

Topic 13 – Angiosperms

Reading:

Chapter 8: Flowers, Fruits and Seeds (pp. 125-139)

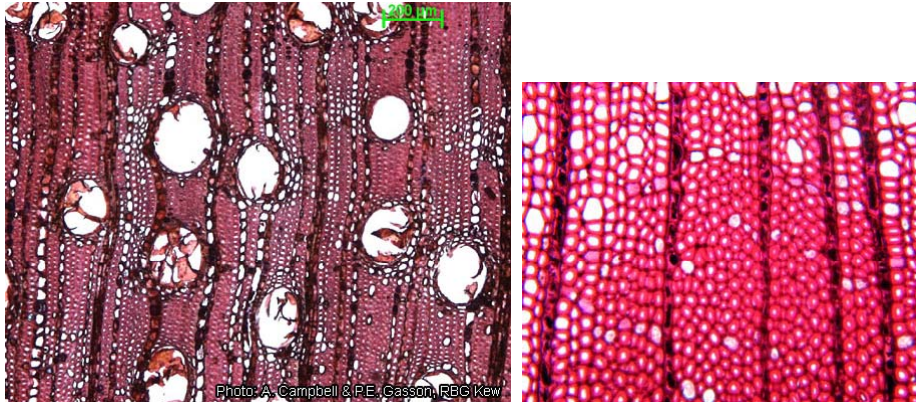
Chapter 23: Angiosperms (pp. 433-445, plus Figure 23.18 on pp. 446-447)

Hartley. 2012. *Parksia* 2: 6-7. @ <http://herbarium.millersville.edu>

I. Structures Unique to Angiosperms

I. Structures Unique to Angiosperms

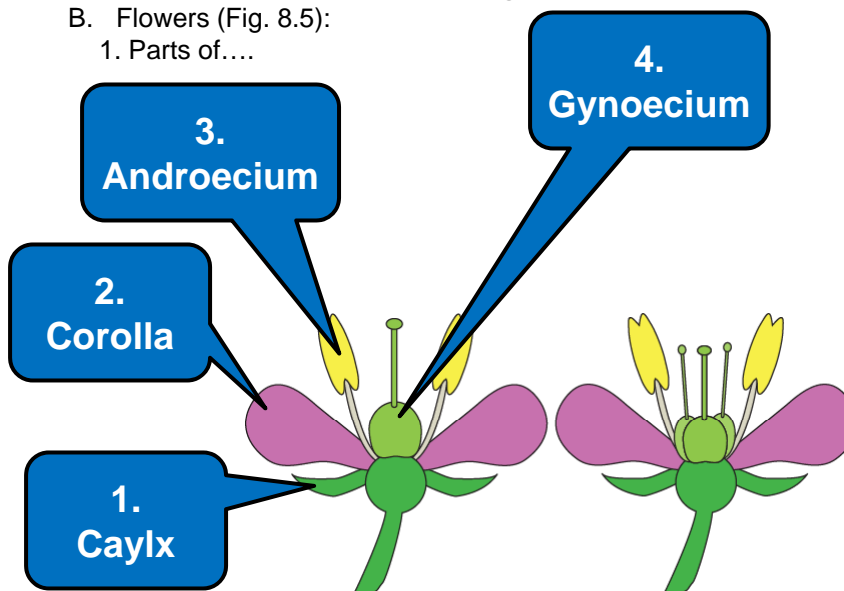
A. Vessel Elements & Fibers in Xylem, Sieve Tube Members in Phloem



I. Structures Unique to Angiosperms

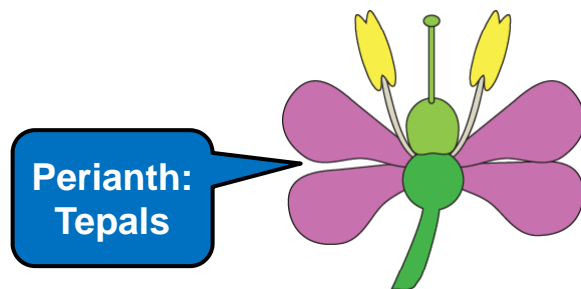
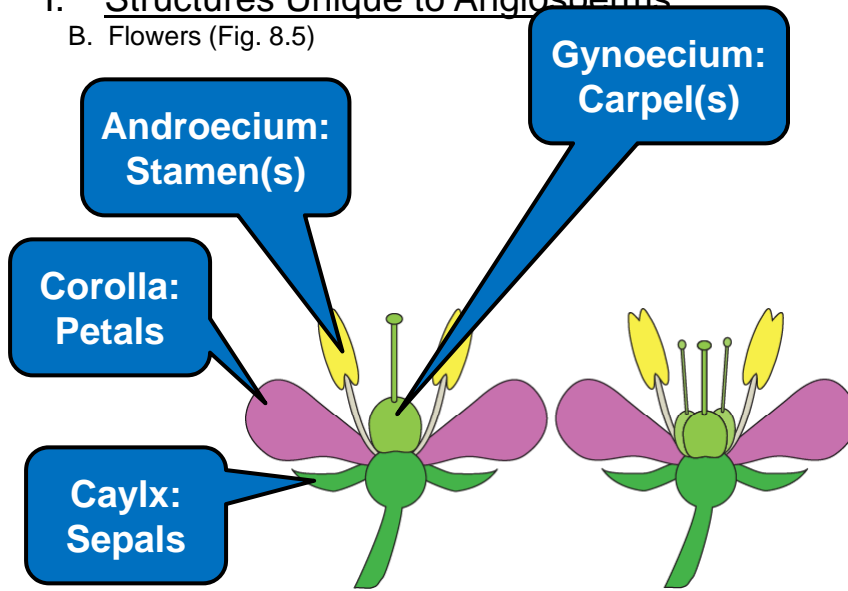
B. Flowers (Fig. 8.5):

1. Parts of....



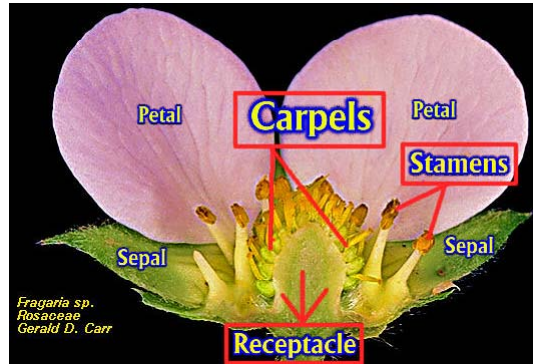
I. Structures Unique to Angiosperms

B. Flowers (Fig. 8.5)



I. Structures Unique to Angiosperms

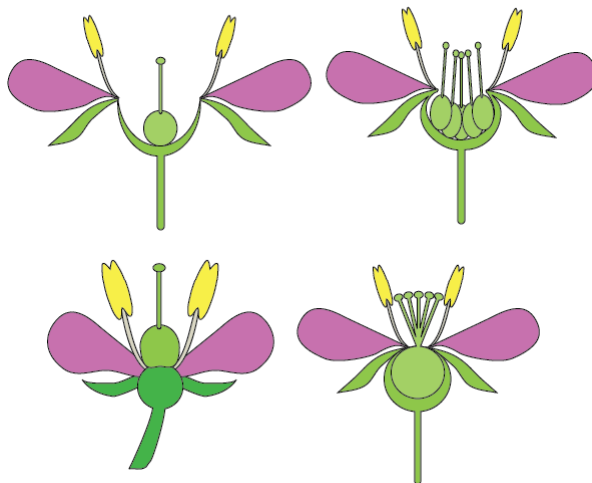
B. Flowers (Fig. 8.5)



I. Structures Unique to Angiosperms

B. Flowers (Fig. 8.5)

2. Ovary Position



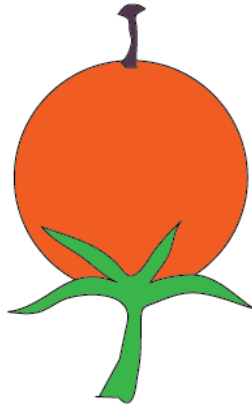
I. Structures Unique to Angiosperms

B. Flowers (Fig. 8.5)

3. Merosity
4. Fusion (Connation vs. Adnation)
5. Symmetry

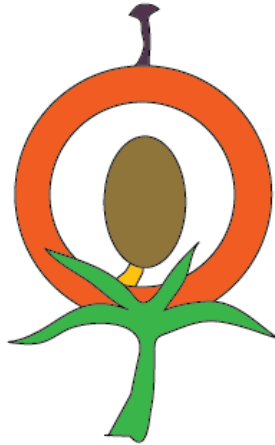
C. Fruits

1. Fruit from ovary, seeds from ovules.



C. Fruits

1. Fruit from ovary, seeds from ovules.



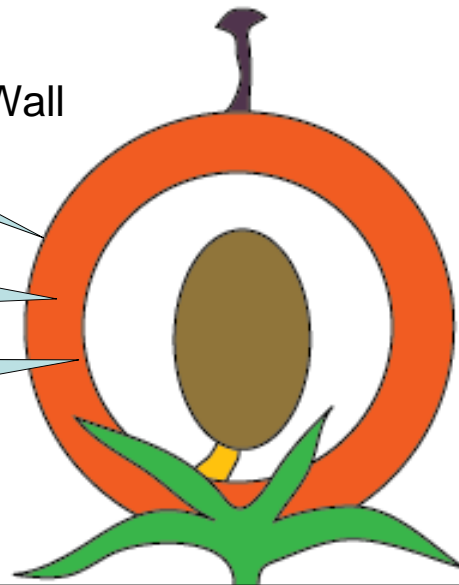
C. Fruits

2. Pericarp – Fruit Wall

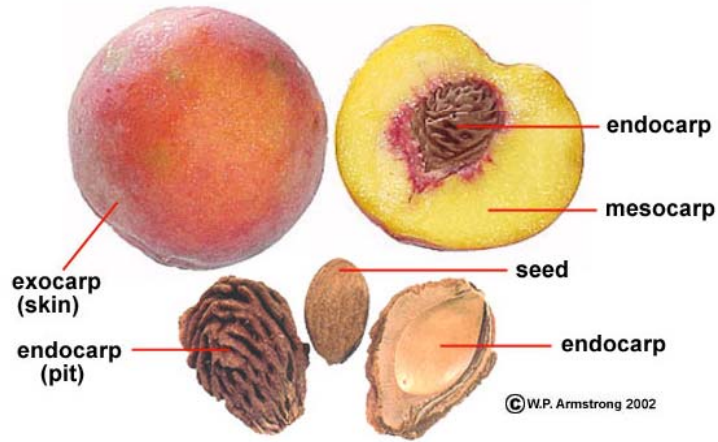
Exocarp

Mesocarp

Endocarp



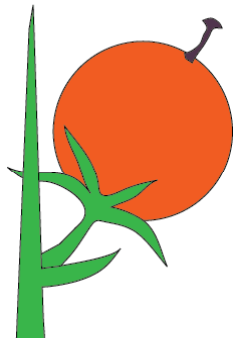
2. Pericarp



Drupe (fleshy fruit with a stony endocarp)

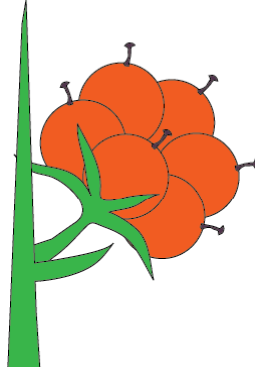
C. Fruits

3. Simple, Aggregate, vs. Multiple



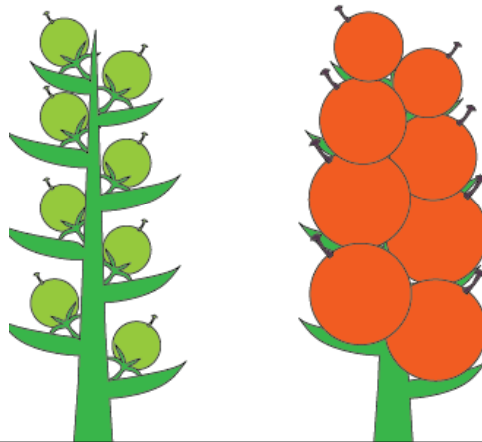
C. Fruits

3. Simple, Aggregate, vs. Multiple



C. Fruits

3. Simple, Aggregate, vs. Multiple



3. Simple, Aggregate, vs. Multiple

Tomato = berry



Tomato (Potato Family)

3. Simple, Aggregate, vs. Multiple

Citrus fruit =
hesperidium



3. Simple, Aggregate, vs. Multiple

Blueberry =
Berry from
inferior ovary



3. Simple, Aggregate, vs. Multiple

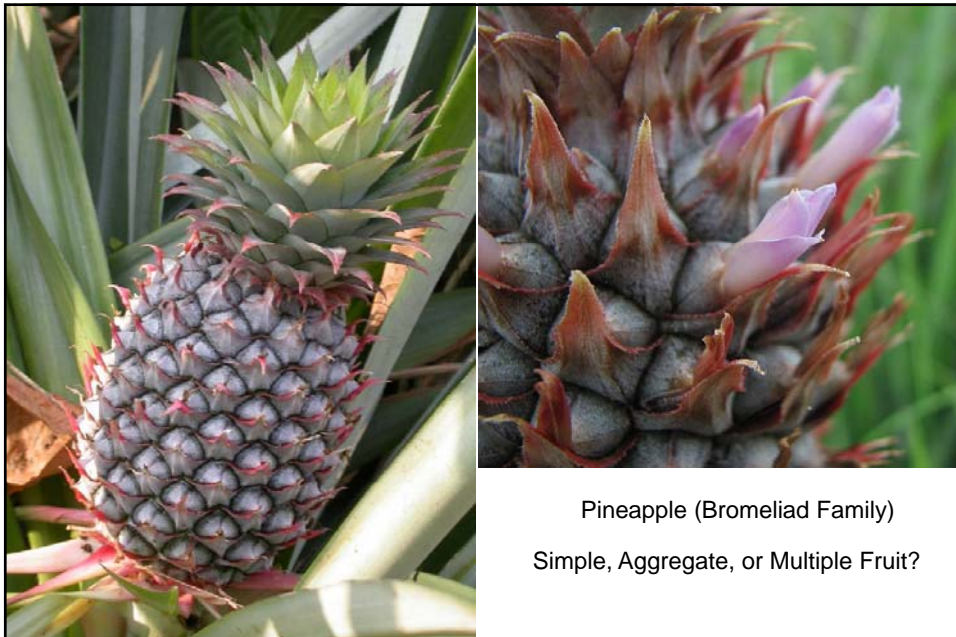


Raspberry = aggregate of drupelets.

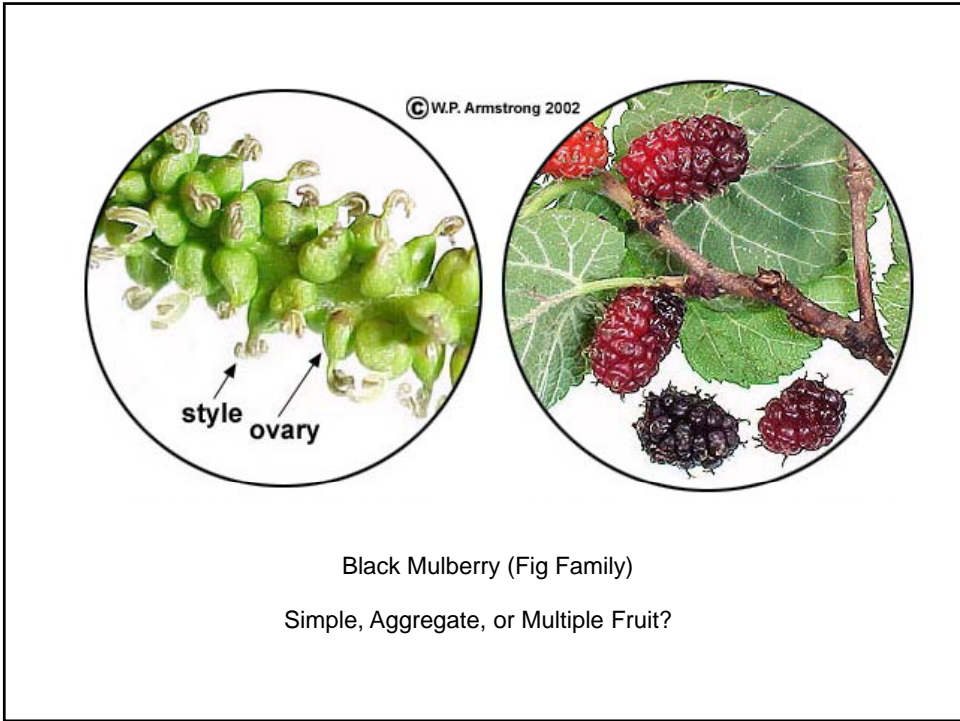
3. Simple, Aggregate, vs. Multiple



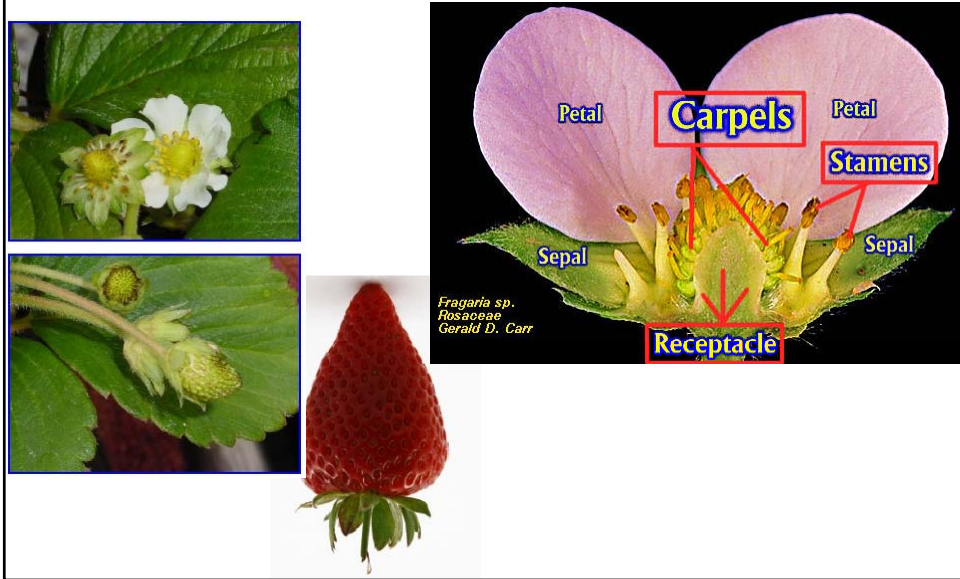
Morinda or Noni (Coffee Family)



Pineapple (Bromeliad Family)
Simple, Aggregate, or Multiple Fruit?



4. Accessory Fruit



4. Accessory Fruit

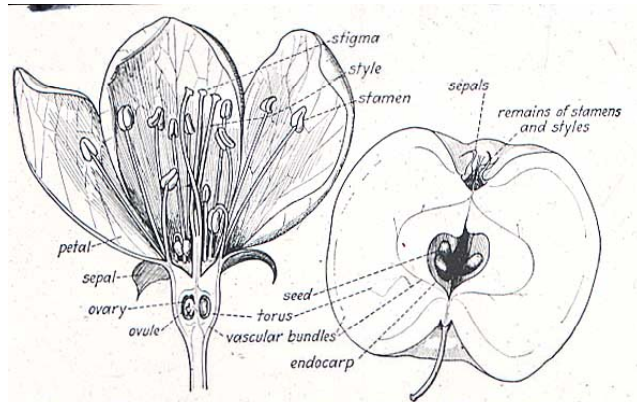
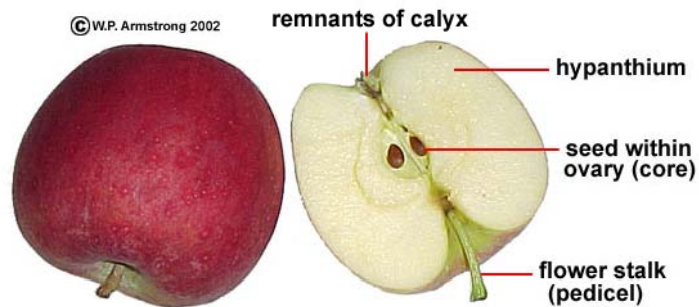


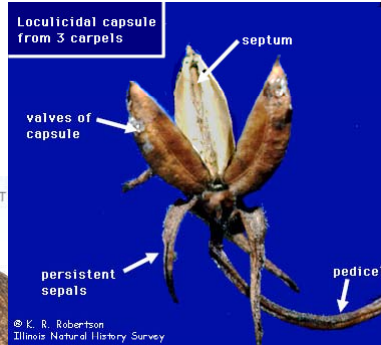
FIG. 381. Flower and fruit of apple (*Malus pumila*), cut lengthwise to show the relation of the parts of the flower to the torus.

4. Accessory Fruit



Pome (ovary surrounded by fleshy hypanthium)
e.g. apple (*Malus domestica* cv. 'gala')

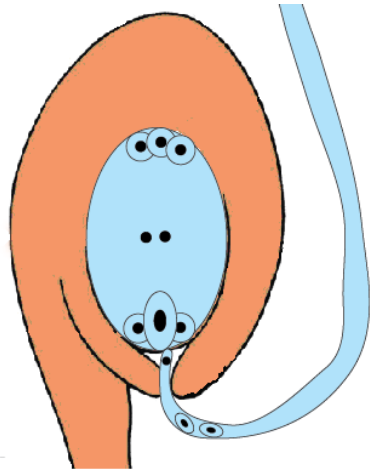
5. Dry vs. Fleshy, Dehiscent vs. Indehiscent



5. Dry vs. Fleshy, Dehiscent vs. Indehiscent



D. Double “Fertilization”



1. Zygote ($2n$)
2. Endosperm ($3n$)

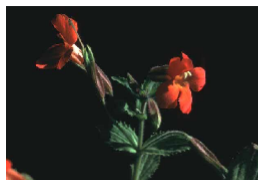
II. Pollination

A. Bee Pollination

- Blue and/or yellow
- open (or short tubular)
- nectar and/or pollen as reward



Mimulus cardinalis and *M. lewisii*



Mimulus cardinalis: hummingbird pollinated



Photo: Jeff Abbas

Mimulus lewisii: bumblebee pollinated

II. Pollination

B. Bird Pollination

- Red
- Long tubular
- nectar as reward
- no odor



II. Pollination

C. Bat Pollination





II. Pollination

D. Wind Pollination

- Perianth highly reduced, green or otherwise inconspicuous.
- Stamens and stigmas exerted
- Nectarless
- No reward
- No odor



The flowers of grasses are located at the top of the plant where they are exposed to the wind.



The anthers and feathery stigmas of grasses hang out of the flowers where they can be blown by the wind. Petals are absent.



[*Acer saccharum*](#) (sugar maple) - The anthers as well as the flower itself hang down where they can be blown by the wind. The flower has no petals.



[*Acer saccharum*](#) (sugar maple) - The flowers of *A. saccharum* as well as many other wind-pollinated trees appear in the early spring when leaves are not yet present to interfere with pollen movement

Wind-pollinated flowers

In general, wind-pollinated flowers are green, small, and often lack petals. The anthers and stigmas generally hang outside the flowers to allow the wind to carry the pollen.



Juglans nigra (black walnut) - Male flowers are arranged in catkins which hang down to be blown by the wind.



Juglans nigra (black walnut) - Female flowers are green, with no petals or sepals to attract pollinators. The stigmas are relatively large to catch pollen.

II. Pollination

E. Deceptive Pollination

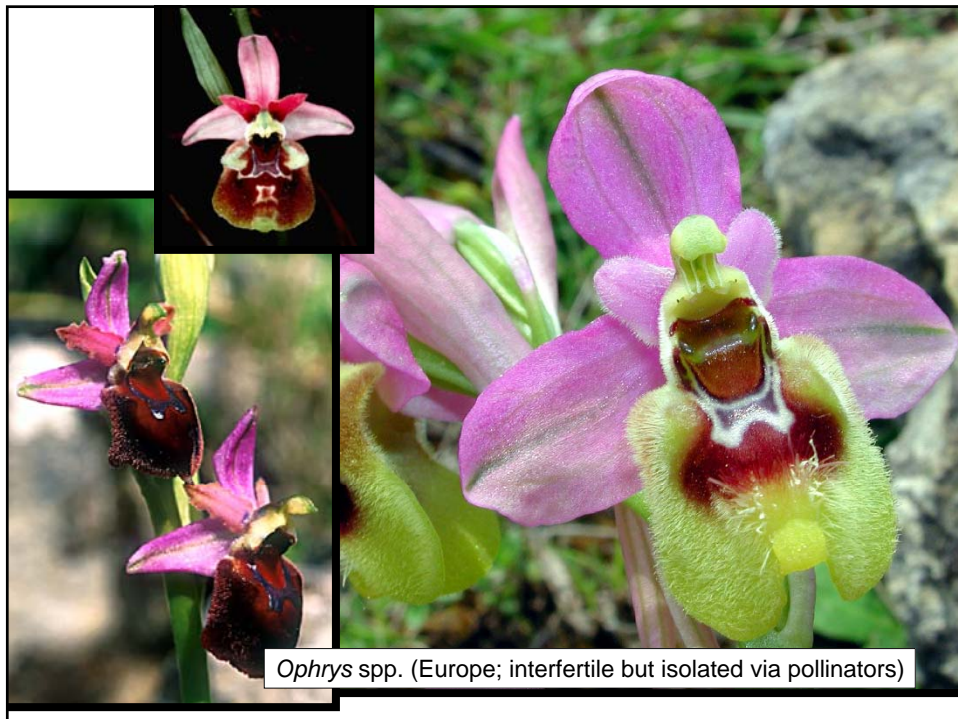
1. Sexual Deception in Some Orchids

Reward: **Nothing.**

Flower Form: **Lower tepal (“labellum”)**
mimics female bee in color, texture, &
phermones.

Pollinator Behavior: **Male bees attempt**
to mate with labellum.

Research Underway: Dr. Florian Schiestl (Institute
for Systematic Botany, University of Zurich)





2. Carrion flowers

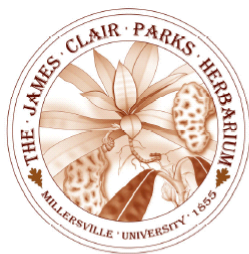
Reward: **Nothing.**

Flower Form: **Petals, inflorescence, or spathe mimics rotting flesh in color, texture, & odor.**

Pollinator Behavior: **Flies, beetles lay eggs on flower thinking it is larval food.**

Research Underway: Dr. Denis Barabe' (Montreal Botanical Garden, Univ. of Montreal).

Symoplocarpus
(skunk-cabbage)



PARKSIA

Dedicated to the dissemination of useful information regarding plants

@ <http://herbarium.millersville.edu>

SKUNK-CABBAGE: A HOMEOTHERMIC PLANT IN THE PENNSYLVANIA FLORA

NATHAN P. HARTLEY

James C. Parks Herbarium, Biology Department, Millersville University of Pennsylvania, PO Box 1002, Millersville, Pennsylvania, 17551, United States of America

Thermogenesis in plants is a rare phenomenon in which a plant actively works to warm its flowers in woods, marshes and stream sides (Fig. 1). Skunk-cabbage is singular among thermogenic plants in



Fig. 1. A skunk-cabbage plant (*Symplocarpus foetidus*). Photo from the Public Domain. [This and other images are in color on the Web version of this article.]

Eastern skunk-cabbage, *Symplocarpus foetidus* (Araceae), is a perennial forb native to eastern North America and is found in wet

a relatively constant, high temperature that may be optimal for its unseasonably early pollen and ovule development which, in turn, can determine



Fig. 2. A skunk-cabbage inflorescence. The spadix is concealed by the carrion-colored spathe. Photo © Sue Sweeney.