THE NEW YORK BOTANICAL GARDEN

Plants Up Close

Pre-/Post-Visit Activities

Thank you for registering for the GreenSchool Workshop *Plants Up Close*. During this workshop, students will discover how plant stems, leaves, and seeds look on a microscopic level. The following selection of pre- and post-visit activity ideas and recommended resources is designed to support 6-8th grade classroom integration of the plant science concepts addressed in *Plants Up Close*.

Pre-visit Activity Ideas

Magnification: a closer look

Students review the concept of magnification and make their own wet mount slides to view plant cells.

Materials:

- compound microscopes
- slides
- cover slips
- iodine
- ¼ inch squares of raw onion skin

- Review with the class what magnification is and why it is important for scientific research. Briefly discuss compound microscopes and how/why they are used (Refer to Vocabulary Key).

- Discuss the basic structure and function of a cell. Review that plant cells have cell walls and chloroplasts and animal cells do not.

- Set up the microscopes.

- Divide the students into pairs or groups to share the microscopes. Guide them through a discussion about the parts of a microscope and how to use one.

- Explain the function of following parts:
  - Eyepiece 10x
  - Objective lens 4x, 10x, 40x
  - Stage clips – holds slide in place
  - Carrying arm
  - Mirror or light source
  - Diaphragm – controls light level and contrast
  - Coarse focus knob
  - Fine focus knob

- Direct students to first place the onion skin flat onto the slide, and to put one drop of iodine on top of the skin. Hold the cover slip at an angle and carefully place it over the onion skin. Tap out any large air bubbles.

- Focus the slide under the lowest magnification.

- Students can draw a diagram and label what they see. Once students have finished observing the slides under the lowest magnification, have them make observations and diagrams under the higher magnifications.

- Using the 40x objective lens, students should be able to see that onion cells are rectangular in shape and that the cells stack together neatly. The round dots inside of the cells are nuclei; they control heredity and cell division. Students should also be able to see two layers lining the cell; the cell wall is on the outside, and the cell membrane is on the inside. The cell wall strengthens the plant stem. Animal cells have nuclei and cell membranes, but no cell wall. Plant cells also contain chloroplasts, the structures where photosynthesis takes place. Chloroplasts contain chlorophyll, the pigment that makes leaves green.

Post-visit Activity Ideas

Edible Plant Cells

Students deepen their understanding about plant cell structure and function by building edible, three-dimensional plant cells.

Materials:

- square/rectangular plastic containers
- various fruits
- package of gelatin
- boiling water
- mixing bowl
- mixing spoon
- plastic food storage bags
- rubber bands
- twist ties

- Discuss the plant cell structures that you explored in class and during your GreenSchool workshop.

- Make a package of gelatin according to the package directions and leave at room temperature until cool enough for students to handle.

- Instruct each student or group of students to put the plastic bag into the plastic container so that it lines the container. Next, ladle gelatin into the bags until the container is almost full.

- Then, put in fruits representing the different cell organelles: mandarin oranges to represent mitochondria, grapes to represent nuclei, blueberries to represent chloroplasts, etc. The plastic bag represents cell membranes, while the container represents cell walls. Use a twist tie or rubber band to close the bag and set in the refrigerator for several hours or overnight.

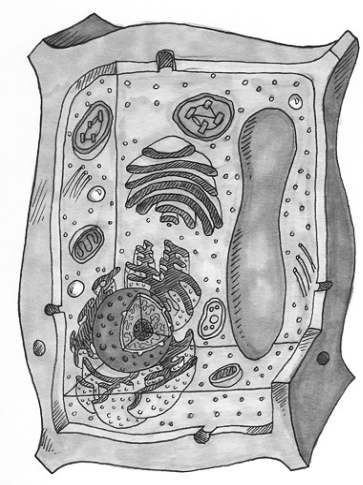
- The finished cells can be stacked on top of each other to form plant tissues or cut in half to view cross sections before being eaten.

Vocabulary Key

Compound microscope – A microscope that has a series of lenses. Standard compound microscopes are used to view thin, transparent objects mounted on slides. Other compound microscopes called dissection microscopes are used to view things too large to be put onto a slide.

Magnification using a compound microscope – The magnification seen using a compound microscope is the product of the magnifications of the eyepiece and the objective lens. For example: 10x eyepiece and 4x objective = 40x total magnification. Standard compound microscopes have one eyepiece and several rotating objective lenses.

Stains – Stains are used to color parts of the cell so they are more easily seen. Iodine is a commonly used stain.



Recommended Teacher Resources

Barron's; Parramon Editorial Team. *Essential Atlas of Botany*. Hauppauge, N.Y: The Barron's Educational Series, 2004.

Capon, Brian. *Botany for Gardeners, An Introduction and Guide*. Portland, Ore.: Timber Press, 1990.

Recommended Books For Children

Oxlade, Chris and Corinne Stockley. *The World of the Microscope* (Usborne Science &Experiments). N.Y.: Scholastic, 1995.

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