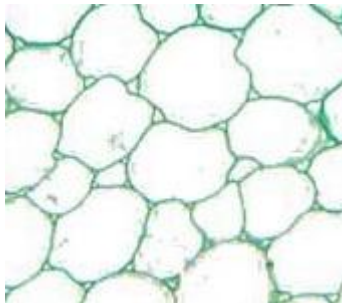


Plant Anatomy Lab 2 - Cell Types

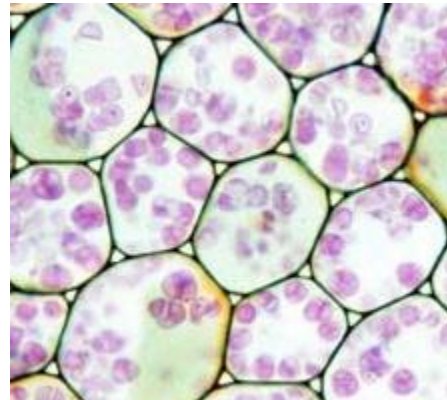
In this exercise, you will be able to observe many of the various cell types common to most plant tissues. Although you will be looking at cells as part of complex tissues and organs, focus your attention on looking for these cell types and don't worry about the tissue characteristics. The tissues and organs will be covered later in the course.

Parenchyma



Typical pith cells from a corn stem.

a) Storage parenchyma: Obtain a piece of the tissue from a potato tuber. Cut a thin section from anywhere in the interior of the tuber and observe with your microscope. Note the occurrence of thin-walled parenchyma cells and the presence of numerous oblong objects within these cells. The cell walls are fairly thin, so stain them briefly with toluidine blue or safranin. The walls should stand out better, now, but the internal objects are not stained. Now place the tissue section in an iodine solution for 10 or 15 seconds (should be a thin section). Rinse with water and observe the section again. The iodine remains yellowish except it will stain starch dark blue, almost black. It should be obvious why these cells are called storage parenchyma!

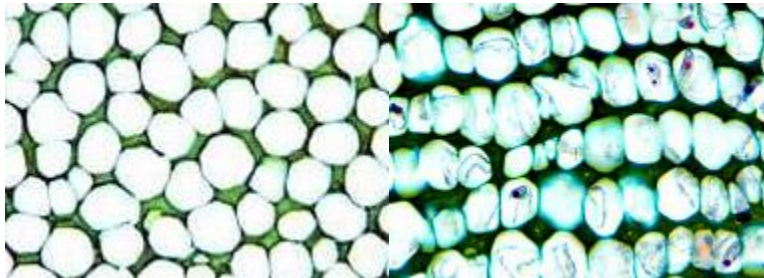


Now extract an apple seed from one of the apples. Cut a thin transverse section from the middle of the seed. These cells should have a few objects that are somewhat similar to those observed in the potato cells. Stain with iodine. Are these starch grains? What might these objects be assuming the cells are storage parenchyma? Is there any difference in their shape compared to the starch grains in the potato cells? This is a bit of a clue as to their nature.

b) Boundary parenchyma: Obtain a leaf of spinach. Carefully peel away a section of the lower epidermis and mount it on a slide in water (later, we will talk about why “lower” is a bad term to use). Observe the epidermal cells. What shape do they have? For the majority of these cells, do they have chloroplasts? Find a stomatal complex with two guard cells. These are specialized epidermal cells. In terms of cell organelles, what is the obvious difference between guard cells and other epidermal cells? In many cases, the epidermal layer will not separate cleanly from the cells towards the inside of the leaf. You can also use this part of your epidermis (with some attached chlorenchyma) in the next section.

c) Synthetic parenchyma: Using the spinach leaf you collected for the above section, obtain a transverse section of the leaf (try the technique suggested in the handout from last week that involved using two razor blades). A thin sheet of paper between the blades may help. Observe this section and also the epidermis with attached chlorenchyma obtained above. Note the presence of chloroplasts in the chlorenchyma cells. Are the chloroplasts distributed evenly throughout the cells? How?

Collenchyma



Cut a transverse section of the petiole or midvein of your spinach leaf. Observe the angular and lamellar collenchyma cells along the underside of the midrib. Refer to pictures in your text, the course web page, or those available at the front of the lab for examples of these cells. Note the uneven thickening of the cell walls. There will be areas of the cell wall that are no thicker than you have seen for parenchyma cells. A prepared slide of a *Helianthus* (sunflower) stem will also show collenchyma cells near the edge of the stem just interior to the epidermis.

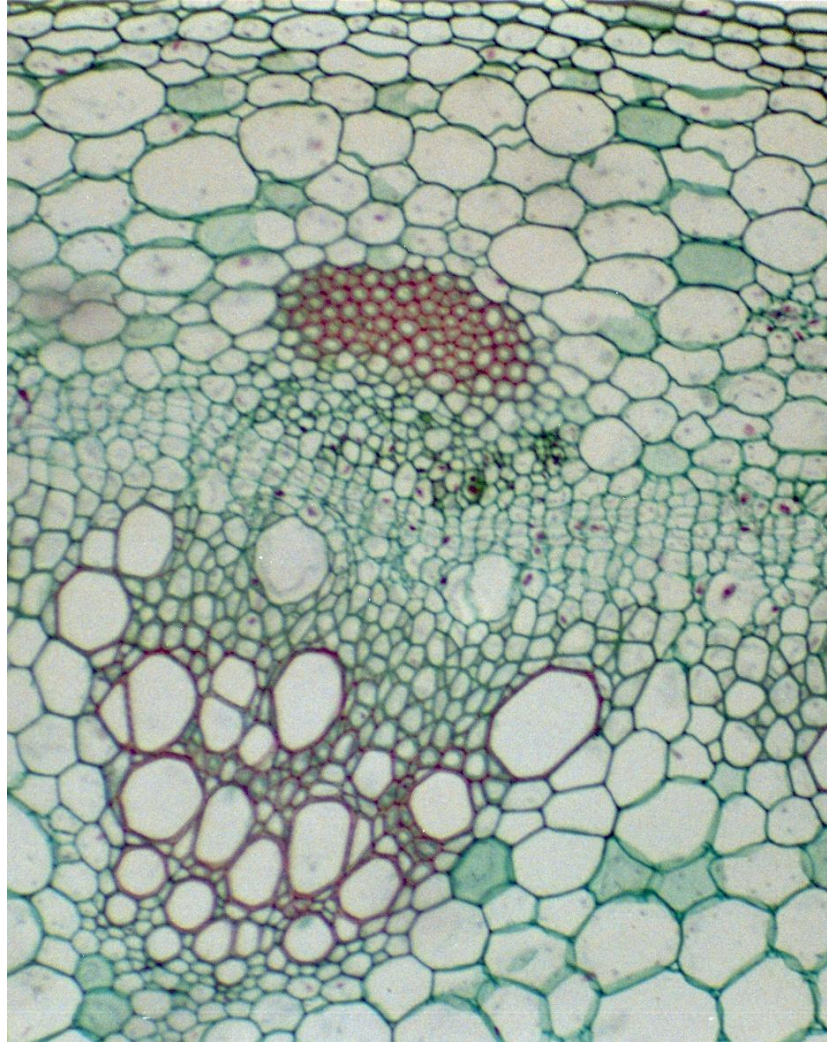
Also make a thin section of a beet leaf petiole and observe the collenchyma cells along the ribs at the edge of the petiole. You may also see collenchyma cells exterior of the phloem tissue which is part of the vascular bundles. Save this tissue section for looking at sclerenchyma cells next.

Sclerenchyma

For the transverse section of the beet petiole, you should notice the sclerenchyma cells that are involved in conduction as part of the xylem. These will be thick walled cells (vessels), with the wall thickness fairly even around the cell.

Other sclerenchyma cells do not function in conduction. Obtain a piece of tissue from the interior of a pear. Cut a thin section and observe the presence of very thick walled cells called sclerids (also called stone cells). These cells give pears that “gritty” texture. If your section is nice and thin, you should find a few sclerids that are not as crowded together and have been cut cleanly through. Note the thickness of the cell wall and the presence of numerous branched pits in the wall. See the pictures in your text, or check the course web page for images from previous students in the course.

4) Lastly, obtained a prepared slide with a *Helianthus* stem transverse section. By looking carefully at this slide, you should be able to find parenchyma cells, collenchyma cells, and sclerenchyma cells (both xylem and non-xylem). Where are these cells types located? Good example of a lab exam question!



Part of a *Helianthus* stem section showing one vascular bundle and surrounding cells. The epidermis is located just outside the top of the image.