

(To be used when use of the microscope is introduced as a means of reviewing its use.)

Slide: Sun Leaf Pear, B 669a Stain: quadruple stain (fast green, crystal violet, Orange G, safranin)

Scan the entire leaf section using the 4x objective, note major visible features, especially vascular tissue bundles and leaf tissue structure. Find a well-defined vascular bundle (*not* the central vein), then rotate the 10x objective into place. Finally, examine the vascular bundle with the 40x objective. Note the various classes of cells which you can distinguish. Illustrate the 400x view containing the following labeled features which should be familiar to you from first year biology:

epidermis:	Upper epidermis: epidermal cells, cuticle.
	Lower epidermis: epidermal cells, stoma, guard cells (search for these).
mesophyll:	palisade parenchyma, spongy parenchyma, intercellular space
vascular tissues:	vascular bundle, bundle sheath, xylem (superior, large, few) and phloem (inferior, small and numerous)

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CELLS: THE FUNCTIONAL UNITS OF ORGANISMS

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25Sept 93, rvsd 27Sept94, 17Sept95, 3Oct95, 19Sept96, 8Oct96, 5Sept97, 20Sept99, 7Oct99, 29Sept00, 2Oct01, 22Sept03
http://biology.clc.uc.edu/fankhauser/Labs/Cell_Biology/Cells_Lab/CELLS.htm
http://biology.clc.uc.edu/fankhauser/Labs/Microbiology/History_Microbiology.html

Robert Hooke first described cells in cork in *Micrographia*, pp 112-116 (1665). Later, the unified cell theory developed from the combined works of a botanist, Mattias Schleiden who published a study of the cellular nature of plant tissues in 1838, and a zoologist, Theodor Schwann, who studied animal tissues and illustrated cells in cartilage. In their joint paper of 1839, they proposed the theory that *all* organisms are composed of cells (unified cell theory).

We will repeat some of these classical studies by preparing and examining a variety of plant and animal tissues to search for evidence of their cellular composition. Strictly follow correct protocol for microscope use.

MATERIALS: (Wash all tools immediately after each use. Do not let material dry out on them.)

single edge razor blades	cork
dropper bottle of dH ₂ O	fresh onion
0.3% methylene blue stain	cartilage from breast bone of a young chicken
clean slides and cover slips	Prepared slide:
forceps and fine scissors	hyaline cartilage , trachea, H&E, H 680

- CORK:** Repeat the experiment of Robert Hooke: First slice off a piece of cork with a single-edged razor blade to produce a smooth, clean surface. Then shave a thin wedge of cork *as thin as possible* from the clean surface. Examine the thinnest edge of the slice under the microscope, and illustrate its structure seen at 400x. What exactly are you seeing?
- ONION:** Prepare a slide with three spots: 1) dry, 2) drop of water, 3) drop of methylene blue. Slice a wedge from a fresh onion and discard the outer layer or two. Separate a fresh layer and break it back to the membranous outer layer of epithelium. Peel off epithelium with forceps, cut into three small pieces, apply one to each of the three prepared spots on the slide (keep flat). Cover with cover slips. Write out your observations of each: 1) dry mount, 2) wet mount with water, 3) wet mount with methylene blue. Which mounting technique resolved the most detail? Illustrate any evidence of *stained* cells seen at 100x and 400x (on the same page). Label: plasma membrane, nucleus, nucleolus, cytoplasm, endoplasmic reticulum, stomata, guard cells.
- CHICKEN CARTILAGE:** Slice an ultra-thin section of the hyaline cartilage from a chicken breast bone as you did for the cork in exercise 1. Prepare a wet mount in water and a wet mount in methylene blue. Compare the two views. Illustrate any evidence of stained cells seen at 400x. Why was this material a fortunate choice for Schwann to first study animal cells? (cells = chondrocytes. The space between = matrix). (*Wash tools immed.*)
- HYALINE CARTILAGE, PREPARED SLIDE:** Examine hyaline cartilage as seen in the prepared slide (H 680) from a cross section of the trachea. Compare with the section you prepared in 3. Illustrate at 400x, label: matrix, lacunae and chondrocytes.
- CHICKEN MUSCLE:** For a contrasting tissue, cut a very thin longitudinal section of muscle, suspend in stain, squash under a cover slip. Note muscle fibers at 100x. Draw at 400x, label: fibers, nerves, mitochondria, nucleus, striations.