






Flower Power: Pollination

Overview:

Students will learn the anatomy of a flower and how flowers can self- and cross-pollinate in order to reproduce.







Objectives:

At the end of the lesson students will be able to:

-  **Explain** the processes of self- and cross- pollination.
-  **Explain** how insects and other animals act as pollinators.
-  **Draw** a diagram of a flower and label all its reproductive parts.

Vocabulary:







 anther
 filament
 stigma
 style
 ovary
 pistil
 sepal

 petal
 ovule
 pollen
 fertilization
 self-pollination
 cross-pollination



Learning Activities:

- I. **Presentation: Flower Power (25 min.)**
 - A. Ask students to recall the parts of a plant (root, stem, fruit, flower, leaf, and seed).
 - B. Tell students that today's lesson will look at **flowers** more closely.
 - C. Show students a lily plant. Use this during the following discussion about flower parts.
 - D. Distribute handout: "Flower Power." Have students write notes on the handout including the function of each part.
 - Flowers can be divided into four basic parts: sepals, pistils, petals, and stamen.
 - The *sepal* is the outer green part that is at the base of the flower and protects the flower before budding.


Materials:

-  Lily plant or a photo of a lily
-  Handout: "Flower Power"
-  Supplemental Materials: four National Geographic pollination pictures
-  Clipboards
-  Colored pencils and white paper for each student
-  Live flowers in the garden that students can use to illustrate their diagrams

On the Board:

-  Vocabulary
-  Student Reflection Questions

Suggested Snack:

-  Have students taste test an edible flower, like a rose.

- The *pistil* is the female part of the flower. It is made up of:
 1. an *ovary*: which holds the ovules (the seeds)
 2. a *style*: which holds up the stigma
 3. a *stigma*: sticky surface at the top of the style that traps and holds pollen
 4. *seeds*: the fertilized ripened ovules of a flowering plant containing an embryo and capable of germination in order to produce a new plant
 - The *stamen* is the male part of the flower. It is made up of:
 1. an *anther*: which holds the pollen
 2. *pollen*: the grains containing the male gametes
 3. a *filament*: which holds up the anther
 - The *petals* are the colorful part of the plant that attract pollinators.
 - Flowers with only all male or all female parts are called “imperfect” (e.g., cucumbers, pumpkin, melons). “Imperfect” in this case means they have to rely on pollination from the wind, birds, or insects to produce “fruit.” Flowers with both male and female parts are called “perfect” (e.g., roses, lilies, dandelions). “Perfect” in this case means they can pollinate themselves and don’t have to rely on the wind, birds, or insects.
- E. Ask students to define *pollination*: the transfer of pollen from the anthers of a flower to the stigma of the same flower or another flower. Pollination is necessary for *fertilization* (the fusion of nuclei from the pollen grain with nuclei in the ovule). After fertilization, the flower is able to develop seeds which can grow into new plants.
- As stated above, some flowers can *self-pollinate*: when the pollen from the anther is deposited on the stigma of the same flower, or another flower from the same plant.
 - As stated above, other plants *cross-pollinate*: when pollen is transferred from the anther of one flower to the stigma of another flower. Flowers that cross-pollinate need the help of pollinators.
- F. Ask students: What can pollinate plants? (Birds, wind, bees and other insects)
- Show National Geographic pictures of pollination available with this lesson plan.
 - Explain that flowers are structured differently depending on what kind of pollinator works for them.
 1. Bird-pollinated flowers may have:
 - long-tube shaped flowers (that a bird can fit its beak into)
 - bright red and yellow flowers to attract birds
 - little or no fragrance
 2. wind-pollinated flowers may have:
 - large stigmas outside the flower

- little or no fragrance
 - light non-sticky pollen
 - no showy petals
3. insect-pollinated flowers may have:
 - brightly colored petals
 - strong sweet fragrance
 - nectar producing glands
 - Also, note that bees visit flowers to collect their nectar, then take it back to their hive to make honey. The pollen that attaches to their bodies while they are doing this gets transferred to another plant as they fly from plant to plant.
 2. Garden Activity: Drawing a Flower (20 min.)
 - A. Distribute clipboards, paper, and pencils.
 - B. Send students into the garden. Their task is to pick a flower anywhere in the garden, draw it, and label all its component parts.
 - C. Bring students back into the classroom and have them share their drawing with a partner.
 3. Snack: Have students taste an edible flower (like a rose) and then honey (made by bee pollinators). (5 min.)
 4. Have students answer the Reflection Questions in their garden journals. (5 min.)

Student Reflection Questions:

1. How is flower reproduction similar to human reproduction? How is it different? (**Some flowers can self-pollinate, but humans cannot undergo reproduction alone.**)
2. Why do you think that flowers that rely on different kinds of pollinators may have different characteristics?

Assessment Questions:

1. Name the four basic parts of a flower. Which is the female part? Which is the male part? (**sepals, pistils, petals, and stamen; female - pistil, male - stamen**)
2. Which aspect of the flower attracts pollinators? (**colorful petals**)

Standards:

Next Generation Science Standards

Growth, Development, and Reproduction of Organisms

- MS-LS1-4.DCI-Disciplinary Core Ideas

Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

- MS-LS1-5.

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Acknowledgements:

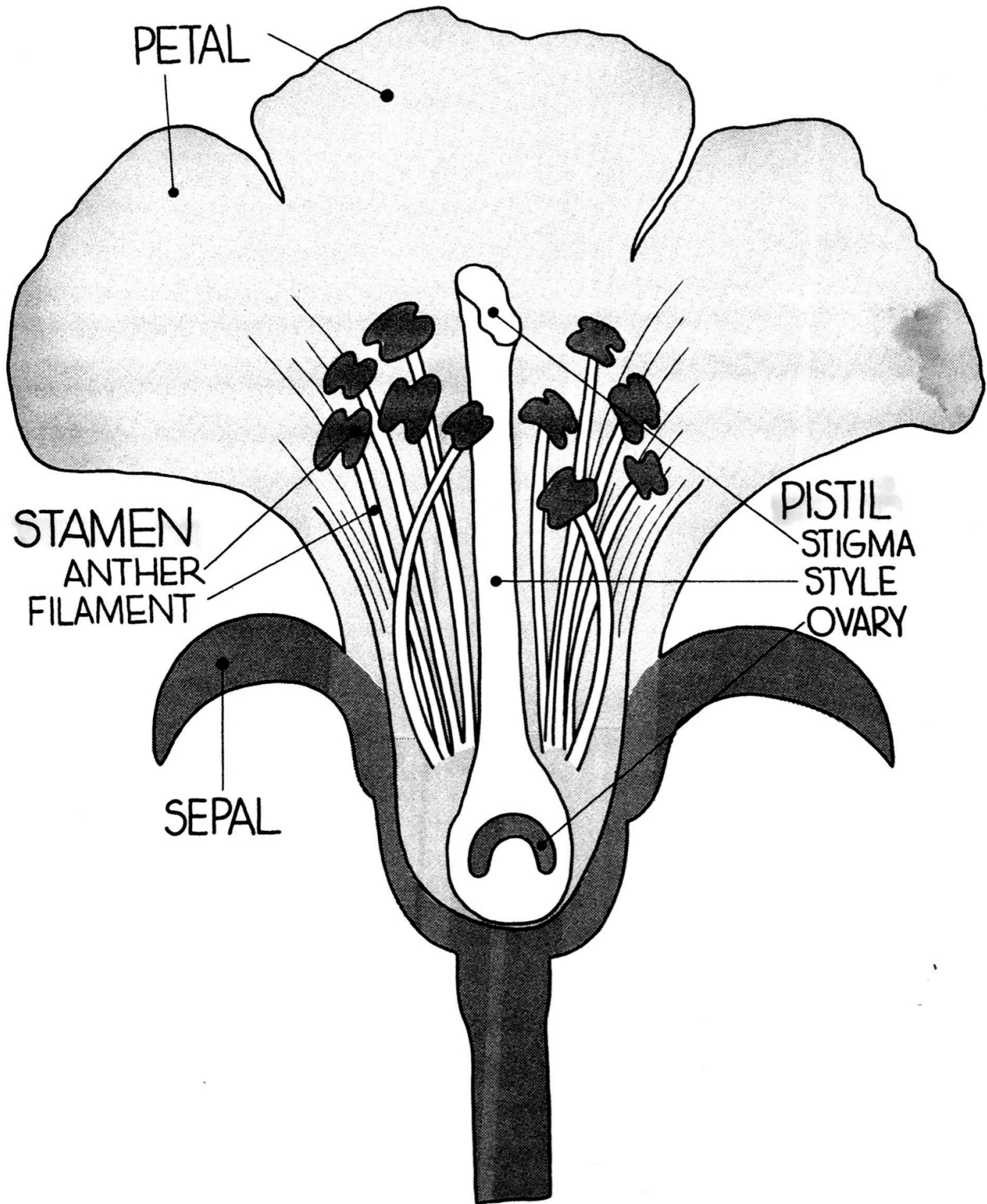
Photo Credit:

All photos for this lesson are from National Geographic.

<http://www.nationalgeographic.com/search?q=pollination+photos>



Flower Power





Photos from National Geographic







