

Exploring corn tissue

Can you identify the cells and tissues that make up the histology of a corn plant?

Background

The study of an organism's tissues is called **histology**. Plants have tissues that build the root, stem, and leaves just as tissues build our bodies. In plants, monocots and dicots have different arrangements of tissues. This allows the identification of the root compared to the stem or leaves.

As the plant grows, structural tissues form to add strength and stability to plant parts. These are called **ground** tissues. At the same time, the plant grows **vascular** tissue that include xylem (for moving water *up* the stem) and phloem (for moving manufactured food or sugars *down* the stem). Other tissues cover and protect the plant parts and are called **dermal** tissues.

All of these tissue types are made of various kinds of cells, all designed for specific functions in the plant. Corn, as a monocot, has a very specific arrangement of many of these tissues. This activity will explore the arrangement and identification of the cells and tissues found in a corn plant.

Materials

- Corn root, stem, and leaf slides
- Microscope
- White poster paper

Instructions

Root

1. Put a corn root slide under the microscope on low power.
2. Look at the list of tissues and cells below.
3. Identify each layer according to the descriptions.
4. Draw a cross section of a young root on the top third of the large poster paper.
5. Label the following tissues and cells on your drawing:
 - **Cortex:** large area inside the epidermis for storage of starch
 - **Xylem:** large cells inside the “cylinder” or core of the root that form a “ring” and move water
 - **Epidermis:** single outer layer of cells used for protection and water absorption
 - **Pith:** empty cells making up the center of a monocot root
 - **Phloem:** smaller cells just outside the xylem cells
 - **Endodermis:** a ring of cells after the cortex the marks the beginning of the vascular cylinder
 - **Vascular cylinder:** large “core” in the center of the root containing the xylem, phloem, and pith

Stem

1. Put a corn stem slide under the microscope on low power.
2. Look at the list of tissues and cells below.
3. Identify each layer according to the descriptions.
4. Draw a cross section of a young root on the middle third of the large poster paper.
5. Label the following tissues and cells on your drawing.
 - **Cortex:** large area inside the epidermis for storage of starch
 - **Xylem:** large cells that appear as the “eyes” inside of one of the vascular bundles
 - **Vascular bundles:** separate, circular structures scattered throughout the corn stem containing xylem and phloem

that appear as “faces”

- **Phloem:** smaller cells in each bundle that make up the “forehead” of the face
- **Epidermis:** the single outside layer of cells
- **Pith:** large empty cells scattered around the bundles
- **Air space:** large empty cells that make up the “nose” of the face

Leaves

1. Put a corn leaf slide under the microscope on low power.
2. Look at the list of tissues and cells below.
3. Identify each layer according to the descriptions.
4. Draw a cross section of a young root on the bottom third of the large poster paper.
5. Label the following tissues and cells on your drawing.
 - **Xylem:** large cells that appear as the “eyes” inside of one of the vascular bundles
 - **Phloem:** smaller cells in each bundle that make up the “forehead” of the face
 - **Vascular bundles:** separate circular structures scattered throughout the corn stem containing xylem and phloem that appear as “faces”, but they now are considered the veins in the leaf as seen externally
 - **Mesophyl:** the filler cells between the bundles or veins
 - **Stomata:** openings in the epidermis of the leaf
 - **Epidermis:** lower and upper single layer of cells
 - **Guard cells:** two cells surrounding the stomata

Reflection

1. What differences do you see between the corn root and the corn stem?
2. Are there more stomata on the upper or lower epidermis? Why might this be the case?
3. How is the leaf structure designed to maximize sunlight for photosynthesis?
4. Describe how the vascular tissue is arranged as you move through the corn plant.