TISSUES

CLASSIFICATION OF ANIMAL TISSUE

ANIMAL TISSUE:

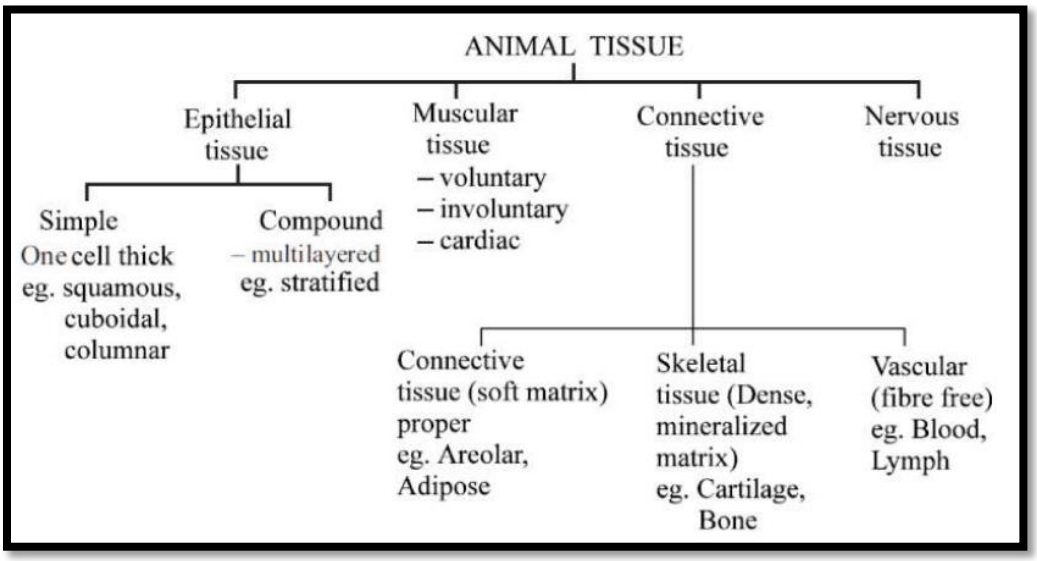
Based upon the structure and functions, simple tissues in multicellular animals are categorized into four types. These are :

(1) Epithelial Tissue

(2) Muscular Tissue

(3) Connective Tissue

(4) Nervous Tissue



1. Epithelial tissue:

• Cells are tightly packed with no intercellular spaces and form a continuous sheet. • Rest on extracellular fibrous basement membrane.

• Make outer covering or protective tissues in animal body.

• It regulates exchange of materials between body and the external environment and also between different parts of the body

(a) Simple Epithelial Tissue:

• Single cell thick layer. On the basis of shape of cells, it is of different types:

Simple Epithelial tissue

Squamous

Cuboidal

Columnar

Squamous

Simple thin flat, tiles like cells, forms a delicate lining, cells are transverse and oval with nucleus in center

Helps in exchange of materials, provide protection

Found in Alveoli of lungs, Bowman's capsule of nephron, blood capillaries, lining of body cavity, epidermis of skin

Cuboidal

Cube shaped cells with centric and rounded nucleus

Found in lining of kidney tubules and ducts of salivary glands, in retina of the eyes, in testis and ovaries

It is involved in secretion absorption and excretion It also provides mechanical support

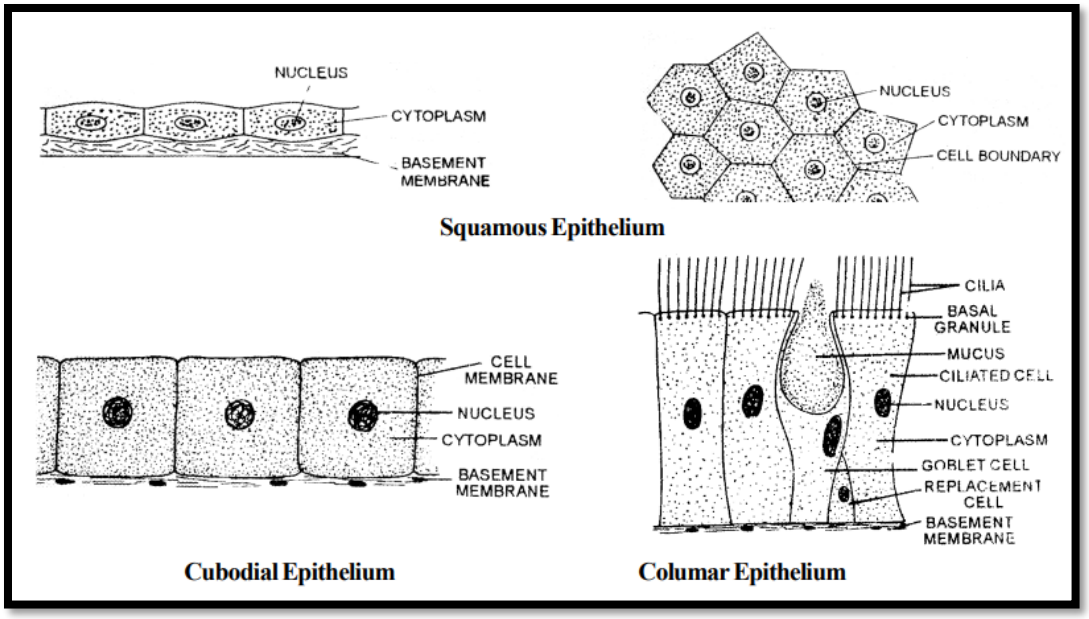
Columnar

Tall, pillar like cells nucleus at the base, on free surface microvilli, cilia are present

In intestine, it helps in absorption and secretion

In respiratory tract on the free surface of cells cilia are present. Cilia can move and pushes mucus forward to clear it.

When goblet cells are present between cell then mucus is secreted by cells for eg. Stomach, colon, rectum etc.



(b) Compound Epithelial Tissue:

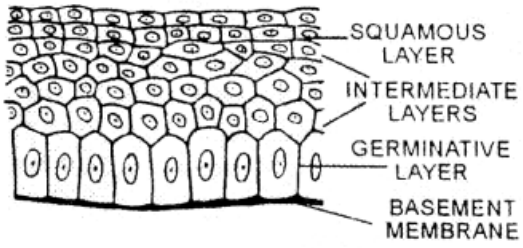
• It is multilayered thick structure.

• It is also called as stratified epithelial tissue.

• It is found in those regions of body where rapid wear and tear of cells is required. • Skin is regarded as stratified squamous epithelial tissue as outer most layer of skin is squamous type.

• It is found in conjuctiva, female urethra, larynx, ureter, urinary bladder etc.

• It provides protection



Stratified squamous epithelial tissue

2. Muscular Tissue:

• Muscular tissue is distinguished from other tissues by its unique ability to contract and relax and thereby perform mechanical work. It is responsible for movement of body organs and location of body.

• Muscle cells are highly elongated and contractile and are called Muscle fibres.

• The contractility is due to the presence of contractile proteins (Actin & Myosin) in the muscle fibre.

• The plasma membrane of muscle cells is called sarcolemma and endoplasmic reticulum of muscle cell is called sarcoplasmic reticulum.

Type of muscular Tissue:

Striated / voluntary

Smooth/Involuntary

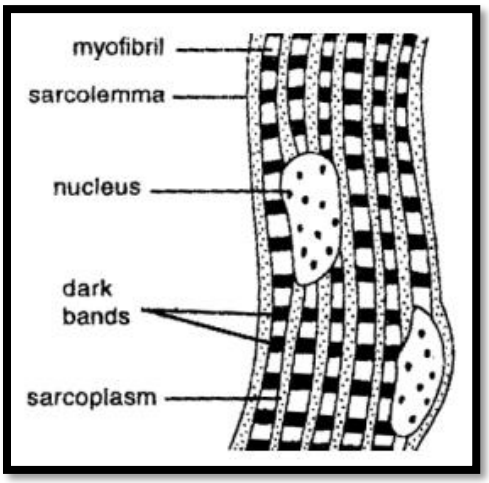
Cardiac [striped & Involuntary]

(a) Striated muscles / Skeletal muscle / Voluntary muscle:

• They are also called as voluntary muscles because these are under the control of one's will.

• They are also found in tongue, limbs, neck, facial muscles etc.

• Muscle fibres or cells are multinucleated and unbranched



(b) Smooth / Unstriated / Visceral / Involuntary Muscles:

• These are not under the will of organism, hence called as Involuntary Muscles.

• They are involuntary muscles also called smooth muscles.

• These are present in the walls of visceral tubular organs like alimentary canal, blood vessels, urinary bladder, urethra etc so are called as Visceral Muscles.

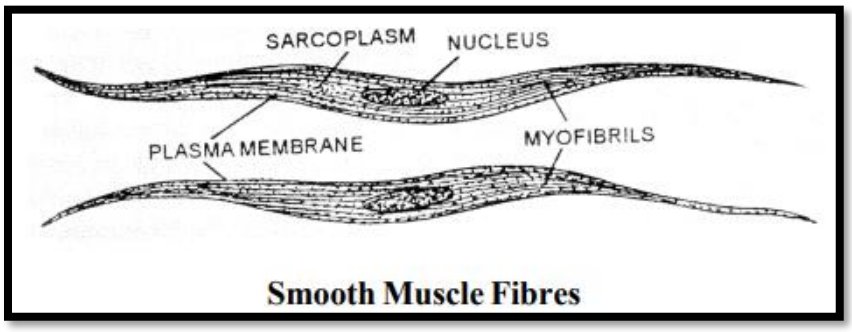
• These are also present in the dermis of skin, iris and ciliary muscles of eye.

• Sarcomeres is muscle cells. Sarcomeres are small and spindle shaped with tapering ends.

• It is covered by Sarcolemma. It is usually uninucleate and the nucleus is oval and centric.

• These are not attached to skeletal structures, hence called as Non-skeletal muscles.

• These fibres contract slowly but for a long period without undergoing fatigue, hence called as Nonfatigue muscles.



Smooth Muscle Fibres

(c) Cardiac Muscles:

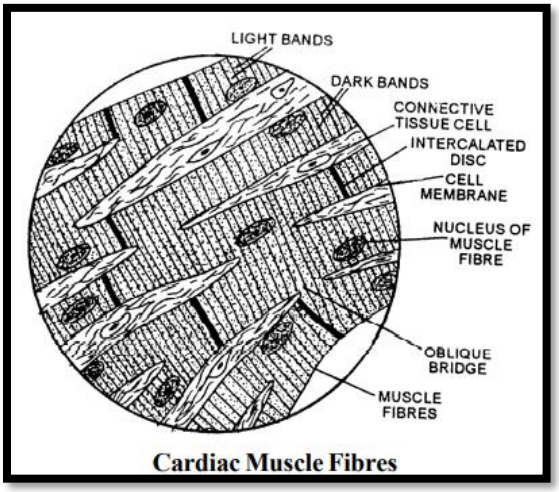
• These are found in the walls of heart.

• These are uninucleate, and branched.

• These are involuntary.

• Cardiac muscles are joined end to end by flat, dense, zig-zag junctions called **INTERCALATED DISC.**

• These muscles contract rapidly like skeletal muscles but do not get fatigued. So, these work efficiently throughout the life.



Cardiac Muscle Fibres

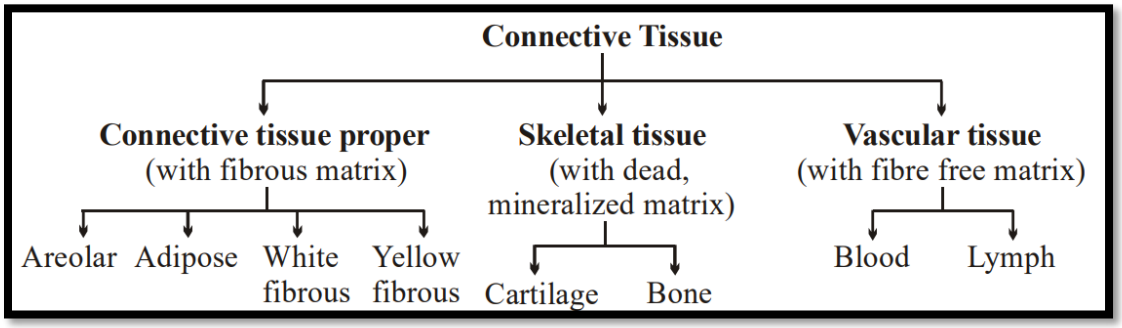
3. Connective Tissue:

• The cells of the CT are widely spaced and embedded in an intercellular matrix.

• The nature of matrix decides the function of tissue.

• White & yellow fibres are present in the matrix.

• Their basic function is to provide support to different organs and keeping them in place.



A. Connective tissue proper:

• It is most abundant type of connective tissue. It is of following types –

(i) Areolar Tissue:

• Most widely distributed tissue. Thus most abundant.

• Consist of transparent, jelly like, sticky matrix containing fibres, cells and mucin.

• Fibres are of two types i.e. white and yellow fibres. White fibres are made up of collagen protein.

• Yellow fibres are made up of elastin protein and provide elasticity to the tissue.

• Matrix contain several cells. Fibroblasts or fibrocytes are large, flat cells, which secrete matrix and fibres. Macrophages are large, amoeboid, phagocytic cells. Mast cells are small, oval, secrete heparin, histamine etc. which prevents blood clotting and involve in allergic reactions respectively

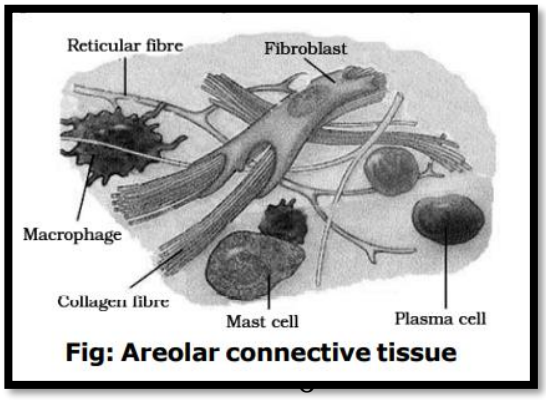


Fig: Areolar connective tissue

(ii) Adipose Tissue

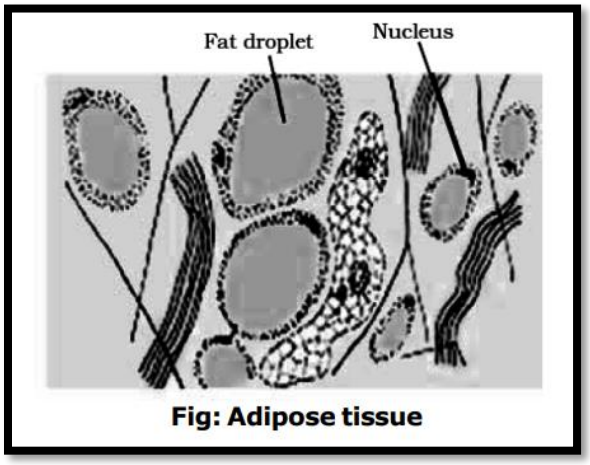


Fig: Adipose tissue

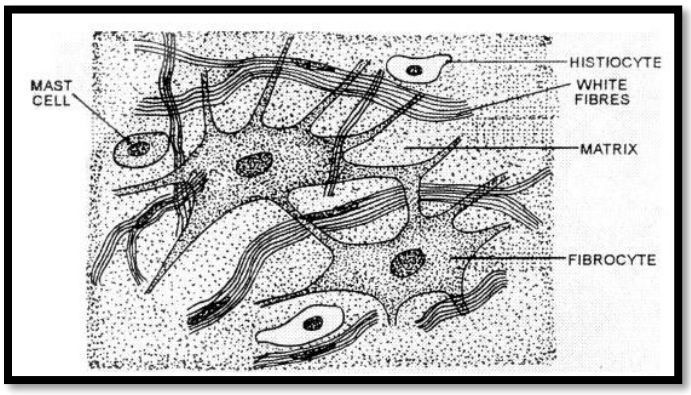
Fat storing connective tissue, matrix contain adipocytes cells, storing fat.

Matrix contains fibers, cells etc.

Primarily store food, below skin prevents heat loss from body and forms shock-absorbing cushion around kidneys and the eye balls.

(iii) White Fibrous Tissue:

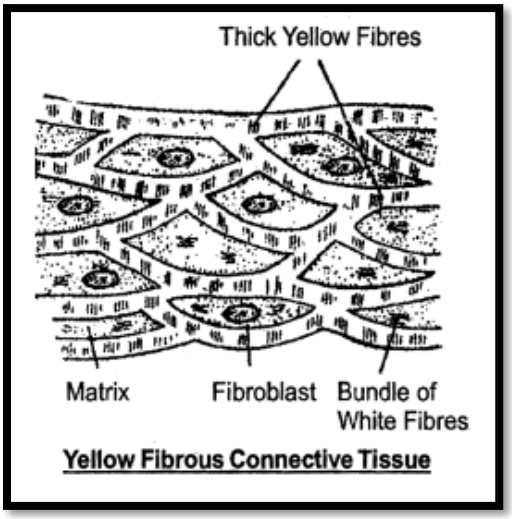
- Rich in white collagen fibres.
- For example tendons connect the muscles with the bones.



(iv) Yellow Elastic Tissue:

• Contain loose network of yellow elastic fibres.

• For example ligaments that bind bone to bone



B. Skeletal Tissue :

• Have a tough matrix with protein, calcium and phosphorus salts.

• Forms a rigid frame work. Which supports the body, protects the vital organs, provide surface for attachment of muscles etc.

• These are of two types:

(i) Bones:

• Hardest tissue in the body with calcified matrix.

• Main constituent of the skeleton.

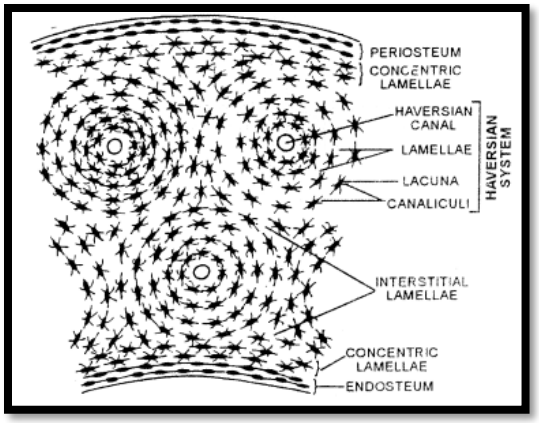
• Matrix is dense and hard, formed of a protein called ossein.

• Remain externally covered by periosteum.

• Matrix have longitudinal and transverse blood vessels i.e. Haversian and Volkmann's canals respectively

• In matrix osteocyte cells are arranged in concentric rings or lamellae and forms Haversian system.

• In long bones, central bone marrow cavity is present, having soft fatty tissue called Bone marrow, which is of 2 types called red and yellow bone marrow.

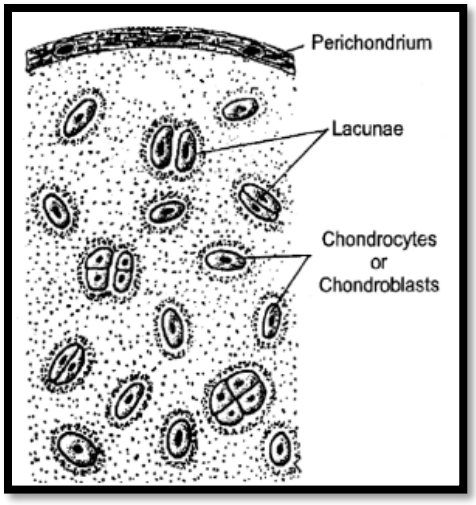


(ii) Cartilage:

• It is elastic and strong but softer than bone.

• Matrix is like a homogenous mass, composed of flexible material i.e. the chondrinid, having less amount of calcium salts.

• Cells are called as chondrocytes. Chondrocytes remain scattered in matrix



Voluntary and involuntary muscles

There are two kinds of muscles.

(i) Voluntary muscles are those muscles, which function as per direction of conscious will. Brain can stop or start them. For examples, skeletal muscles that come into use when we walk.

(ii) Involuntary muscles are those muscles, which function on their own, independent of conscious will. Brain cannot stop or start them. For examples, breathing in and out of air