



The Purpose of Pollen

Noticing Pollination in the Garden

Day 2 of Cultivating Connections Spring Sequence

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Target Grade Level

1st - 5th grade

Objectives

By the end of this activity, students will be able to:

- Identify the stigma and anthers and explain their functions
- Define pollination and explain when it occurs
- Describe 2 methods of pollination

STE(A)M Integration

Art: journals, singing

Science: observation & data tracking, plant part identification, pollination song

NGSS Performance Expectation

2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

4LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction

Lesson Length

60 minutes

Summary

This session introduces 1st - 5th grade students to pollination through a series of hands-on activities, addressing the essential question: *What is pollination?* During this lesson, students will learn about the reason why plants flower and how they are pollinated. Through four activities (singing, acting out wind pollination, pollination tag and flower dissection), students will come to understand and observe the amazing process of plant reproduction!

Rationale

The activities clarify the interdependence between plants and pollinators, and illustrate the ways in which flower structure functions to support reproduction. By engaging students' minds and bodies in learning, they develop a fuller, better-rounded understanding of pollination and how it connects to them in relation to the food grown in their school gardens, as well as the food they see in the grocery store. This fosters a deeper connection between the child and nature's processes, by illustrating human dependence on food and therefore pollination.

Background

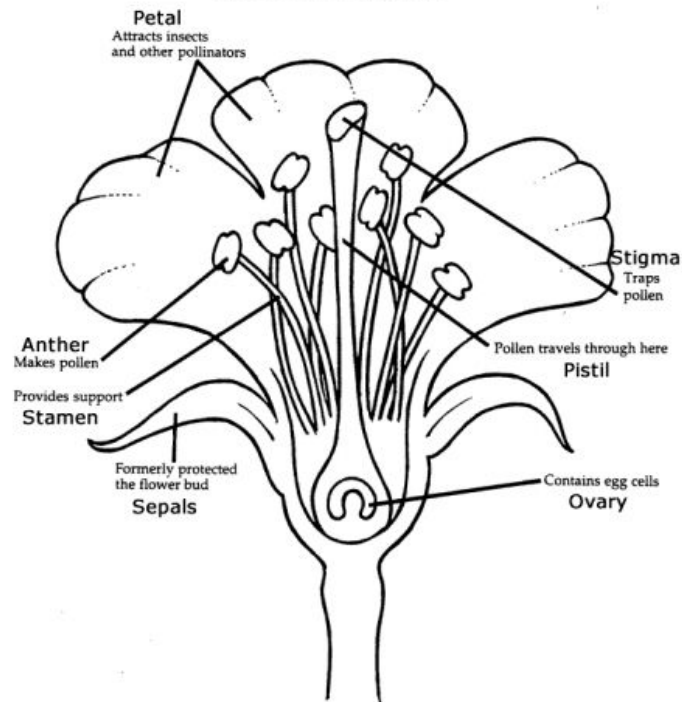
Materials

- Flowers (1 per student - one with obvious male and female parts. ex: rhododendron)
- Flower part sorting mats (1 per student) **OR**
- Flower part coloring worksheets (1 per student)
- Cinnamon (about 1 tsp for each pair of students)
- Double sided-tape
- Fake flowers (1 per student - one with a prominent stigma)
- Pompoms (multicolored. Enough for each cup to have 5 of the same color)
- Cups (1 per student)
- Journals (from Day 1)
- Student measuring sticks (from Day 1)
- Rain gauge
- Thermometer

Preparation for Lesson

1. Wrap the stigmas of the fake flowers in double sided tape.
2. Draw a flower diagram on a board or a flip chart with labels. If drawing is not your strong suit, feel free to display the flower diagram on a projector screen before you go outside.
3. Prepare cups for pollination game: Put 5 pompoms in each cup. Within each cup the color of the pompoms should be the same, but each cup should contain a different color.
4. Print enough flower sorting mats or coloring activity sheets for each student (depending on which activity you choose to facilitate).
5. Write or display song lyrics

Parts of a Flower



Pollination refers to the process in which pollen grains from the stamen of one flower are transferred to the stigma of the same or a different flower. This can happen with the assistance of wind, or more efficiently with the help of a variety of different pollinators, including insects such as bees, moths, butterflies, beetles and flies, as well as an array of birds and mammals.

Flowers and pollinators work together for mutual benefit. The flower attracts the pollinator with its bright colors and intricate patterns. This is how a flower communicates the presence of delicious nectar, in exchange for fertilization assistance. The bee, for example, is lured to the flower while seeking its food, and in the process of collecting the nectar, bumps into the male parts of the flower: the anthers that sit atop the stamen. Pollen from the anther sticks to the bee, and travels with it as it buzzes from flower to flower collecting food. The bee will rub up against the female part of another flower: the stigma, and deposit the pollen. The pollen grains then travel down through the pistil to the ovary at the base of the flower, where the eggs are stored. Once pollen and the egg meet, seeds form, and eventually end up inside of the plant's fruit, which is then eaten, digested and excreted by animals, distributing seeds so that they may grow into plants themselves.

Key Vocabulary

- Pollination
- Stigma
- Anther
- Pollen

Evidence of Learning

- Flower dissection (part identification)
- Articulate the pollination process

Garden Related Activities

- Pollinator song
- Pollination game
- Wind pollination activity
- Flower dissection/ coloring activity

Procedure

Introduction (5-10 minutes)

1. Welcome the group to the garden.
2. Have the students close their eyes and take a deep breath.
3. Have them take a moment of gratitude to think about what they are thankful for, and offer them the chance to share with the group.
4. To begin the lesson, ask the students what they learned last session about what happens in spring. Ask them to name signs of spring, and note the weather associated with the season.
5. Explain to the students that they will be learning about pollination and flower parts associated with this process.
6. Explain that the next task is to explore these concepts in their own garden.

Journal Activity (10 minutes)

Inform students we will be measuring plant growth, rainfall, and temperature for the day. We will rotate between measuring stations, then come together to discuss our findings.

1. Have students open their journals to page 1.
2. Have students write in the date on their data log.
3. Ask students if they have any questions.
4. Split the students into 4 groups, one group for each measuring station (2 groups can work as well, do what seems intuitive for the size of the class).
5. Give each group 2 rulers and assign each group to a station.
6. Have students document their findings at each station
7. Once the groups have rotated through all of the stations, have students come back to the circle to discuss the data.
8. Ask for a volunteer with a quiet hand to share the data they got and open the discussion to the group.
9. Take a rough group average and either assign a role or ask for a volunteer to help graph the data on the flip-chart. Do this for all four graphs.

TO SIMPLIFY

For younger age groups, consider making the measurements and recording results as a whole group, taking volunteers to perform each task.

TO ADD COMPLEXITY

Provide the following prompt for students to answer in a blank page in their journals: *How many different flowers do you see? Choose one and describe its parts and draw a picture of it. Write down other observations that might be important to the flowers such as temperature and weather.*

1. Transition into the lesson by asking the students if anyone knows the names of the parts of a flower.
2. Ask them if they know what pollination is and how it works.
3. Use your diagram of a cross cut flower to explain each of the parts and what they do. Use a real flower to make the connection.
4. Teach the following song (to the tune of The Itsy Bitsy Spider) pointing to the words as you go, to familiarize them with the vocabulary:

Pollinator Song:

Flowers must be fertilized in order to make seeds
They rely on pollinators to do this special deed
They attract the birds and bees with nectar and bright colors
Who transfer pollen from their anthers to the stigmas of the others.

From the stigma down the pistil and then to the ovary
Where the pollen meets an egg and then becomes a brand new seed!

Pollination Game (10 minutes)

1. Tell the students that you need their help setting up the game. Give each student a cup of pompoms and ask them to go place it in a grassy area within a set of boundaries determined by you, and return to you when they are finished.
2. Explain that they will be acting as bees and will be “pollinating” the flowers by taking a pompom from one flower and putting it in the cup of another flower. Encourage them to take on the animal form of the bee by flapping their wings and buzzing.
3. Have the honey bees all start in one place, and call it the hive. Tell them that once they have pollinated all of the flowers they must report back to you, the queen bee.
4. Release the honey bees to pollinate the flowers.
5. When all the bees have returned to the hive, collect the cups and ask the students what they notice about the pompoms. They should tell you that they have several different colors in their cups now. Explain that this shows how pollen moves from flower to flower with the help of pollinators like bees.

Optional:

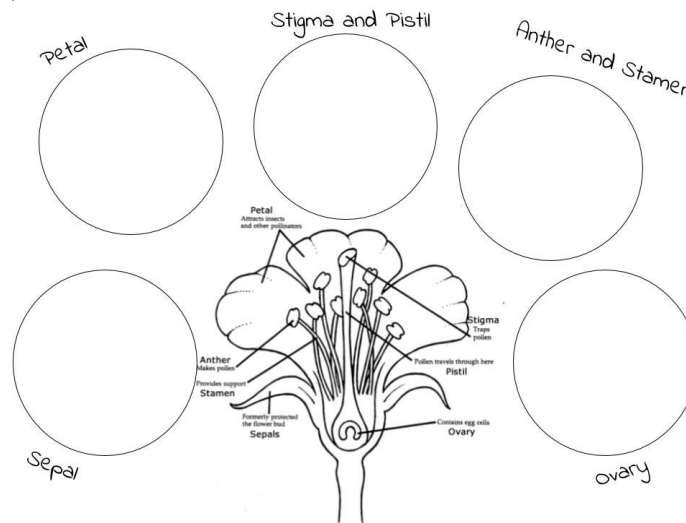
Incorporate the challenge of wind pollination by selecting a few students to act as wind, who will need to try to toss their pompoms into the cup from 3 large steps away. Use failed attempts as an opportunity to explain that while wind sometimes works, pollinators are much more efficient.

Assessing Understanding

(15-20 minutes)

In order to assess students' understanding of the reproductive flower parts, perform a flower dissection activity.

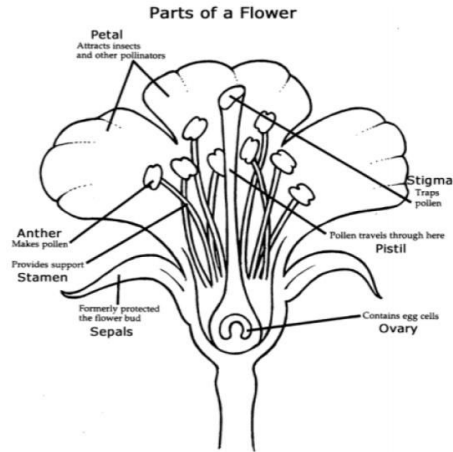
1. Supply each student with a real flower and a flower part sorting mat (attached):



2. Show the students how to gently separate each part of the flower. Then instruct the students to carefully take apart their own flowers and divide them into the parts they learned about at the beginning of the session.
3. Ask them to place each part in the respective circle on their mat. Encourage them to look for pollen on the anthers, and to break open the ovary to look for egg cells.
4. While they are working, help them dissect and identify, probing them with questions such as: *"What do you think this part is? What does it do? Does pollen come from this part (anther) or this part (stigma)?"*
5. Ask them to raise their hands when they are done so you can check their work. Take note of the number of successes/failures.
6. Come back together once everyone is finished to explain the correct identification.

TO SIMPLIFY:

If flowers are unavailable or students are having trouble staying on task, consider a coloring activity as an alternative assessment (see attachment).



PETAL
 STIGMA
 PISTIL
 OVARY
 ANTHER
 STAMEN
 SEPALS

1. Instruct the students to fill in the each part of the flower with a different color, and to shade the bubble word that matches the part with the same color. Be very clear about this, coloring with rules might be a new concept to them.
2. Walk around while they color and assist them where necessary. Ask them probing questions like: *“Can you show me where the _____ is? Do you know what part does _____?”*
3. When they are finished, allow them to wander and follow their curiosities, looking around the garden for plant parts and pollinators, carrying their colored diagrams with them.

Wrap-up (5 minutes)

1. Have the children gather around in a sharing circle, and ask them what they learned today. When they say pollination, ask them what that is. How many pollinators can they think of? Can they remember the two ways flowers are pollinated? How about which part of the flower pollen comes from? How do flowers and pollinators benefit each other? Record their responses in writing and use them to evaluate the success of your lesson. Were the learning outcomes met?
2. Ask them what their favorite part of the day was. Use their feedback to self-evaluate.
3. Invite the students to keep an eye out for pollinators like bees and hummingbirds in the garden and around the neighborhood, as they will be learning more about pollinators next week. Ask them to report back to you next time you meet to tell you what they saw the pollinators doing in order to smoothly transition into the next lesson.

Supplementary Materials

- On a rainy day, consider playing this short (2:40) stop-motion video that simply illustrates the symbiotic relationship between flowers and pollinators:

Pollination Lesson with Stop Motion Science Animation for Kids.
Dir. Lucas Miller. *Stop Motion Science*. YouTube, 30 Mar. 2012.
Web. 16 Feb. 2017.

<https://www.youtube.com/watch?v=zy3r1zlC IU>

Outdoor Wind Pollination Activity (5-10 minutes)

1. Ask students to split into pairs. One student is the wind and the other gets to hold the flower.
2. Hand out pre-taped fake flowers, one per pair.
3. Ask them to stand 3 steps away from their partner.
4. Pour about a teaspoon of cinnamon (which will act as pollen) in the hands of the students who are being the wind, and ask them to hold it until every pair has some.
5. Ask the flower holders to hold their flower away from their body and stand off to the side so they don't get cinnamon on them.
6. Explain that on the count of three the wind partner is going to hold their cinnamon or "pollen" on their flat hand, and blow it into the direction of the flower. The flowers cannot move their legs, but they may swing their arms to 'catch' as much 'pollen' as possible on the sticky stigma of their fake flower.
7. Count to three and have the kids act out wind pollination.
8. Ask them what they noticed. *"How much pollen did they catch? Was it less than they expected? Did wind pollination do a very good job? Would another pollination method work better? Why?"*
9. With cinnamon in your own hand, pretend to be a pollinator (ask them to choose what kind you are, challenging them to come up with one you haven't talked about) and walk up to a flower holder and roll the sticky stigma in the cinnamon. Show them what it looks like. *"What differences do they see? What inferences can they make?"*

TO SIMPLIFY:

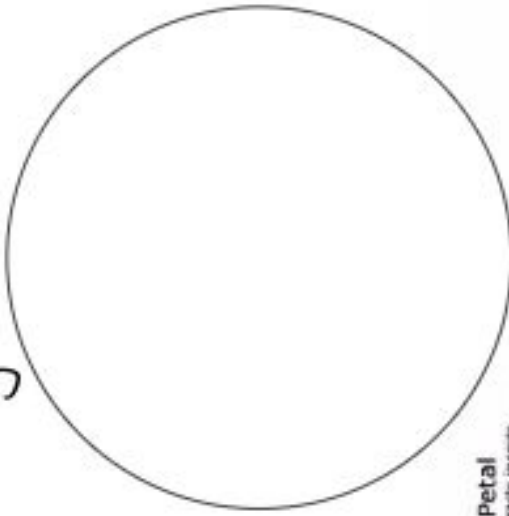
If students are having trouble staying focused, select a well behaved volunteer or another facilitator to assist you with a demonstration instead.

Adapted From:

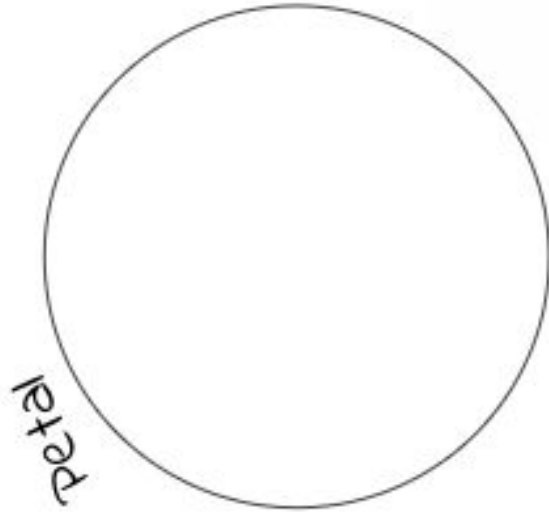
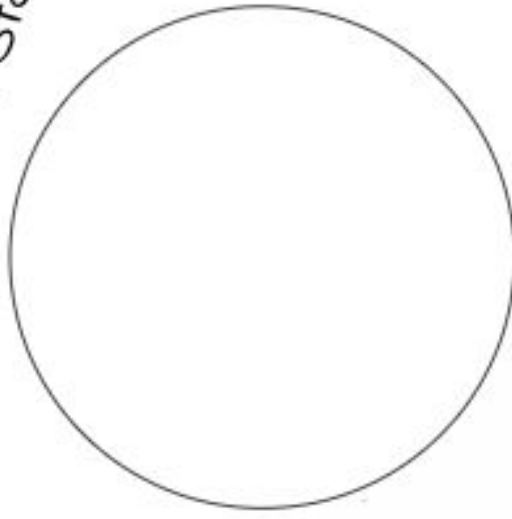
"Hands-on Interactive Activities (outdoor/indoor) | CPP: California Phenology Project."
California Phenology Project. University of California, Santa Barbara, n.d. Web. 15 Feb. 2017.

Image: "Flowers & Pollination." *School Garden Project of Lane County*. N.p., n.d. Web. 25 Feb. 2017.
<<https://www.schoolgardenproject.org/download/flowers-pollination/>>

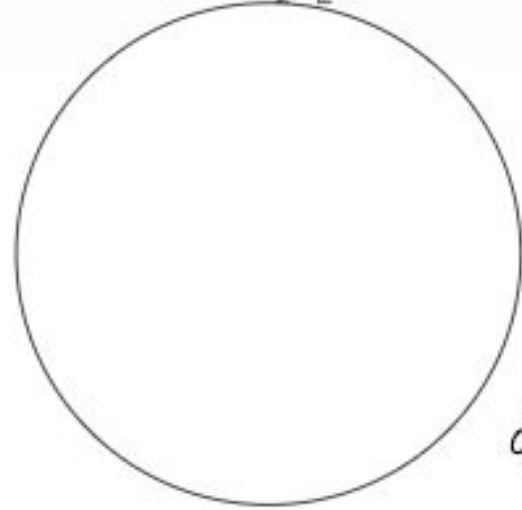
Stigma and Pistil



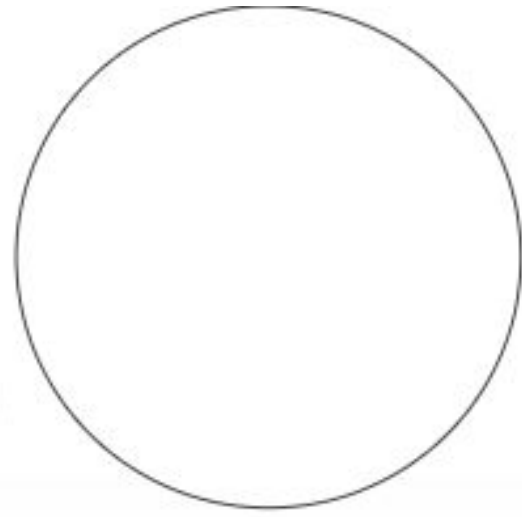
Anther and Stamen



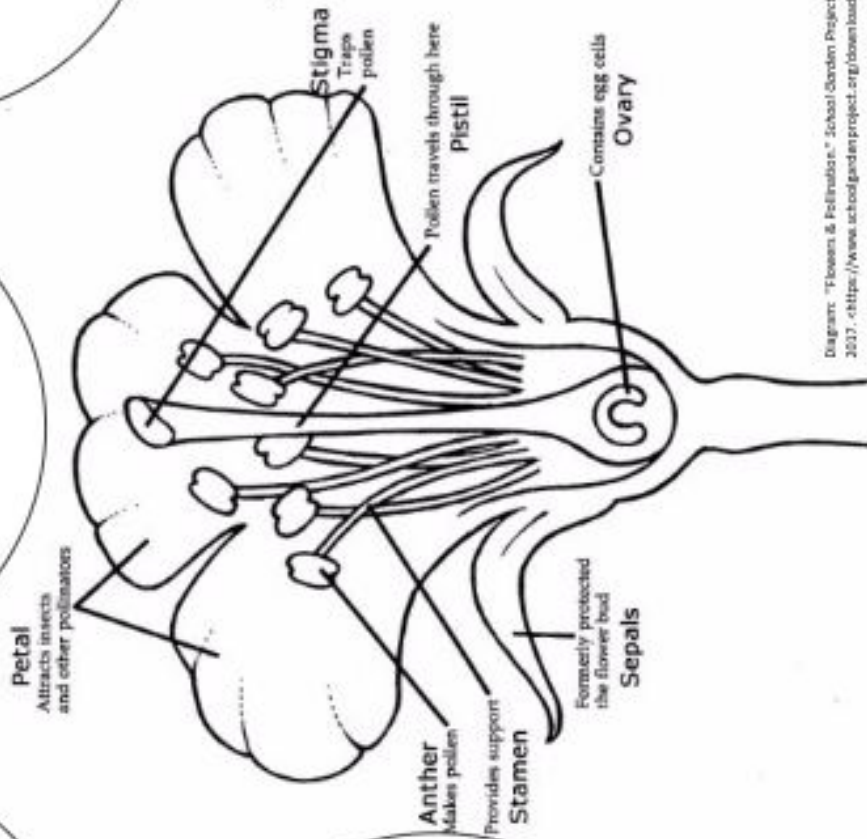
Petal



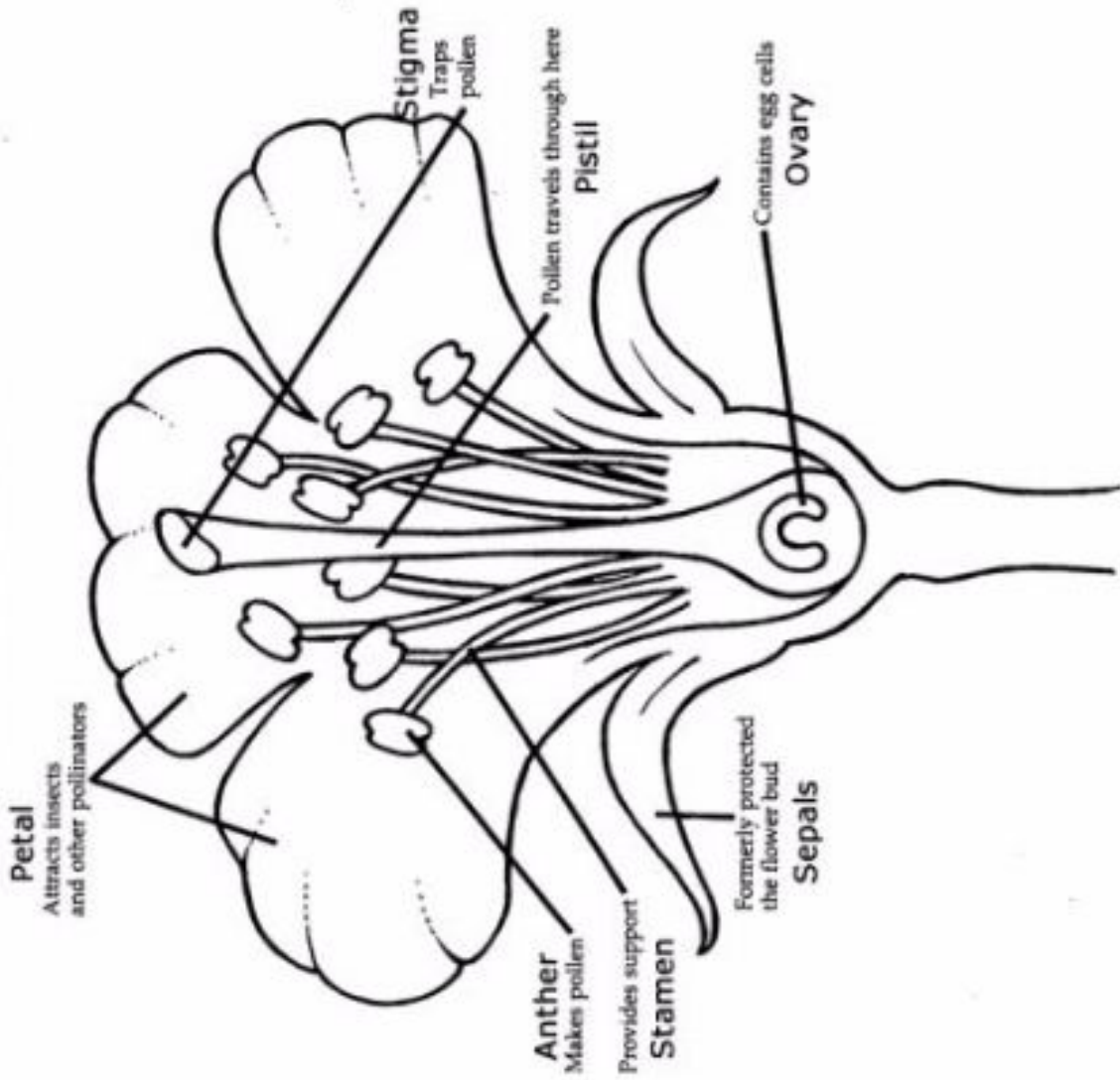
Sepal



Ovary



Parts of a Flower



PETAL

STIGMA

PISTIL

Ovary

ANTHER

STAMEN

SEPALS