



Pollen Collection: Who's in Your School Yard?

Overview

Students collect pollen from their school yard, then examine their samples under the microscope.

Introduction

Pollen contains the male gametes of a flower. Flowers make use of insects, birds, wind, and even water to help facilitate the transfer of these gametes from one flower to another. Pollen is produced on the **stamen** and collected on the **pistil**. The transfer from stamen to pistil is called pollination.

The pollen grain's hard outer coat protects the sperm cells until they arrive at their destination. This protective coat can be the cause of many allergies: light-weight pollen is easily inhaled, bringing it into contact with the sensitive nasal passages where the shape and composition of the coat can be an irritant. An allergy to pollen is called hay fever.

While pollen can be a pain to those who are sensitive, pollen can also be incredibly useful to forensic scientists. Sometimes, the investigation of a crime will involve a specialist in **palynology**, the study of pollen. A forensic palynologist can, for instance, examine pollen found on the clothing of a murder victim and be able to tell where the murder was committed, if a potential suspect was at the crime scene, or even the time of year the crime was committed. Forensic palynologists examine and identify the types of pollen found on the suspect, victim, or crime scene. Each crime scene will have a unique mixture of plants from the surrounding area, and therefore leave a unique pollen "fingerprint". In this lab, we will be looking at the pollen "fingerprint" of your school yard.

Motivation

During your CSI visit, you examined how pollen could be used in forensic analysis of a crime scene. If a crime occurred in your school yard, what kind of pollen would investigators find? How many different types of pollen do you think are in the air around your school yard?

Objectives

Upon completion of this investigation, students should be able to

1. Demonstrate proper use of a compound microscope.
2. Explain where pollen is produced and how it travels.
3. Explain how pollen causes allergies.
4. Prepare a slide for observation under the microscope.

Associated California State Biology Standards

- 5f. Students know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.
- 7a. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
- 7c. Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
- 7d. Construct scale models, maps, and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).

Materials (for each group)

- Glass slide and coverslip
- Silicone grease (tiny amount)
- Permanent marker
- Compound microscope
- Calberla's staining solution

Calberla's solution may be purchased or made:

- 5 ml glycerol
- 10 ml 95% ethanol
- 15 ml distilled water
- 2 drops saturated, aqueous solution of basic fuchsin

To see the pollen properly, they should be stained a light pink and not a dark red. It may be necessary to adjust the fuchsin concentration.

Procedure

1. Student groups should coat a slide with a thin layer of silicone grease (about one square inch of grease is good). Each group should use a permanent marker to write their initials, time, and date on the edge of the slide.
2. Take the class outside and instruct each group to place the slide on any flat surface that won't be disturbed. Groups may each choose a different, distinct location. Leave the slides out overnight to pick up pollen from the air.
3. After a twenty-four hour period, instruct students to bring the slides inside.
4. Each group should stain the slides using Calberla's solution (see "Materials").
5. After being stained, groups then are to place a coverslip over the grease.
6. Finally, slides are mounted on the microscope stage for viewing. Students should always start with the lowest objective. When they see pollen (which will appear pink), they may switch to a higher power objective and draw the different pollen grains in detail. Drawings should include notations of relative size, shape, color, and apparent texture. Descriptions should be included alongside the drawings.

Evaluation

The following questions are listed under the Analysis section of the student handout and may be used as part of a report, class discussion or assessment.

1. What is a pollen grain?
2. What part of the flower produces pollen?
3. How could a daily pollen analysis (both qualitative and quantitative) of the air be useful to allergy sufferers?

Extension Activities

Complete "Dissect a Flower," also from the Huntington Botanical Gardens.

Name: _____

Student Sheet: "Pollen Collection: Who's in your School Yard?"

Procedure

1. Coat a slide with a thin layer of silicone grease (about one square inch of grease is good). Write your initials and the time on the edge of the slide.
2. Place the slide outside on any flat surface that won't be disturbed. Leave it there overnight to pick up pollen from the air.
3. After a twenty-four hour period, bring the slides inside and stain the collection area with Calberla's solution.
4. After you add the stain, place a coverslip over the grease.
5. Mount the slide on the microscope stage and view it using the lowest power objective. When you see pollen (which will appear pink), switch to a higher power objective and draw it in detail. Be sure to note such details as relative size, shape, color, and apparent surface texture. Also, write a description alongside your drawing.

Analysis

On a separate sheet of paper please complete the following:

1. What is a pollen grain?
2. What part of the flower produces pollen?
3. How could a daily pollen analysis (both qualitative and quantitative) of the air be useful to allergy sufferers?