristematic cells in the tip of onion roots showing cell division (Arrows)