SIMPLE PERMANENT TISSUE (PLANTS)

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PLANT ANATOMY (Bio 203)

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Outline

- Introduction
- Parenchyma
- Collenchyma
- Sclerenchyma
- Reference

Learning objectives

- 1. Identify Parenchyma
- 2. Identify Collenchyma
- 3. Identify Sclerenchyma
- 4. Differentiate Between the permanent tissues

A **permanent tissue** is a group of cells that have **lost the power** of cell division and growth.

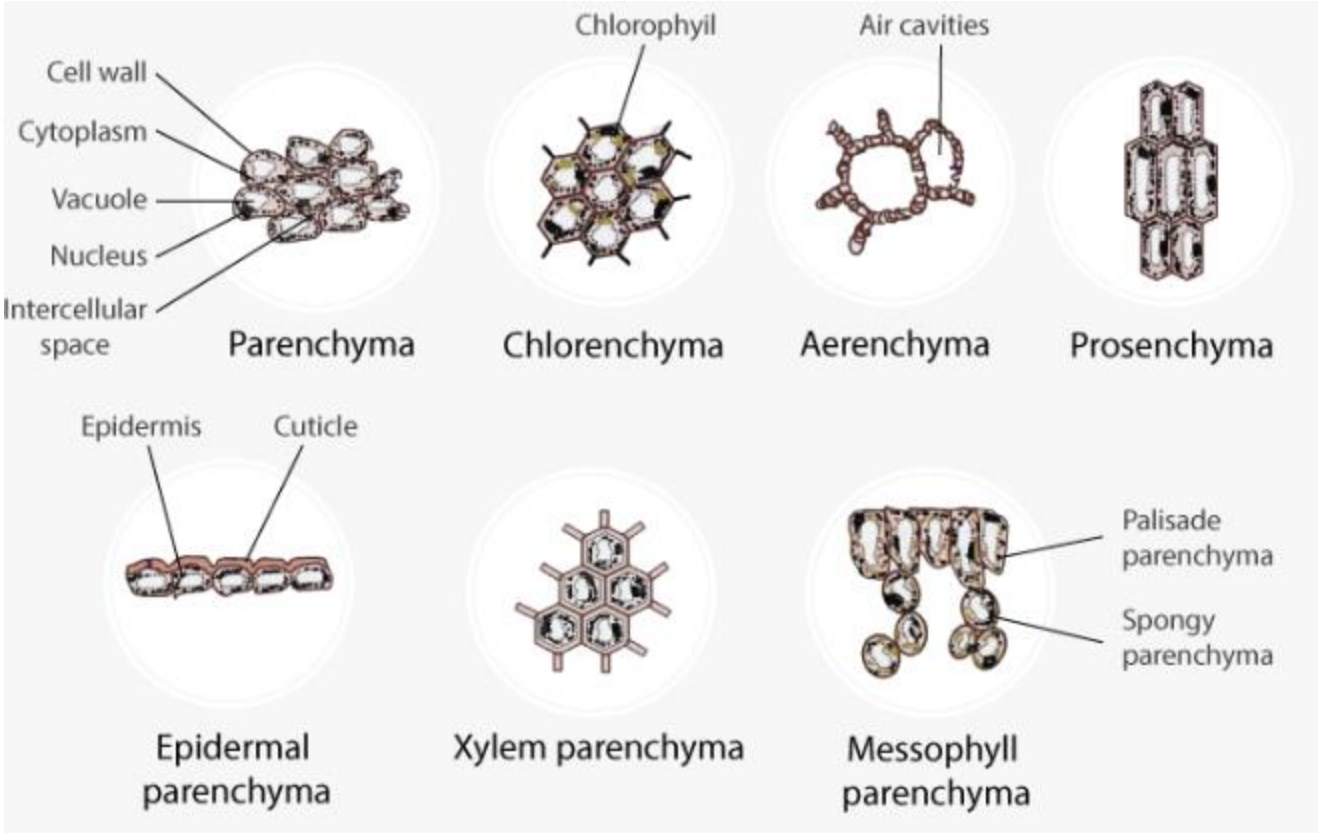
These cells have attained their definite form and size

They are formed by the **differentiation of the meristematic** cells

PARENCHYMA

- ✓ **Parenchyma** are **the most common** permanent tissues in plants.
- ✓ It is an aggregate or collection of **living cells** which are oval, spherical or polygonal in shape
- ✓ Their walls are **thin and made of cellulose** and they contain large vacuole.
- ✓ The cells have intercellular spaces in between them

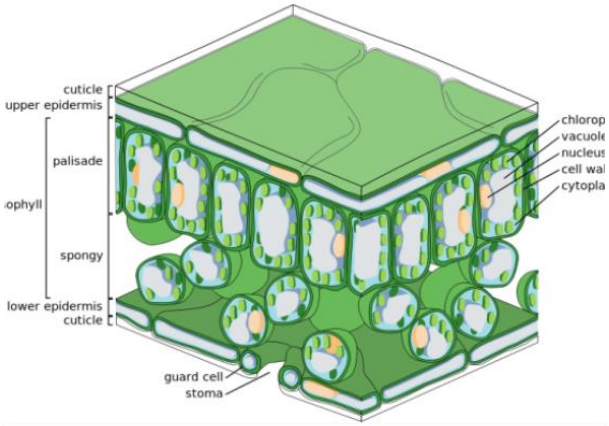
TYPES OF PARENCHYMA CELLS



Chlorenchyma: Chlorenchyma cells are the one that carries chloroplasts and are responsible for performing photosynthesis.

They can also be termed as the mesophyll cells present in leaves and help in differentiating between the palisade and spongy cells.

They can be seen in the green parts of the plants such as stems, sepal etc.



Aerenchyma: They contain very wide spaces that are intercellular.

These are found in aquatic plants.

Aerenchyma aids in the floating plants' buoyancy.

It helps with respiration and provides aquatic plants with ample oxygen.

Storage Parenchyma: These store different compounds such as water, starch, proteins, etc. They serve as a reservoir for food and water

Functions of Parenchyma cells

- **Storage:** Parenchyma cells have large intercellular space which is ideal for storage

- **Transport:** Parenchyma cells transport nutrients and other chemicals

- **Photosynthesis:** Chlorenchyma present in the mesophyll and the other green parts of the plant, have chloroplasts and perform photosynthesis

•**Gas Exchange:** Aerenchyma cells help in the gas exchange

•**Protection:** In gymnosperms, the parenchymatous cell have spiny projections that help in the protection from predators

•**Totipotent:** Parenchyma cells have an ability to transform to the other types of cells and act as a precursor for other types of cells

•**Buoyancy:** Aerenchyma present in aquatic plants have air sacs that help in floating

•**Healing and regeneration:** Parenchyma cells that retain their ability to divide even on maturity help in regeneration and wound healing.

Collenchyma

Collenchyma tissue is a term given by a scientist named **Schleiden** in the year 1839.

Collenchyma tissue can define as the simple permanent tissue that comprises axially elongated cells with the **non-uniform** and thickened cell wall.

Type of ground tissue, they are elongated cells with irregularly thick cell walls that provide support and structure.

The tissue is elastic or **extensible**, which gives flexibility to the stems in bending without breakage.

Types of Collenchyma

- Angular collenchyma
- Lamellar collenchyma
- Lacunar collenchyma
- Annular collenchyma

Sclerenchyma

Sclerenchyma, in plants, support tissue composed of any of various kinds of hard woody cells.

Mature sclerenchyma cells are usually dead cells that have heavily thickened secondary walls containing lignin.

The cells are rigid and nonstretchable and are usually found in nongrowing regions of plant bodies, such as the bark or mature stems.

Sclerenchyma cells occur in many different shapes and sizes, but two main types occur: fibres and sclereids

COMPARISON CHART

BASIS FOR COMPARISON	PARENCHYMA	COLLENCHYMA	SCLERENCHYMA
Meaning	The living plant cells are originating from ground and protoderm meristem. These type of cells are most abundantly found in plants tissue.	The type of living plant cells originating from the pro-cambium. The epidermal layers of the plant are made of collenchyma cell.	The hard and outer part of the stem is made up of the sclerenchyma cells. These are the dead plant cells which originate from ground meristem and protoderm procambium.
Found in	These type of cells are present in every soft part of the plant.	These cells are found in specific part of the plant like leaves, stems, and petioles.	It is found in mature parts of the plants or trees.

Type of cell	Unspecialized and living cells.	Specialized cells and living cells.	Specialized, matured and dead cells.
Cell Shape	There are various shapes of the cells, but generally, they are isodiametric.	Elongated cells are present.	Sclereids, elongated and fibre shape.
Intercellular space between the cells	Present.	Less space is present between the cells.	Absent and so cells are tightly packed.
Function	Parenchyma cells help in storage of foods, in gaseous exchange, and in photosynthesis.	Collenchyma cells provide mechanical support and elasticity to the plant.	Sclerenchyma cells provide mechanical support to the plant. It also supports transportation of water and nutrients to the plants.

REFERENCE

1. Plant anatomy by James D. Mauseth

2. Plant Anatomy (A Concept-Based Approach to the Structure of Seed Plants)

1. Plant Anatomy: An Applied Approach / Edition 1 by David F .