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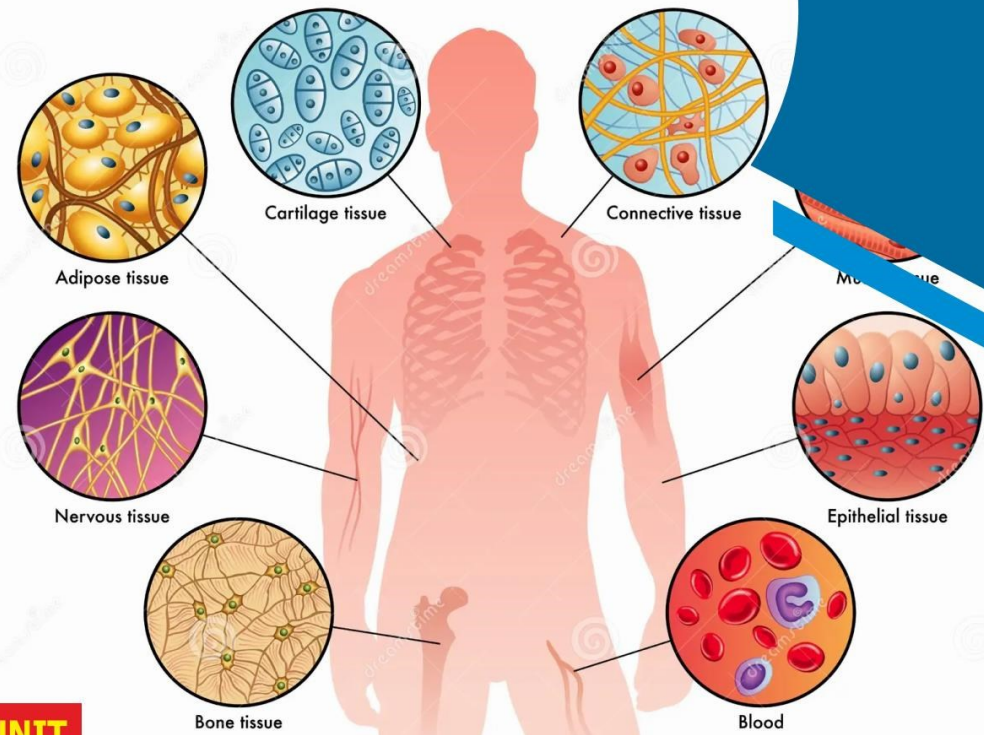


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Animal Tissue



**UNIT
05**

Animal Form and Function

Animal Tissues

**SAMPATH
LANKADHEERA**

B.Sc. (Hons), M.Sc.



Live Biology
Biology
New Syllabus

SAMPATH LANKADHEERA

Unit
05 Animal Form and Function
Animal Tissues

ADVANCED LEVEL

Biology

Unit - 05

Animal Form and Function

o Animal Tissues

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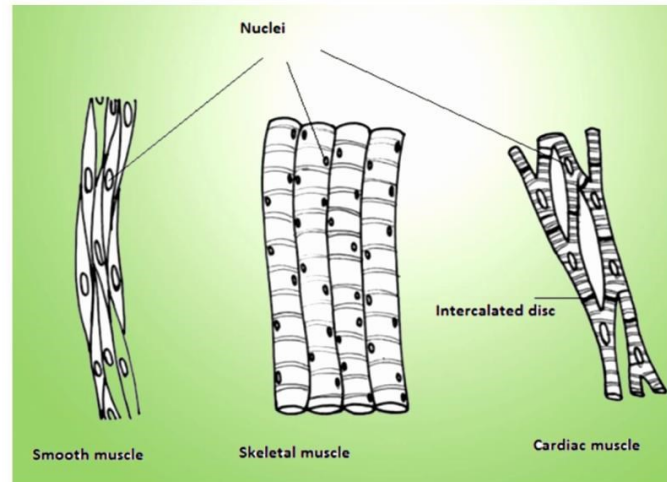
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- Buffering action (5/0)
- Neutrophils**
- Destroy bacteria and microorganisms, Remove dead cells (5/3)
- Eosinophiles**
- Destroy antibody-antigen complexes, Relates to inflammatory responses (5/3)
- Basophils**
- Release histamine, Relates with inflammatory responses (5/3)
- Monocytes**
- Destroy microorganisms/bacteria, removal of dead cells (5/3)
- Lymphocytes**
- Production of antibodies and Cytotoxins (5/3)
- Platelets**
- Start blood clotting process (5/0)
- Diagram**
- RBC and any 4 WBC type (4 x 2 = 8 marks)
(Total = 150)





1. (a) Why blood is considered as a connective tissue.

Answer

1. Mesoderm in origin. (5/0)
2. Large matrix, cells and fibers present. (5/3/1)
3. Red blood cells, white blood cells and platelets present as cells. (5/3/1)
4. Blood plasma as matrix. (5/0)
5. Fibrinogen to form fibers. (5/0)
6. Maintains physiological connection between organs. (5/3)

(b) Briefly describe the structure of the different types of cells found in human blood and state their major functions.

Structure

Red blood cells

- Biconcave, disc shaped (5/3)
- Nucleus absent (5/0)

Neutrophils

- Nucleus with many lobes (3-5) (5/0)
- Granulated cytoplasm (5/0)

Eosinophiles

- Nucleus bilobed (5/0)
- Granulated cytoplasm (5/0)

Basophiles

- partially separated bilobed Nucleus (5/0)
- Granulated cytoplasm (5/0)

Monocytes

- Kidney shaped nucleus (5/0)
- Cytoplasm without granules (5/0)

Lymphocyte

- Large nucleus (5/0)
- Cytoplasm without granules (5/0)

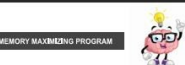
Platelets

- Nucleus absent (5/0)
- Small (5/0)

Functions

Red blood cells

- Transport of respiratory gases O_2/CO_2 (5/0)



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35

ADVANCED LEVEL

Biology

THEORY

in English Medium

New Syllabus



Unit 05 Animal Form and Function
Animal Tissues

Smart Note

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1. (a) Describe the various components of connective tissue. How are these distributed within the tissue?
(b) Explain how fibrous, and adipose connective tissue differ from areolar tissue. (1992/Zoo)

(a) Describe the various components of connective tissue. How are these distributed within the tissue?

Answer

- These types of tissue consist of different types of cells scattered in a large amount of extracellular matrix containing different types of fibres.
- Matrix may be a semisolid (Jelly-like), liquid or solid (dense and rigid).
- Different types of cells can be found in the matrix such as fibroblasts (secrete fiber proteins), macrophages (engulf foreign particles or any cell debris by phagocytosis) and mast cells (secrete heparin and histamine) in addition fat cells (storage and insulation) and leukocytes (protection) are found in some connective tissues.
- There are three different types of fibers. They are collagen fibers (provide strength and flexibility), reticular fibers (join connective tissues to adjacent tissues) and elastic fibers (make tissue elastic).

(b) Explain how loose, fibrous, and adipose connective tissue differ from each other. (1992/Zoo)

- Loose connective tissue (Areolar Tissue) is the most widely distributed connective tissue type in the vertebrate body than other two.
- Loose connective tissue has fibroblasts, macrophages, mast cells, leukocytes and fat cells. Fibrous tissue has fewer fibroblasts. Adipose tissue is packed with adipose cells. Each adipose cell contains a large fat droplet.
- All three types of fibres are found in loose connective tissue. Fibers are loosely arranged and wavy in nature. Fibrous connective tissue (Dense connective tissue) is densely packed with collagen fibers. Fibers are not visible in adipose tissues.
- Matrix more abundant in loose connective tissue but in fibrous tissue the matrix is relatively reduced.
- Loose connective tissue binds epithelia and the underlying tissue. Therefore this holds organs in place. This tissue is found under the skin and throughout the body. Fibrous tissue is found in tendons (attach muscle to bones) and ligaments (connect bones and joints) where tensile strength is required. Adipose tissue found under the skin where it act as a thermal insulator and energy store.

Model Question

1. Describe the structural and functional differences between different muscle tissues.

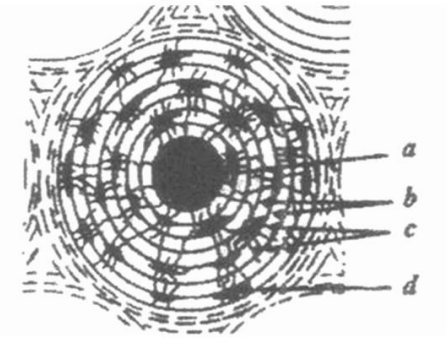
Answer

1. Muscle tissue is responsible for movement.
2. The cells in the muscle tissue are composed of actin and myosin proteins.
3. This tissue is able to contract and relax.
4. There are three basic types of muscle tissues found in the vertebrate animal body.
5. They are smooth muscle, skeletal muscle and cardiac muscle tissues.
6. **Smooth muscle tissue** has spindle shaped and uninucleated cells.
7. Cells lack striations.
8. This tissue is responsible for involuntary body functions (e.g. churning of stomach, constriction of arteries).
9. This tissue is found in digestive tract, urinary bladder, arteries and other internal organs.
10. Skeletal muscles composed of bundles of long cells with multi nuclei.
11. Cells are striated.
12. The contractile units of this muscle cells are called sarcomers.
13. This gives the striated appearance to the muscle cells.
14. The arrangement of the sarcomere gives the striated appearance.
15. The muscles are generally attached to the skeletal system and helps mainly in voluntary body movements.
16. **Cardiac muscle tissue** composed of uninucleated cells which are interconnected via intercalated discs.
17. Cells are striated with sarcomeres.
18. Cardiac muscle tissue is responsible for involuntary heart contractions.
19. Intercalated disks help relay signals from cell to cell and synchronize heart contraction.
20. Cardiac muscle tissue is only found in the wall of the heart.



2015 AL

03. (A) Questions A (i) - A (iv) are based on the diagram given below.



(i) What is the structure shown in the above diagram?

.....

(ii) Name the structures labelled as a - d in the above diagram.

.....
.....
.....
.....

(iii) Name the two main types of cells found in the structure shown in the above diagram and state the main function of each of them.

.....
.....

(iv) What are the structures found in a?

.....
.....
.....

Essay Aid

- (a) Describe the various components of connective tissue and how are these distributed within the tissue?
(b) Explain how loose, fibrous, and adipose connective tissue differ from areolar tissue. (1992/Zoo)
- Describe the various components of areolar connective tissue. How are these distributed within the tissue?
- (a) Why is blood considered to be a connective tissue?
(b) Briefly describe the structure of the different types of cells found in human blood and state their major function (1994/Zoo)

5.1.0 : Explores structure and growth of animals

5.1.1 : Relates the structure of animal tissues to their functions

Number of Periods : 10

Learning Outcomes:

- States the four major types of tissues as epithelial tissues, connective tissues, muscle tissues and nervous tissues
- Lists the structural features of epithelial tissues
- States the structure and basic functions of each tissue types and differentiates them according to the number of cell layers and the shape of the cell
- Lists the major features of connective tissues
- Classifies the connective tissues as loose, dense, adipose, blood, cartilage and bone
- Briefly explains the structure of each connective tissue and states the locations of each
- Writes down the major structural and functional features of muscle tissues
- Classifies the muscle tissues as smooth, skeletal and cardiac muscles.
- Compares the major structural and physiological features which contribute to form major muscle types.
- States the locations of each muscle tissue within the human body.
- States the basic features of the nervous tissue.
- Names the neurons and neuroglia as different cells from each other in nervous tissue.
- States the major difference of the cells; neurons and neuroglia.
- Briefly explains the gross structure of the motor neurone by using a diagram.
- Writes down the major functions of the neuroglia.

5.1.0 : Explores structure and growth of animals

5.1.1 : Relates the structure of animal tissues to their functions

- There are four major types of animal tissues. Epithelial, connective, muscle tissue and nervous tissue.

1. Epithelial tissue

Characteristics

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Functions

- Protection (Eg. Barrier against mechanical injury, pathogens, barrier against fluid loss)
- Secretion (Eg. Enzymes, hormones, mucus, sweat)
- Absorption (Eg. Nutrients, respiratory gases)

21. Smooth muscles

- (1) never get fatigued. (2) may contract faster than skeleton muscles. (3) are not attached to tendons.
- (4) are composed of cylindrical shaped fibres. (5) are composed of cells having one or two nuclei.

2010/16

AL/2013

1. (A) (i) What is the basic physiological feature of muscles?

.....

(ii) What is a muscle fiber?

.....

(iii) State three physiological differences between human cardiac muscle fibers and skeletal muscle fibers.

Cardiac muscle fibers	Skeletal muscle fibers

(iv) State three structural differences between human cardiac muscle fibers and smooth muscle fibers.

Cardiac muscle fibers	Smooth muscle fibers

Nervous Tissue

1. What are main cells present in nervous tissue

.....

2. What are main regions of a neuron

.....

3. What is the function of a dendrite

.....

4. State the function of an axon

.....

MCQ

5. What is the tissue consist of relatively large cells?

- (1) Muscular tissue (2) Nervous tissue (3) Epidermal cells (4) Connective tissue (5) Adipose tissue

6. Node of Ranvier can be seen in,

- (1) Interneuron (2) Axons (3) Dendrites (4) Dendrons (5) Myelin sheaths

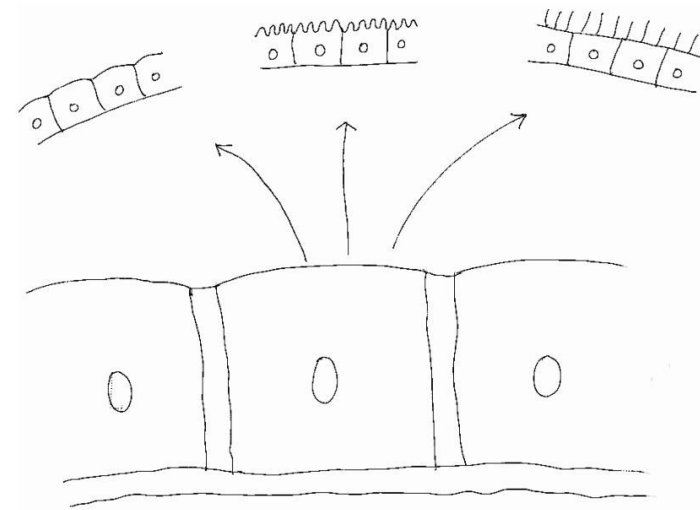
6. What is least important to move a bone with the involvement of muscles?
 (1) Oxygen supply (2) Nerves supply (3) Tendon (4) Supply of glucose (5) Opposing muscle
7. Skeletal muscle fibers
 (1) Non fatigable (2) Contracts autonomously even after separation
 (3) Intercalated discs are present (4) Mitochondria are abundant (5) Have an autonomous nervous supply
8. Which of the statement is incorrect, regarding the skeletal muscle?
 (1) Striped (2) Mesoderm in origin (3) Voluntarily controlled (4) Myoglobin is present
 (5) Present in hair erector muscles
9. Skeletal muscle fiber,
 (1) multinucleate (2) Branched (3) Only one sarcomere is present (4) Small number of mitochondria is present.
 (5) Spindle shaped
10. Striated muscles are absent
 (1) Eyelids (2) Tongue (3) Diaphragm (4) Biceps (5) Iris of the eye
11. What is the major functional property of a striated muscle?
 (1) Fatigable rapid contraction (2) Non fatigable slow contraction (3) Slow prolong contraction
 (4) Rhythmic contraction (5) 1st and 4th answers.

Smooth Muscle

12. What is the ideal tissue to prepare a permanent slide of a smooth muscle?
 (1) Areolar tissue of mice (2) Adipose tissue (3) Bicep (4) Tendons (5) Intestinal wall
13. Smooth muscle differentiates from striated muscle by?
 (1) Consist of single cells separated from each other. (2) Controlled by involuntary nerves
 (3) Muscle cells are multinucleate (4) Cannot contract long time. (5) Consist of fine elongated cells.
14. Which of the statement is correct, regarding smooth muscles?
 (1) Fibers are multinucleate (2) Striations are present (3) Have a voluntary nervous supply
 (4) Present in walls of all organs with an inner cavity (5) Some smooth muscles contracts involuntarily
15. Which of the statement is incorrect, regarding the smooth muscles?
 (1) It contains less number of mitochondria compared to skeletal muscle.
 (2) Sarcoplasmic reticulum is less extensive compared to skeletal muscle.
 (3) Small amount of glycogen is present compared to skeletal muscle
 (4) Cells are shorter than striated muscles (5) Actin, myosin proteins are absent in myofibrils.
16. Which of the following statements is incorrect regarding smooth muscles?
 (1) Non striped (2) Cells are multinucleate (3) Mesoderm in origin
 (4) Innervated by nerves from autonomic nervous system (5) Contracts involuntarily
17. What is the structure that we do not find in smooth muscle tissues as major muscle?
 (1) Tongue (2) Bladder (3) Lungs (4) Stomach (5) Artery
18. Smooth muscles
 (1) Sarcolemma present (2) multinucleate (3) Cylinder shaped (4) Actin is absent (5) Present in spincters

Cardiac Muscle

19. Which is correct about both a cardiac muscle fibre and a smooth muscle fibre?
 (1) Striated (2) spindle shaped (3) never fatigued (4) myogenic (5) are under involuntary control. 2002
20. What is the characteristic property of heart muscle?
 (1) Fatigable slow, prolong contraction (2) Fatigable fast contraction (3) Non fatigable, rhythmic contraction
 (4) Fatigable slow, rhythmic contraction (5) Fatigable, fast, rhythmic contraction.



Different Types of Epithelial Tissues

- There are two general types according to number of cell layers on the basement membrane.
1. Simple epithelia – Single cell layer
(Eg. Simple squamous, Simple cuboidal, Simple columnar and pseudo-stratified)
 2. Compound epithelia – Several cell layers
(Eg. Stratified squamous, Transitional)

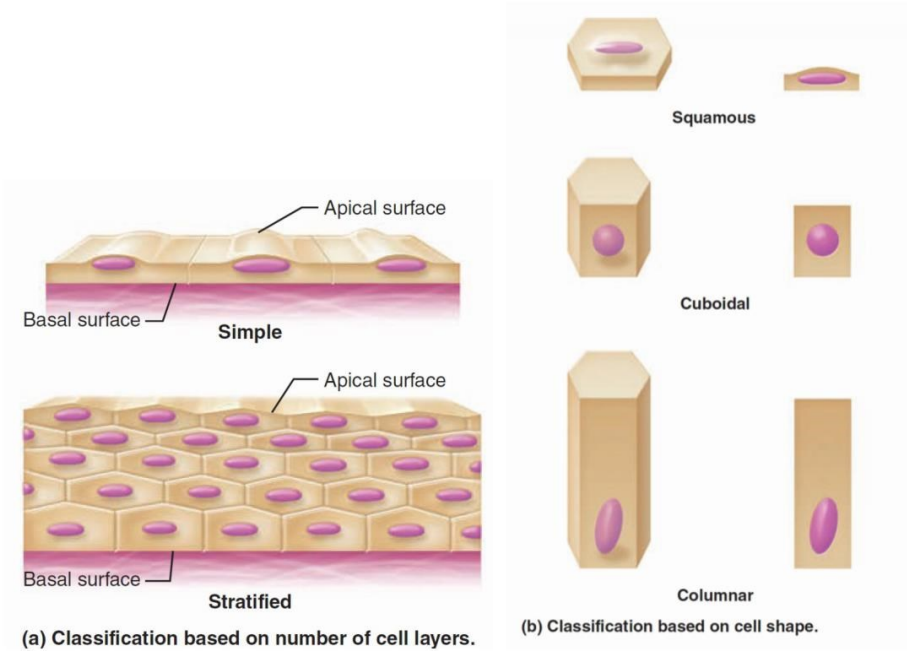


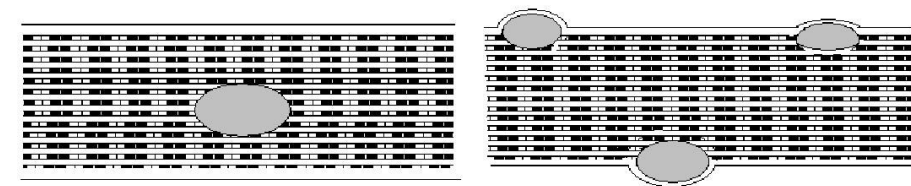
Fig. Different epithelia

3. Which of the following pair of element need to construct bones?
(1) Fe and Na (2) P and Ca (3) Fe and K (4) Ca and Na (5) P and Fe
3. Bones and cartilages differ each other form,
(1) Absence of cell in bones (2) Presence of fibers in bones (3) Presence of blood vessel in the matrix of bones and absence of them in cartilages (4) Presence of fine branch cells in cartilage.
(5) Having same chemicals substances but in different properties in bones and cartilages
4. Which of the following statement is incorrect regarding cartilage and bones?
(1) They are skeletal structure (2) They can grow (3) Blood vessel present in the matrix
(4) Specialized skeletal tissues (5) Have mesoderm origin.

Muscle Tissue

	Skeletal muscle	Smooth muscle	Cardiac muscle
Shape			
Nuclei			
Striations			
Sacrolemma and sarcomere			
Intercalated disc			
Nerve supply Voluntary/Involuntary			
Neurogenic/Myogenic			
Fatigue			

4. Following diagrams show striations present in two muscle types. Explain how you identify two diagrams.



Skeletal Muscles

5. Skeletal muscle fibre
(1) is spindle shaped. (2) is striated. (3) shows myogenic contractions. (4) is uninucleate. (5) never gets fatigued. (AL/2001)

Blood

- 5. The white blood cells associated with antibody production are
(1) neutrophils. (2) basophils. (3) eosinophils. (4) monocytes. (5) lymphocytes. 2004
- 6. What is more abundant in blood,
(1) Plasma protein (2) Water (3) Amino acids (4) Hormones (5) Waste products
- 7. Most abundant white blood cell in grown healthy male,
(1) Basophils (2) Eosinophils (3) Lymphocytes (4) Monocytes (5) Neutrophils
- 9. What is the incorrect statement about thrombocytes?
(1) They are type of WBCs (2) Nucleus absent (3) Involved in blood clotting (4) Have short life time
(5) They are present in small number
- 9. pH of human blood,
(1) 7.4 (2) 8.6 (3) 0.2 (4) 8.2 (5) 6.0
- 10. What is the cell type in human blood converts to phagocytes?
(1) Neutrophils (2) Lymphocytes (3) Basophils (4) Monocytes (5) Eosinophils
- 11. When observing a stained human blood smear under high power of L.M, circular cells with lighter center was seen. These cells are,
(1) Lymphocytes (2) Monocytes (3) Neutrophils (4) Basophils (5) Red blood cell
- 13. Which one of the following statements regarding human leucocytes is correct?
(1) Eosinophils have granules containing heparin. (2) Basophils destroy microorganisms by phagocytosis.
(3) Lymphocytes are the largest leucocytes. (4) Neutrophils can leave the blood system.
(5) Monocytes play a role in destroying some parasites. 2013 old/15

Cartilage

- 3. Elastic cartilage is present in human,
(1) Trachea (2) Long bones (3) Skull (4) Ribs (5) End of nose
- 4. Which of the following sentence is incorrect regarding hyaline cartilage?
(1) Covered by perichondrium (2) Cells are present in groups in the matrix. (3) Blood vessels are absent within the matrix. (4) Fiber can be seen by L.M. (5) Large number of cell present in the peripheral region.
- 5. What is the most abundant connective tissue present in human body?
(1) Areolar tissue (2) Adipose tissues (3) Dens regular tissue (4) Dens irregular tissue (5) Bone
- 6. Elastic cartilage is present in human,
(1) Trachea (2) Head of Femur (3) Inter vertebral disc (4) Epiglottis (5) Larynx
- 7. Elastic fibers are abundant in,
(1) Adipose tissue (2) Hyaline cartilage (3) Fibrous cartilage (4) Elastic cartilage (5) Dens regular tissue
- 8. Which of the followings sentence is true about cartilage?
(1) Chondriocytes are not true cells (2) Fibrous cartilage is present in inter vertebral discs
(3) Cartilage are absent in mature skeleton of human (4) All boney structure differentiates from cartilages
(5) Chondrin is present in bones
- 9. What is the statement incorrect about cartilage?
(1) Present in the all vertebrates (2) Blood vessels are absent (3) Three types present
(4) It is a connective tissue (5) Lacunae absent

Bone Tissue

- 10. Which of the following is not a function of bone?
(1) Provides support to the body (2) Production of WBC'S (3) Ca⁺⁺ reserves
(4) Provide surface to attach muscles (5) Protection of internal organs

Simple squamous epithelium

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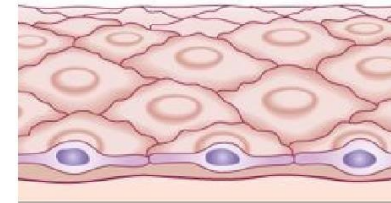


Fig. Squamous epithelium

Simple cuboidal epithelium

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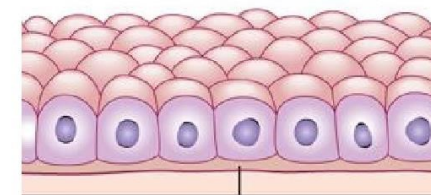


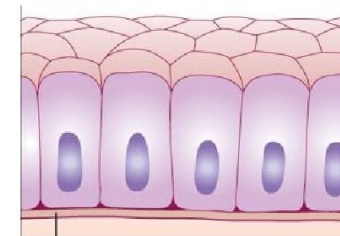
Fig. Cuboidal epithelium

Simple columnar epithelium

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Pseudostratified columnar epithelium

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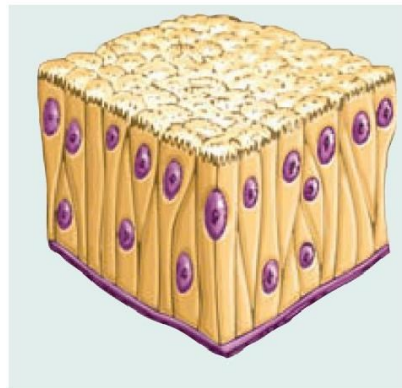


Fig. Pseudo-stratified squamous epithelium

Compound Epithelium

Stratified squamous epithelium

- This tissue is composed of a number of layers of cells.
- This epithelium regenerates rapidly.
- Cell division produces new cells near the basement membrane.
- The old cells are sloughed off and replaced by the new cells .
- This epithelium is found on surfaces where they are subjected to abrasion such as outer lining of mouth, anus, vagina.

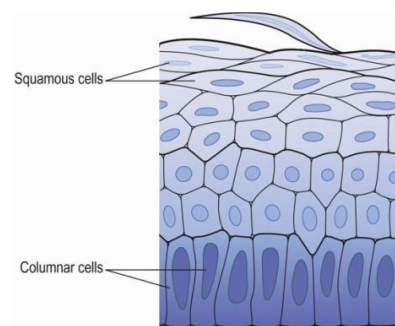
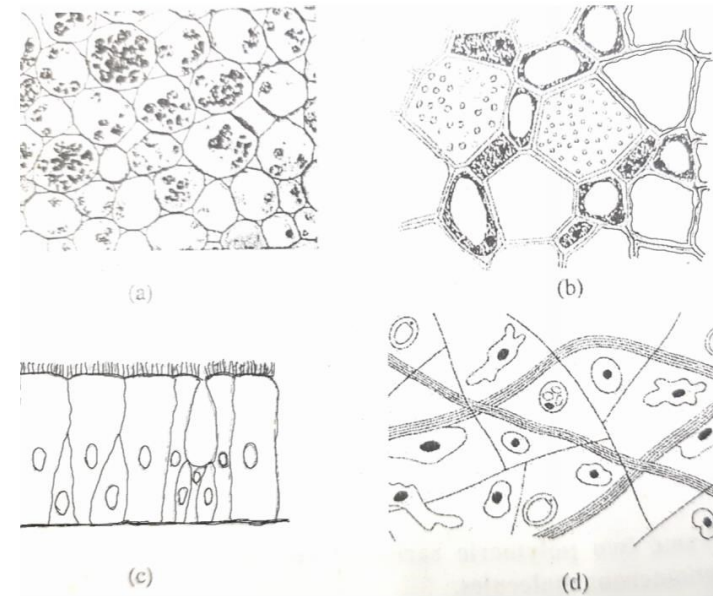


Fig. Stratified squamous epithelium

AL 2009
(iii)



Giving above are four drawing of tissues of plants and animals. Name the tissues, and state location in the plants or animals body and one major function of each of them.

Name of the Tissue	Location	Function
(a)
(b)
(c)
(d)

Connective tissues MCQ

- What is the structure that you don't expect to see in a stained permanent slide of an areolar tissue?
(1) Mast cell (2) Phagocytes (3) Yellow fiber (4) White fiber (5) Smooth muscle
- Areolar tissue
(1) Is the connective tissue with less amount of matrix. (2) Reticular fiber is absent.
(3) Is the most abundant connective tissue in the body. (4) Has a rich blood supply.
(5) Has large number of smooth muscles.
- What is the sentence correct regarding connective tissue?
(1) Matrix of the bone is strengthen by Ca^{+2} and PO_4^{-3} (2) Blood vessels are present in the matrix of cartilage
(3) Fiber are absent in blood (4) Collagen is present only in fibrous connective tissues
(5) Relatively few number of fibers and a large matrix is present in areolar tissue
- If you want to prepare a permanent slide to show both yellow fibers and white fibers, you should select,
(1) Mammalian areolar tissue (2) Cartilage of mammalian external ear
(3) Piece of bone fiber sharks skeleton (4) Frogs lungs (5) Frogs bladder
- Dense yellow fibrous connective tissue present in,
(1) Tendons (2) Walls of blood vessels (3) Kidney capsule (4) Ligament (5) Periosteum

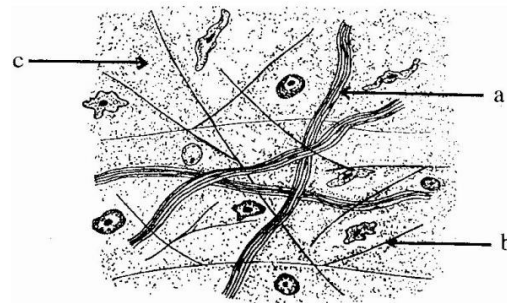
21. Human stratified squamous epithelium
 (1) Present in epidermis (2) Does secretory function (3) Consist only with squamous cells (4) Is stretchable
 (5) Is rich in blood vessels
22. Which is the structure consisting of simple squamous epithelium in human body?
 (1) Esophagus (2) Bladder (3) Trachea (4) Thyroid gland (5) Bowman's capsule

Connective Tissues

AL 1998

1. What is a connective tissue?
.....
2. Which germ layer gives rise to connective tissues in the human body?
.....
3. Which type of connective tissue in man is usually considered to be typical?
.....
4. Name the type of connective tissue in man that differs most from the typical form.
.....
5. Name the main type of connective tissue found in the pinna of the ear of man.
.....

Questions 6 and 7 are based on the following diagram of a connective tissue.



6. Name the connective tissue given in the diagram.
.....
7. Name the parts labelled as a, b and c.
 - (i) a
 - (ii) b
 - (iii) c
 - (iv) To which group of macromolecules do the main constituents of 'a' and 'b' belong?
9. Name five cell types normally found in the above connective tissue and state one main function of each of these cells.

Cell type	Main function
(i)
(ii)
(iii)
(iv)
(v)

2. Connective tissue

Characteristics

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- Different types of cells can be found in the matrix such as fibroblasts (secrete fiber proteins), macrophages (engulf foreign particles or any cell debris by phagocytosis) and mast cells (secrete heparin and histamine) in addition fat cells (storage and insulation) and leukocytes (protection) are found in some connective tissues.
- There are three different types of fibers.
- They are collagen fibers (provide strength and flexibility), reticular fibers (join connective tissues to adjacent tissues) and elastic fibers (make tissue elastic).

Functions

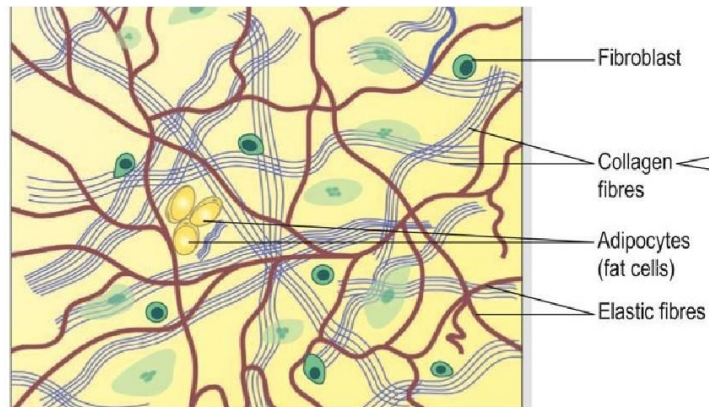
- Binding and structural support
- Protection
- Transport of materials
- Insulation

Different Types of Connective Tissues

- There are different types of connective tissues.
- They are loose connective tissue (Areolar tissue), Fibrous connective tissue (Dense connective tissue), adipose tissue, blood, cartilage and bone .

Loose connective tissue (Areolar Tissue)

- Fibers are loosely arranged and wavy in nature.
- This tissue binds epithelia and the underlying tissue.
- Therefore this holds organs in place.



Location

- This tissue is found under the skin and throughout the body.

Adipose tissue

Epithelial Tissues

AL 1996

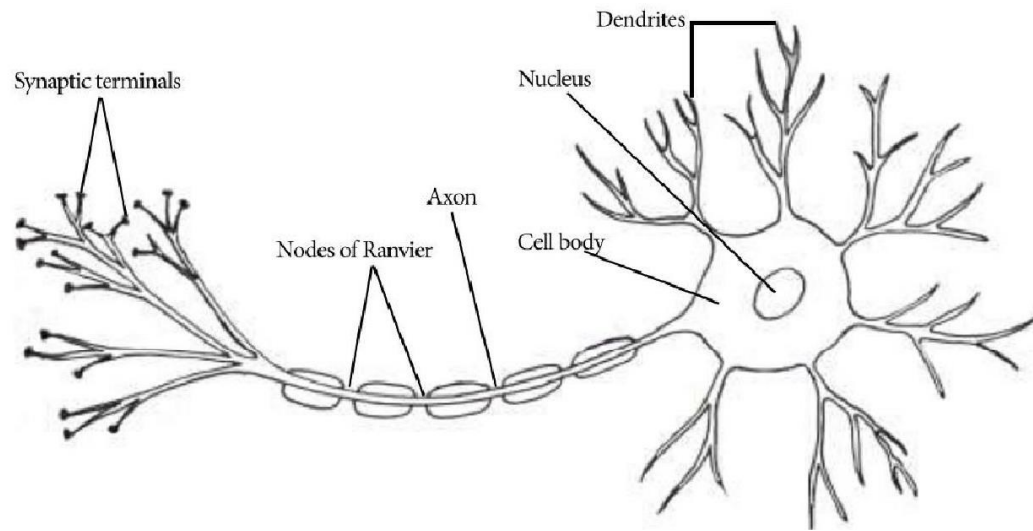
1. What is a tissue
.....
2. State two main structural features of epithelial tissue.
.....
3. State two main functions of epithelial tissue.
.....
4. State three main types of simple epithelial tissues found in human body.
.....
5. What are the types of epithelia found in following?
Urinary bladder of man :
Bowman's capsule of man :

MCQ

7. In man, simple squamous epithelium is seen in the
(1) Thyroid gland (2) Kidney (3) Oesophagus (4) Skin (5) Tongue 2005
8. Which of the following mammalian tissue consist of a transitional epithelium?
(1) Epidermis (2) Bladder (3) Trachea (4) Lung alveolar (5) Germinal epithelium of ovary
9. Simple squamous epithelia in man are found in the
(1) Epidermis and buccal cavity. (2) Ducts of sweat glands and ducts of salivary glands.
(3) Urinary bladder and Bowman's capsule. (4) Alveoli and blood capillaries.
(5) Thyroid gland and convoluted tubules of nephrons.
10. Transitional epithelium is usually present in,
(1) Secretory surfaces (2) Absorptive surfaces (3) Surfaces subject to stretch
(4) Surfaces where the friction is high (5) Places which subject to high pressure
11. What is the common property of all epithelial tissues?
(1) Consist of one cell layer (2) Present on a basement membrane (3) Do secretory function
(4) Covers only external surface of the body (5) Efficient in providing protection
12. What is the region of human alimentary tract lined with a columnar epithelium?
(1) Epithelium lines from esophagus to rectum (2) Epithelium lines from stomach to the end of large intestine
(3) Epithelium of the duodenum (4) Epithelium of the stomach (5) Epithelium small intestine
13. Which of the flowing statements is incorrect regarding stratified epithelium?
(1) Present on basal membrane (2) No direct blood supply (3) Only the external epitheliums are stratified
(4) Many are glandular (5) Less amount of intercellular material present
14. What is the characteristic feature of a particular epithelium?
(1) Location (2) Number of mitochondria present (3) Shape of the cell (4) Location of the nucleus within cell
(5) Presence of microvilli
15. Select the tissue with a simple cuboidal epithelium
(1) Lung alveoli (2) Endometrium (3) Bladder wall (4) Lining of the intestine (5) Distal convoluted tubule of the nephron
20. Stratified epithelium is absent in human
(1) Epidermis (2) Buccal cavity (3) Esophagus (4) Vagina (5) Trachea

Neuroglia (Glial cells)

- Neuroglial cells are supportive cells of neurons.
- Their functions include nourishment of nerve cells, insulation of nerve cells, replenishing neurons and sometimes modulate neuron functions.
- Neuroglia are more abundant than neurons.



PRACTICAL NO.23

Microscopic observation and identification of different types of animal tissues

Objectives

Students should be able to

- observe major animal tissues using a light microscope,
- to draw suitable diagrams of animal tissues as seen through the light microscope proportionately,
- differentiate the animal tissues according to their characteristic features.

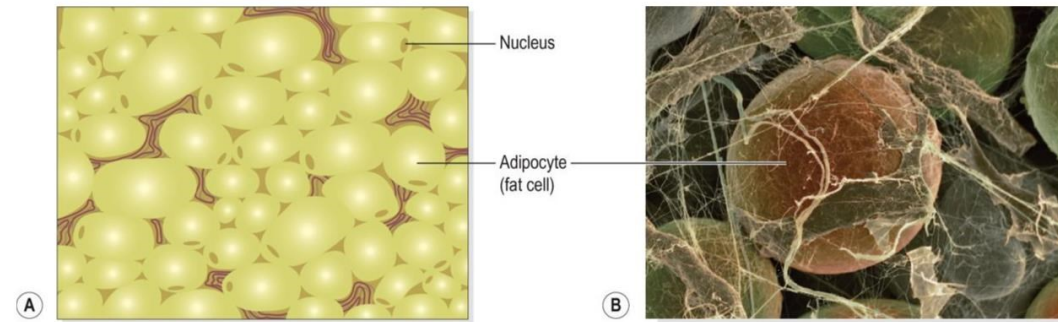
Materials and equipment

- Light Microscopes
- Prepared slides of epithelial tissues, smooth, striated and cardiac muscles, connective tissues such as loose, dense, cartilage, bone and human blood cells

Instructions

- Allow students to examine the slides of epithelial tissues, smooth, striated and cardiac muscles, connective tissues such as loose, dense, cartilage, bones and human blood cells under a light microscope.
- Let students draw suitable diagrams to show the observed characteristics of above tissues.
- Instruct the students to record their observations highlighting the identified features of each tissue.

- For instance, it is found under the skin where it act as a thermal insulator and energy store.



Fibrous connective tissue (Dense connective tissue)

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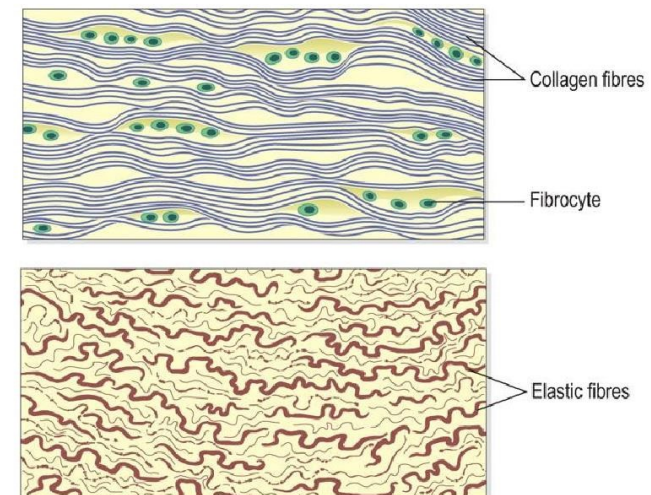
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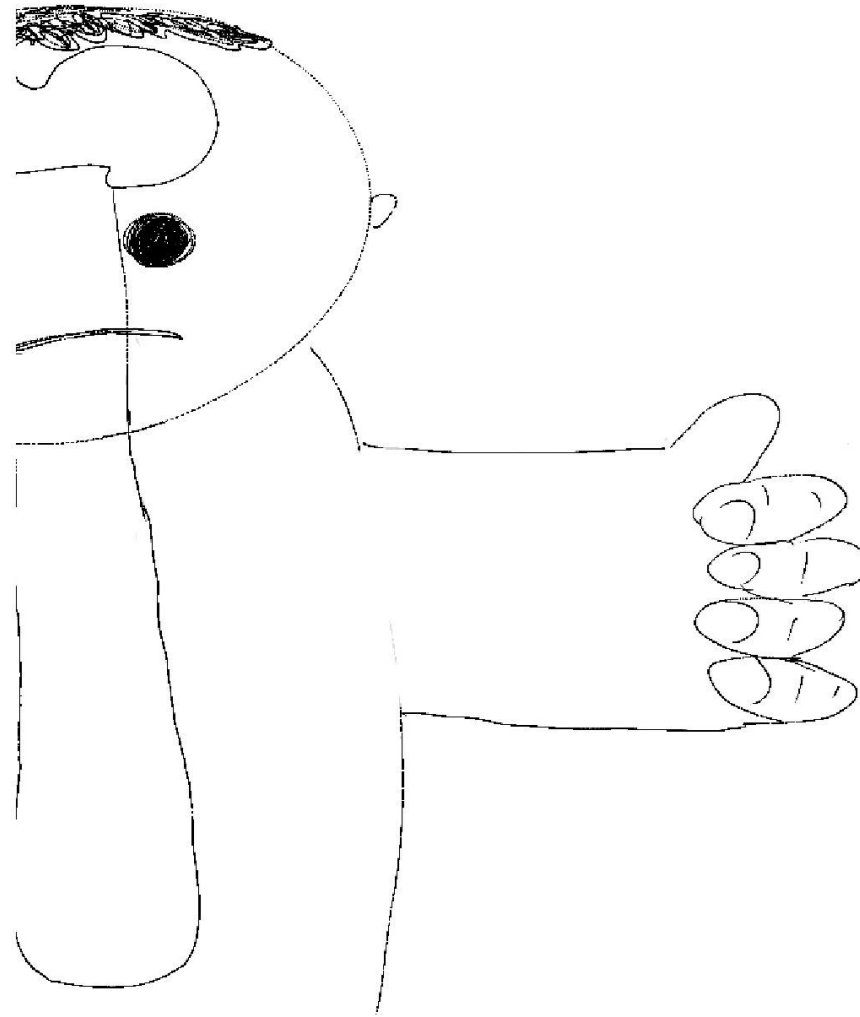
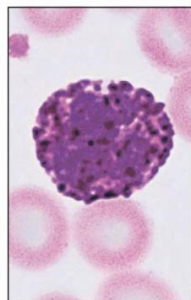
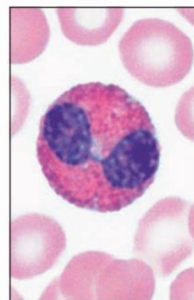
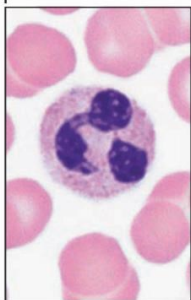
Blood tissue

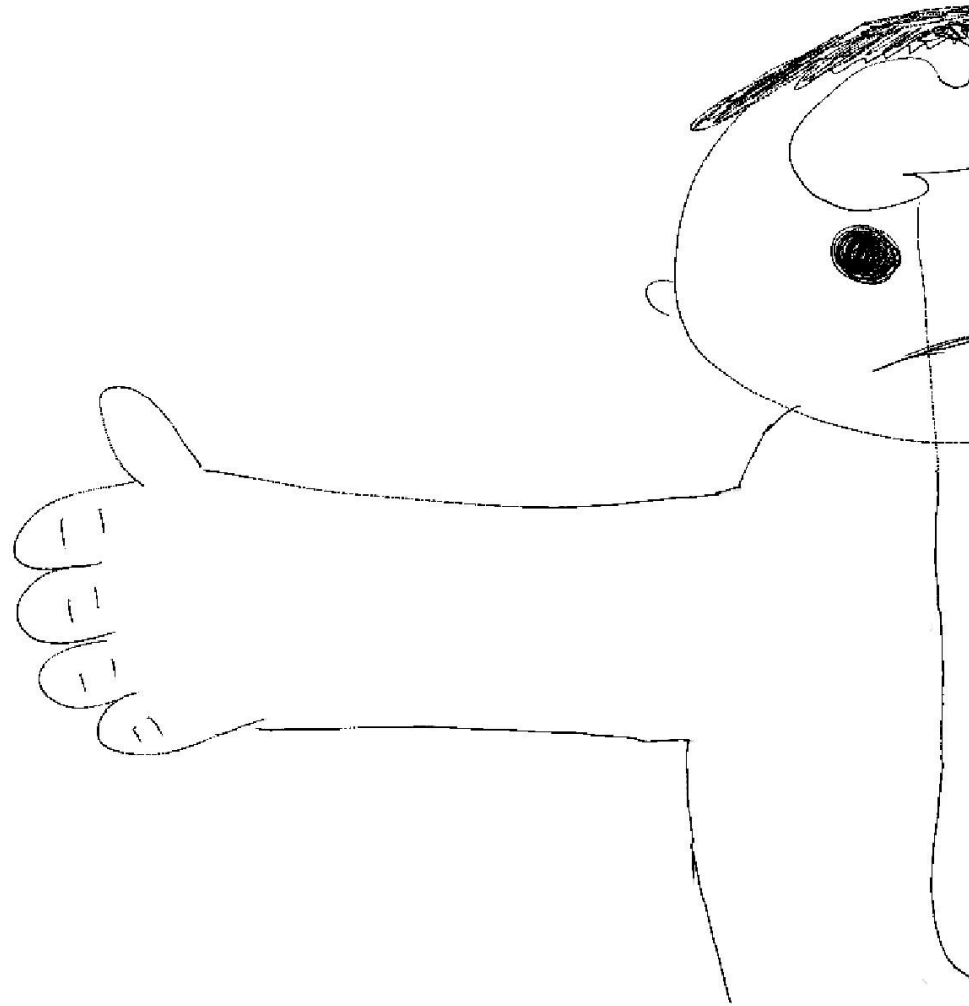
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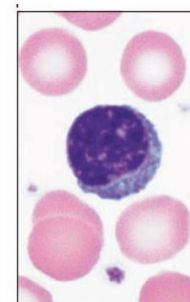
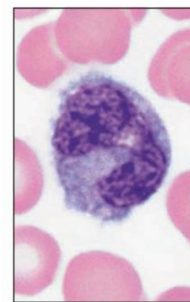
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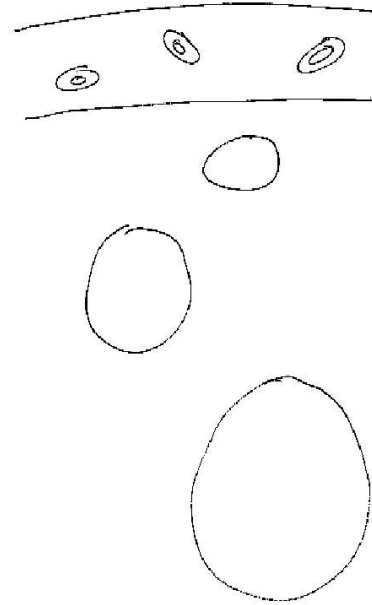
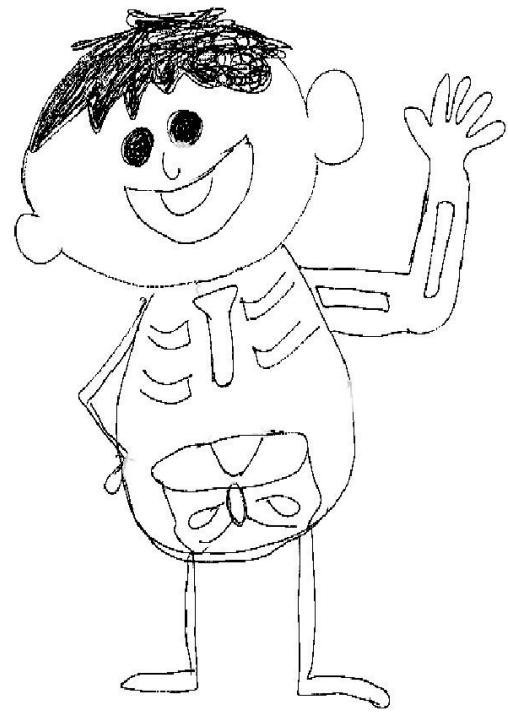




- Main functions of blood tissues include transport of materials, protection, and osmo-regulation.



Cartilage

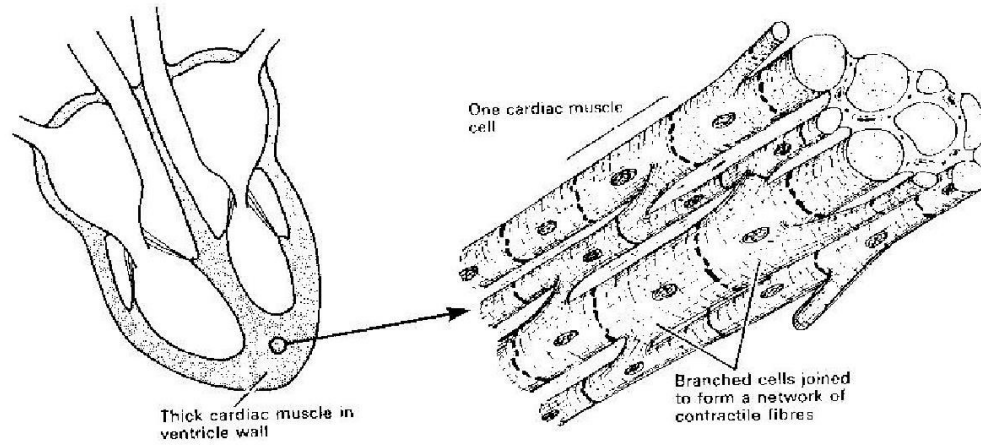


4. Nervous tissue

- Dendrites and cell body is used to receive nerve impulses from other neurons.
- Axon is used to transmit impulses to other neurons, cells or muscles.
- Axons are bundled together into nerves.

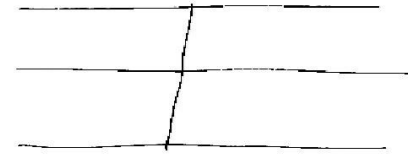
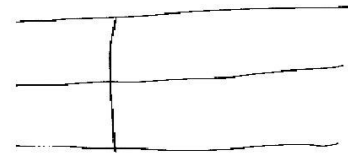
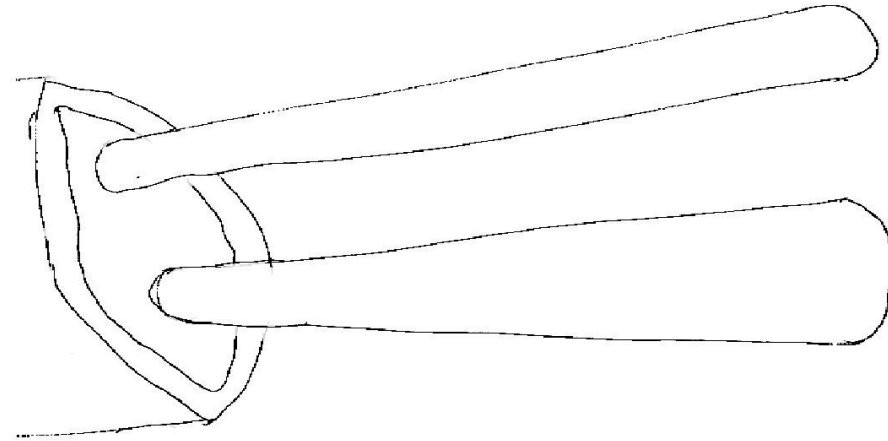
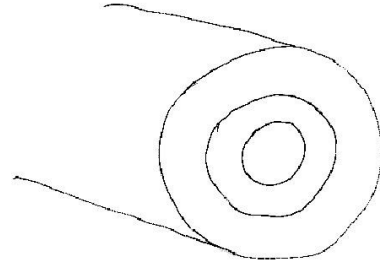
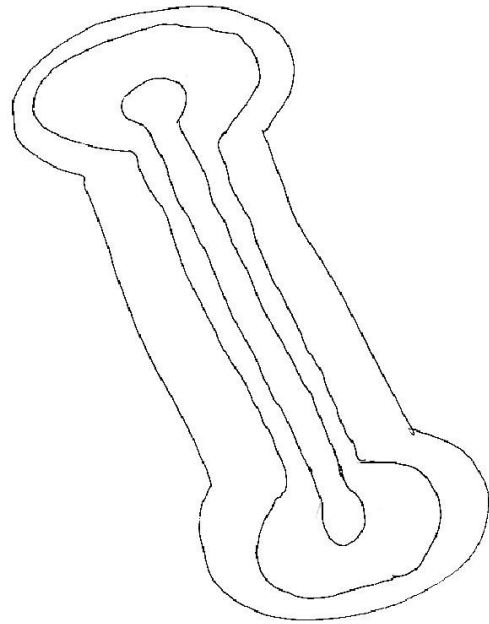
Cardiac muscle tissue

- Intercalated disks help relay signals from cell to cell and synchronize heart contraction.
- Cardiac muscle tissue is only found in the wall of the heart.



Bone

- The mammalian hard bone has repeating units called osteons.
- Each osteons has a concentric layer of mineralized materials.
- At the centre of the osteon is a central canal containing blood vessels and nerves.
- This tissue forms the endoskeleton of most vertebrates and provides support and strength to the body.



Skeletal muscle tissue

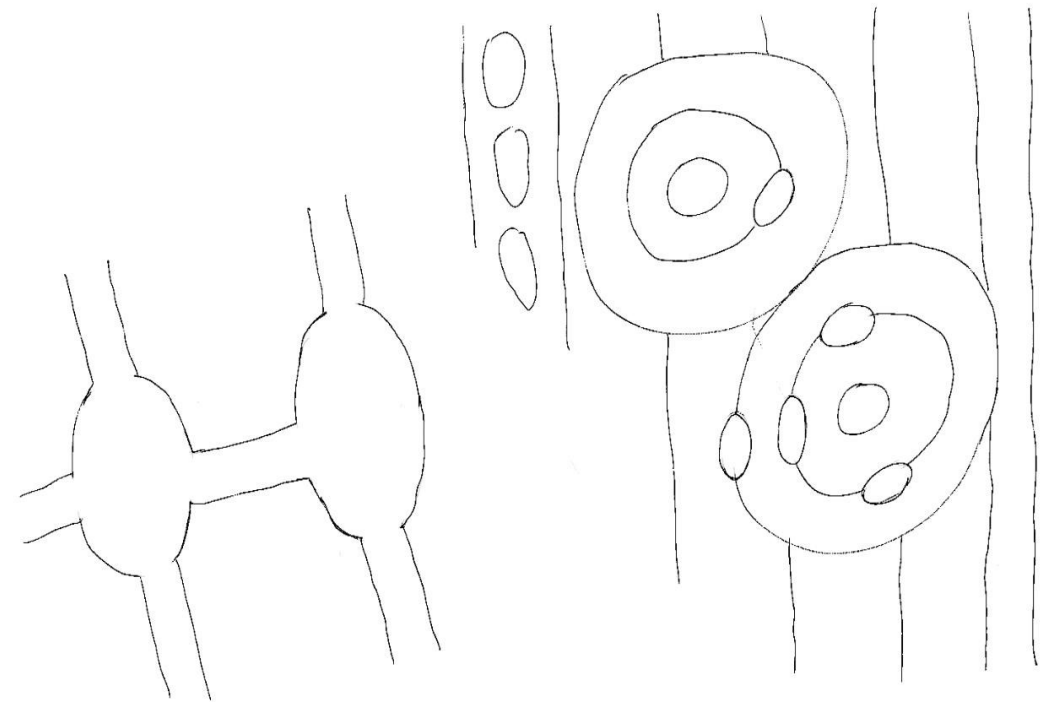
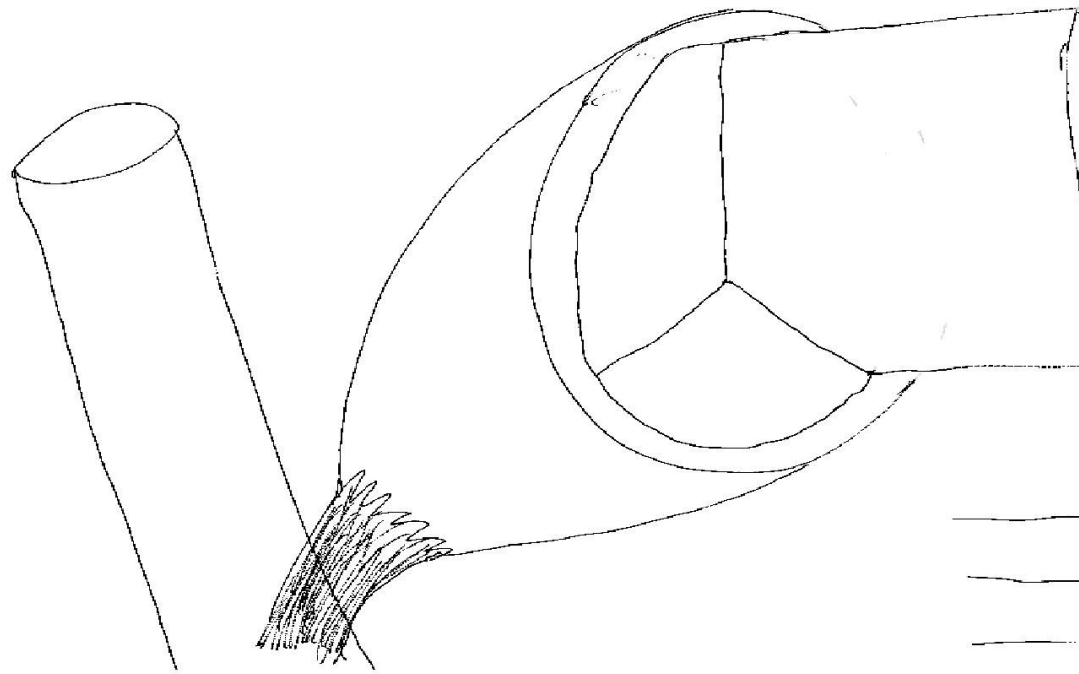
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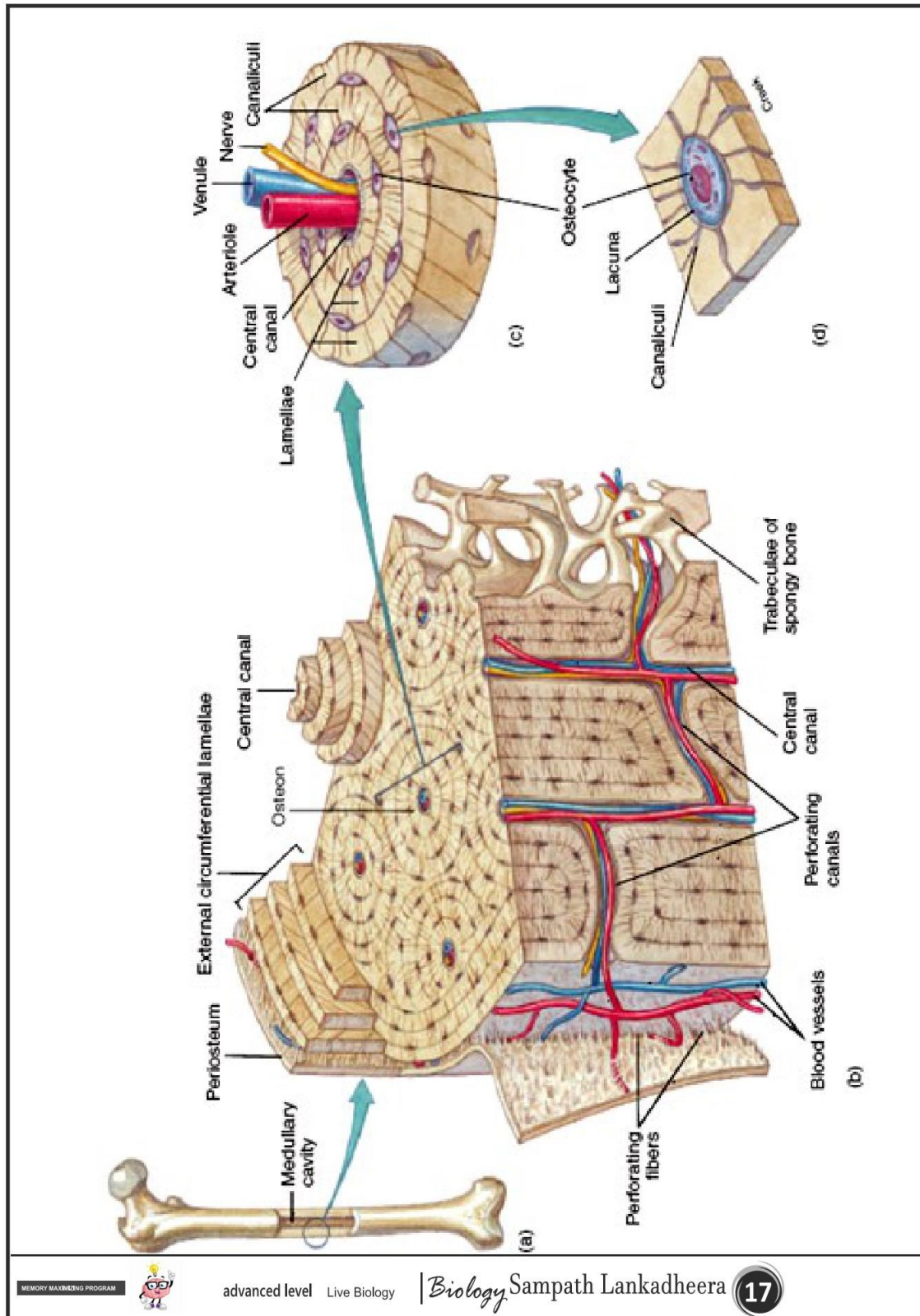
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- The arrangement of the sarcomere gives the striated appearance.
- The muscles are generally attached to the skeletal system and helps mainly in voluntary body movements.





3. Muscle tissue

- Muscle tissue is responsible for movement.
- The cells in the muscle tissue are composed of actin and myosin proteins.
- This tissue is able to contract and relax.
- There are three basic types of muscle tissues found in the vertebrate animal body.
- They are smooth muscle, skeletal muscle and cardiac muscle tissues.

Smooth muscle tissue

- This tissue is found in digestive tract, urinary bladder, arteries and other internal organs.

