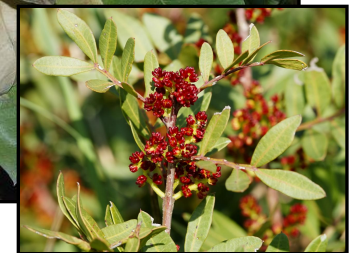


Pollination Activity

Jennifer J. Weber and Laura B. Vary



Instructions for Pollination Activity

Supplies: To assemble plant envelopes

1. Make copies of slides #5-17, once for every 5 students
2. In the lower right-hand corner of the slide is a letter – this designates a set of materials that belong in the SAME envelope
3. For each plant there are three materials:
 - a. name tag
 - b. pollen grains
 - c. pistils
4. FOR PISTACHIO there are TWO materials
 - a. name tag
 - b. pollen grains (designated: C-M) OR pistils (C-F)
5. Cut along the dotted lines or punch holes in slides #5,8,11,13,15 to make name tags, attach string to each name tag
6. Cut along the dotted lines in slides #6,9,12,16 to make 4 pollen grains of each plant
7. Slide #17 is an optional worksheet to label the parts of a flower

Instructions for Pollination Activity

Set-up: Each student receives ONE plant envelope

The envelope will contain :

- 1.A name tag with plant name and picture
- 2.Four pollen grains from the plant on the name tag
- 3.A worksheet with a dissected pistil (female organs) to fertilize

Exception – PISTACHIO envelope contains:

- 1.A name tag with plant name and picture
- 2.EITHER: four pistachio pollen grains OR a worksheet with pistils

Scenarios & solutions are on slides#19-15 to facilitate the exercise

The goal of this activity is to have the maximum fertilization success
Each student will be an individual plant

Instructions for Pollination Activity

The goal of this activity is to have the maximum fertilization success

Each student will be an individual plant

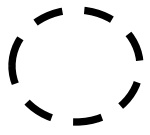
Students will be asked to think about different scenarios

Set-up: Each student should wear the plant name tag from the envelope

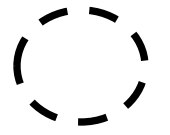
Students should be told to **KEEP the PISTIL WORKSHEET**

However, students may have the opportunity to **exchange POLLEN GRAINS**

Allow a few minutes for students to discuss how to have the maximum fertilization success – think numbers of fruits!!



Strawberry

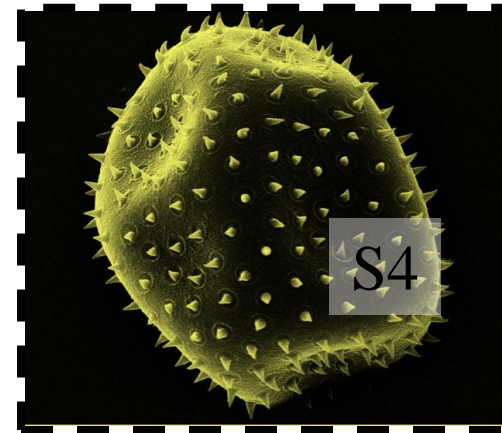
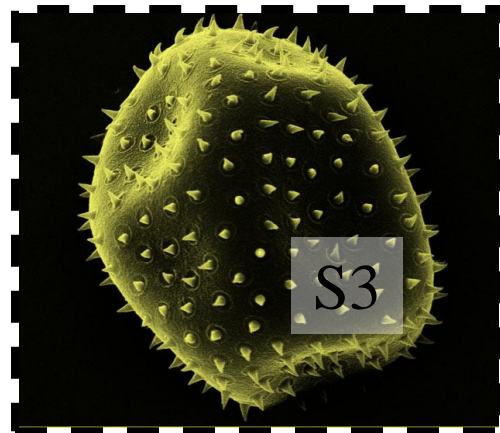
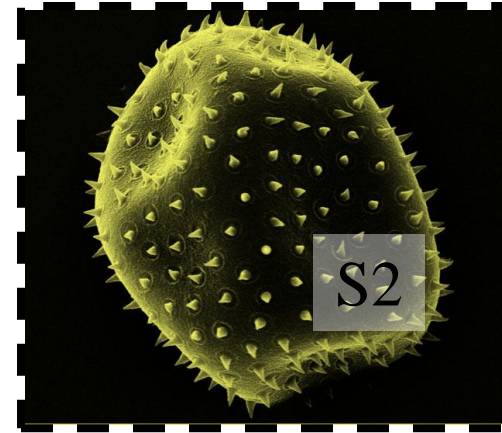
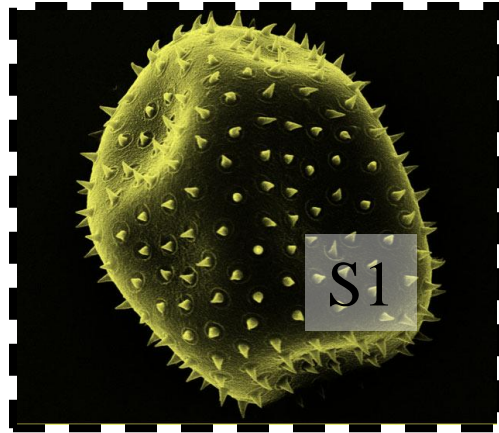


Fragaria (Rosaceae)

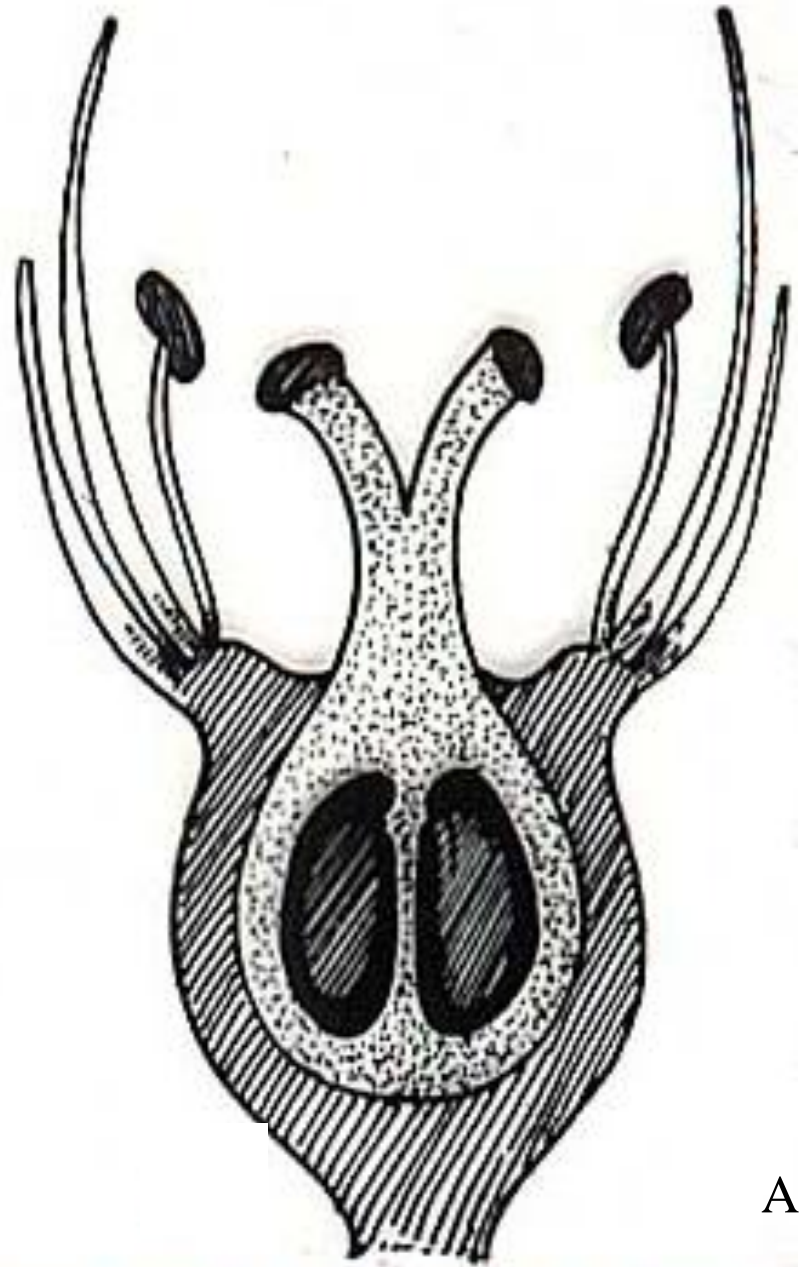
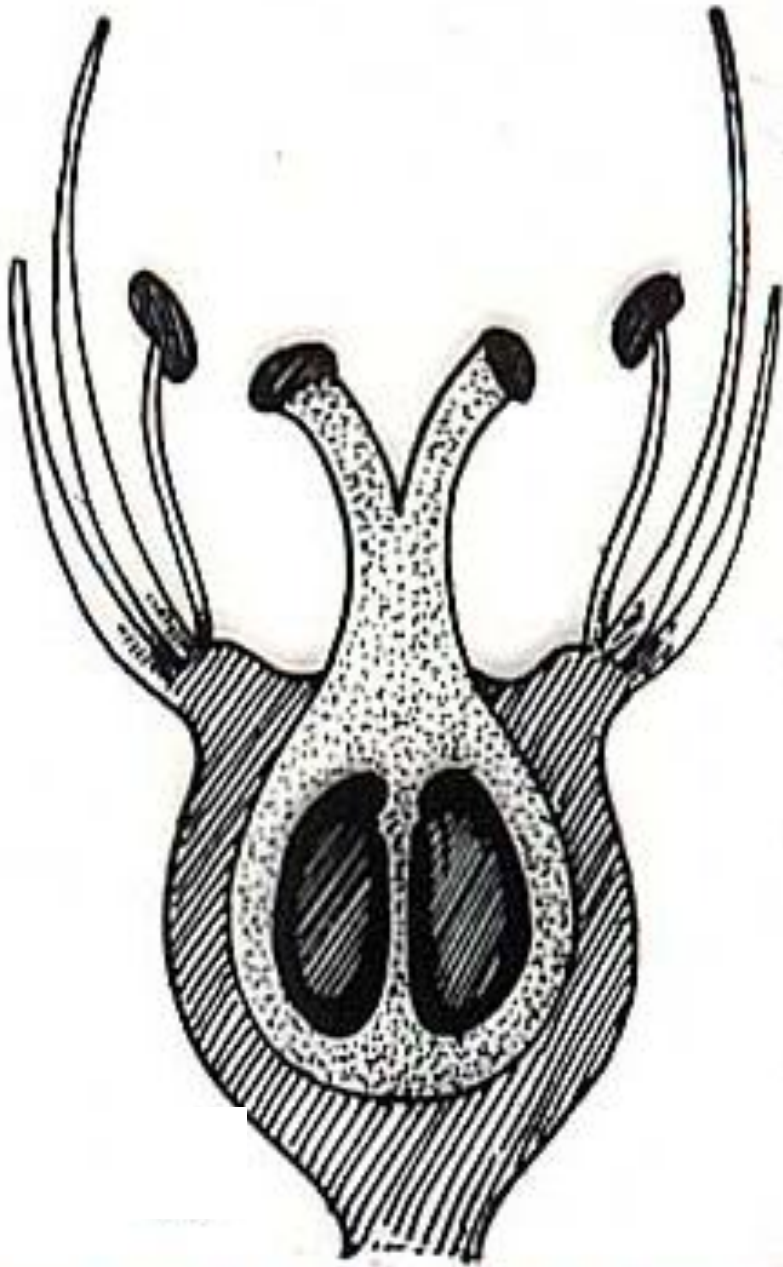


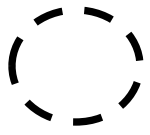
hermaphroditic, insect pollinated

Strawberry pollen

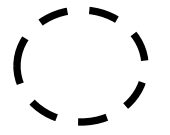


Strawberry pistil





Orange

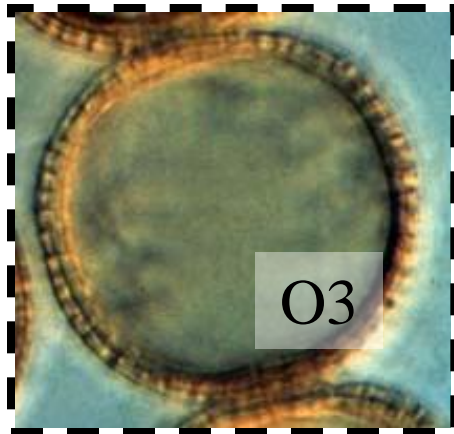
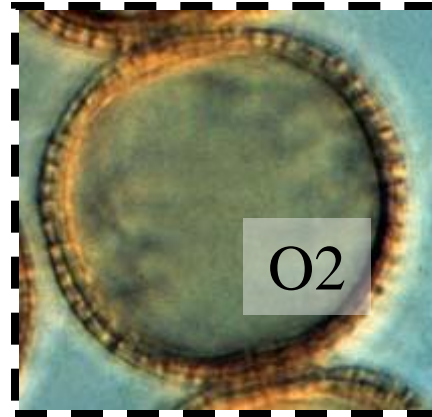
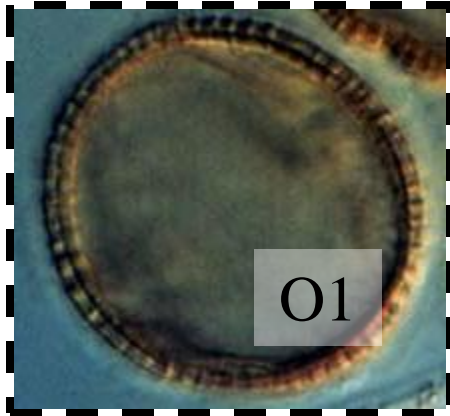


Citrus aurantium (Rutaceae)

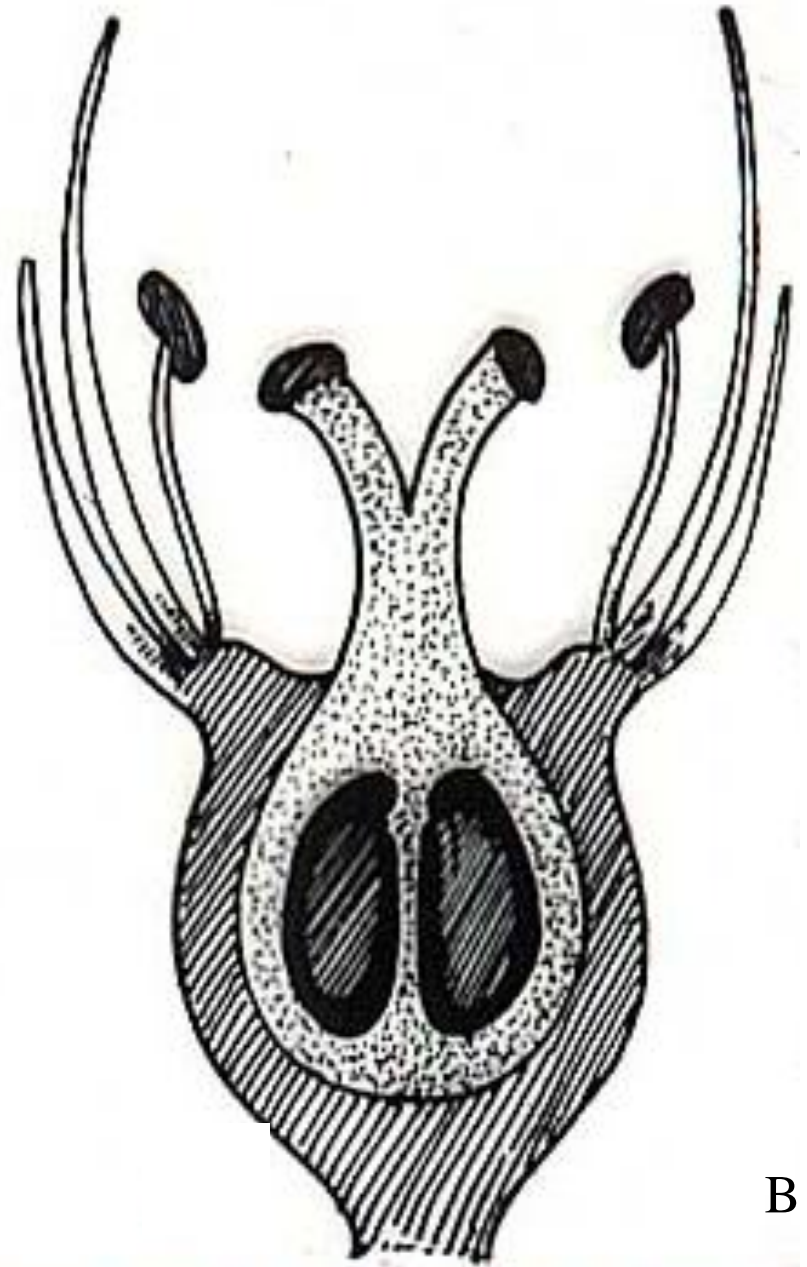
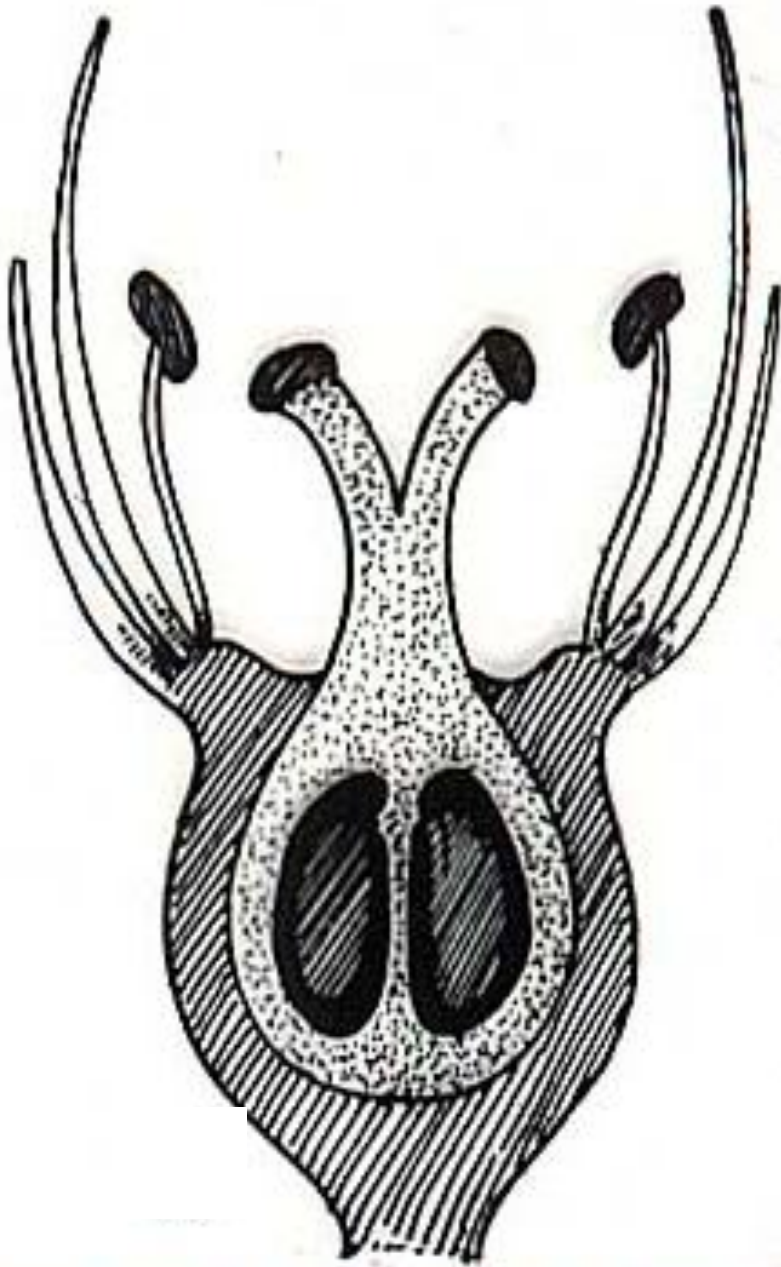


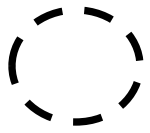
hermaphroditic, insect pollinated

Orange tree pollen



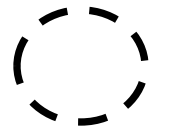
Orange tree pistil





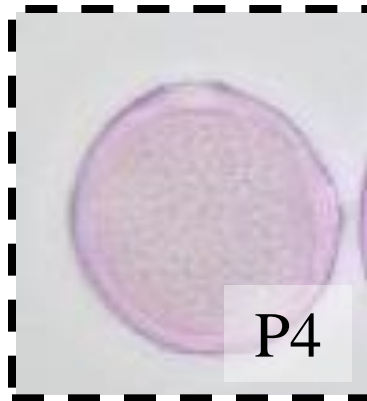
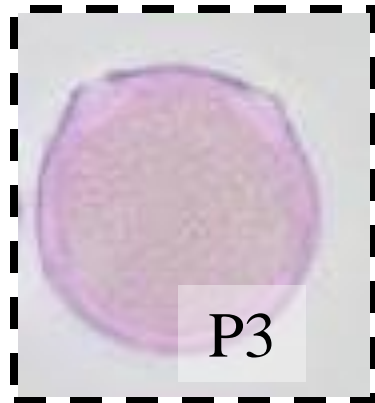
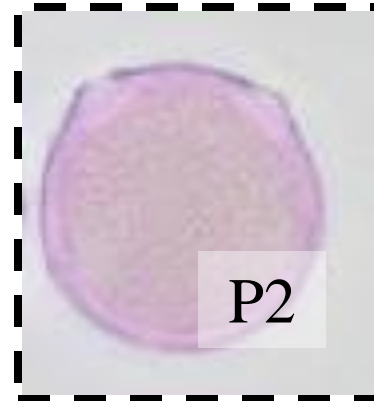
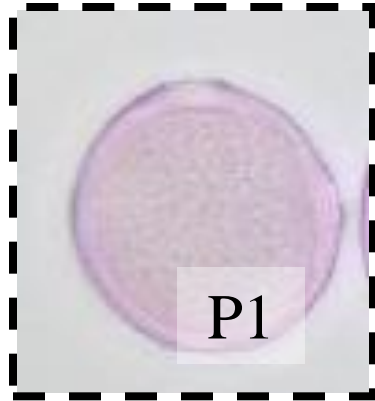
Pistachio - Male

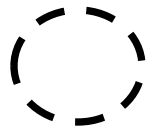
Pistacia (Anacardiaceae)



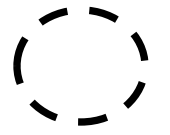
separate male & female plants, wind pollinated

Pistachio tree pollen





Pistachio - Female

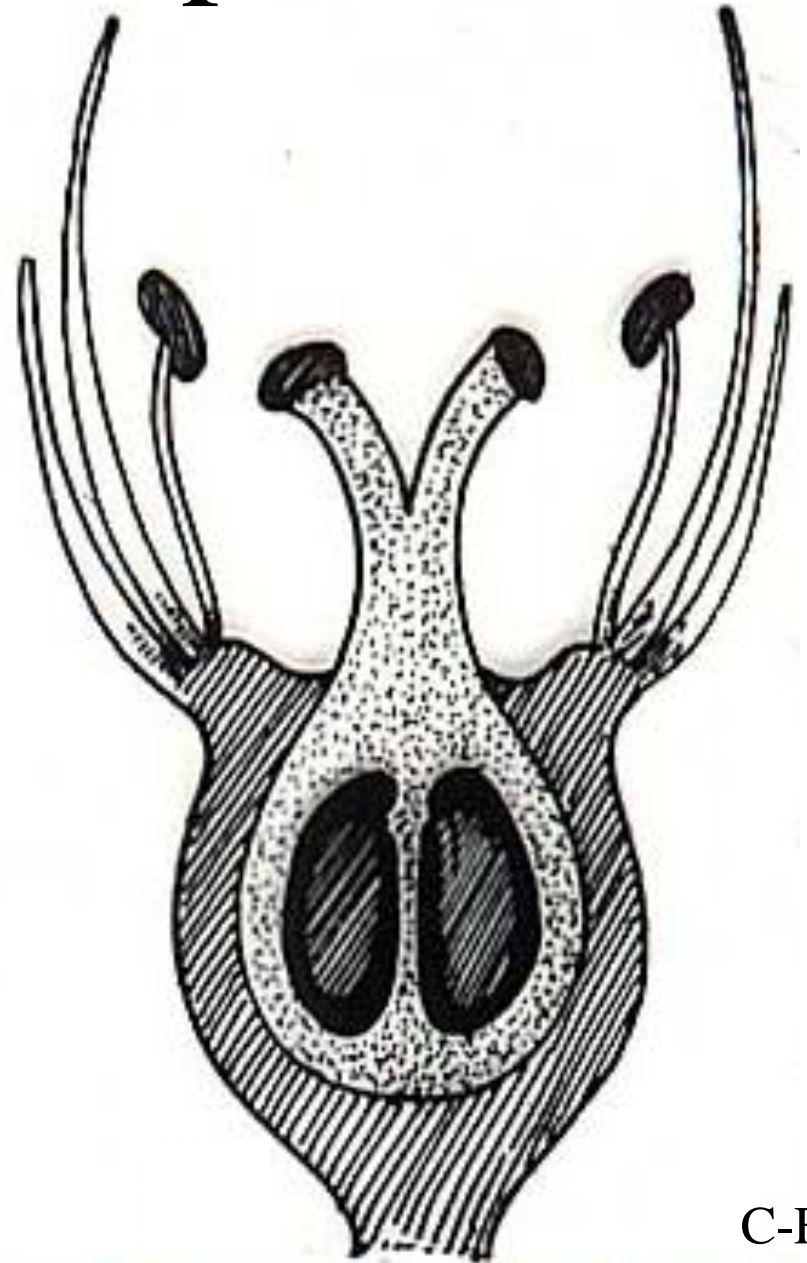
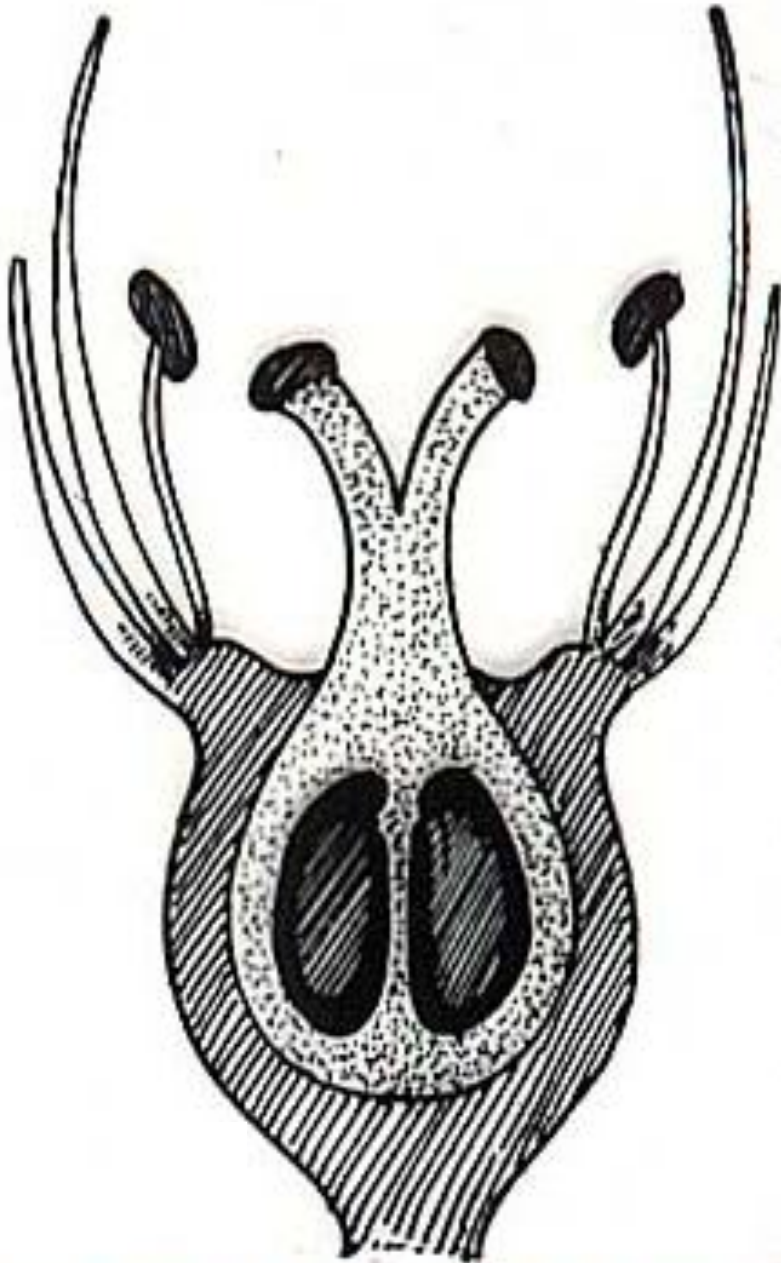


Pistacia (Anacardiaceae)



separate male & female plants, wind pollinated

Pistachio tree pistil



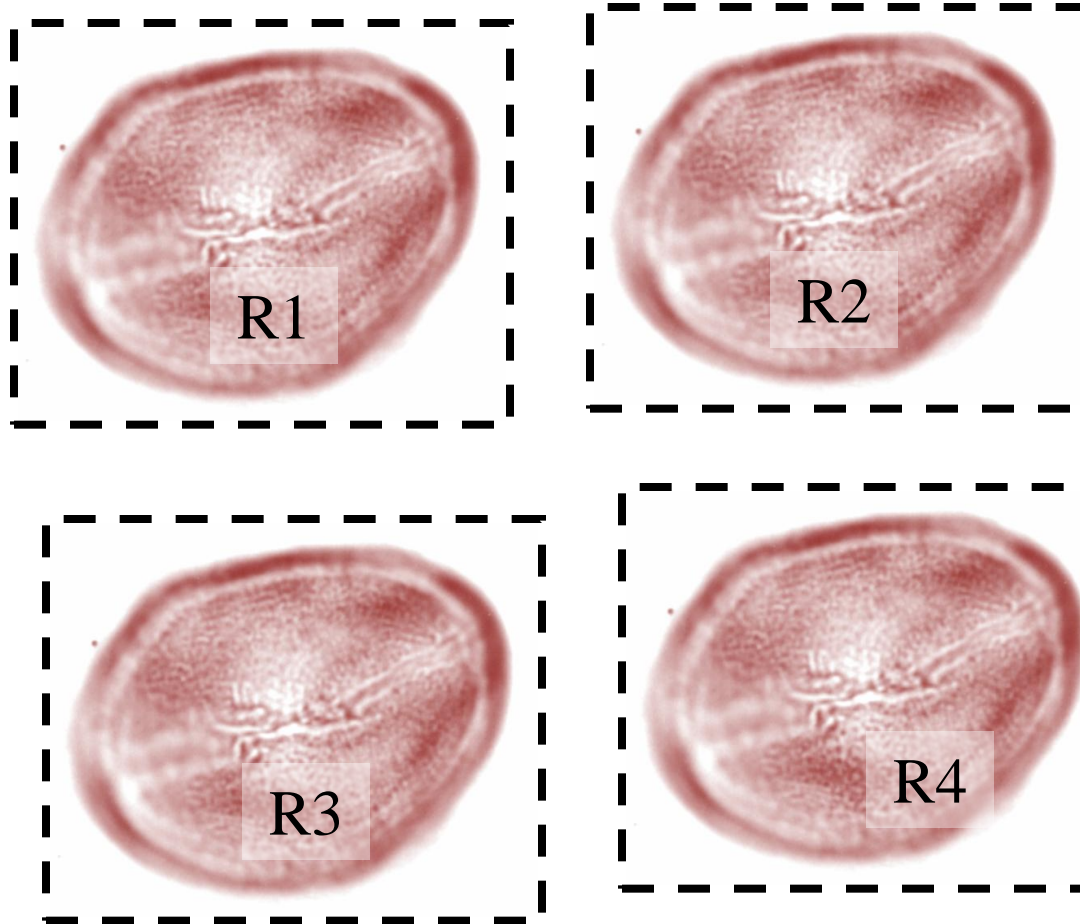
Rose

Rosa (Rosaceae)

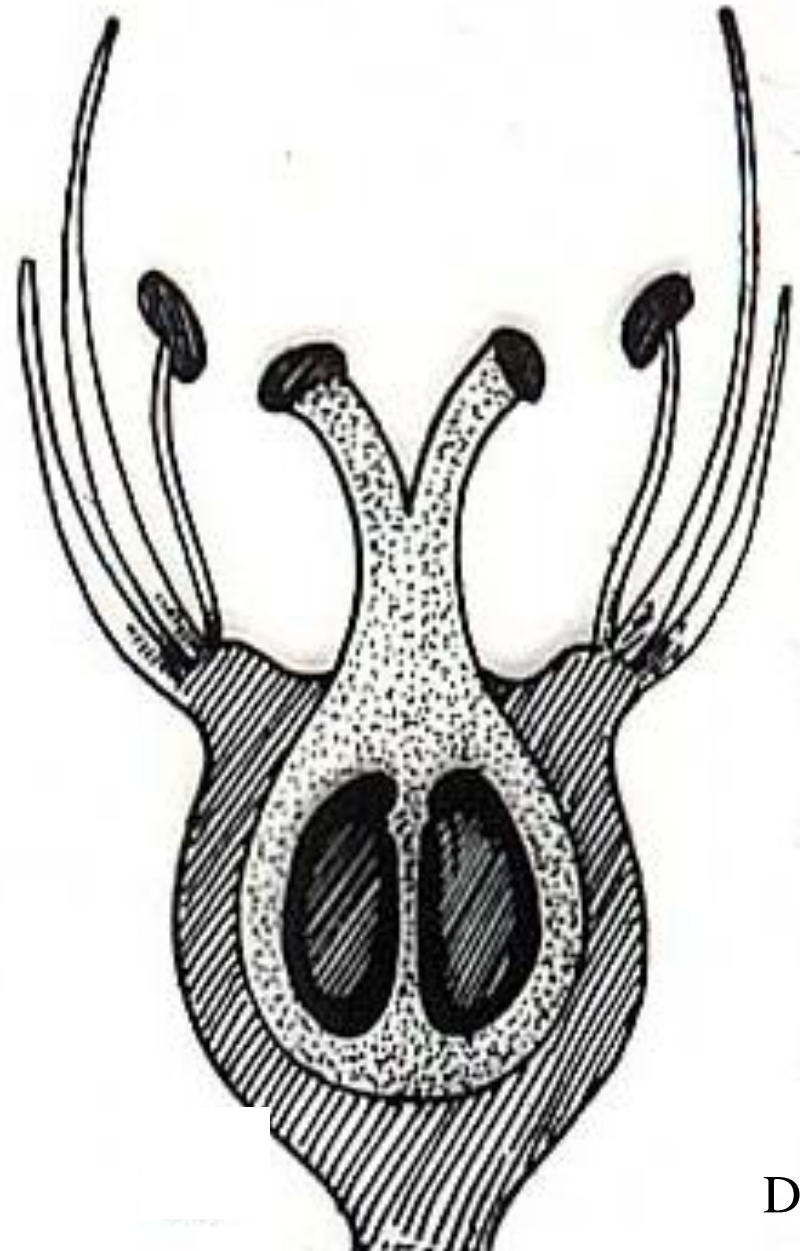
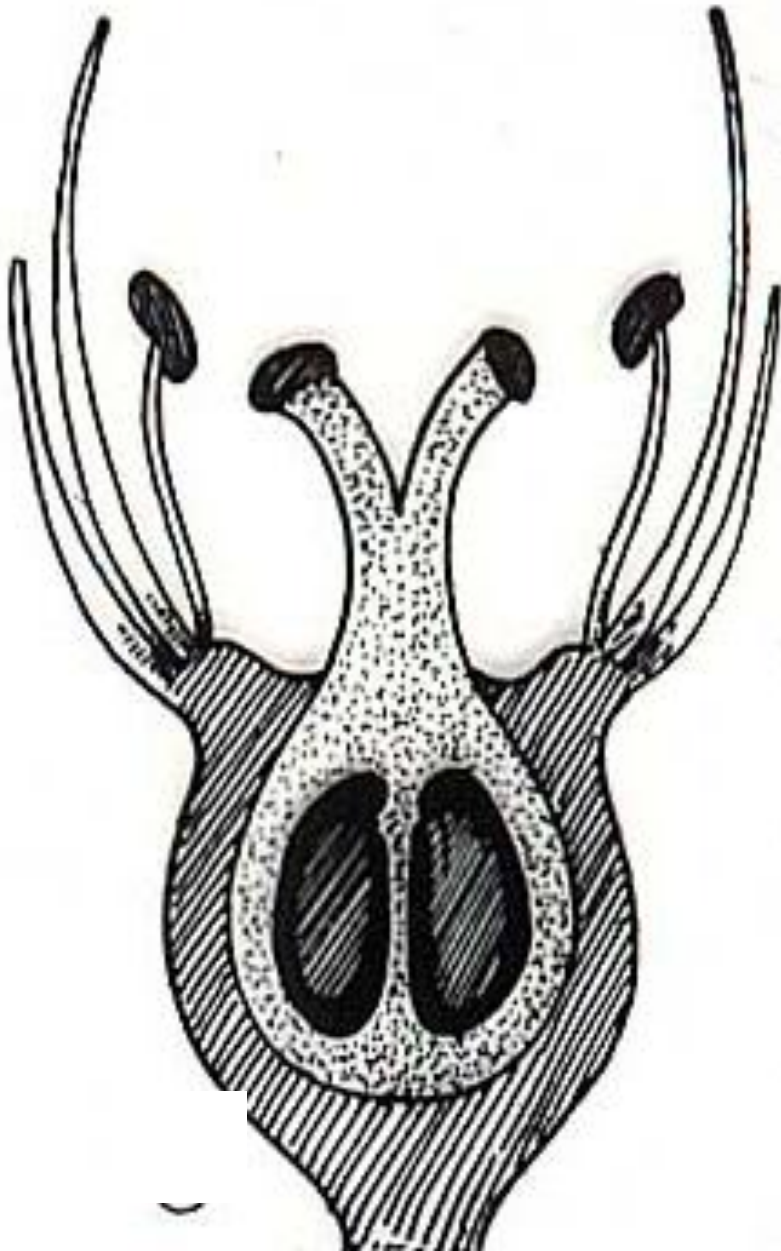


hermaphroditic, insect pollinated

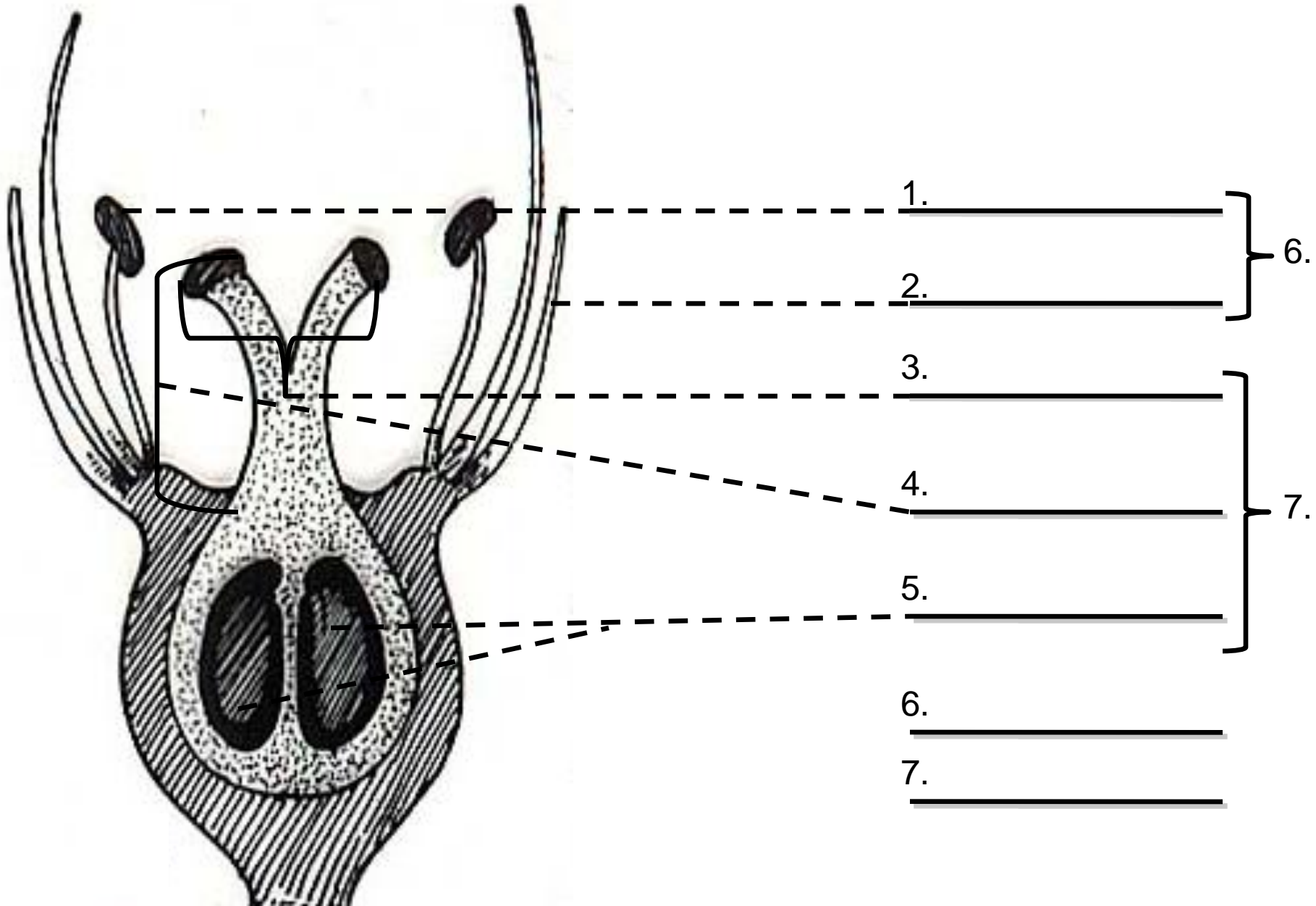
Rose pollen



Rose pistil

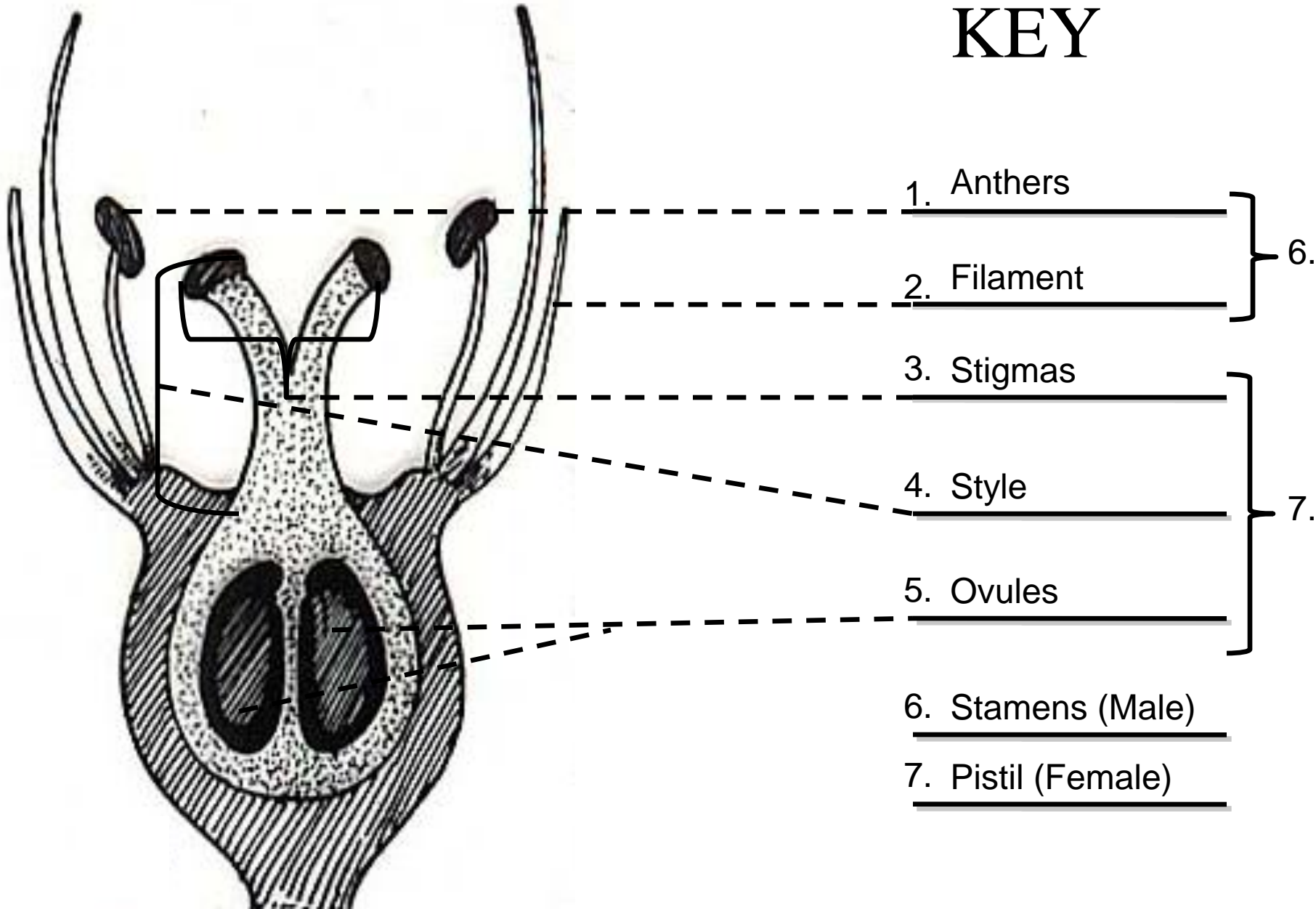


Label the parts of the flower



Label the parts of the flower

KEY

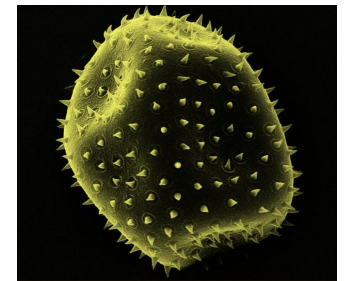


Pollination Activity

You are the plant on your name tag

You want to grow the maximum number of fruits possible under each scenario

You also want to give away the maximum number of pollen grain under each scenario



Scenario One: No Pollinators, No Wind!

There are NO pollinators this year!!

Everyone must stay in their seat – no exchange of pollen grains.

Scenario One: No Pollinators, No Wind!

SOLUTION

In this scenario all hermaphroditic plants may be able to self-fertilize. The pistachio plants **CANNOT** produce fruits in this scenario. Why not? The pistachio plants have separate male & female flowers!

Plants that self-fertilized may have 4 fruits

Pistachios have 0 fruits

What about inbreeding depression??

Self-fertilized fruits may not be as good as fruits fertilized from pollen grains of another plant. But with NO pollinators, ANY fruit is better than NO fruit!

Scenario Two: Lots of pollinators & lots of wind, but you have to act quickly!

You have a few minutes to walk around and **share pollen grains** to make fruits

Keep your pistils and try to fertilize your own ovules

Give your pollen grains away to fertilize other ovules

Scenario Two: Lots of pollinators & lots of wind!

Plant yourself to maximize pollination success in the future

Everyone Stop where you are! Pollination time has ENDED!!

Now take your materials (pistils, pollen grains, etc) and “plant” yourself next to other individuals in a way that would help with future pollination

-DID YOU MAXIMIZE YOUR FERTILIZATION SUCCESS??

Do you have a pollen grain for each ovule (number of fruits)?

Did you give away all four of your pollen grains?

Scenario Two: Lots of pollinators & lots of wind!

SOLUTION

Only pollen grains from the same species can make fruits, all pollen grains from other species should be put aside (not counted)

Why? These plants do not hybridize, pollen grains from other species would *not* make pollen tubes or would *not* make fruits.

Planting – Everyone should be sitting near other individuals of the same plant species. This would increase pollination success, because pollen grains do not have to travel as far to land on a stigma of the same species

-DID YOU MAXIMIZE YOUR FERTILIZATION SUCCESS??

-Each individual may have up to FOUR fruits if they collect FOUR pollen grains from the same species

-Also each individual may have donated up to FOUR pollen grains if they GAVE them to the same species

**Pistachios can have only max 4 fruits or 4 pollen grain donations

Scenario Three: Lots of pollinators & lots of wind – but this year is very, very DRY!

You have a few minutes to walk around and **share pollen grains** to make fruits

Keep your pistils and try to fertilize your own ovules

Give your pollen grains away to fertilize other ovules

Remember! Only pollen grains from the same species can make fruits

Scenario Three: Lots of pollinators & lots of wind – but this year is very, very DRY!

SOLUTION

Oh NO! Because it is a DRY year, any pollen grain with the #2 on it was not viable – it could not fertilize ANY fruits!

All pollen grains with a #2 should be put aside (not counted)

-DID YOU MAXIMIZE YOUR FERTILIZATION SUCCESS??

Did you collect a variety of pollen grains?

What would you do differently next time?

What would you do the same?

Could a dry year impact some flowers more than others?

Photo credits

http://www.wansteadwildlife.org.uk/WILDLIFE/wildlife_images_JPGS/plants_col_jpgs_large/plant_Wild_Strawberry_col_080618_60355c.jpg

<http://www.telegraph.co.uk/science/picture-galleries/>

http://upload.wikimedia.org/wikipedia/commons/5/56/Pistacia_lentiscus_%28male_flowers%29.jpg

http://www.polleninfo.org/index.php?language=en&nav=_n99&module=article&action=first_page&row=66&id_parent=2136&id_image=979

<http://www.biolib.cz/IMG/GAL/38995.jpg>

http://upload.wikimedia.org/wikipedia/commons/b/b0/OrangeBloss_wb.jpg

<http://images.botany.org/set-10/10-019v.jpg>

http://upload.wikimedia.org/wikipedia/commons/2/21/Bandel_Rose.jpg

http://pollen.usda.gov/light_micrographs/rosaceae/rosa%20bracteata2.html

<http://www.eeob.iastate.edu/classes/bio366/terminology/flower/images/hypanthium-ovary.jpg>