

Topic 13  
Pollination in Angiosperms

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



*Mimulus lewisii*: bumblebee  
pollinated

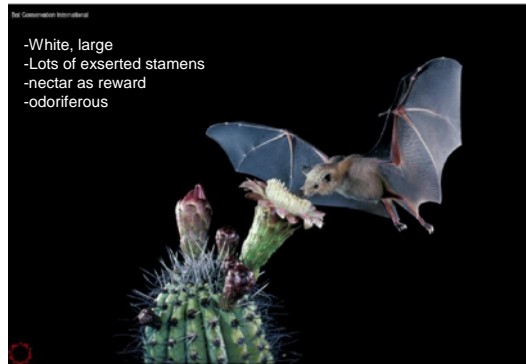
## Bird Pollination

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



## Bat Pollination


- White, large
- Lots of exerted stamens
- nectar as reward
- odoriferous






## 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.

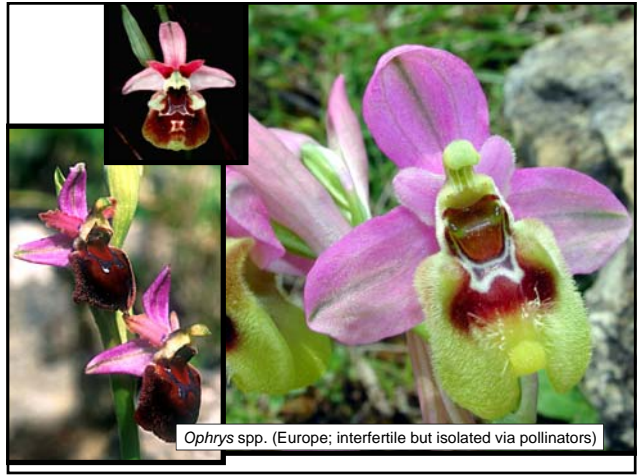
# Deceptive Pollination

1. Sexual Deception in Some Orchids

Reward: **Nothing.**

Flower Form: **Lower tepal ("labellum") mimics female bee in color, texture, & pheromones.**

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



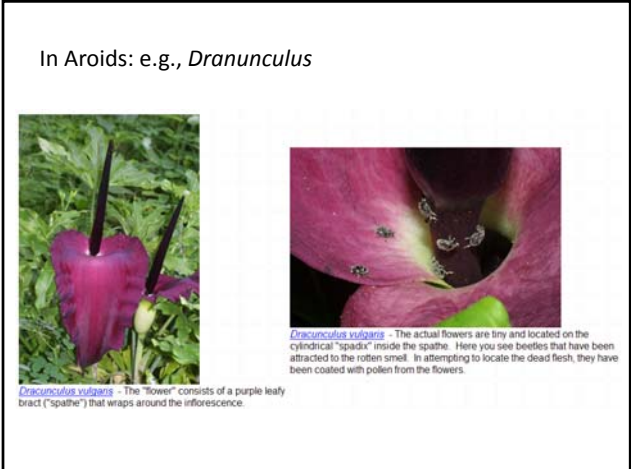
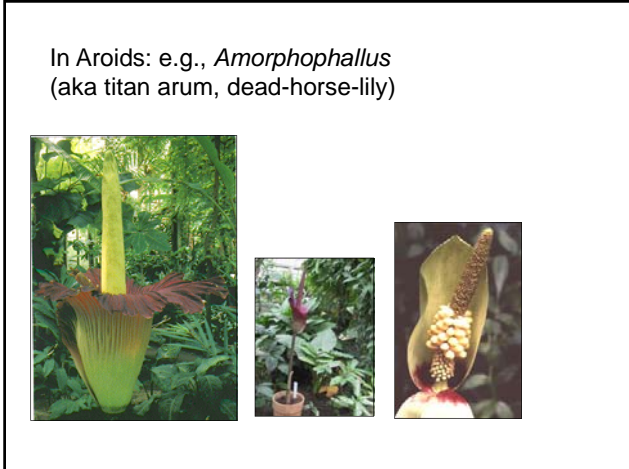


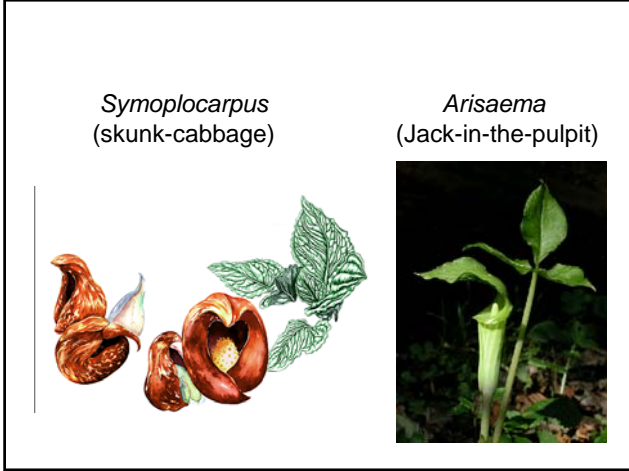
2. Carrion flowers


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.**







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**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. Skunk-cabbage is similar among thermogenic plants in that it warms its flowers in woods, marshes and stream sides (Fig. 1). Skunk-cabbage is similar among thermogenic plants in that it warms its flowers in woods, marshes and stream sides (Fig. 1).




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.]




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

Eastern skunk-cabbage, *Symplocarpus foetidus* (Araceae), is a perennial forb native to eastern North America and is found in wet areas with a relatively constant, high temperature that may be optimal for its unseasonably early pollen and ovule development which, in turn, can determine the timing of its flowering.

