

Lab 6C Paleoclimates and Pollen Teaching Notes

Note: this lab activity was adapted from:

https://www.windows2universe.org/teacher_resources/teach_pollen.html

Alternative, more readable, instructions.

<https://scied.ucar.edu/activity/paleoclimates-and-pollen>

Directions:

Pre-lab Preparation:

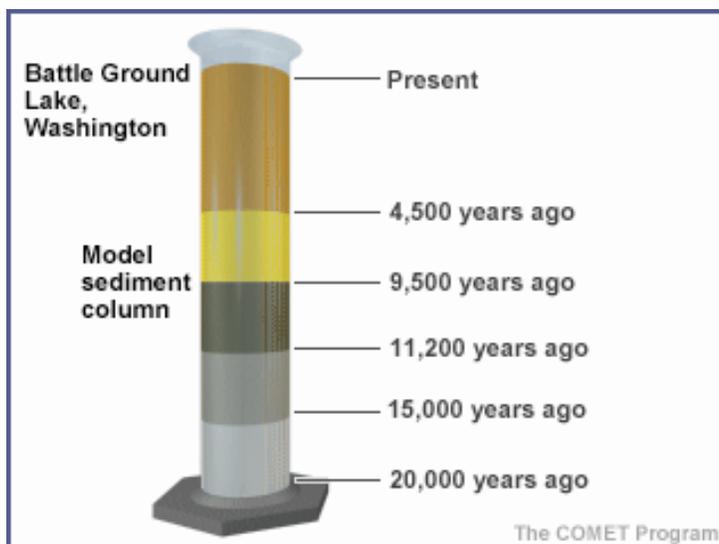
Review the lab instructions, read the background information, and locate the answer key for the activity - all of this information is on student page

<https://serc.carleton.edu/eslabs/weather/6c.html>

Acquire all materials, make a color key, and assemble the bags.

1. Layer different kinds of soil (garden soil, sand, fine gravel, potting mixture, peat moss, vermiculite, perlite, or similar material) into the graduated cylinder, or similar container ("Smart Water" brand water bottles make a good substitute), so they form five layers for the Washington example. (You'll need six layers if you decide to do the optional Colorado example). This represents the sediment core with which the students will work. Label the layers with their respective ages as shown.

The example shown below represents the Battle Ground Lake, Washington sediment core. You only need to make one representative core.



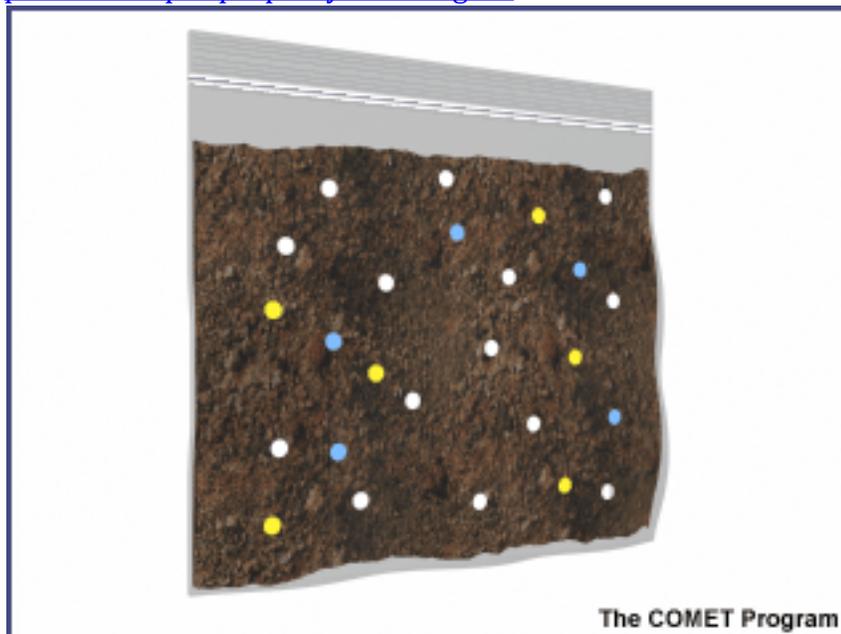
2. Choose different colors of small beads to represent the "pollen" grains. You will need 11 different types if you are doing the Washington example (or 12 different types if you are doing the Colorado example.) Note the

characteristics of each bead type in the "color and shape" column of the pollen key in your master copy of the student guide. The students will need to use this table to identify pollen in their samples.

3. Count out the different color pollen grains (beads).
4. Prepare a sample of each "sediment" layer in the column (five or six). You may need to duplicate some of the samples so each pair of students gets one sample.
 - Use one re-sealable plastic bag for each sediment layer sample.
 - Using a permanent marker, label each bag with its number, Layer 5 (or 6 for Colorado) being the "oldest" and Layer 1 the most recent.
 - Fill each bag with approximately one cup of the material that represents a sediment layer in the core. For example, if sand represents Layer 1, place one cup of sand in the plastic bag marked Layer 1. If you chose a dark soil for Layer 2, place one cup of dark soil in the plastic bag marked Layer 2 and so on until all layers in the column have one (or more) corresponding samples.
5. Using the proportions of "pollen" listed in the teacher's key, put approximately 25 beads into each sample bag to represent the pollen found in that layer.

A teacher's key for setting up the bags can be found here:

https://scied.ucar.edu/activity/paleoclimates-and-pollen#sample_prep_key_washington



Day of Activity:

Begin by reading / sharing the background information included in the student instructions.

Show students on a map (or Google Earth) the location where these cores were sampled. Once students are oriented to the project, hand out the student activity worksheets.

1. Ask the students to carefully examine the pictures of the different pollen types, noting the structural differences in each type. Discuss those differences and how scientists can use them to identify the plants from which they were shed.
2. Display the sediment column and discuss the way that sediment is laid down in lakes, how it traps pollen, and how scientists obtain the lake sediment cores.
3. Hand out one sediment layer sample, pie pan, tweezers (or forceps), and student handout to each pair of students. Explain that each sample contains "pollen" from the species prevalent at the time of deposition. Students should empty the contents of their sample into the paper plate, then
 - Sift through the sample to separate out the pollen from the sediment
 - Determine from the key in the student handout what species of plants are represented.
 - Determine what percentage of the total pollen comes from each species
4. If more than one pair of students worked on any sediment layer, ask them to get together and come to a consensus on what plants they have found and the relative abundances. The table in the student handout can be used to keep track of the percentage of plants found in each layer. Have students come to a consensus on what the climate must have been like at the time of deposition.
5. Ask each group studying a sediment layer to report their conclusions to the class, then, as a class, build a consensus on the pattern of climate change represented by this sediment column. Students can complete their worksheets with data provided by those studying different sediment layers.
6. When finished, ask the students to carefully return the pollen samples to the sample bags with the sediment material. These samples can be used again.