Ecological and Evolutionary Research in the Classroom

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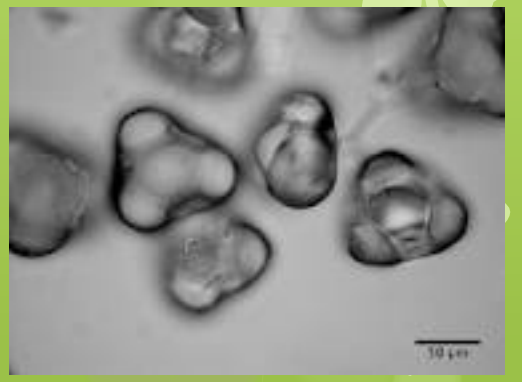
Materials Research Laboratory
U.C. Santa Barbara

RET I (Mazer Lab)
Planting and Growing Clarkia Unguiculata Seeds

Dissecting Clarkia Flowers Buds (Counting Pollen and Ovules)

ovules

Counting grid



Pollen grains

Another branch of the Mazer lab

Phenology - the study of seasonal phases and cycles in plants and animals (e.g. migration, mating, blooming).

Ethno-phenology – the study of the traditional uses of plants by native peoples.

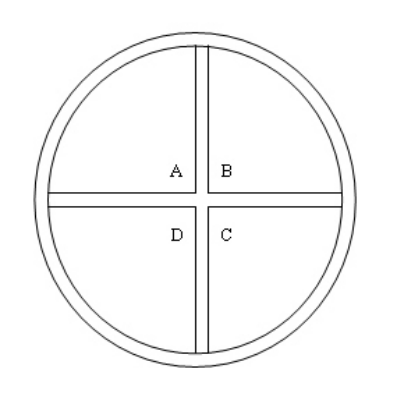
Bringing the Mazer Lab Methods and Concepts into the Classroom

1. ***What are the changes that take place in developing Clarkia unguiculata Seedlings? - Cultivating Clarkia unguiculata in a classroom***
2. ***What variations could we detect in different parts of a Clarkia unguiculata flower bud? - Dissecting a Clarkia unguiculata flower bud***
3. ***How can traditional uses of plants be studied and used in a modern society? – A study in Ethno Phenology***

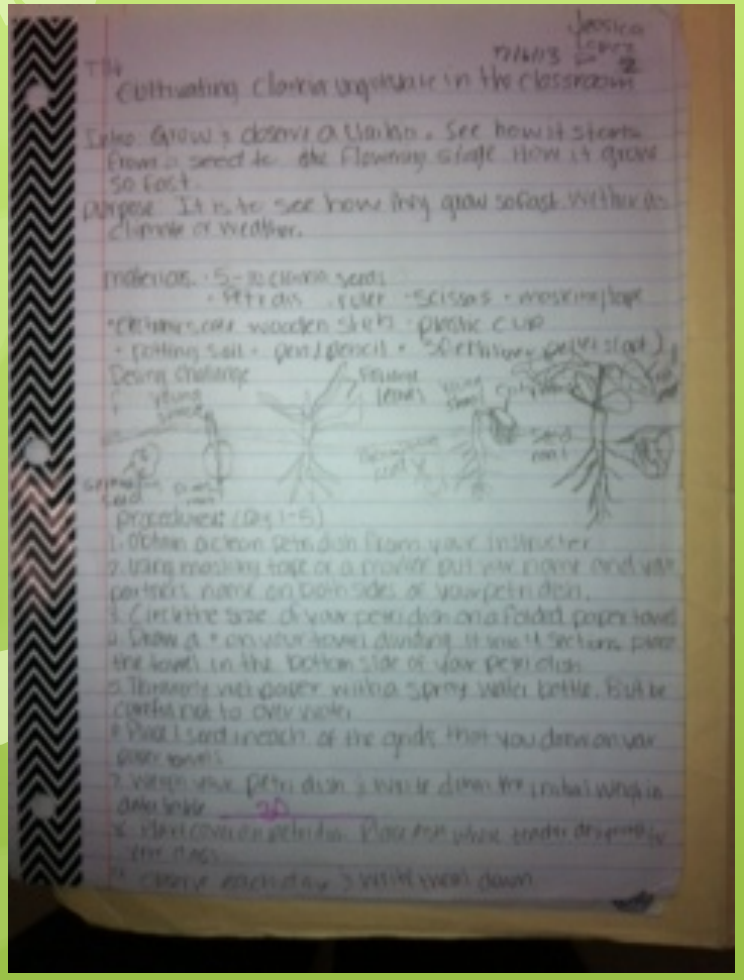
Cultivating Clarkia unguiculata in the classroom

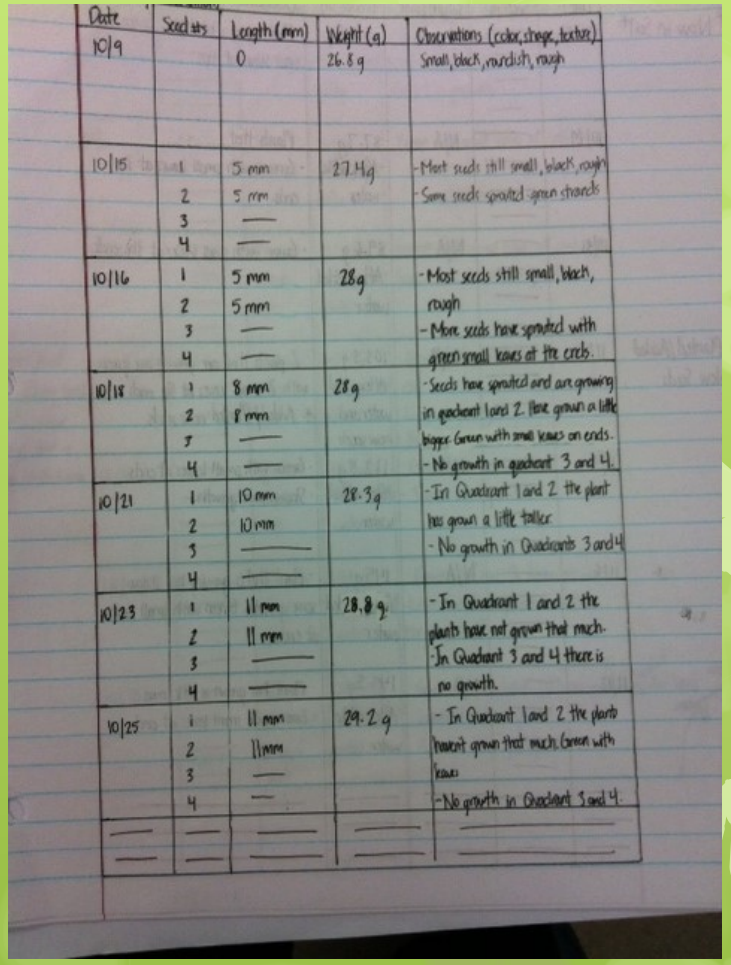
Data Collection

Date	Seed #	Length(mm)	Weight(g)	Observations (color, shape, texture, etc.)



Cultivating Clarkia Lab Write-up examples





Date	Seed #s	Length (mm)	Weight (g)	Observations (color, stage, texture)
10/9		0	26.8 g	Small, black, roundish, rough
10/15	1	5 mm	27.4g	- Most seeds still small, black, rough
	2	5 mm		- Some seeds sprouted green strands
	3	—		
	4	—		
10/16	1	5 mm	28g	- Most seeds still small, black, rough
	2	5 mm		- More seeds have sprouted with green small leaves at the ends
	3	—		
	4	—		
10/18	1	8 mm	28g	- Seeds have sprouted and are growing in quadrant 1 and 2. Have grown a little bigger. Green with small leaves on ends.
	2	8 mm		- No growth in quadrant 3 and 4.
	3	—		
	4	—		
10/21	1	10 mm	28.3g	- In Quadrant 1 and 2 the plant has grown a little taller
	2	10 mm		- No growth in Quadrants 3 and 4
	3	—		
	4	—		
10/23	1	11 mm	28.8 g	- In Quadrant 1 and 2 the plants have not grown that much.
	2	11 mm		- In Quadrant 3 and 4 there is no growth.
	3	—		
	4	—		
10/25	1	11 mm	29.2 g	- In Quadrant 1 and 2 the plants haven't grown that much. Green with leaves
	2	11mm		- No growth in Quadrant 3 and 4.
	3	—		
	4	—		
—	—	—	—	—
—	—	—	—	—

Clarkia Growth Progression

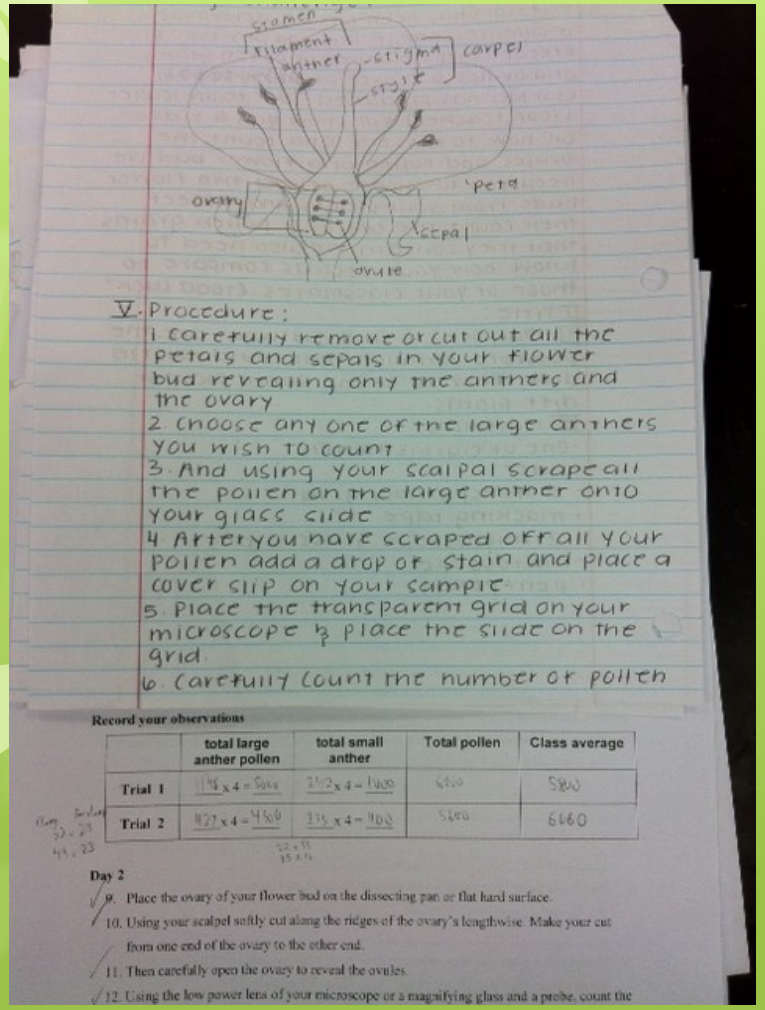
Photos of plants

Dissecting of a Clarkia unguiculata flower bud

	total large anther pollen	total small anther	Total pollen	Class average
Trial 1	_____x 4 = _____	_____x 4 = _____		
Trial 2	_____x 4 = ____	_____x 4 = ____		

	Number of ovules	Class average	Comments
Trial 1			
Trial 2			

Write-up Photos



V. Procedure:

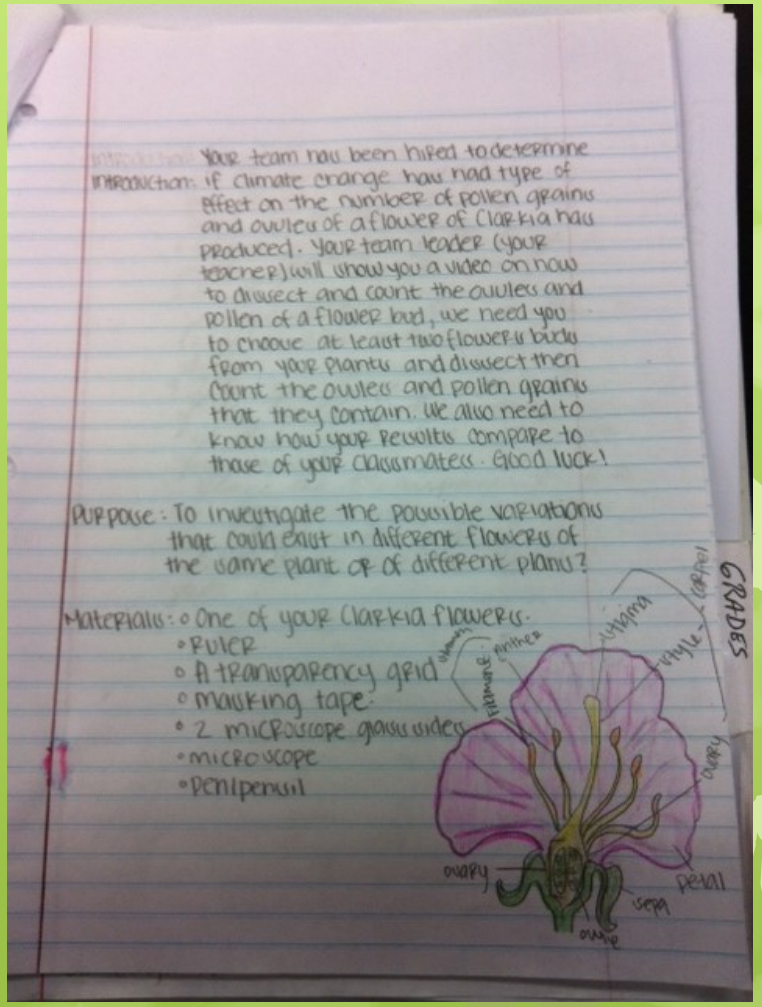
1. Carefully remove or cut out all the petals and sepals in your flower bud revealing only the anthers and the ovary
2. Choose any one of the large anthers you wish to count
3. And using your scalpal scrape all the pollen on the large anther onto your glass slide
4. After you have scraped off all your pollen add a drop of stain and place a cover slip on your sample
5. Place the transparent grid on your microscope & place the slide on the grid
6. Carefully count the number of pollen

Record your observations

	total large anther pollen	total small anther	Total pollen	Class average
Trial 1	1196 x 4 = 5064	252 x 4 = 1008	6072	5840
Trial 2	1127 x 4 = 4508	375 x 4 = 1502	6010	6460

Day 2

9. Place the ovary of your flower bud on the dissecting pan or flat hard surface.
10. Using your scalpel softly cut along the ridges of the ovary's lengthwise. Make your cut from one end of the ovary to the other end.
11. Then carefully open the ovary to reveal the ovules.
12. Using the low power lens of your microscope or a magnifying glass and a probe, count the

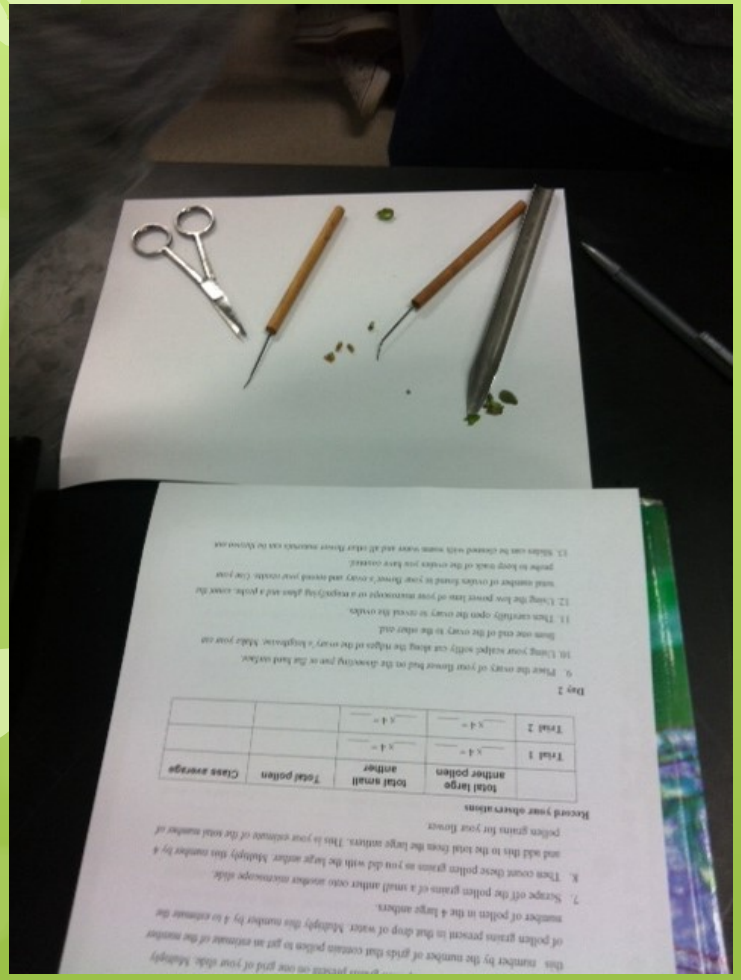


Introduction: Your team has been hired to determine if climate change has had type of effect on the number of pollen grains and ovules of a flower of Clarkia has produced. Your team leader (your teacher) will show you a video on how to dissect and count the ovules and pollen of a flower bud, we need you to choose at least two flowers buds from your plants and dissect them count the ovules and pollen grains that they contain. We also need to know how your results compare to those of your classmates. Good luck!

Purpose: To investigate the possible variations that could exist in different flowers of the same plant or of different plants?

Materials:
- One of your Clarkia flowers.
- RULER
- A transparency grid
- masking tape
- 2 microscope glass slides
- microscope
- Pen/pencil

Flower Dissection Photos



A study in Ethno-Phenology
an web-based activity

Common Name	Scientific Name	Ailment	Plant Structure	Preparation	Other uses
1. Linden tree	Tilia americana	nervousness	Leaves, flowers or buds	Prepare a tea with leaves, flowers or buds	Headaches or digestion problems
2. Quaking aspen	Populus tremuloides	fever	bark	Salicin must be extracted	Anti-inflammatory

	Date:	Date:	Date:
Do you see...?	Time:	Time:	Time:
Young Leaves? How many? (#)	Yes No _____	Yes No _____	Yes No _____
Leaves? How many? (#)	Yes No _____	Yes No _____	Yes No _____
Flowers or Flower Buds? %	Yes No _____	Yes No _____	Yes No _____
Open Flowers? %	Yes No _____	Yes No _____	Yes No _____
Fruits? %	Yes No _____	Yes No _____	Yes No _____

Phenology Sites

https://www.usanpn.org/about

http://www.budburst.org/

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