

The Root

The **primary root**, the plant's first root, develops from the root meristem of the embryo. In gymnosperms and many dicotyledons, the primary root develops as a **taproot**, which gives rise to **lateral**, or **branch, roots**. The taproot and its smaller branched lateral roots form a **taproot system**. In monocotyledons and some dicotyledons, the primary root is commonly short-lived, so the root system of the adult plant is composed of many branching **adventitious roots** (roots which originate from stem tissue). In these plants, the roots form a **fibrous root system**.

A. Root Systems

While examining the tap and fibrous roots provided, attempt to relate the root system structure to its functions of anchorage, absorption, storage, and conduction. Examine too, the stem cuttings available. The roots arising from stem cuttings are also adventitious. Cuttings are one means that plants have of vegetative propagation.

B. Root Structure

1. The Root Tip

Examine a living radish seedling. Identify the root cap and the many root hairs. What is the function of root hairs? What function does the root cap have?

2. Dicot Root Structure

Obtain a prepared slide of a cross section of *Ranunculus* root. Note the wide cortex and narrow vascular cylinder - or stele.

Using your high power objective identify each of the following, beginning at the outermost cell layer and working toward the center of the root.

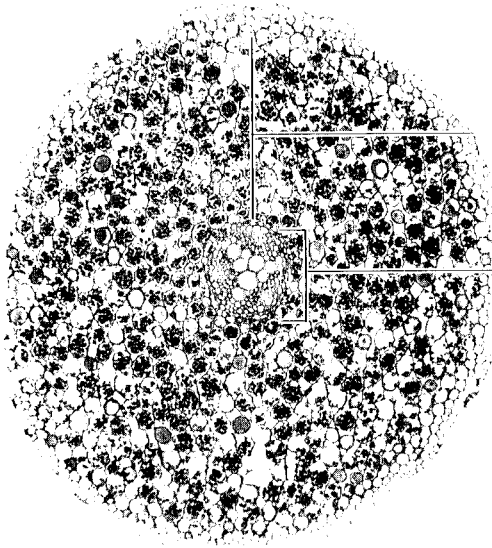
- The single layer of **epidermis**
- The wide **cortex** region of starch-storing parenchyma cells (note the many intercellular spaces)
- The thick-walled **endodermis**, the internal border of the cortex.
- The layer of thin-walled **pericycle** cells, which forms the outer layer of the vascular cylinder (stele)
- **Xylem**, consisting of three or four radiating ridges of thick-walled cells
- Strands of **phloem** alternating with the ridges of the xylem

3. Monocot Root Structure

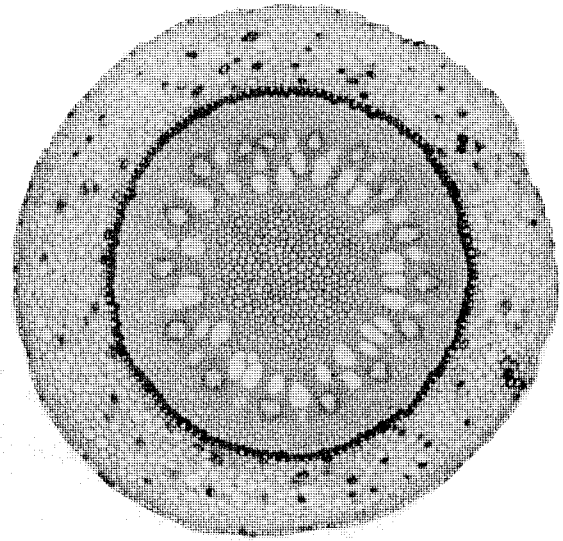
Obtain a prepared slide containing cross sections of mature *Zea* (corn) or of *Smilax* root. Examine the slide with low power and note the relative size of the cortex and the vascular cylinder. Unlike dicot roots, roots of monocots contain a central **pith** region interior to the vascular cylinder.

Using the high power objective, identify the following tissues from the outside to the center of the root:

- **Epidermis**
- **Cortex** with a conspicuous, thick-walled **endodermis**
- **Xylem**, which alternates irregularly with small **phloem** patches.
- Internal **pith**



Dicot Root Cross Section



Monocot Root Cross Section

4. Lateral Root Origin

Observe the slide of lateral root origin. From which region in the root do lateral roots originate?