

Plant Structure and Function

Angiosperms (Flowering plants) are the most diverse group of plants known (over 275.000 named species and thought to be at least that many more unknown to science). Within the Angiosperms, there are two plant groups, the Monocots and the Dicots. The distinction between these two groups is not always clear, but some general trends are outlined below

	Monocot	Dicot
Leaf Venation	Parallel	Net
Vascular bundles	Scattered	Ring
Habit	Herbaceous	Herbaceous+Woody
Roots	Fibrous	Taproot
Growth	Primary only	Primary and secondary
Example	Grass, palm, Wheat	Oak, Rosses, Sunflower

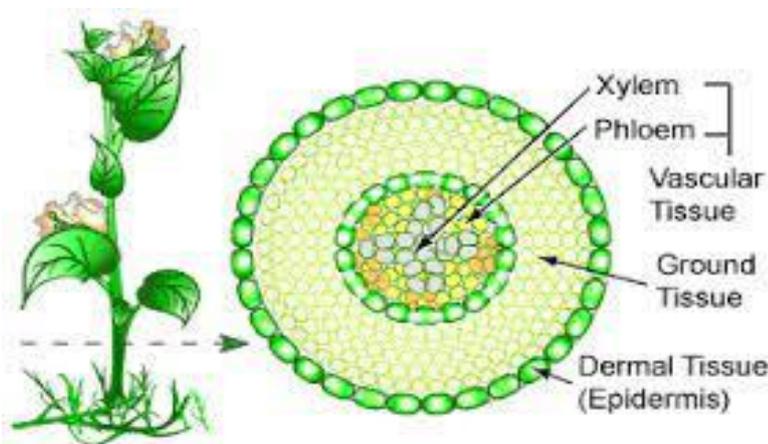
A plant has two organ systems:

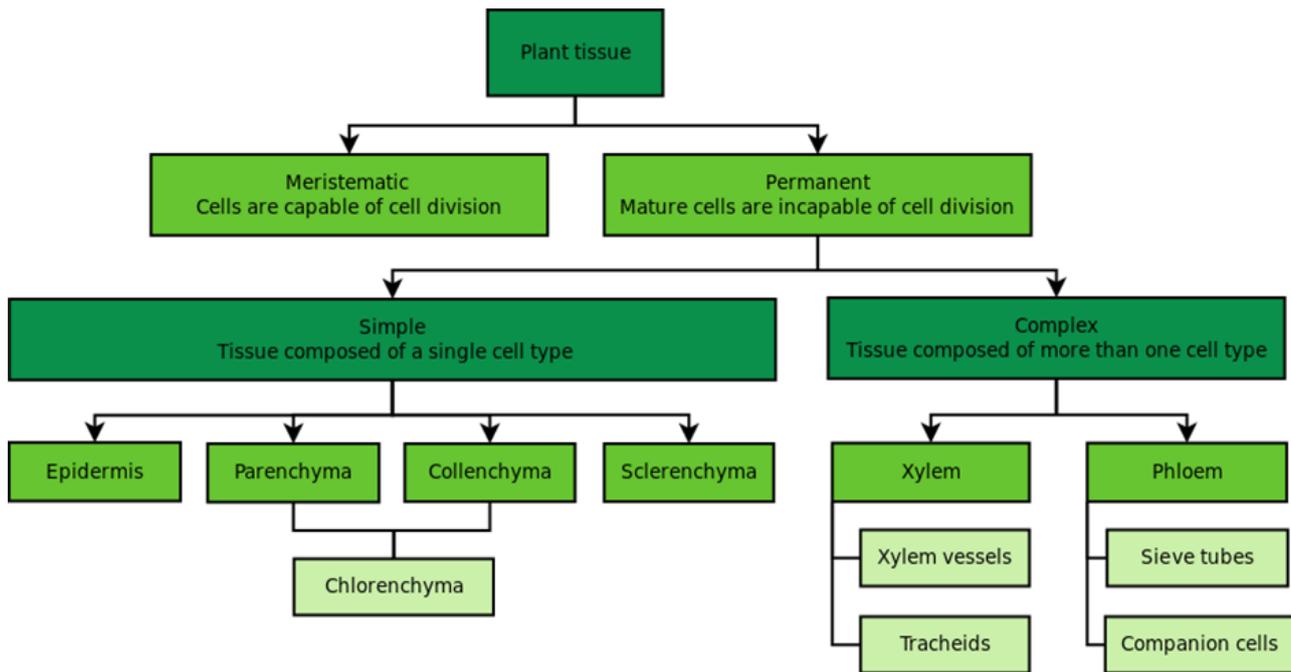
1. Shoot system; includes the organs such as leaves, buds, stems, flowers (if the plant has any), and fruits (if the plant has any).
2. Root system; includes those parts of the plant below ground, such as the roots, tubers, and rhizomes.

Plant Tissues

A mature vascular plant, eg., a tobacco plant, contains several differentiated cell types. These are grouped together in tissues.

Some tissues contain only one type of cell. Some consist of several.





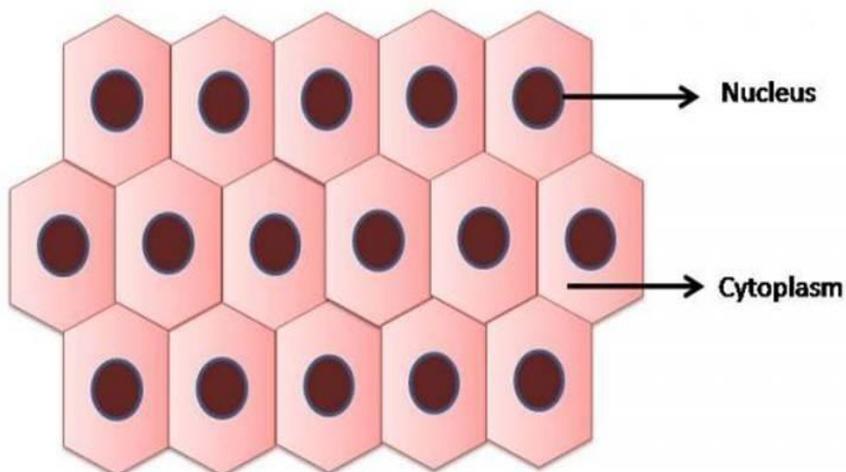
1.Meristematic

The main function of meristematic tissue is mitosis. The cells are small, Meristematic thin-walled, with no central vacuole and no specialized features.

Meristematic tissue is located in; the apical meristems at the growing points of roots and stems.

The secondary meristems (lateral buds) at the nodes of stems (where branching occurs, and in some plants; A ring of meristematic tissue, called the cambium that is found within the mature stem. The cells produced in the meristems soon become differentiated into one or another of several types.

A typical meristematic tissue



2. Protective

Protective tissue covers the surface of leaves and the living Protective cells of roots and stems. Its cells are flattened with their top and bottom surfaces parallel. The upper and lower epidermis of the leaf are examples of protective tissue

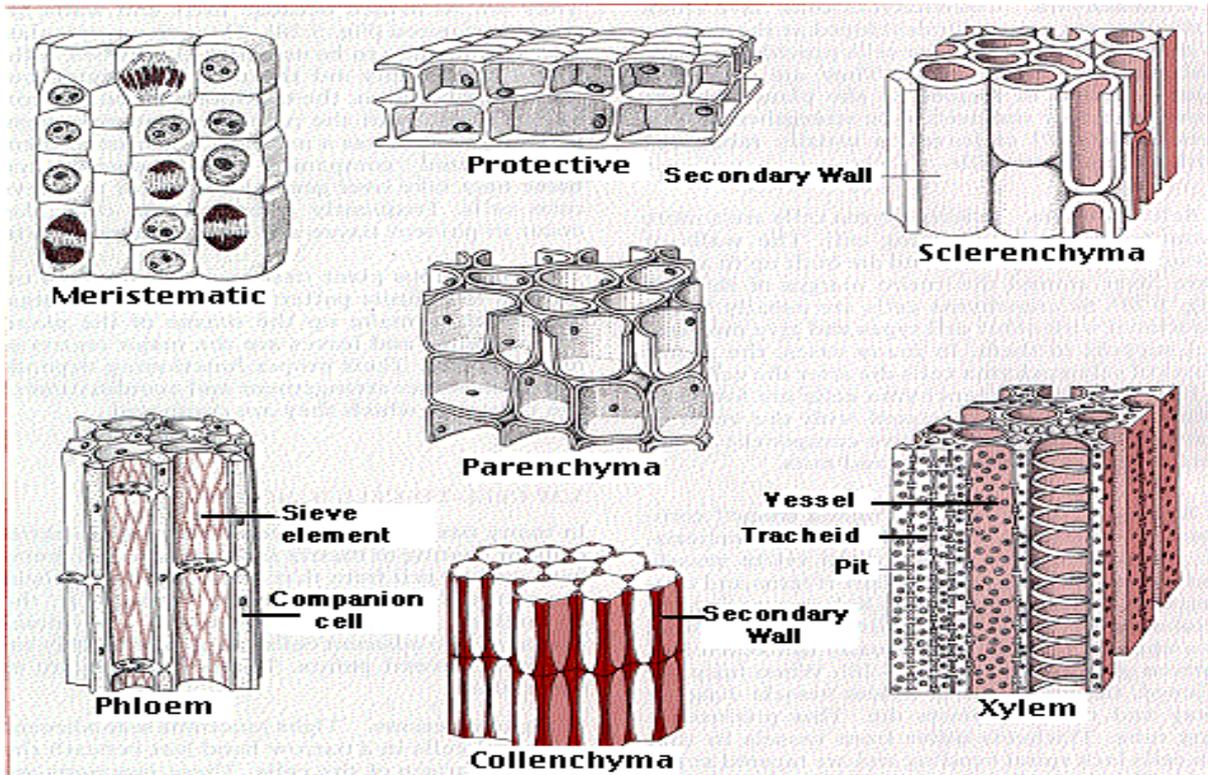


3. Parenchyma

- The cells of parenchyma are large, thin-walled, and usually have a large central vacuole. They are often partially separated from each other.
- They are usually stuffed with plastids. In areas not exposed to light, colorless plastids predominate and food storage is the main function.
- The cells of the white potato are parenchyma cells. Where Parenchyma light is present, e.g., in leaves, chloroplasts predominate and photosynthesis is the main function

4. Sclerenchyma

- The walls of these cells are very thick and built up in a uniform layer around the entire margin of the cell. Often, the protoplasts die after the cell wall is fully formed.
- Sclerenchyma cells are usually found Sclerenchyma associated with other cells types and give them mechanical support.
- Sclerenchyma is found in stems and also in leaf veins. Sclerenchyma also makes up the hard outer covering of seeds and nuts.



5. Collenchyma

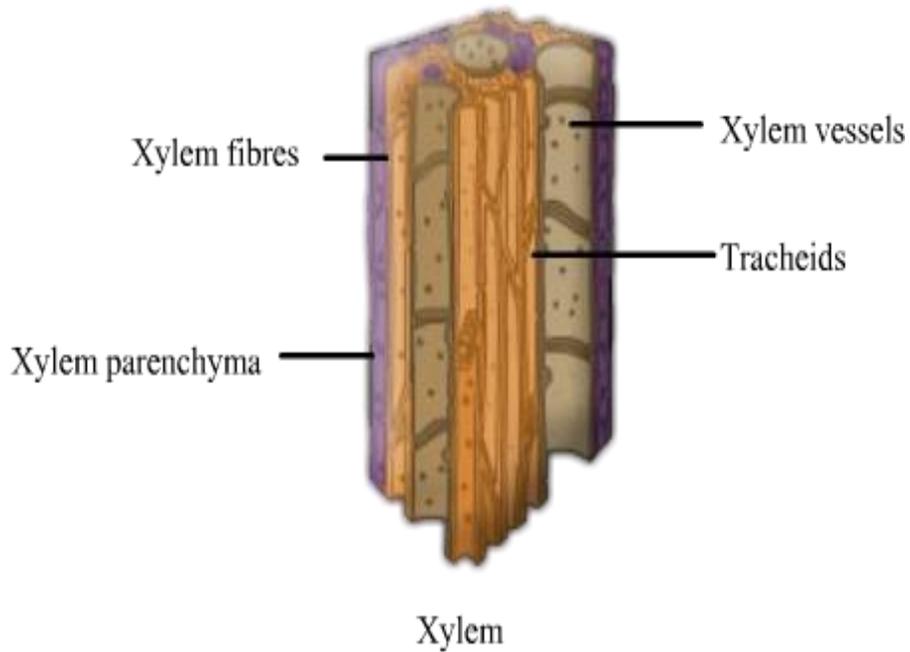
Collenchyma cells have thick walls that are especially thick at their corners. • These cells provide mechanical support for the plant. They are most often found in areas that are growing rapidly and need to be strengthened. The petiole ("stalk") of leaves is usually reinforced with collenchyma.

6. Xylem

- Xylem conducts water and dissolved minerals from the roots to all the other parts of the plant. In angiosperms, most of the water travels in the xylem vessels.
- These are thick-walled tubes that can extend vertically through several feet of xylem tissue. Their diameter may be as large as 0.7 mm.
- Their walls are thickened with secondary deposits of cellulose and are usually further strengthened by impregnation with lignin.
- The secondary walls of Xylem vessels are deposited in spirals and rings and are usually perforated by pits.
- Xylem vessels arise from individual cylindrical cells oriented end to end.
- The vessels carry water and some dissolved solutes, such as inorganic ions, up the plant. Xylem also contains tracheids.
- In woody plants, the older xylem ceases to participate in water transport and simply serves to

give strength to the trunk.

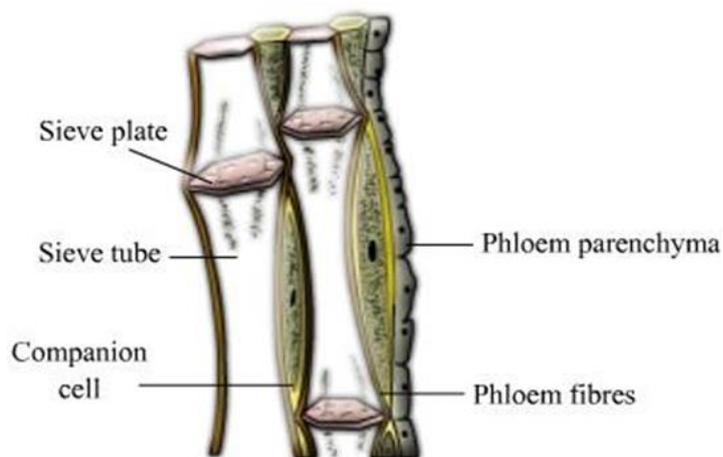
- Wood is xylem. When counting the annual rings of a tree, one is counting rings of xylem.



7. Phloem

The main components of phloem are

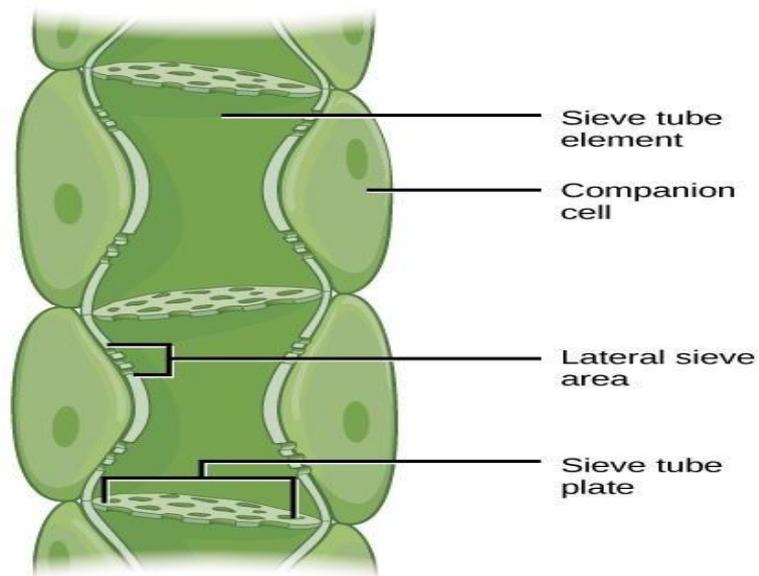
- Sieve elements and
- Companion cells



- Sieve elements are so-named because their end walls are perforated.
- This allows cytoplasmic connections between vertically-stacked cells.

- The result is a sieve tube that conducts the products of photosynthesis, sugars and amino acids from the place where they are manufactured (a "source"), eg. leaves, to the places where they are consumed or stored; such as (roots, growing tips of stems and leaves, flowers, fruits, tubers, corms, etc.

Sieve elements have no nucleus and only a sparse collection of other organelles. They depend on the adjacent companion cells for many functions



PARENCHYMA VS COLLENCHYMA VS SCLERENCHYMA

<p>Parenchyma cells are found in every soft part of the plant</p> <p>Unspecialized cells</p> <p>Consists of a thin cell wall</p> <p>Cell wall is made up of cellulose</p> <p>Intercellular space is present between cells</p> <p>Consists of living cells at maturity</p> <p>Photosynthesis, storage of food, gas exchange and floating of aqueous plants are the major functions</p>	<p>Collenchyma cells are found in petiole, leaves and young stems</p> <p>Specialized cells</p> <p>Consists of an unequally thin cell wall</p> <p>Cell wall is made up of cellulose and pectin</p> <p>No or little intercellular space is present between cells</p> <p>Consists of living cells at maturity</p> <p>Providing mechanical support to the plant, resisting bending and stretching by the wind are the major functions</p>	<p>Sclerenchyma is found in the mature parts of the plant</p> <p>Specialized cells</p> <p>Consists of a thick and rigid cell wall</p> <p>Cell wall is made up of waterproofing lignin</p> <p>No intercellular space is present between cells</p> <p>Consists of dead cells at maturity</p> <p>Providing mechanical support, protection and transportation of water and nutrients are the major functions</p> <p>Visit www.pediaa.com</p>
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