Biology Behind the Crime Scene
Week 10: Lab #10 Plants and Pollen: Forensic Botany

Adapted from Young Naturalist Company "What Leaf is It?" Activities and Ward's Mixed Pollen Key Card

In class, we have learned about how the identity of plants and pollen can be key to placing a person at a crime scene. In our lab today you will examine both leaves and pollen. You will use different kinds of keys to identify these leaves and pollen. Living things are classified by a system called taxonomy. There are many levels of taxonomy, starting with very broad groups and narrowing down all the way to individual species. Most species are known by their two word Latin classification name, for example modern humans are Homo sapiens. The first of those two words is the genus level name, which closely related species share with each other. For example, other hominids you may have heard of include Homo habilis and Homo erectus.

Keys are guides to figuring out the classification of an observed specimen. Often it is easier to identify a specimen to the genus level than it is to the species level. For example, you may be able to easily tell a pollen grain is from the Pinus genus (pine trees), but as an untrained scientist you would probably have a harder time distinguishing Pinus flexilis (limber pine) pollen from Pinus albicaulis (white pine) pollen. Types of keys you can use include **dichotomous keys** and **picture keys**. Dichotomous keys are text keys that give you sets of choices between two alternatives. As you make each choice, the key will either give you the identification or send you to another part of the key. You just keep making choices until you come to an identification. If you have made your choices correctly, you will have the correct identification of your specimen. Picture keys are just what the name implies – sets of pictures that you can use to compare with your observed specimen until you find a match. You will be using both dichotomous and picture keys during today's exercise.

Purpose/Objectives:

- To learn how to use dichotomous keys
- To learn how to use picture keys
- To identify unknown plant and pollen specimens using the identification keys

Materials:

Leaves:
Dichotomous leaf key
Leaf terms handout
unknown leaves [samples need to stay in bags]

Pollen:
Mixed Pollen (WM) Picture Key cards
Prepared pollen glass microscope slides
colored pencils
compound microscopes

Lab Procedures:

NOTE: For today's lab, you will be working individually – in other words, you MUST obtain, observe, and identify each specimen for yourself.

During today's procedure half of the students will be instructed to start with Part 1 and the other half with Part 2. You will need to clearly label in your notebook the part at which you start. If you start with Part 2 [the pollen grains,] leave at least 45 minutes for the leaves [Part 1.]

Part 1: Identifying leaves using a dichotomous key

1. Obtain a copy of the Leaf Key and Leaf Terms handout.

2. Obtain a single unknown leaf specimen from the leaf station. Handle the leaf with care, and LEAVE THE LEAF IN THE BAG TO MINIMIZE DAMAGE TO THE SPECIMEN. These leaves need to last for other sections of the laboratory.

3. Write down the number of your specimen in your notebook. Using the leaf terms as a reference, examine your specimen and use it to make decisions as you go through the dichotomous leaf key. FOR EACH AND ALL SETS OF CHOICES, YOU MUST NOTE YOUR CHOICE IN YOUR NOTEBOOK [Ex., Leaf #: 1a -> 2b -> Scotch Pine.] The paper backing for the leaf will tell you in what orientation it was attached to the plant (opposite or alternate).

4. Once you have determined the identity of your unknown leaf, write down its identity in your notebook [See step 4.]

5. Return your specimen to the leaf station for other students to use.

6. Repeat steps 3 – 6 until you have identified all 13 different unknown leaves.

Part 2. Identifying pollen grains using a picture key

1. Obtain a high-power compound microscope and set it up at your station.

2. Obtain a single pollen slide from the slide box. Handle the slide with care - these slides need to last for other sections of the laboratory. Hold the slide only on the label part.

3. Put your slide on your microscope and examine it. Using the lowest magnification and the slide mover, find what looks like a bunch of confetti [one student has described them as "Skittles".]

4. Center a single pollen grain in your field of view, then change the objectives to a higher magnification so you can see more detail (do not use the 100x oil immersion objective).

5. Sketch what you see in your notebook using colored pencils.

6. REPEAT Steps 4 & 5 for as many different types of pollen as possible [at LEAST 15 out of the 20 different types] FOR EACH POLLEN GRAIN, YOU MUST SKETCH WHAT YOU SEE IN YOUR NOTEBOOK and sign your sketch. All of the different pollen types are on each of the slides; simply move your slide to focus on different pollen.

7. Obtain a copy of the Mixed Pollen (WM) Key Card from your instructor. Use your specimen and key card to determine the pollen type of the grain you are examining. Once you have determined the identity of the pollen grain, write down its identity in your notebook as a label to the sketch of what you saw. Do this for all 15 pollen drawings.

8. Once finished, return your slide to the slide box.

Part 3. Lab clean-up and notebook signing

Unplug and recover your microscopes. If you obtained your microscopes from another part of the room, return them to where you found them. Make sure you have made all necessary observations and sketches in your notebook and that you have written a conclusion. Make sure to have your notebook signed by your instructor before you leave.