Experiment (A)

Aim

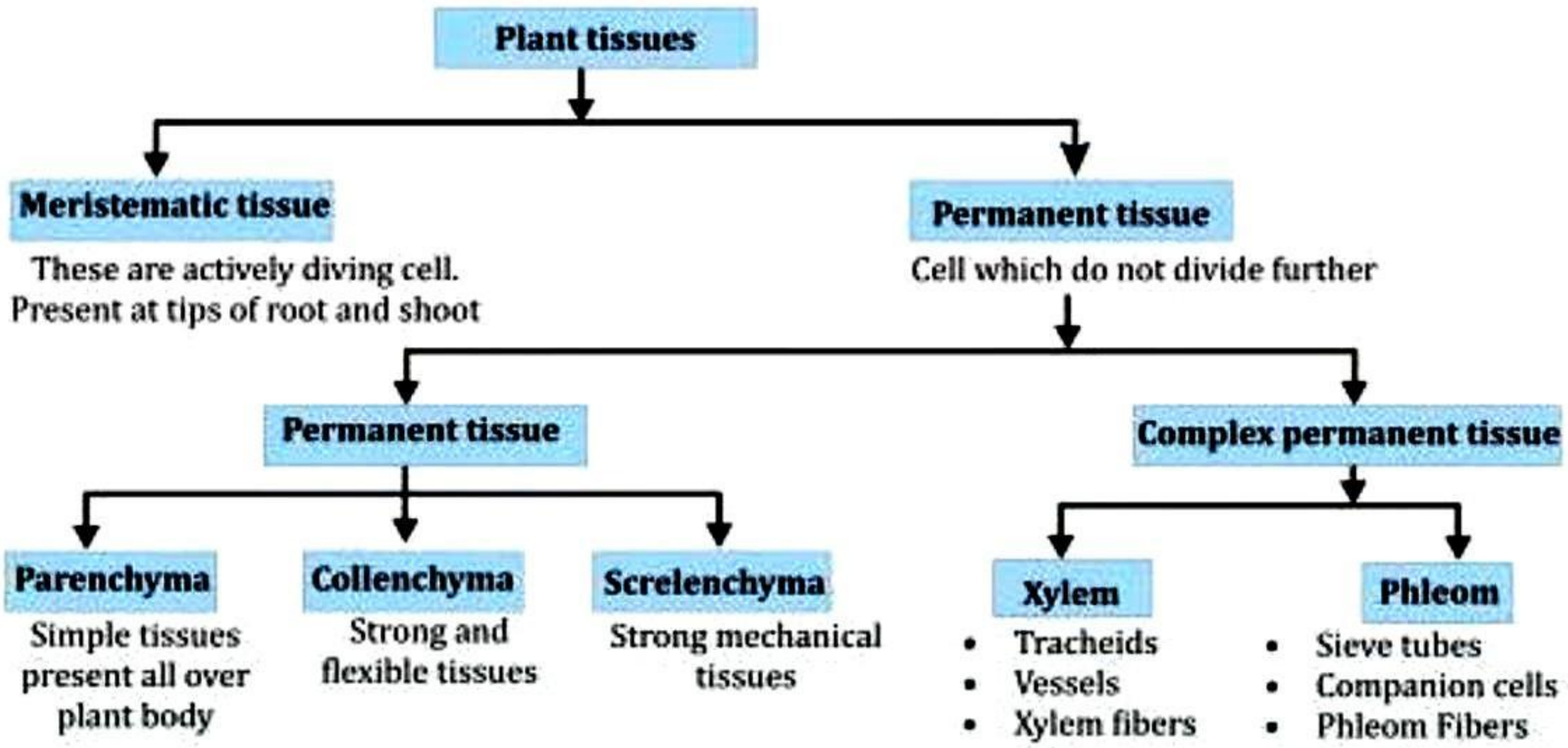
To identify parenchyma, collenchyma and sclerenchyma tissues in plants, striated muscle fibres and nerve cells in animals, from prepared (permanent) slides and to draw their labelled diagrams.

MATERIALS AND APPARATUS REQUIRED

Permanent slides of parenchyma tissues, sclerenchyma tissues, striated muscle fibre, nerve cells and compound microscope.

THEORY

Tissues: A group of cells having similar structure, origin and functions are called a tissue. There are two types of tissues – plant tissues and animal tissues.



PROCEDURE

1. Place the compound microscope where proper light can be received and reflected on the slide.
2. Place the permanent slides one by one. Observe its structure and draw diagrams.

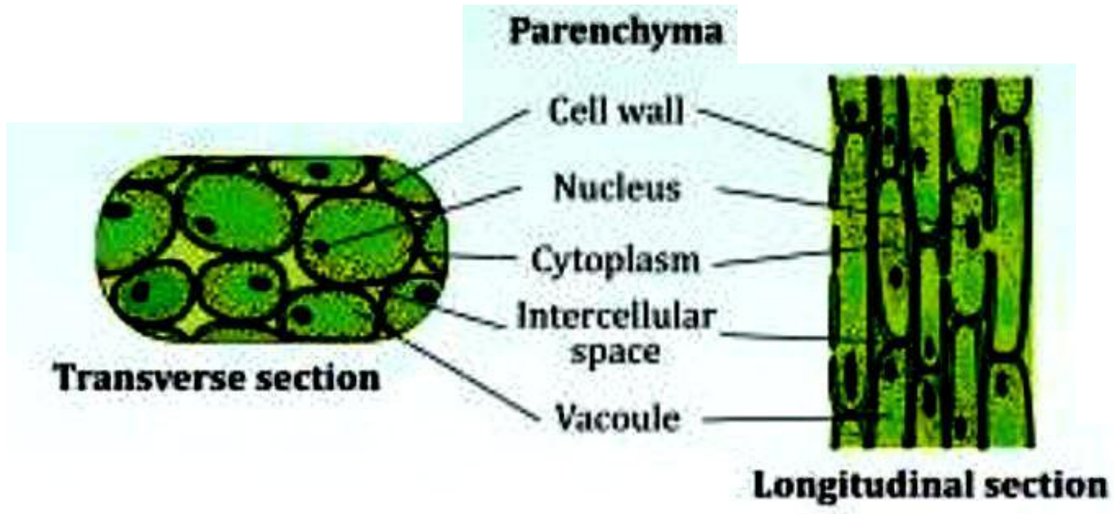
OBSERVATIONS

PLANT TISSUES

I. **Parenchyma tissues.**

1. All cells are the same in size and length.
2. Corners of the cells show intercellular spaces.
3. Each cell shows a prominent nucleus and a large central vacuole.
4. Each cell has thin cell walls.

5. Intercellular spaces are present in between the cells.

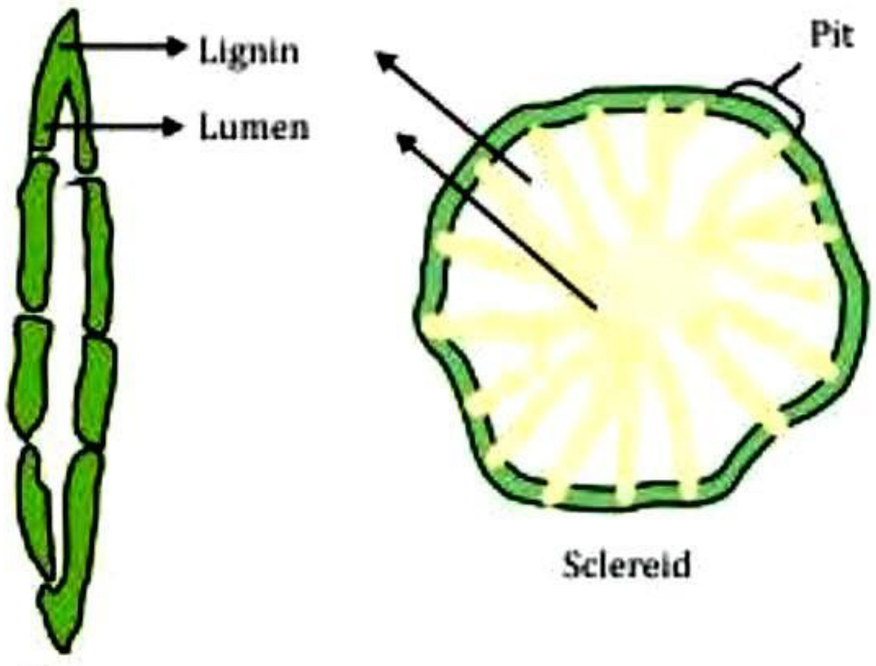


INFERENCE

1. These are plant cells as a large vacuole is seen and a cell wall is present.
2. These are all living cells.
3. These cells are present all over the plant body i.e. – stems, leaves, roots, flowers and fruits.

II. Sclerenchyma tissues

1. These cells show thick comers and thick cell walls.
2. They do not have any protoplasm in them.
3. They show lignified walls.
4. They can be divided into two types, sclerenchyma fibres and sclereids.
5. These cells are dead.



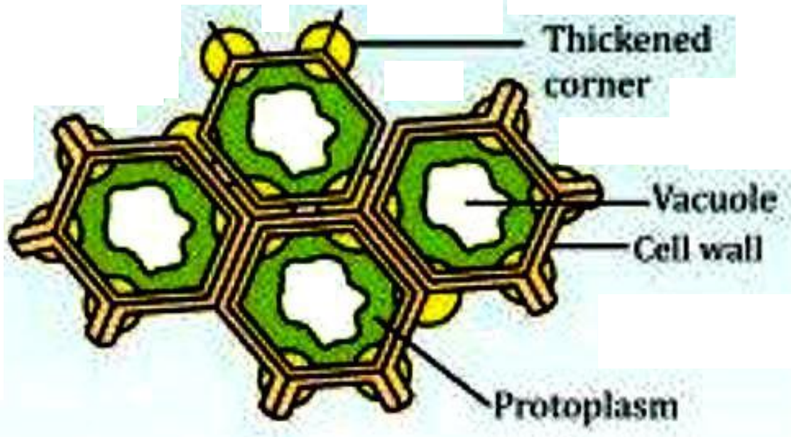
Sclerenchymatous Tissue

INFERENCE

The sclerenchyma tissues are dead cells, with a hard cell wall and provide mechanical support to the plant. E.g., coconut husk, and hard shells of fruits.

III. Collenchyma tissues

(i) The cells of the collenchyma may be oval or elongated.
(ii) Each cell consists of a central nucleus with cytoplasm at the periphery.
(iii) Cell walls are thickened at the comers. The thickening is due to cellulose and pectin.
(iv) Intercellular space is absent.
(v) These cells are commonly seen below the epidermis in petioles, leaves and stems.
(vi) Its main function is to provide mechanical strength.



INFERENCE

1. These cells have thick comers.
2. There is no space between the cells.
3. The nucleus is prominent at the periphery with cytoplasm, but the centre of the cells consists of a vacuole.

PRECAUTIONS

1. Handle the microscope carefully.
2. Handle the permanent slides carefully.
3. Always focus the slide first at low power and then at high power.

VIVA VOCE

Q1. What is a tissue?

Ans. A group of cells alike in form, similar in origin and performing a definite function is called a tissue.

Q2. What do you mean by 'isodiametric'?

Ans. When expansion occurs equally on all sides, i.e., having similar diameter in all planes, it is called as isodiametric. In parenchymatous tissue, cells are isodiametric in nature.

Q3. What is the major constitution of the cell wall in plants?

Ans. The major constitution of the cell wall in plants is cellulose.

Q4. Why do sclerenchymatous cells become thick walled?

Ans. Sclerenchymatous cells become thick walled due to deposition of lignin.

Q5. Name the plant tissue, which is used to make ropes, jute, fibres, etc.

Ans. Sclerenchyma tissue

Q6. What is the main function of sclerenchyma?

Ans. Sclerenchyma consists of dead cells. Hence it serves a purely mechanical function by providing strength and rigidity to the plant body.

Q7. In which part of plant tissue do we find sufficient intercellular spaces?

Ans. In parenchymatous tissue, we find sufficient intercellular spaces.

Q8. Name the cells in plants which are dead at maturity.

Ans. Sieve tubes

Q9. Name the tissue which is responsible for the grit of fruits.

Ans. Sclereids

Q10. Name the plant tissue which is mainly responsible for mechanical strength.

Ans. Sclerenchyma

Experiment (B)

Aim

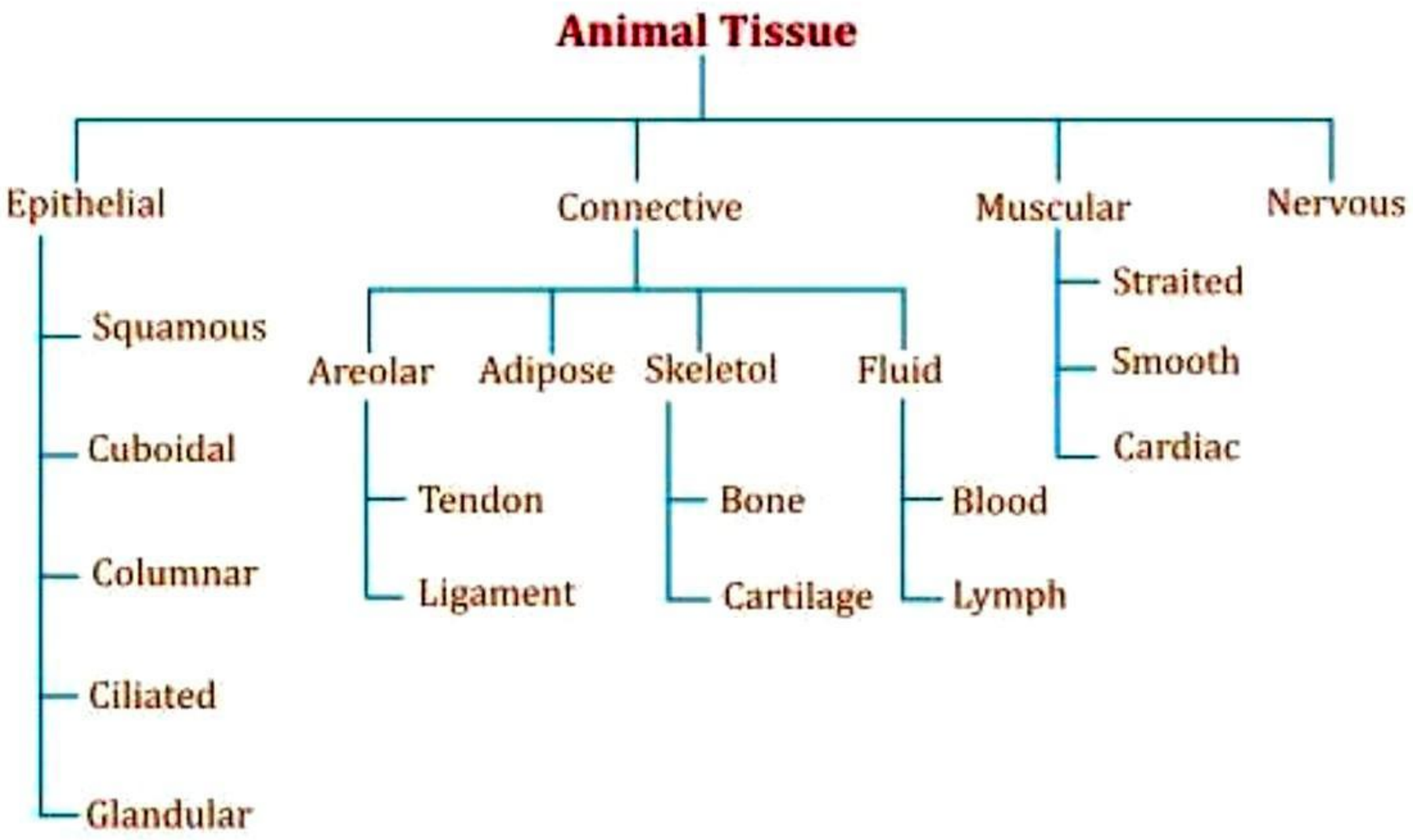
Identification striped smooth and cardiac muscle fibers and nerve cells in animals, from prepared slides Drawing of their labelled diagrams.

MATERIALS AND APPARATUS REQUIRED

Prepared slides of non-striated, striated, and cardiac muscle fibers and nerve cells, compound microscope.

THEORY

A tissue is a group of cells that are similar in structure, origin and function.



PROCEDURE

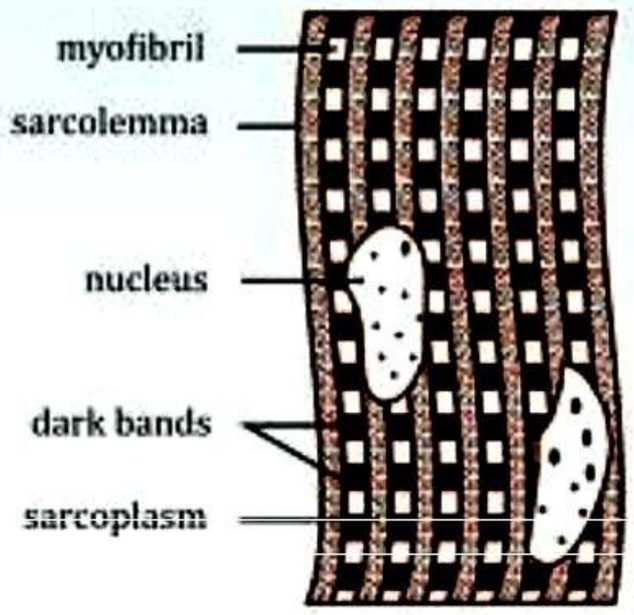
1. Clean the microscope and adjust the light in microscope.
2. Place the prepared slide of tissue on the stage of microscope and focus first at low power and then at high power.
3. Observe the structure of tissues and draw the diagram of tissues as seen under microscope.

OBSERVATIONS

I. Striated Muscles or Striped or Skeletal Muscles

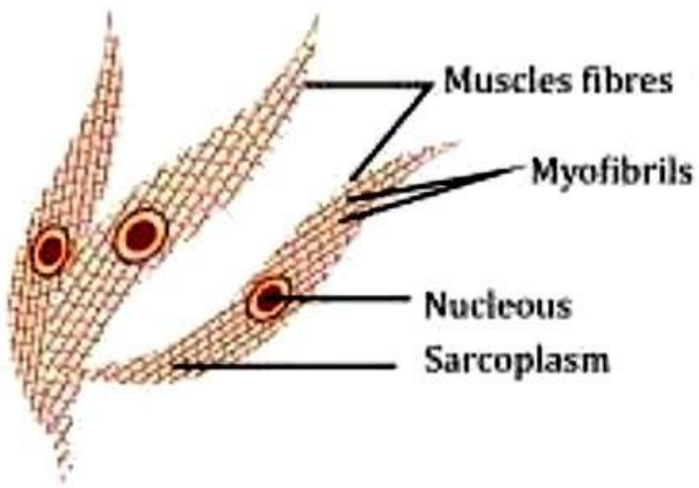
1. Striated muscle cells are cylindrical, elongated and enclosed in a membrane called sarcolemma.

2. These muscle cells are multinucleated.
3. Striated muscles show the presence of light and dark bands which gives it striped appearance.
4. These muscles are present attached to the skeleton of the body.
5. They are voluntary muscles (i.e., work according to our will).



II. Non-striated Muscles or Unstriped or Smooth Muscles

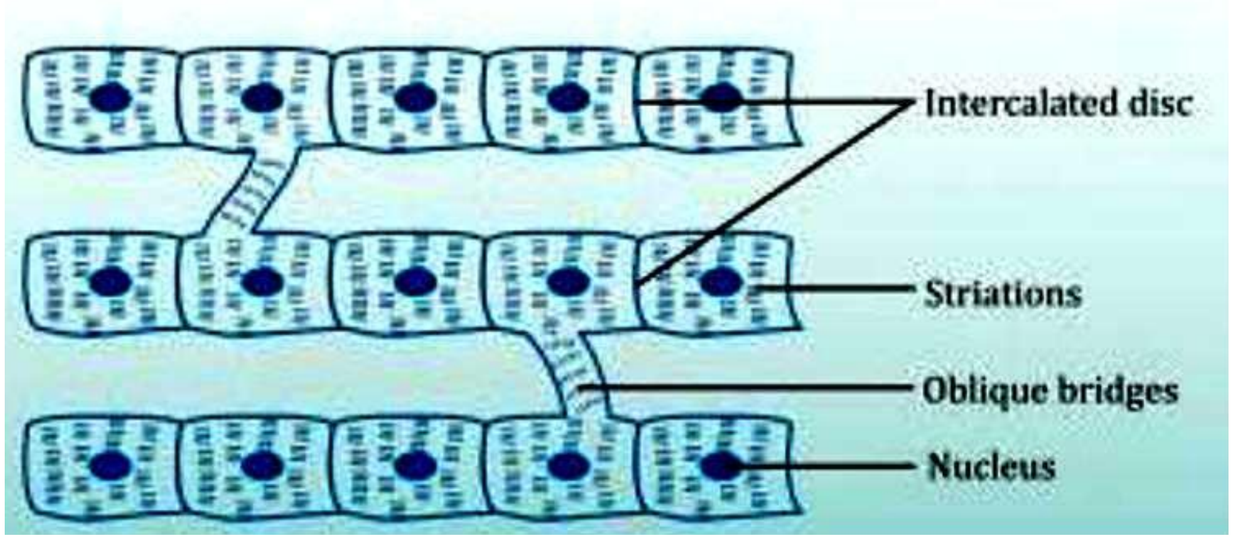
1. The cells are spindle shaped.
2. Nucleus is centrally located.
3. These muscles do not show striations (i.e., no light and dark bands).
4. Non-striated muscles are involuntary in nature.
5. They are commonly found in alimentary canals and blood vessels.



Non-straited muscles

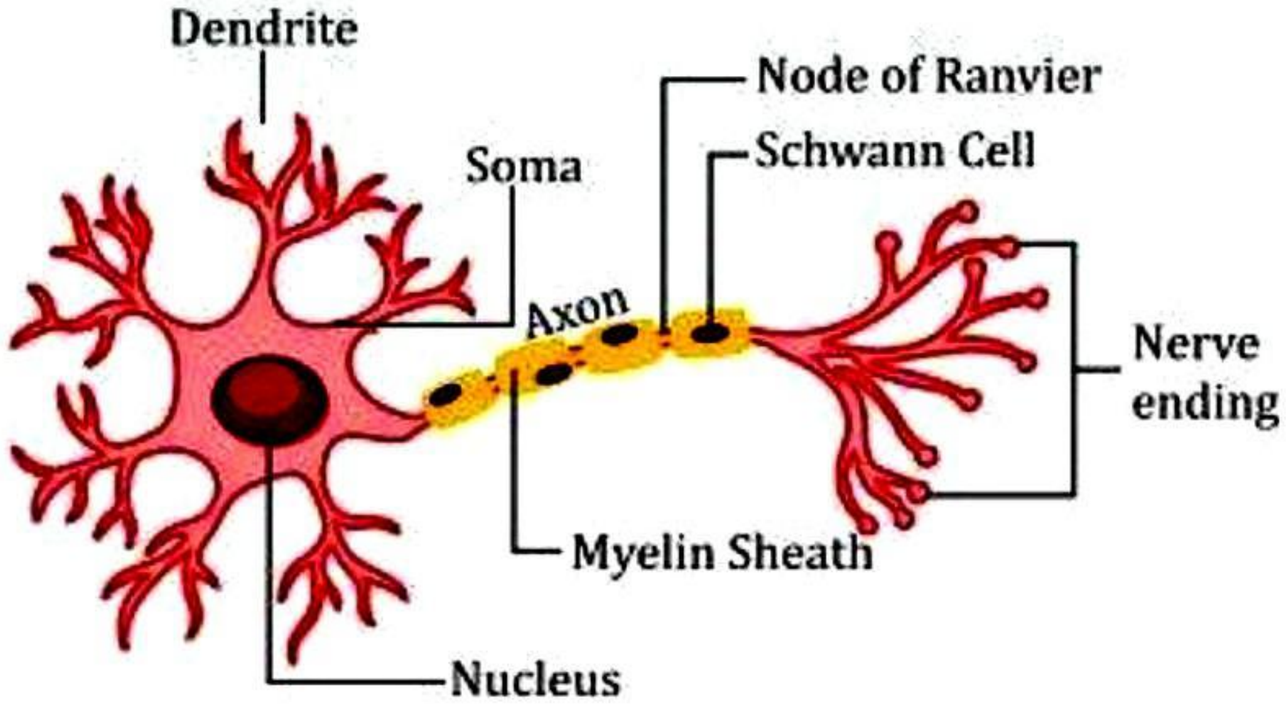
III. Cardiac Muscles

1. Cardiac muscle cells are long, branched and uninucleate.
2. These show the presence of intercalated discs.
3. They show alternate light and dark bands.
4. These are involuntary muscles and responsible for rhythmic contraction and relaxation of heart.
5. Cardiac muscles are present only in walls of heart.



IV. NERVE CELL

1. Nerve cell comprises of a cell body or cyton with a single nucleus and cytoplasm.
2. Many small cytoplasmic projections arise from cyton which are called dendrons. The dendrons divide further to form dendrites.
3. A long cytoplasmic projection arising from cell body is called axon.
4. A myelin sheath is present over the axon in some nerve fibers, these are called myelinated nerve fiber and when myelin sheath is absent these are called non-myelinated nerve fibers.
5. Myelin sheath is not continuous. There are gaps along the entire length. Each gap is called nodes of Ranvier.
6. Nerve cells help in conduction of nerve impulse.



RESULTS

A. Muscular tissue consists of different types of muscle fibres, such as (i) striated, (ii) smooth, and (iii) cardiac muscle fibres. The striated muscle fibres work according to our will (voluntary) and get tired (fatigued) when overworked. The functioning of smooth and cardiac muscle fibres are not under our control (involuntary).

B. The above observations show a multipolar neuron as it shows many processes arising from the cell body. The cyton shows distinct nucleus and granulated cytoplasm. The axon is the longest dendrite which helps in conducting the impulses.

PRECAUTIONS

1. Handle the microscope carefully.
2. Always focus the slide first at low power and then at high power.

VIVA VOCE

Q1. Give one example of Parenchymatous tissues.

Ans. Parenchyma cells occur in the form of continuous masses as homogeneous parenchyma tissues e.g. in pith and cortex of stems and roots, mesophyll of leaves, the flesh of succulent fruits and in the endosperm of seeds.

Q2. Give two examples of connective tissue.

Ans. Blood and bone.

Q3. Name the muscles attached to bones and helps in the movement.

Ans. Striated, skeletal muscles.

Q4. Name the muscles present in the heart.

Ans. Cardiac muscles.

Q5. Name a fluid connective tissue.

Ans. Blood, lymph.

Q6. Name the simple permanent tissues of plant.

Ans. Parenchyma, collenchyma and sclerenchyma.

Q7. What is histology?

Ans. Histology is the branch of biology dealing with the study of tissues.

Q8. Name the components of light and dark bands of striated muscle cells.

Ans. Light bands consist of actin proteins and dark bands of myosin proteins.

Q9. How would you differentiate between a slide of striated and cardiac muscles?

Ans. Striated muscles are long and unbranched whereas cardiac muscles are short and branched. Striated muscles lack intercalated discs whereas intercalated discs are present in cardiac muscles.

Q10. The diagram of sclerenchyma tissue given can be correctly identified because of the.

Ans. Cells with a thick cell wall and dead nucleus are seen in sclerenchyma.