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Unit-1
Animal Tissues

All living organism are made up of cell some organisms are unicellular and some are multicellular. A group of cell is called Tissue. Mayer coined the term tissue. A tissue may be defined as a group of cells that may be or may not be similar in structure but are specialized to perform specific functions. The study of tissue is called histology. Francois Bichat is father of Histology.

Cell is a basic unit of body. Many cells combine to form tissue. Many tissue combined to form an organ. Number of organ functioning together and form organ system and various organ system form a body.

Cells → Tissue → organs → organ system → Body

On the basis of structure and functions, there are four fundamental types of animal tissues.

1) epithelia tissue 2) connective tissue 3) Muscular tissue 4) Nervous tissue.

1) Epithelia tissue:-

Epithelia tissue is the tissue which forms covering of various body parts (skin) on outside as well as various internal organs and body space inside. The cells are closely packed. The cells are held together by a cementing substance.

made up of carbohydrate derivatives. The cell is not supplied with blood vessels. epithelial tissues are protective, Secretary, glandular and sensory in functions.

On the basis of shape of cells and cell layers. the epithelial tissue can be classified into

(A) Simple epithelium:- The simple epithelial tissue is composed of simple single layer of cells. These cells are arranged in single layer.

(1) Simple squamous epithelium:- This is made up of thin, flat and rounded nucleus. hexagonal cells. Each cells contains large central rounded nucleus. These cells are closely fitted like the tiles on masaic floor. Therefore this is also called pavement epithelium.

Location:- It usually forms a covering around coelom lining of buccal cavity, blood vessels, kidney, alveoli of lungs etc.

Function:- Protection, absorption, filtration and exchange of gases.

(2) Simple cuboidal epithelium:- This tissue consist cubical cells. Each cells has centrally located rounded nucleus. These cell lies on basement membrane.

Location:- It forms the lining of kidney tubules, sweat glands, salivary gland, testis & ovary.

Function:- This tissue involve in secretion, absorption and excretion.

Types of simple cuboidal epithelium
- ciliated cuboidal
- Brush bordered cuboidal

3) Simple columnar epithelium:- The epithelium consist of tall columnar cells. each cell has a large nucleus located at the basal end. These cells rest upon basement membrane.

Location:- It forms the lining of stomach, gastric glands, intestinal gland, gall bladder, ureter and uterine wall etc.

function:- Protection, secreation etc.

types of simple columnar epithelium
- Ciliated columnar:- These cells have cilia on the free surfaces. These cells are associated with secretory goblet cells. It is located in ovidual respiratory passages.
- Brush bordered columnar:- These cells have microvilli at free end of cells. It is located at intestinal mucosa.

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Pseudo stratified epithelium:- The cells are columnar. The cells remain deep but do not reach the free surface. Their nuclei lie at different levels. These cells rest upon basement membrane.

Location:- It is found in lining of trachea, large bronchi, duct of some glands.

Function:- It function as protection against dust particles entering the respiratory tract.

B) Stratified or compound epithelial tissues.

* Representative figure of simple epithelium.

a)

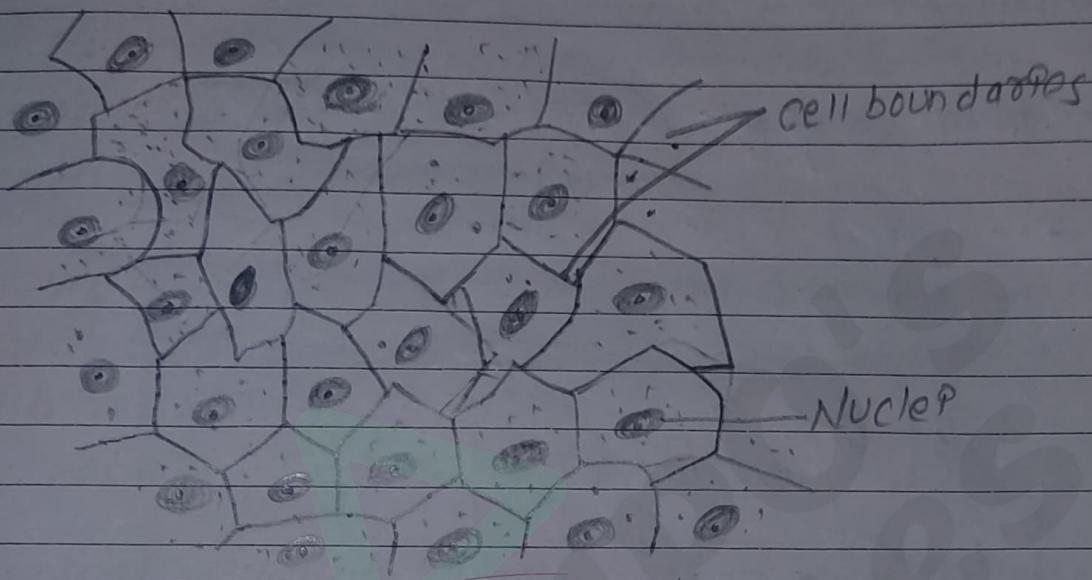

fig:- Simple squamous

b)

fig:- Simple cuboidal.

c)

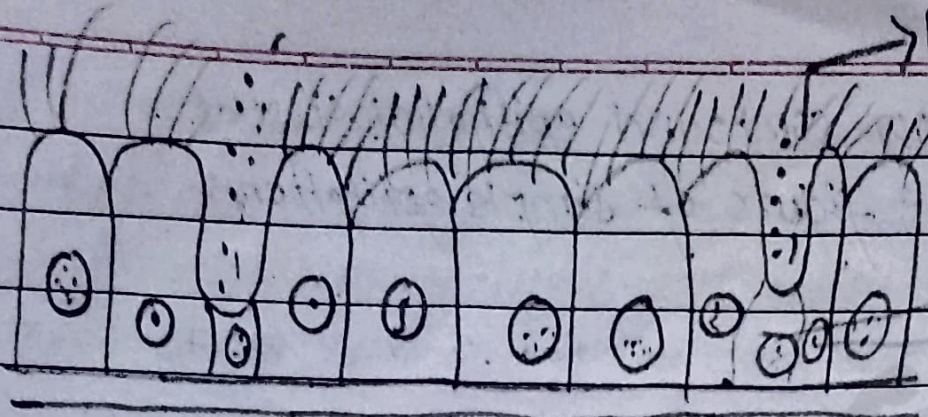

fig:- Simple columnar.

d)

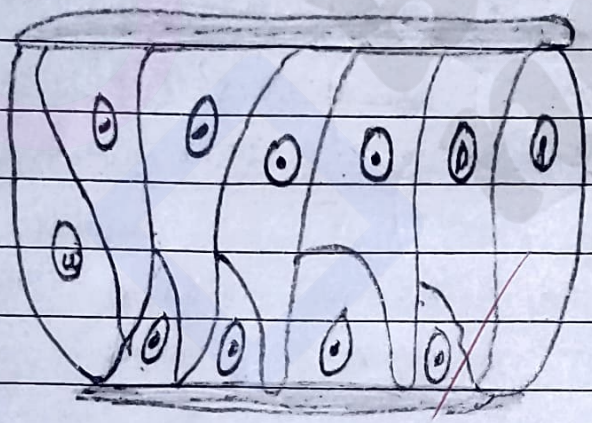

fig:- pseudo stratified.

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c) Modified epithelium:-

Some epithelial cells are modified for specialized fun
ction. these are;

a) ciliated epithelium: It is modified form of columnar or cu
boidal cells. these cells bear cilia at their free surfaces cilia
helps in conduction of mucus and other substances.

Location: It forms lining of neck of urinifelous tubular
sperm drugs, trachea, bronchi etc.

b) Sensory epithelium:- It is modified columnar cells. some of the
columnar cells develop fine sensory fibres at their free surfaces,
which are sensitive in nature.

Location:- It form lining of tongue and nasal cavities.

c) Germinal epithelium:- these cells are modified cuboidal cells
which are found in testes and ovary. these can divide and de
veloped into gametes by meiosis.

Location:- these form lining of gonads.

d) Glandular epithelium:- these cells are modified columnar or cu
boidal cells specialized for manufacture and secreation of certa
in chemical substances. these cells form glands.

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Types of glands:-

a) Based on the kind of secretion and the duct present.

- Unicellular glands: these occurs as a single cell, scattered in the columnar cells. eg:- Goblet cells or mucus secreting cells.

- Multicellular glands:- These glands are formed of many cuboidal cells. These cells form many tubular invagination.
  eg:- sweat gland, gastric gland etc.

b) Based on kind of secretion and the duct present.

- exocrine glands:- These are the glands which pour their secretion through the duct to their respective site of action. their secretion are called enzymes. Gland could be unicellular or multicellular. eg:- salivary, tear, gastric etc.

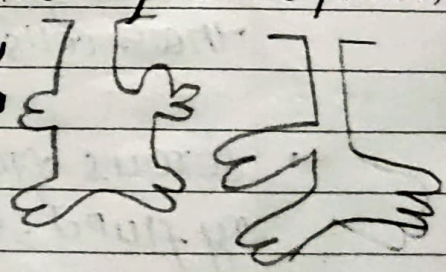
- endocrine glands:- These are the glands which do not possess duct and pour their secretion directly in to the blood vessels, called ductless glands. Their secretion are hormones which reach their respective site of action through blood.
  eg:- pituitary, thyroid etc.

c) Based on shape and complexity:-
The exocrine gland are of two main types; simple and compound.

d) Simple glands:- these glands have a single unbranched duct. The secretory part could be in the form of tubes or sacs. These could be ~~coiled~~ or ~~branched~~ uncoiled, branched or unbranched
Various form of simple glands are:-

- Simple tubular glands:- found in intestine.
- Simple coiled tubular glands:- found in sweat glands in the skin of mammals.
- Simple branched, tubular glands:- found in ~~lining~~ gastric gland s, Burner's glands of intestine.
- Simple alveolar glands:- found in the mucous secreting glands in the skin of frog.
- Simple branched alvelor glands:- found in the sebaceous or oil glands in the skin of mammals.

b) Compound glands:- these glands have number of ducts forming ~~a branched~~ branching pattern. The secretory ~~glan~~ part could be in the form of tubes, sacs or both.



Different form of compound glands are:-

- Compound tubular glands:→ found in salivary glands
- Compound alvelor glands:→ found in mammary, pancreatic gland.
- Compound tubular - alvelor glands:→ found in parts of salivary and mammary glands.

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d) Base on mode of secretion:-

On the bases of mode of releasing the secretion, the exocrine glands are of three types:-

- Merocrine:- In these glands, the secretions are discharged on its cell surface by diffusion without losing any of its cytoplasm. eg:- Goblet cells, salivary gland, intestinal gland and sweat glands.
- Apocrine:- the cells lose a part of its cytoplasm while releasing its secretions. eg:- Mammary gland, sweat glands.
- Holocrine:- the entire cell when filled with secretory product breaks down in order to release its secretions.
  eg:- sebaceous glands in the skin of mammals.

e) Base on nature of secretion:-

- Mucous glands:- these are the glands which secrete the mucus. these cells are called mucocytes - eg:- Goblet cells
- serous glands:- these are the gland which secrete clear watery fluid. eg:- intestinal gland, sweat glands.
- Mixed glands:- some glands are made of both, mucocytes and serocytes and hence produce both kinds of secretions. eg:- gastric, pancreatic glands.

2) Connective Tissue:-

Connective tissue bind different types of cells or tissue together in an organs. Those are developed from meso derm connective tissue consist of different kind of cells and fibre functions:-

a) Bind different cells or tissue together.
b) Store lipids in the cell as in adipose.
c) Form skeleton to support framework of the body.
d) provide hard surface for muscle attachment.
e) Transport material from one place to another in body.
f) Replace dead and damaged tissue,
g) Insulate the body.

Structures of connective Tissue:-

Basically connective tissue is composed of cells, fibres and matrix.

1) Cells:- these are living components that are widely distributed in matrix.

these are of following types.

a) Fibroblasts:- these are spindle shaped with long protoplasmic processes. They have an oval nucleus. They form fibres.

b) Macrophages or histocytes:- these are large irregular shaped. They have a kidney shaped nucleus. They are capable of amoeboid movemet and can ingest damage cell tissues.

c) Mast cells:- these are largred oval shaped cells they produce heparin and histomine. the heparin prevents coagulation of blood while histamine cause inflammation.

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d) Plasma cells:- These are small, round or irregular cells produced by the divisions of migratory lymphocytes. They produce antibodies that help in defence.

Representive figures of Modified epithelium.

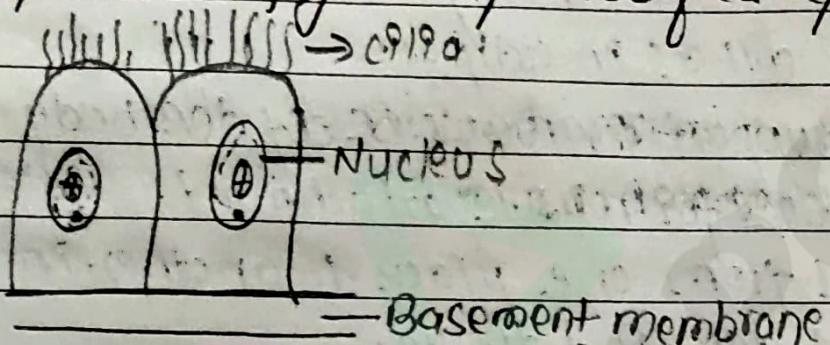

fig:- Ciliated epithelium

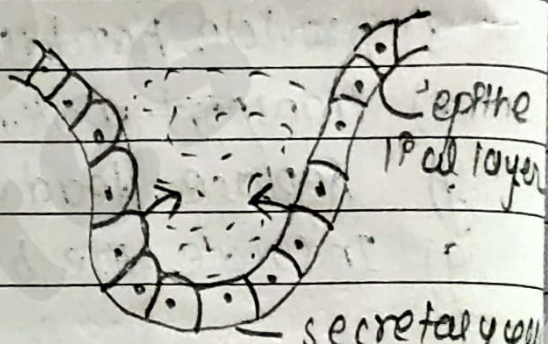

fig:- Glandular epithelium

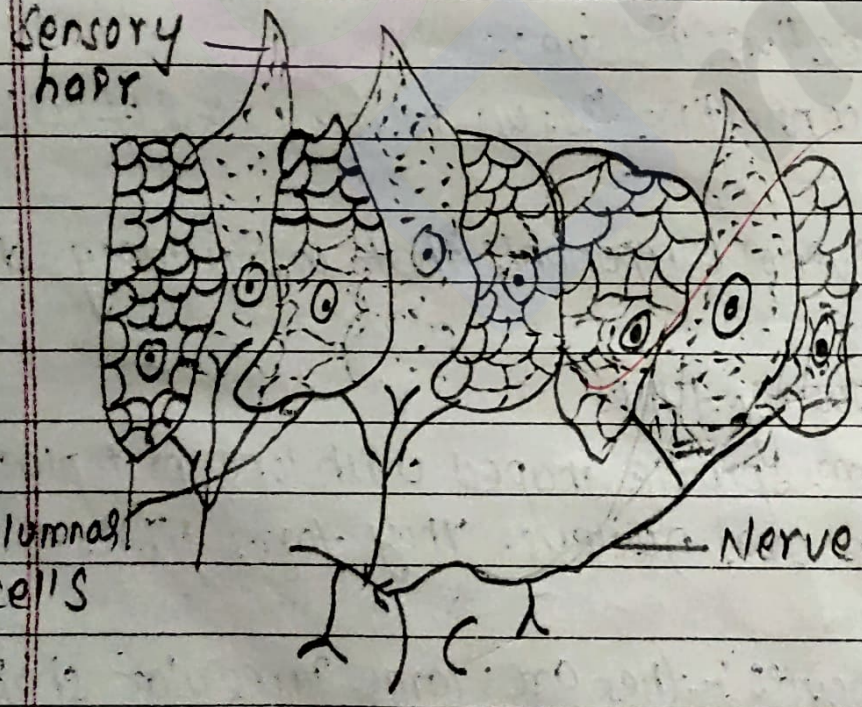

fig:- Sensory epithelium

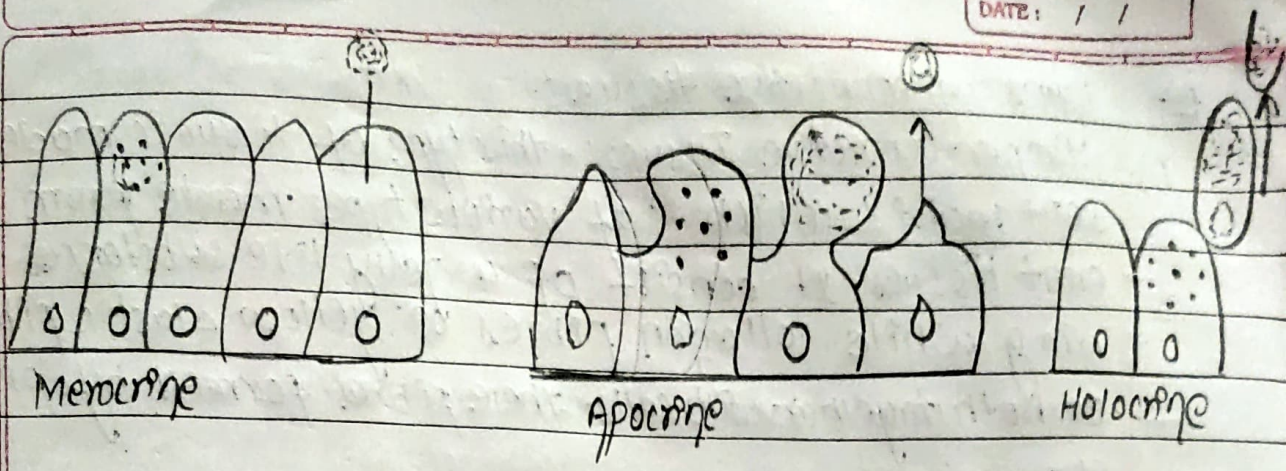

Fig:- Various form of gland according to mod
e of secretions.

2) Fibres:- These are non living products of cells widely distributed in the matrix. These are of three types.

a) collagen / white fibres:- These are long, unbranched and white fibres present in bundles. They are flexible but inelastic. they contain protein collagen.

b) Elastic / yellow fibres:- They are long, branched and yellow fib
re present singly. These are flexible and elastic. They contain protein elastic.

Reticulate fibres:- They are short, fine thread like fibres. The
e fibres are interconnected to form a network or reticular fibr
s. they contain protein reticulin.

3) Matrix:- connective tissues contains a large amount of non living, transparent fluid or semisolid intercellular substance known as matrix. It contain various organic and inorganic substances.

A) Types of connective tissues:-

A) Proper connective Tissues:- this type of tissue is made up of soft matrix which is of various types made from different tissues. It consist of a jelly like substances containing white collagen fibres or yellow elastic fibres or both together with cells. these fibres formed by fibroblast.

On the basis of softness, rigidity and degree of toughness, connective tissue proper is divided into loose and dense connective tissue.

1) Loose connective tissue proper.

a) Areolar tissue:- this is simplest and widely distributed connective tissues. It consist of jelly like soft matrix having fibres and connective tisue cell fibres and other cells are:-

- Yellow collogen fibres:- made of collogen protein.
- Yellow elastic fibres:- Made of elastin protein.
- Fibrocytes:- these are large flat cells. form white and yellow fibres.
- Macrophages:- They are irregular shape cells with granules. they are actively phagocytic i.e engulfing bacteria and other foreign bodies.
- Mast cell:- they produce heparin and histamine. Heparin prevent coagulation of plasma.

functions:-

→ Acts as supporting and packing tissues.
→ Helps in combiling foreign toxins.

b) Adipose (fat) tissue:- Adipose tissue is modified areolar tissue. It consist of large number of fat cells/adipocytes. fibres are less or absent. this tissue is found below the skin, heart, kidney & eyeball.

functions:-

- Serve as an insulating layer in mammals.
- Serve as fat reservor.
- Acts as cushions that prevent eye from injury.

2) Dense connective tissue proper.

a) White fibrous Tissue:-

White fibrous form tendons that connect muscles with Bone. It is modified areolar tissue and consist of thr packed white collagen fibres. these fibres are very tough and non elastic. these tissues are found in perdicardium of heart, brain, spinal cord, cornea of eyeball, capsule of kidney and coverings of cartilage bone.

function:- Provide mechanical protection against starch.

b) Yellow elastic fibres:- It consist mainly of yellow elastic fibres. these tissue form ligament that joints bone to bone.

Difference between Tendon and ligaments.

Tendon	ligaments.
- Join the skeletal muscle to bone	- Join the bones to bones at joints.
- Matrix contain white collagen fibres.	- Matrix contain yellow elastic fibres.
- Fibrocytes are arranged between lead of matrix.	- Fibrocytes are scattered in the matrix.

B) Supportive connective Tissue / ~~skelet~~ Skeletal Tissue.

This is supporting tissue which forms the endoskeleton of vertebrates. It support the body and protect the delicate and vital organs from injuries. Skeletal connective tissue are of two types:-

a) Cartilage b) Bone.

a) Cartilage:- cartilage is soft skeletal tissue in vertebrates body. A typical cartilage consist of cheese like semi solid - matrix containing protein called chondrin. The matrix is secreted by oval, small group of cartilages cells called chondroblast or chondrocytes. This cells are scattered in the matrix and enclosed in fluid filled space called lacunae. Cartilage is covered by perichondrium. On the basis of nature of matrix cartilage are of:-

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a) Hyaline cartilage:- It is flexible and somewhat elastic cells. Its matrix is transport, homogeneous and tough. It is found at surface of bones, larynge and trochea.

b) Elastic cartilage:- It is more flexible and elastic. Its matrix has network of neumerous yellow elastic fibres. It is found in external ear, eustacian tube and epiglottis.

c) Fibro-cartilage:- Its matrix has abundant white collagen fibre It is found in invertebral discs (pads) between mammalian vertebrates where it acts as cushion and in pubic symphysis around joints.

(d) Calcified cartilage:- It is very hard, stuff and non-elastic It is formed when hyaline cartilage gets impregenated with calcium in matrix. It is found in pectoral girdle, head of numerous & femur and vertebrate of sharks.

(b) Bone:-

Bone is specialized connective tissue which is very hard due to deposition of lime salts. The study of bone is called osteology. It provide framework of body. Its matrix posses bone-called osteocytes.

Structure of bone:

A typical bone has following structure:-

1) Periosteum:- It is the outermost coverings of bone. It consi of undifferentiated bone cells.

2) Outer layer of osteoblast:- these are flat- formed by thin layer of cells called endosteum.

(3) Endosteum:- the narrow cavity in bone formed by thin layer of cells called endosteum.

4) Inner layer of osteoblast:- outer layer of endosteum is formed of continous layer of osteoblast cells similar to the outer osteoblasts.

(5) Matrix:- It covers the greater parts of bone. It consist vo nous layer of lamella. each lamella has numerous small space called lauricae. each lauricae give rise to branching channel radiating in all direction called canaliculi

6) ~~Haversium~~ Haversion system:- lamellae are arranged ar ound a central canal called Haversion canal.

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Types of Bone:-

On the basis of matrix present, bone are of 3 types

1) Spongy bone:- It is present on the expanded end of long bones. It is filled with soft tissue called Red bone marrow. It lacks Haversion system.

(2) Compact bone:- It is present on shaft of long bone. It is filled with fatty tissue called yellow bone marrow. It has numerous Haversion system.

Notes:-

The bone contain two types of bone marrow

* Yellow bone marrow:- posses greater fat content, mostly found in long bones.

* Red bone marrow:- Produce RBC and WBC, found in short bones and surface of long bones.

Differences between cartilage and Bone.

Cartilage	Bone
- It is comparably soft, elastic and flexible connective tissue	- It is quite tough, rigid & hard connective tissue.
- Its matrix contain protein chondrin	Its matrix contain protein ossein.
- Matrix does not contain calcium phosphate.	- Matrix contain carbonate and calcium phosphate.
- Matrix has no lamella.	- Matrix is arranged in concentric lamella.

- Each lacuna contain 2:3 cartilage cells	- Each lacunae has only one bone cell.
- The lacunae have no any canaliculi.	The lacunae have several canaliculi.
- It lacks Haversian system.	A long bone has many haversian system.

Reproductive figures of proper connective tissue.

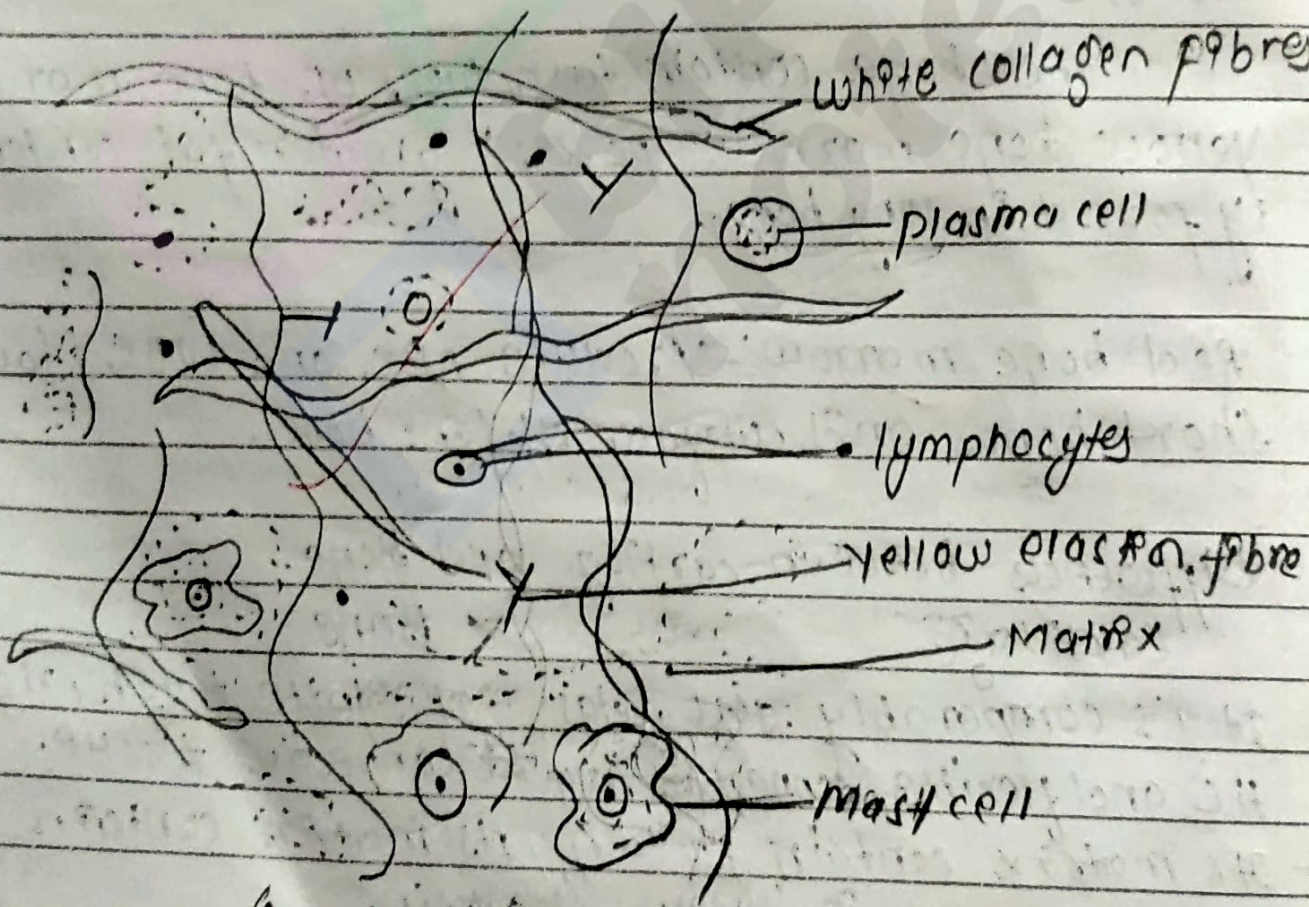

fig :- Areolar tissue.

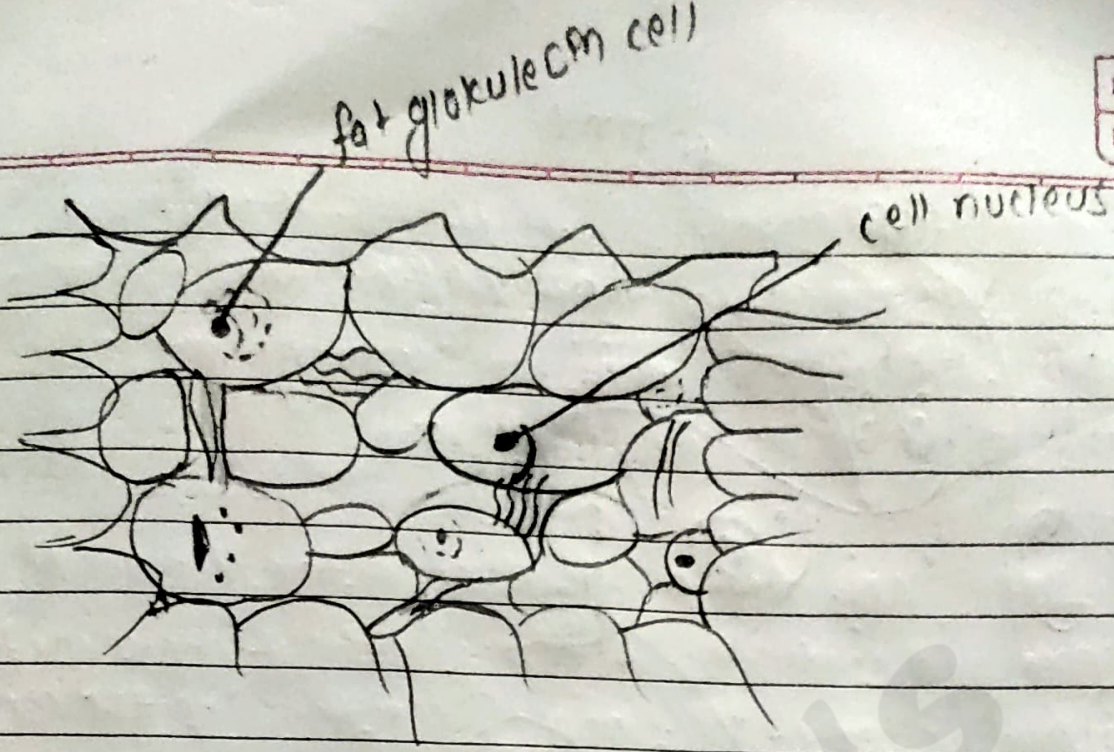

fig:- Adipose Tissue.

fig:- Loose connective tissue proper

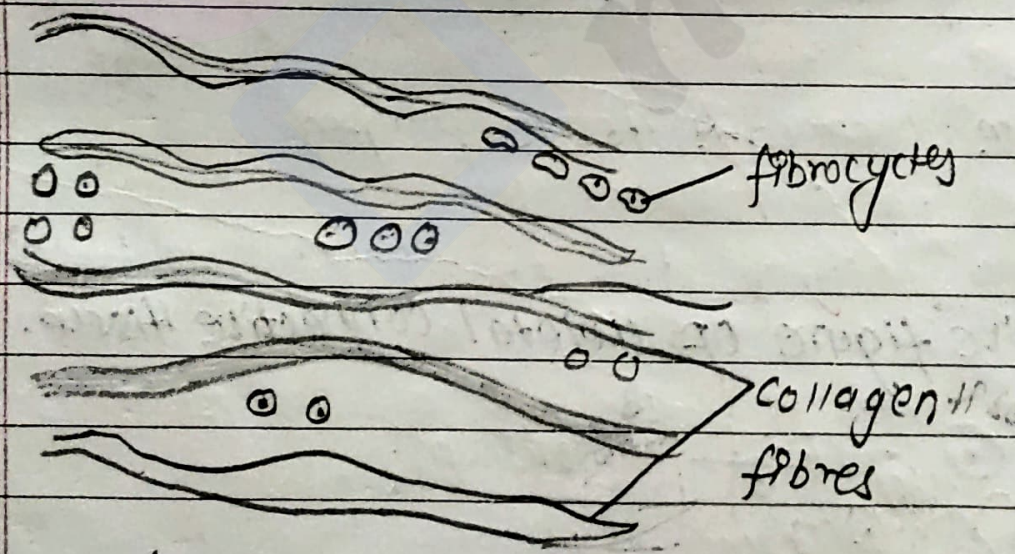

fig:- White fibrous tissue.

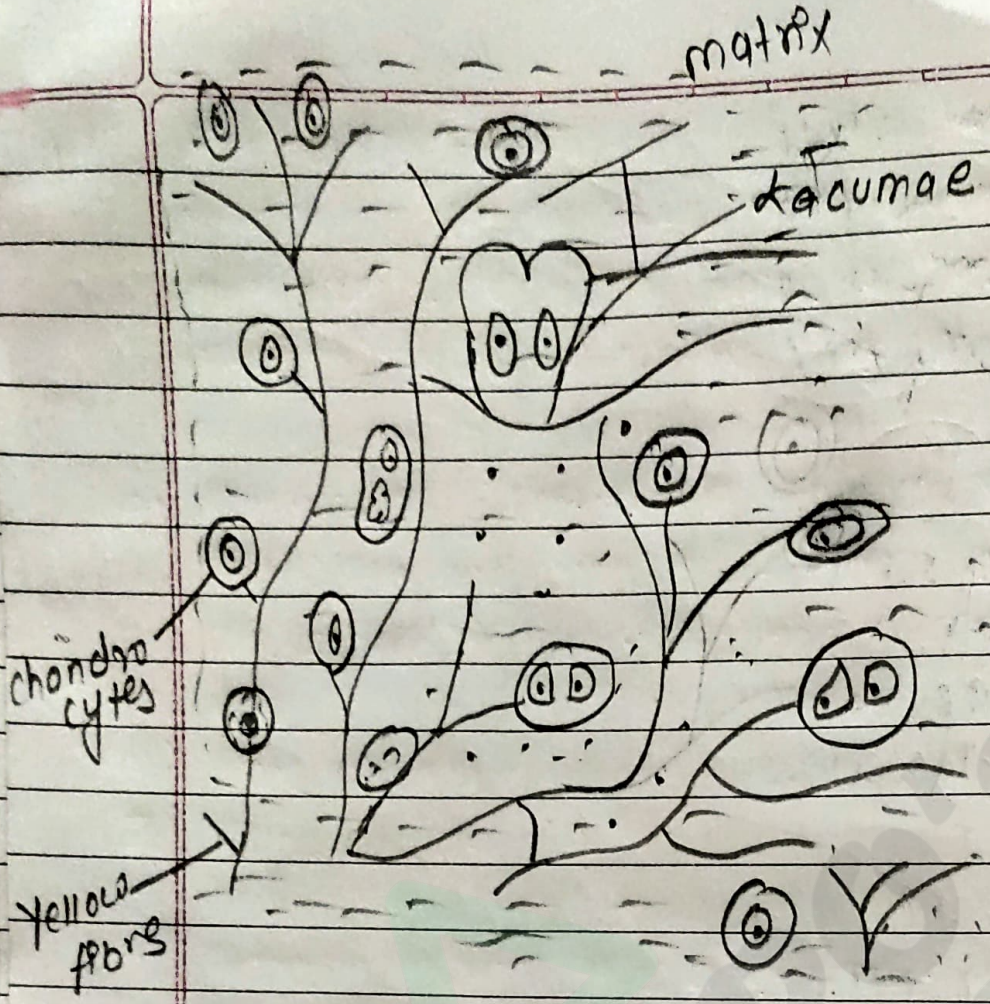

fig:- yellow elastic tissue.

fig:- Dense connective Tissue proper

Reproductive figure of skeletal connective tissue

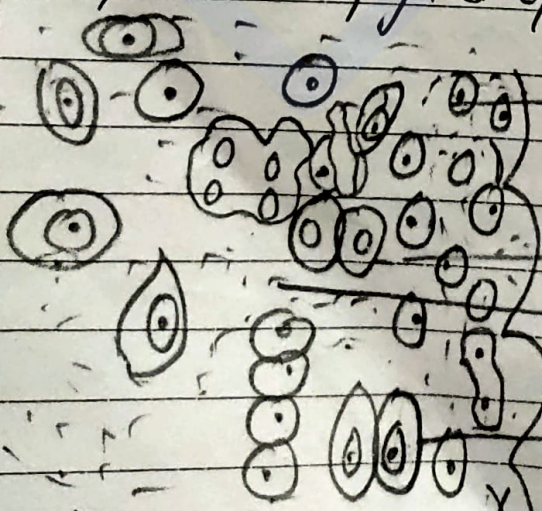

fig:- Hyaline cartilage.

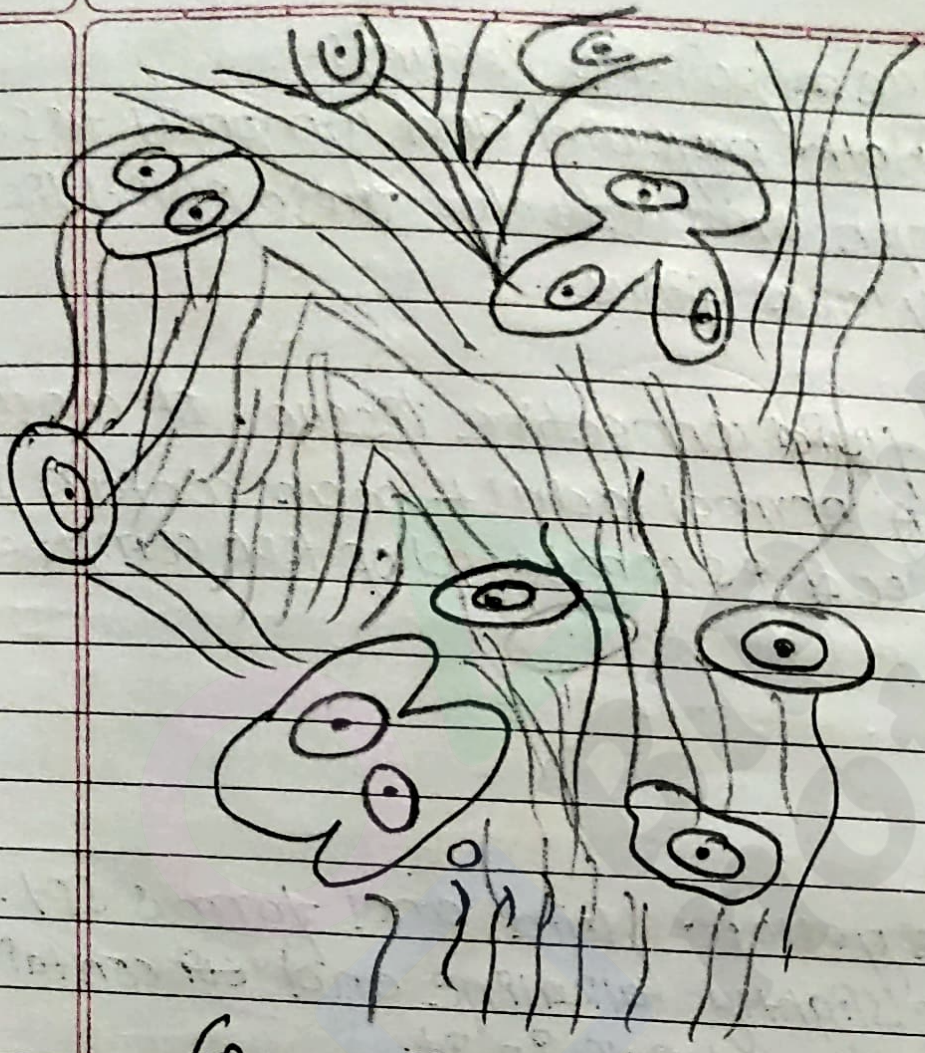

fig :- Fibro cartilage

(3) Fluid connective Tissue (Haemopoietic tissue):-

It consist of both myeloid and lymphoid tissue which form blood and lymph orespectively. these fluid tissue are circulating in both. they lacks fibres.

(A) Blood:- It is one type of fluid connective tissue. It consist of plasma and corpuscles. A normal adult man contain 5.5 lit of blood in body. the blood is composed of two component.

(I) Blood plasma.
(II) Blood capsules.

(I) Blood plasma:- It is pale yellow fluid and forms 55%. of blood by volume. It is slightly alkaline and contain various organic and inorganic materials in it.

Composition:-

Water: 90 - 92%.

Respiratory gases:- O_2 and CO_2.

Dissolved solids:- Protein (7%), Inorganic substances (1%)
organic constituents (1-2%)

Internal secretion:- Antibodies and various enzymes.

→ ~~Func~~ Function of plasma:-

→ It transport digest food products, respiratory gases, excretory waste chemone inside the body.

→ The immunoglation act as antibodies and helps to develop immunity.

→ It distribute temprature in body.

→ Serum albumin maintain osmotic pressure of blood.
→ Plasma protein can neutralize strong acid and bases and hence acts as base buffers and maintain the pH.

(II) Blood corpuscles:-

These are of three types:-

a) Erythrocytes or Red blood cells. (RBC)
b) Leucocytes or white blood cells. (WBC).
c) Thrombocytes or Blood platelets.

(a) Erythrocytes or RBCs:-

In man, RBCs are binocave disc and non nucleated but in fishes, frogs, reptiles and birds, they are oval and nucleated. Number of RBCs in the blood is about 5,400,000 mm^3 in Men and 4,800,000 m^3 in women. Human erythrocytes are average 7.5 thic. Average lifespan of RBC is around 110/120 days. Erythrocytes contain pigment haemoglobin. The formation of erthrocytes is called haemopoesis. RBC are formed in Bone marrow.

The formation of RBC is called haemopoesis and the tissue which forms them is called haemopoetic tissue.

(b) Leucocytes or WBCs:-

These are large in diameter (8-15 μ) and nucleated but less in number than RBCs. They are non pigmented having power of amoeboid movement. Their number may be 10,000 mm^3. They acts as phagocytes responsible for defending the organism against invading bacteria. They are produced in

bone marrow and in lymph glands. their life span in blood is normally of 1-4 days. Excessive WBCs formation is called leuke mia (Blood cancer). Depending on their size, granules, staining rea ction and number and shape of nuclei, WBCs are of 2 types. They are:-

(a) Granulocytes (b) Agranulocytes.

(a) Granulocytes:-

These have lobed nuclei and fine granules. They are formed in red bone marrow. The lifespan is 1-4 hrs. They are of 3 types:-

→ Eosinophils:- These are spherical cell having bilobed nucleus. These are stained in acidic dyes. They constituted 2-3 % of total leucocytes. Main function of eosinophils is to destroy and dest roy the toxins. The excessive formation of eosinophil cause a disease called eosinophilia.

→ Basophils:- These are spherical cells having S-shaped nucleus. These are stained in basic dyes. They constitute 0.5-1 % of total leucocytes. They also release histamine and heparin.

→ Neutrophils:- These are spherical cells having multilobed nucleus. These are stained in neutral dyes. They constitute 60-70 % of total leucocytes. They engulf bacteria or foreign bodies.

(b) Agranulocytes:-
these have oval nuclei without granules. these are formed in bone marrow and lymph nodes. they form 28% of total WBCs. they are of 2 types:-

(1) Lymphocytes:- these are small cells with large nuclei, these are non-motile and non-phagocytic in nature. Lymphocytes produce antibodies to destroy microorganism. theye are of 2 types:-

- B-lymphocytes
- T-lymphocytes.

(2) Monocytes:- these are larger cell with large nuclei. Monocytes are motile and actively phagocytic in nature. the main function is to engulf the microorganism.

(c) Thrombocytes (Blood platelets):-
they are irregular and generally non-nucleated measuring 2-4 μ in diameter. the platelets number about 250,000 mm3 of human blood. their lifespan is about 7 days they play a very important role in initating the formation of blood clot. they contain thromboplastin which speed up the conversion of prothrombin to thrombin.

- Function of blood:-

⇒ they transport oxygen from lungs to all parts of body.
→ they transport soluble organic compound from small intestine to various parts of body.
→ they transport soluble excretory product from tissues to the organs of excretion.

→ They transport metabolic byproducts from area of production to other parts of body.

→ they provide the defense to the body against disease in three ways:-

- phagocytosis, which engulf and digest bacteria which found their way into blood stream.
- Immune mediated by antibodies or lymphocytes.
- clotting of blood: which prevents excessive blood loss and entry of pathogens.

→ They maintain constant blood osmotic pressure and pH.

(B) Lymph:-

lymph is filtered blood without RBCs, WBCs and platelets. It is transparent, slightly yellow and alkaline fluid. It contain glucose, salt, amino acids vitamins in the same concentration as in plasma. It circulates the blood through lymph node and lymph heart.

Function:-

→ lymph acts as middle man which transport respiratory gases, food materials, hormones etc.

→ It destroy the pathogens and foreign particle.

→ lymph maintain the volume of blood in the body.

→ lymph capillaries are associated with absorption and fat soluble vitamins.

(3) Masculor Tissue:-

Masculor Tissue is also mesodermal in origin. It is highly contractile in nature and are elongated cells called muscle fibres. Each fibre contain fine longitudinal fibrils called Myofibrils Its cytoplasm is called ~~scarp~~ sarcoplasm. Each muscle fibre is externely covered by membrane called sarcelemma. these fibres are highly contractile. Muscle are supplied with blood vessels which provide nutrition and take away metabolic wastes. the masculor tissues are used for movement of arms or limbs for locomotion.

⇒ Types of Masculor Tissue:-

(A) Unstriated / Unstriped / Involuntary.
(B) Striated / Striped / Voluntary.
(C) Cardiac.

(A) Unstriped / Involuntary:-

these muscles are spindle-shaped tapering at both ends with numerous fine longitudinal myofibrils. Each myofibril contain a single oval nucleus of middle. there is no sarcolemma. the fibre being bounded by its plasma membrane. The cross striation or light dark bands are absent. Hence the muscles are smooth and unstriped: these muscle are found in wall of hollow organs such as alimentary canal, blood vessels, respiratory passage, urinary bladder and genital tract. Thus they are also called visceral muscles. They are under the control of autonomic nervous system but no control of will.

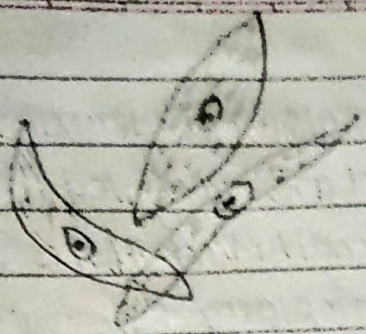

fig:- unstriped muscle.

(2) striated/striped/voluntary:-

these muscles are long and cylindrical fibre with blunt ends. Each fibre is bounded by an elastic sarcolemma and contains many acentric nuclei. Each muscle has numerous myofibrils. The myofibrils have alternately arranged dark and light bands.

Dark band is highly refractive. Dark band is formed of myosin protein.

Light band is non refractive under paralized light and formed of actin protein.

In the vertebrates muscle are attached to skeleton, so they are called skeletal muscles. They are found in body wall, limbs, tongue, pharynx etc. These are under will control. Thus, they are called voluntary muscle. These muscle fired quickly.

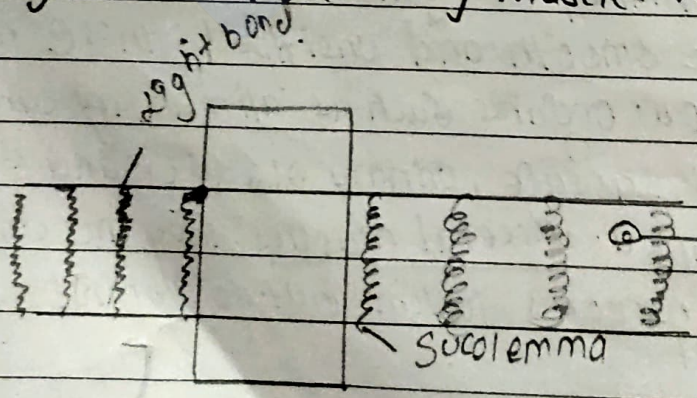

fig:- A single striped muscle fibres

(3) cardiac muscles:-

These muscle are located in heart wall only. these muscle form intermediate type wall having the properties of both striped muscle. they consist of cylindrical fibres interconnected by oblique bridges and forming a continuous contractile network. they contract rhythmically but do not get fatigued. the cardiac muscle are myogenic, it means that the contraction are generated within the muscle. these muscle are supplied by central nervous system and autonomic nervous system. they are striated by involuntary. therefore, they are intermediate in function they contract rhythmically before death.

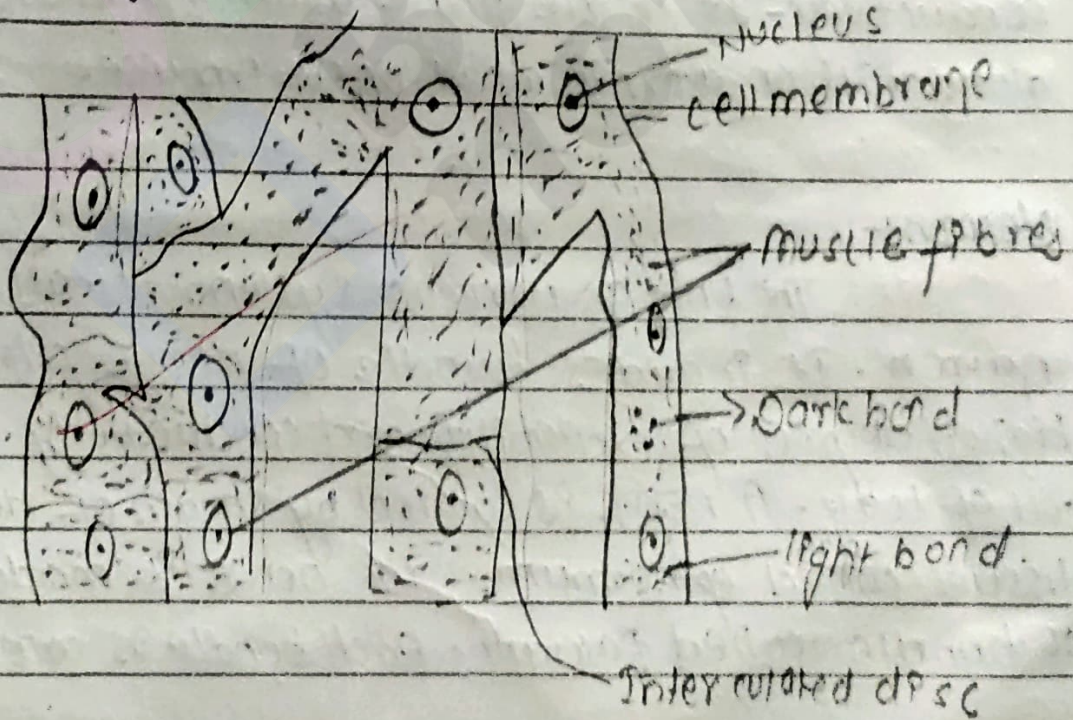

fig:- cardiac muscles

4) Nervous Tissues:-

Nervous tissue form the nervous system of animals. It control and coordinates the body function. It is ectodermal in origin. It consists of nerve cells (neurons), processes of nerve cells (nerve fibres), packing cells (neuroglia) and epithelial cells (ependymal). Neurons have two very important basic properties.

(1) Excitability:- It is phase when the nerve fibres get excited upon receiving any stimulus.

(2) Conductivity:- It is the phase when the message is transmitted along with an axon is called nerve impulse.

* Neuron:-

The unit of nervous system is called nerve cell or neuron. It includes bundle of nerve fibres. It exhibits highest degree of excitability and conductivity. It is the longest cell of body. A nerve is covered by sheath of dense connective tissue called epineurium. The nerve is made of a number of bundle called fasciculi. Each bundle is called fasciculus.

* Structure of nerve cell or neuron.

→ cell body or cyton.
→ Nerve processes.

(1) cell body or cyton:- The unit of nervous system is called ner cell or neuron and the main body of nerve cell is cyto or soma or perikaryon. Its cytoplasm contain a centrally pl cod nucleus, mitochondria, golgi body, endoplasmic reticulu with ribosome.

Presence of large number of mitochondria provide energy for nerve impulse conduction

Neuron, once fully formed nerve divides.

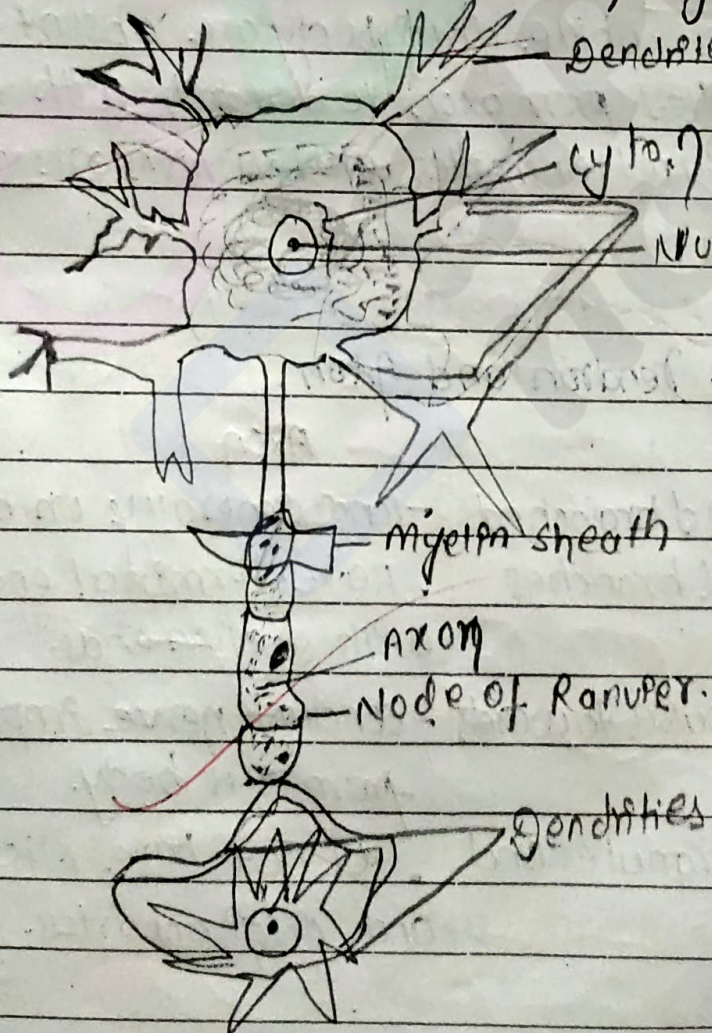

fig: Neuron

Nerve processes:- Arising from the cyton, there are two types of cytoplasmic processes on their surfaces. These are dendrites and axon.

(a) Dendrites:- There are many small, branched nerve processes called dendrites. These are afferent in nature. conducting nerve towards the cyton. These have Nissl's granules and neurofibrils and are non myelinated.

(b) Axon:- One of the proces of cyton becomes long and unbranched called axon. It has neurofibrils but no Nissil's granules. It is covered by a medullary sheath. The cytoplasm of axon is axoplasm. The axoplasm contains neurofibrils and mitochondria while golgibody are absent. Nerve impulse are transmitted from axon to dendrits with the help of chemical called neurotransmitter ~~what~~ which are acetylcholine and adrenalin.

* Difference between Dendron and Axon.

Dendron	Axon
- small, numerous and branched	- long generally un branched.
- Have fine terminal branches	- Have terminal end branches with swollen ends.
- conduct nerve impulse towards cell body	- conduct nerve impulse away from cell body.
- contain Nissl's granules and golgi apparatus.	- Do not have Nissil's granules and golgi apparatus.

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* Types of Nerve fibres:-

(I) Based on structure:- Depending on the presence and absence of my
celin sheath, nerve fibres are of two types.

- Myelinated or medullated nerve fibres:
these fibres have myelin sheath. These are fo
und in white matter of brain and spinal cord, cranial and spi
nal nerves. These involved in the conduction of nerve impulses.

- Non-myelinated or non-medullated nerve fibres:-
these are fibres without myelin shea
th. These are found in grey matter of brain and spinal cord.
These involved the integration of nerve impulses. In non-mye
linated nerve fibre, central axis is covered by neurilemma formed
of sheath of schwann cells.

(II) Based on function of Nerve Impulses:- Based on the function
of conduction of nerve impulses, Nerve fibres are of two types.

- Afferent Nerve fibres:- These conduct nerve impulse from sense
organs to CNS. These are also sensory Nerve fibres. These neu
rons are called afferent or sensory neurons. such as optic nerve.

- Efferent Nerve fibres:- These conduct nerve impulses from CNS
to body organs. These are also called mother nerve fibres.
These neurons are called motor neurons.

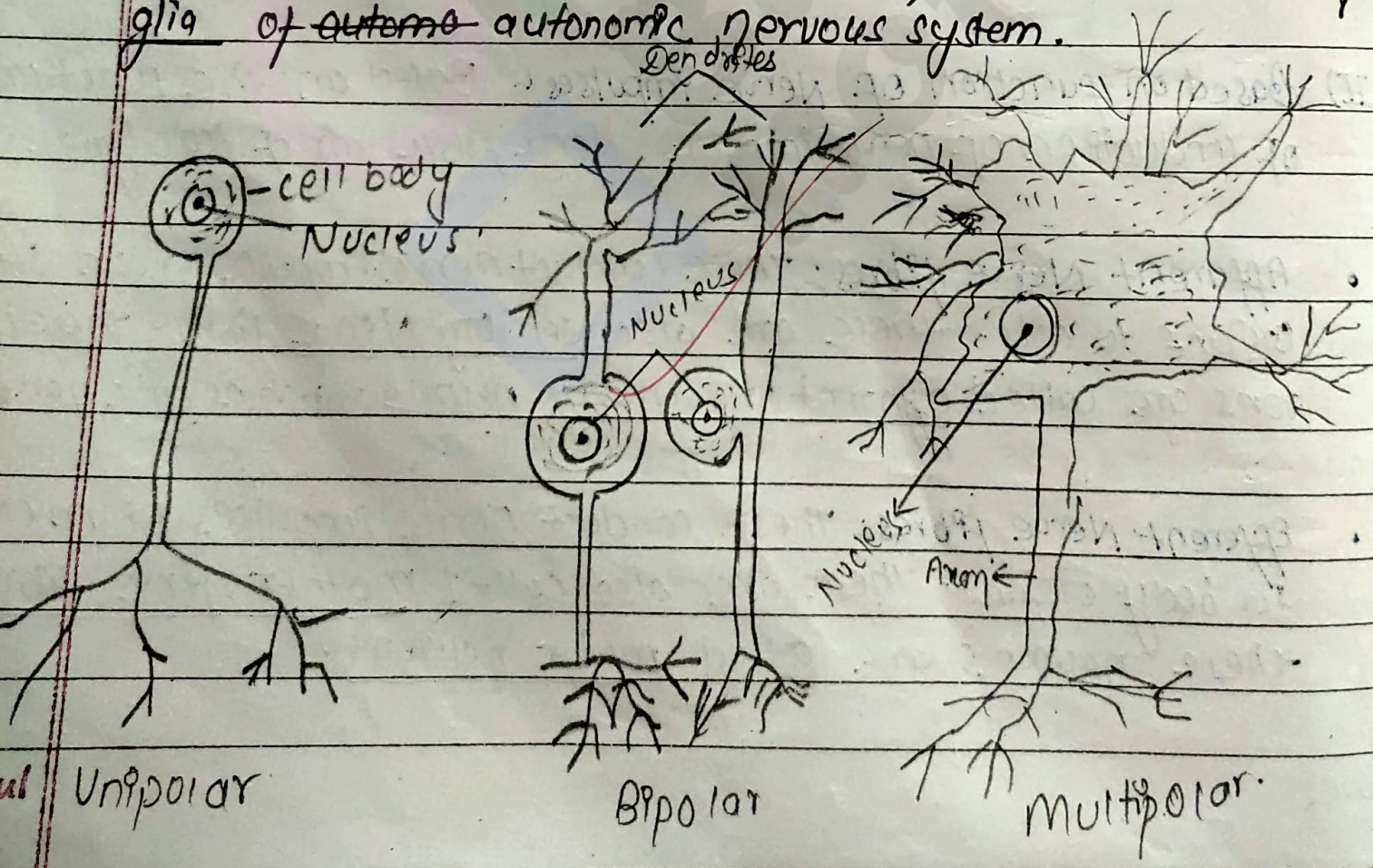
- Mixed nerve fibres:- These are both sensory and motor in function such as all spinal nerves.

III Based on the number of their processes:-

- Unipolar :- These neurons have only one ~~ones~~ axons with dendrites. They are found in dorsal root ganglia of spinal nerve and roots of V, IX and X cranial nerves.

- Bipolar:- These neuron have two processes from cell body. Out of these two process one may be axon and another may be dendron. These are found in retina of eyes and olfactory epithelium of nasal chamber.

- Multipolar:- These neurons have many cell process. at least one which is ~~one~~ axon. These are found in INs and glia of ~~autono~~ autonomic nervous system.



(C) Neuroglia or glia cells:-

The neurons of CNS are supported by three types of non nervous or non-excitable neuroglia cells. These cells are 10 times more numerous than the neurons. These cells are packed in between the nerve cell of CNS, ganglia and retina of eyes.

Three types of neuroglia cells are:-

(1) Microglia cells:-

These are small spindle shaped cells.

(2) Astrocytes:-

These are largest sized cells with several highly branched process.

(3) Oligodendrocytes:-

These are small size few branched process similar to the dendrons of neurons.

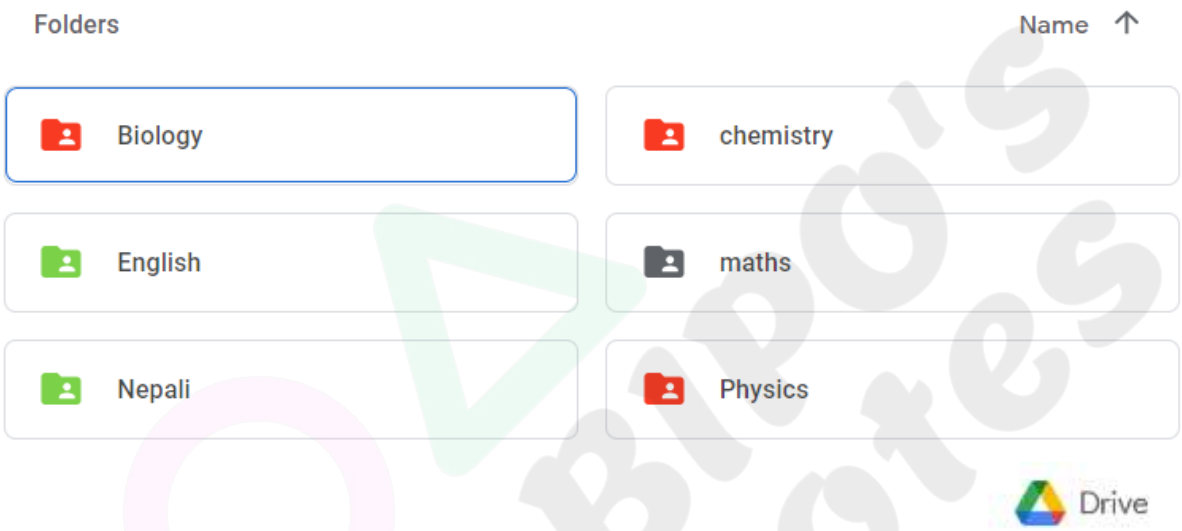
- Functions:-

→ Acts as packing materials between neurons.
→ Provide nutrition to the neurons.
→ Help in memory process.
→ Act as phagocytes and kill microorganism.

Bipin Khatri

(Bipo)

Class 12 complete notes and paper collection.



Feedbacks:

admin@bipinkhatri.com.np | bipinkhatri.ram@gmail.com

Contact:

@im.bipo www.bipinkhatri.com.np @im.bipo