

Chapter 24 Reproduction of Seed Plants **Design an Experiment**

Investigating Pollen Tube Growth

In this investigation, you will design an experiment to test a hypothesis about the chemical signals that steer the growth of pollen tubes toward the ovary.

Problem

What controls the direction of pollen tube growth?

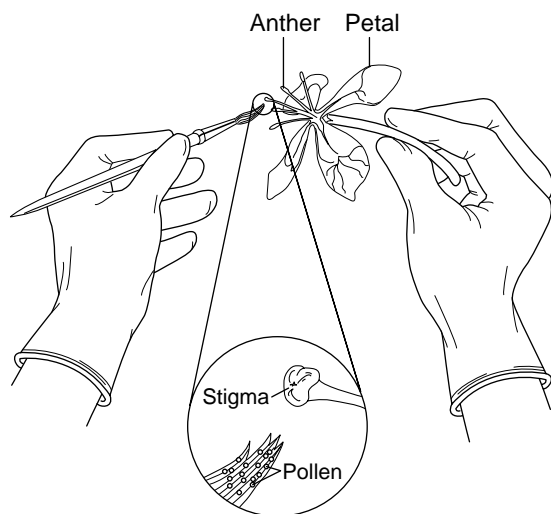
Materials

- flowering plants, such as beans or *Brassicas*
- hand lens
- small paintbrush
- forceps
- pollen nutrient solution
- pollen nutrient solution without calcium
- concentrated calcium chloride solution
- dissecting probe
- microscope slides
- coverslips
- dropper pipette

Skills Designing Experiments, Controlling Variables

Design Your Experiment    

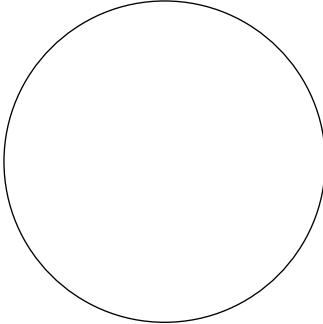
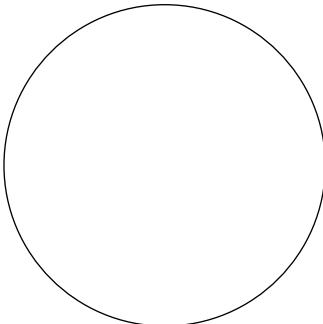
1. Use a hand lens to observe the flowers of a flowering plant. Identify the anthers and stigma of a flower and make drawings of them in the data table on the next page.
2. Use a small paintbrush to transfer pollen from several flowers to the stigmas of other flowers.



3. Use forceps to transfer several anthers to a microscope slide. Add a drop of pollen nutrient solution. Gently tap the anthers with the tip of a dissecting probe to release pollen.
4. Discard the anthers and add a coverslip. Observe the pollen with the microscope at low power. In the data table on the next page, make a labeled drawing of your observations.

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5. Your teacher will provide slides containing pollen that has been in the pollen nutrient solution for several hours. Observe these slides with the microscope. In the data table below, record your observations.

Observations	
Hand Lens Observations	
Pollen in Nutrient Solution Initially	
Pollen in Nutrient Solution After Several Hours	

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6. Pollen tubes have been found to grow toward calcium or pieces of ovaries. On the lines below, design an experiment to test the hypothesis that calcium is the chemical signal that guides the growing pollen tube toward the ovary.

Experimental Plan: _____

- 7. As you plan your investigative procedures, refer to the Lab Tips box on page 55 of your text for information on demonstrating safe practices, making wise choices in the use of materials, and selecting equipment and technology.
- 8. In your plan, also be sure to define and control all important variables. If observing pollen tube growth in a flower directly is too difficult, you will need to choose some other method to test the hypothesis. Have your teacher check your plan before you begin your experiment.

Analyze and Conclude

- 1. **Applying Concepts** The pollen of most plants will not germinate in pure water. What function of the stigma and style did the pollen nutrient solution replace?

- 2. **Observing** Did the pollen tubes grow toward a source of calcium? Toward ovary tissue?

- 3. **Drawing Conclusions** In many experiments, pollen tubes grow toward either calcium or ovary tissue. From these results, could you conclude that calcium directs pollen tube growth toward the ovary in flowers? Explain.

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