

LESSON 5- TISSUES AND OTHER LEVELS OF ORGANIZATION

Cell is the fundamental structural and functional unit of organisms and that bodies of organisms are made up of cells of various shapes and sizes. Groups of similar cells aggregate to collectively perform a particular function. Such groups of cells are termed “tissues”. This lesson deals with the various kinds of tissues of plants and animals.

- A **tissue** is a group of cells with a common origin, structure and function.
- **The plant tissues are mainly of two categories:**
- 1. *Meristematic* (Gk. meristos : dividing)
- 2. *Permanent* (non-dividing)
- Meristematic tissues – Composed of immature or undifferentiated cells without intercellular spaces.

Apical Meristem

- Growth in length of plants and their branches

Intercalary Meristem

- Internodal growth

Lateral Meristem

- Growth in thickness of the plant body (Secondary Growth)

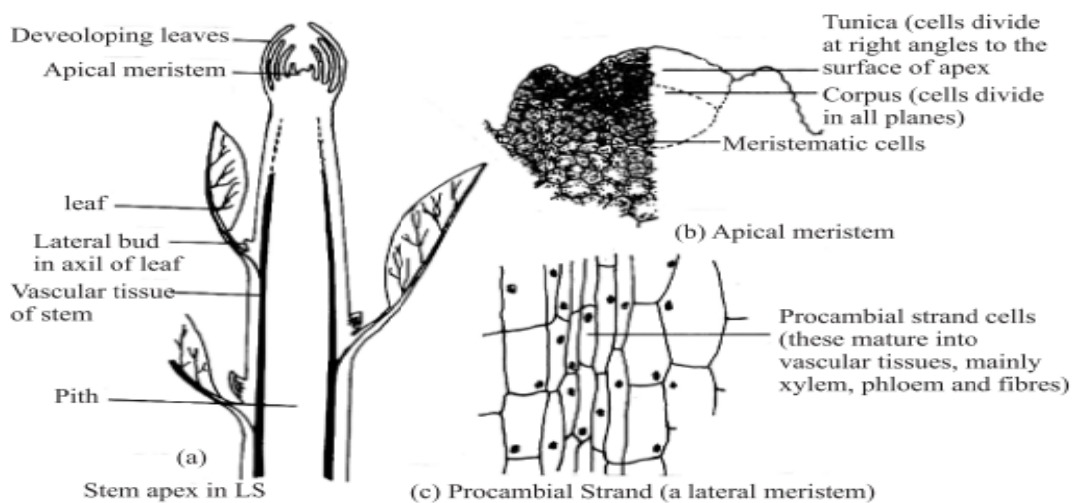


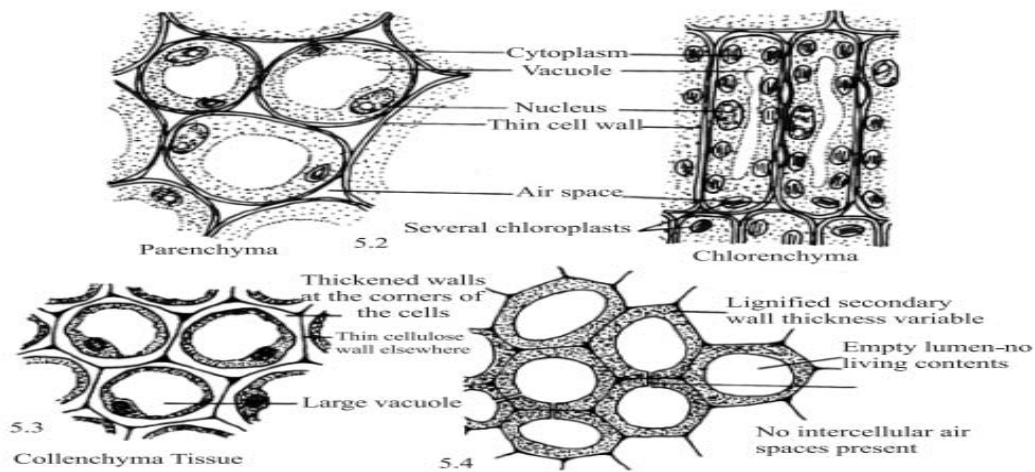
Fig. 5.1 Location of the meristematic tissues in an angiospermous plant

Permanent Tissues

Permanent tissues are those in which growth has stopped either completely or for the time being.

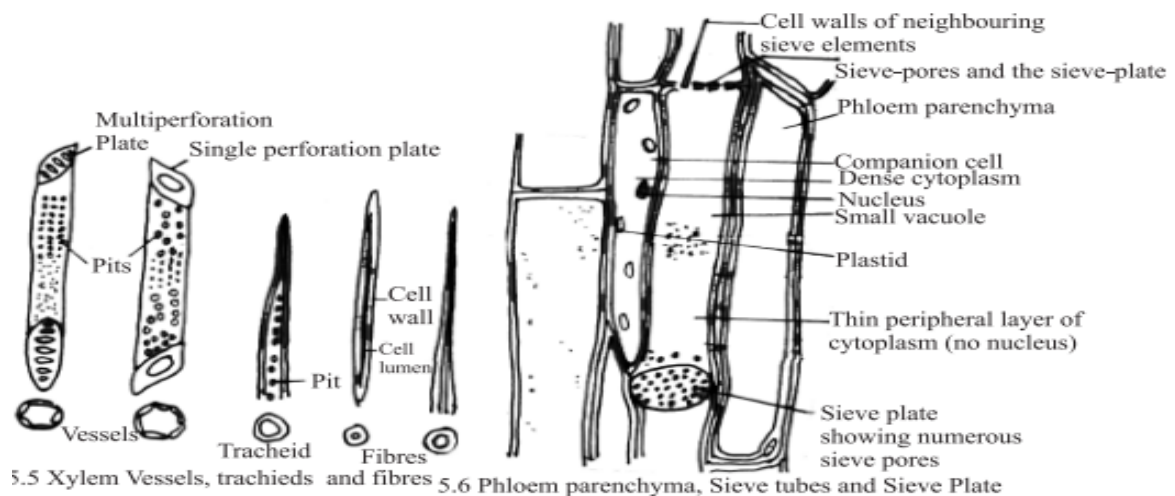
Types of permanent tissues 1. *Simple tissues*: A simple tissue is made up of only one type of cells. Common simple tissues are parenchyma, collenchyma and sclerenchyma

2. *Complex tissues*: A complex tissue is made up of more than one type of cells working together as a unit. Common examples are xylem and phloem



Various Types of Simple Tissues

Complex tissues are mainly of two types: (i) Xylem (ii) Phloem – Xylem and phloem form a continuous system inside the plants that is from the roots through the stem and leaves.



Various types of complex tissues

Theories explaining growth of the plant at its shoot apex and root

Tunica corpus theory was developed for vegetative shoot apex. –

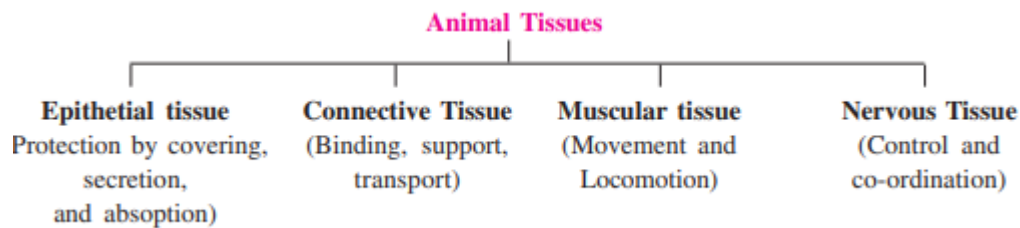
According to this theory, there are two zones of tissues in the apical meristems the tunica (Tunic = cover) consisting of one or more layers of peripheral layers of cells, and the corpus (corpus = body) a mass of cells enclosed by the tunica.

Histogen Theory

According to this theory, the apical meristem of stem and root are composed of small mass of cells which are all alike and divide fast (meristematic)

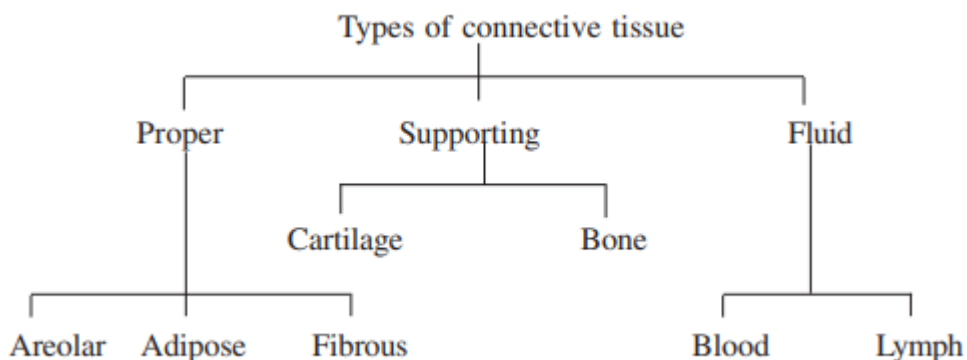
ANIMAL TISSUES

As in plants, tissues in animals are also of various types which perform different functions.



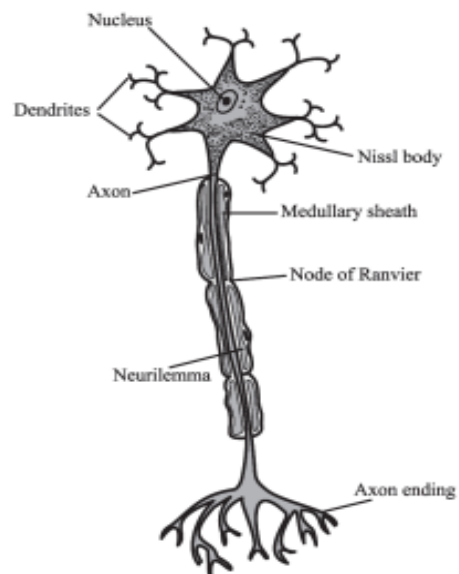
- The animal tissues consist of epithelium (closely packed cells usually on surfaces,) connective tissue which primarily support, connect or bind the body parts together (bones blood etc.), the contractile muscular tissue (different muscles,) and nervous tissue consisting of nerve cells adapted for conducting the message (brain cells)

The connective tissue has two components: (a) matrix, the ground substance and (b) cells



- **Muscle tissue:** This is composed of long excitable cells containing parallel microfilaments of contractile proteins, as in actin, myosin, troponin and tropomyosin

- The muscle fibres of vertebrates are of three different types (i) Striated (ii) Unstriated and (iii) Cardiac
- Nervous tissues has two kinds of cells i.e. neurons and neuroglia cells



- The various tissues in both plants and animals are grouped together to form an organ. The different organs together form the organ system and the various organs systems together constitute the organism or the individual. Thus there are different levels of organization with increasing complexity and specialization from cell to organism.

TEST YOURSELF

1. Mention any two features of the meristematic cells?
2. Give brief description of Theories explaining growth of the plant at its shoot apex and root.
3. State the different types of Animal Tissues and their role.