INTERNATIONAL INDIAN SCHOOL BURAIDAH

STD11, PRACTICE PARER FOR **BIOLOGY**

Ch:3 and 6

Plant kingdom classification

i. Algae

ii. Bryophytes

iii. Pteridophytes

iv. Gymnosperms

v. Angiosperms

Algae

Algae are chlorophyll-bearing, simple, thalloid, autotrophic and largely aquatic (both fresh water and marine) organisms. They occur in a variety of other habitats: moist stones, soils and wood. Some of them also occur in association with fungi (lichen) and animals (e.g., on sloth bear).

The form and size of algae is highly variable, ranging from **microscopic, unicellular** forms like chlamydomonas ,**colonial** forms like Volvox and **filamentous** forms like Ulothrix and Spirogyra**.**A few of the **marine** forms such as kelps, form massive plant bodies.

The algae reproduce by vegetative, asexual and sexual methods. Vegetative reproduction is by fragmentation. Each fragment develops into a **thallus**.

The algae are divided into three main classes: Chlorophyceae (green algae),

: Phaeophyceae(brown algae)

:Rhodophyceae.(Red algae)

(i) Chlorophyceae

The members of chlorophyceae are commonly called **green algae**. The plant body may be unicellular, colonial or filamentous. They are usually grass green due to the dominance of pigments chlorophyll a and b. The pigments are localised in definite chloroplasts.

Eg: Chlamydomonas, Volvox, Spirogyra .

(ii)Phaeophyceae

The members of phaeophyceae or **brown algae** are found primarily in marine habitats. They show great variation in size and form. They range from simple branched, filamentous forms (Ectocarpus) to profusely branched forms as represented by kelps, which may reach a height of 100 metres. They possess **chlorophyll a, c, carotenoids and xanthophylls**. They vary in colour **from olive green to various shades of brown** depending upon the amount of the **xanthophyll pigment, fucoxanthin** present in them. Fig 3.1 (pg 31)

Rhodophyceae

The members of rhodophyceae are commonly called **red algae** because of the predominance of the **red pigment, r-phycoerythrin** in their body. Majority of the red algae are **marine** with greater concentrations found in the warmer areas. They occur in both well-lighted regions close to the surface of water and also at great depths in oceans where relatively little light penetrates. The red thalli of most of the red algae are multicellular. Some of them have complex body organisation. The food is stored as **floridean starch.**

Fig 3.1 (pg 31)

Bryophytes

BRYOPHYTES

Bryophytes include the various **mosses and liverworts** that are found commonly growing in **moist shaded** areas in the hills. Bryophytes are also called **amphibians of the plant kingdom** because these plants can live in soil but are dependent on water for sexual reproduction.

They play an important role in plant succession on bare rocks/soil. They may possess root-like, leaf-like or stem-like structures **(thallus)**. The main **plant body of the bryophyte is haploid**. It produces gametes, hence is called a gametophyte. The **sex organs in bryophytes are multicellular**. The male sex organ is called **antheridium.** The female sex organ is called **archegonium**.


mosses


Liverwort

PTERIDOPHYTES

The Pteridophytes include **horsetails and ferns**. Pteridophytes are used for medicinal purposes and as soil-binders. They are also frequently grown as ornamentals. Evolutionarily, they are the **first terrestrial plants to possess vascular tissues** – **xylem and phloem**. The pteridophytes are found in cool, damp, shady places. , The main plant body is a **sporophyte** which is differentiated into **true root, stem and leaves** . These organs possess **well-differentiated vascular tissues**.

Fig 3.3(pg 37)

<u>GYMNOSPERMS</u> :

The gymnosperms (gymnos : naked, sperma : seeds) are plants in which the ovules are not enclosed by any ovary wall and remain exposed, both before and after fertilisation. The seeds that develop post-fertilisation, are not covered, i.e., are naked. Gymnosperms include medium-sized trees or tall trees and shrubs . One of the gymnosperms, the giant **redwood tree Sequoia is one of the tallest tree species**. The roots are generally tap roots. Roots in some genera have **fungal association** in the form of **mycorrhiza (Pinus)**, while in some others (Cycas) small specialised roots called **coralloid roots** are associated with **N2 - fixing cyanobacteria**. Eg : Cycas , Pinus,Ginko (pg 39 fig 3.4)

Ch:6

TISSUES :A tissue is a group of cells having a common origin and usually performing a common function. A plant is made up of different kinds of tissues. Tissues are classified into **two main groups**, namely, **meristematic and permanent tissues** based on whether the cells being formed are capable of dividing or not.

Meristematic Tissues : Growth in plants is largely restricted to specialised regions of active cell division called **meristems** . The meristems which occur at the **tips of roots and shoots** and produce **primary tissues are called apical meristems** (Figure 6.1). **Root apical meristem** occupies the tip of a root while the **shoot apical meristem** occupies the distant most region of the stem axis.

During the formation of leaves and elongation of stem, some **cells 'left behind'** from shoot apical meristem, constitute the **axillary bud**. Such buds are present in the axils of leaves and are capable of forming a **branch or a flower**.

The meristem which occurs between mature tissues is known as **intercalary meristem**. They occur in grasses and regenerate parts removed by the grazing herbivores. **Both apical meristems and intercalary meristems are primary meristems** because they appear early in life of a plant and contribute to the formation of the primary plant body.

The meristem that occurs in the mature regions of roots and shoots of many plants, particularly those that produce woody axis and appear later than primary meristem is called the **secondary or lateral meristem**. They are cylindrical meristems. **Fascicular vascular cambium, interfascicular cambium and cork-cambium** are examples of lateral meristems. These are **responsible for producing the secondary tissues**.

Following divisions of cells in both primary and as well as secondary meristems, the newly formed cells become **structurally and functionally specialised and lose the ability to divide**. Such cells are termed **permanent or mature cells** and constitute the **permanent tissues**.

Permanent Tissues : The cells of the permanent tissues do not generally divide further. Permanent tissues having all **cells similar in structure and function are called simple tissues**. Permanent tissues having many **different types of cells are called complex tissues.**

Simple permanent tissue: (1) Parenchyma

(2) Collenchyma

(3) sclerenchyma

(1) Parenchyma forms the major component within organs.

*The cells of the parenchyma are generally **isodiametric**. They may be spherical, oval, round, polygonal or elongated

in shape.

* Their **walls** are thin and made up of **cellulose**.

* They may either be **closely packed** or have **small intercellular spaces**.

*The parenchyma performs various functions like **photosynthesis, storage, secretion.**

Fig 6.2(a)

(2)Collenchyma occurs in layers below the epidermis in most of the dicotyledonous plants.

*It is found either as a **homogeneous layer** or in patches.

*It consists of cells which are much **thickened at the corners due to a deposition of cellulose**, **hemicellulose and pectin**. Collenchymatous cells may be oval, spherical or polygonal and often contain chloroplasts. These cells assimilate food when they contain **chloroplasts**.

*Intercellular spaces are absent.

*They **provide mechanical support** to the growing parts of the plant such as **young stem and petiole of a leaf**.

(3) Sclerenchyma

*Sclerenchyma consists of **long, narrow cells with thick and lignified cell walls** having a few or numerous pits.

*They are usually **dead and without protoplasts**.

On the basis of variation in form, structure, origin and development, sclerenchyma may be either **fibres or sclereids**.

*The **fibres** are thick-walled, elongated and pointed cells, generally occuring in groups, in various parts of the plant.

*The **sclereids** are spherical, oval or cylindrical, highly thickened dead cells **with narrow cavities** (lumen). These are commonly found in the **fruit walls of nuts; pulp of fruits** like guava, pear and sapota; **seed coats of legumes** and leaves of tea. **Sclerenchyma provides mechanical support to organs.**

Fig 6.2 (c)

COMPLEX PERMANENT TISSUE:

The complex tissues are **made of more than one type of cells and these work together as a unit**. Xylem and phloem constitute the complex tissues in plants.

***Xylem** functions as a conducting tissue for water and minerals from roots to the stem and leaves.

It also provides mechanical strength to the plant parts.

It is composed of four different kinds of elements, namely, **tracheids, vessels, xylem fibres and xylem parenchyma**.

***Phloem** transports food materials (**Translocation)**, usually from leaves to other parts of the plant.

Phloem in angiosperms is composed of **sieve tube elements, companion cells, phloem parenchyma and phloem fibres**.

THE TISSUE SYSTEM

On the basis of their structure and location, there are three types of tissue systems. These are the

(a) **epidermal tissue system**,

(b)**the ground or fundamental tissue system and**

(c) the vascular or conducting tissue system.

(a) Epidermal tissue system

The epidermal tissue system forms the **outer-most covering of the whole plant body** and comprises **epidermal cells**, **stomata** and the **epidermal appendages** – the trichomes and hairs. It is made up of elongated, compactly arranged cells, which form a continuous layer. Epidermis is usually **single layered**. Epidermal cells are **parenchymatous** with a small amount of cytoplasm lining the cell wall and a large vacuole. The outside of the epidermis is often covered

with a waxy thick layer called the **cuticle** which prevents the loss of water. Cuticle is absent in roots.

Stomata are structures present in the epidermis of leaves. Stomata regulate the process of transpiration and gaseous exchange. Each stoma is composed of **two bean shaped (in dicot plants)** cells known as **guard cells** which enclose stomatal pore. In **Monocot plants the guard cells are dumb-bell shaped.**

Fig # 6.4 (a and b) pg 89

****