Flowers are Magic

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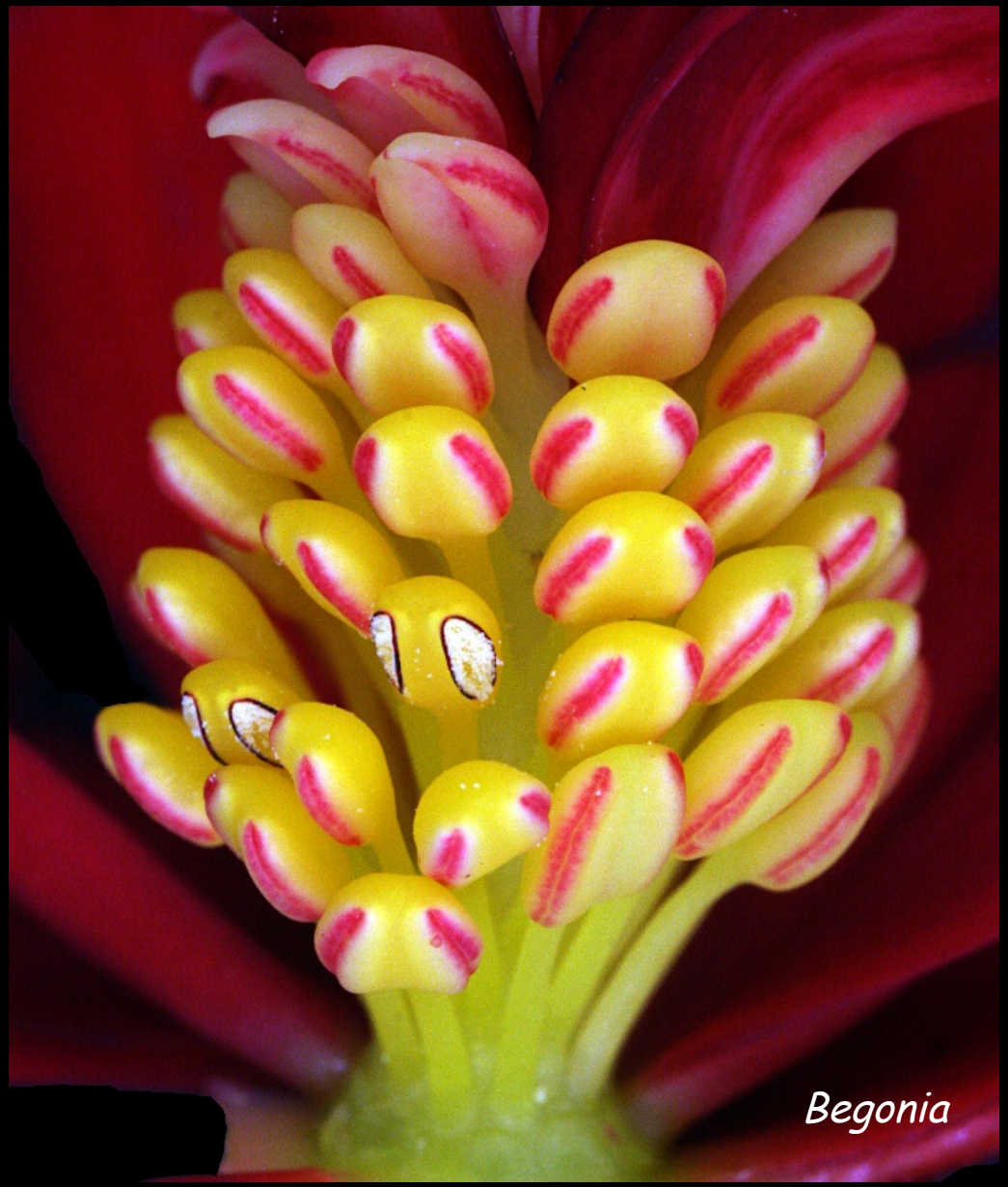
Flowers are Magic

A closer look at floral diversity

Pollination



Begonia

Pollination

Pollination is the process of transferring pollen from the stamens to the stigmatic surface.

Pollination systems

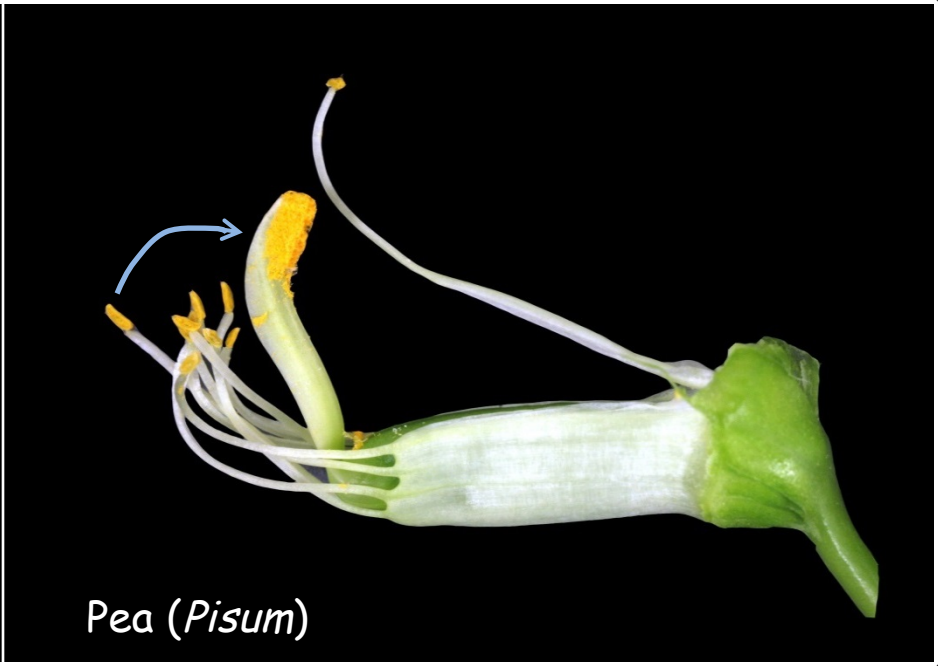
The two basic pollination systems include:

Self-pollination

Cross-pollination

Pollination systems

Self-pollination is a sexual system where the flower is pollinated by pollen within the same flower.



Pea (*Pisum*)

This type of system results in a high degree of pollination success, but low genetic variability in the seeds produced.

Pollination systems

Cross-pollination is where the flower is pollinated by pollen from a different flower usually from a separate plant.

The result are offspring with a higher degree of genetic variability.

Pollination systems

Cross-Pollination

Morphological adaptations in flowers can facilitate cross-pollination. These include:

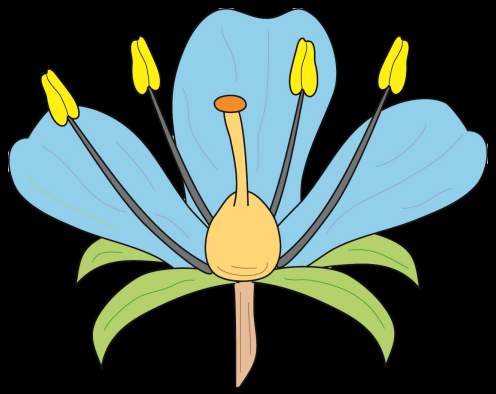
Dioecy (dioecious flowers)

Monoecy (monoecious flowers)

Dichogamy

Polymorphisms

Pollination systems

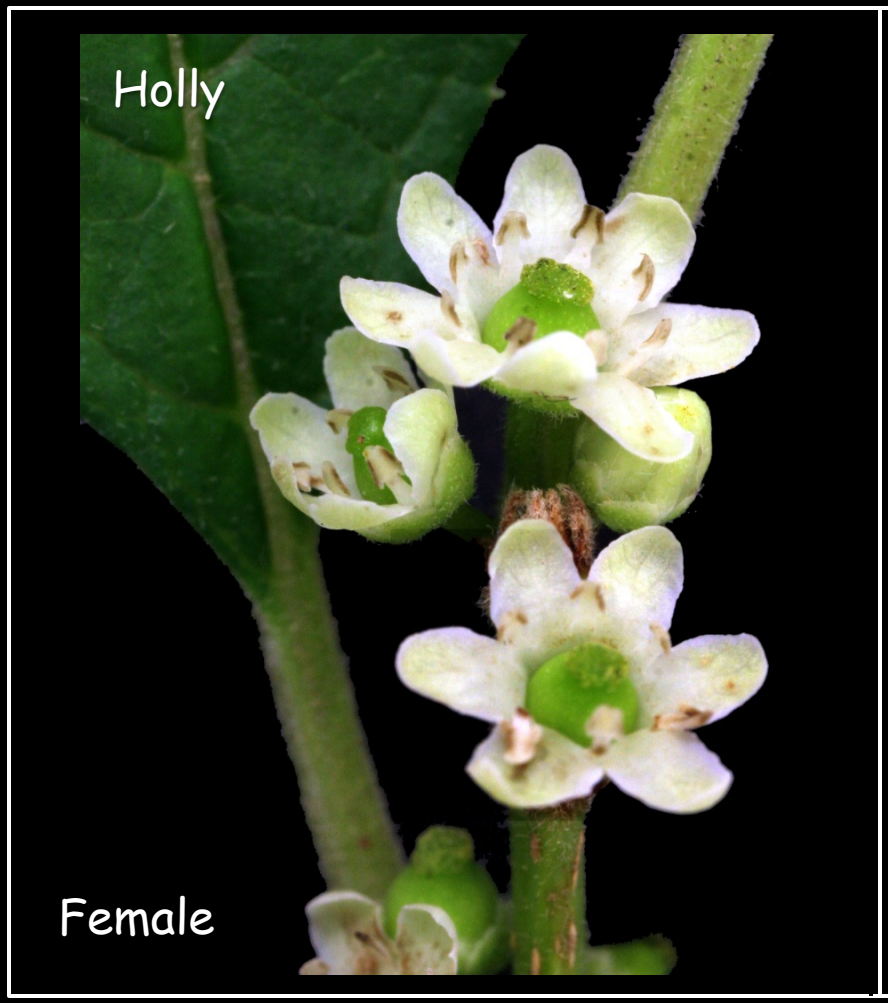


Bisexual

Cranesbill (*Geranium*)

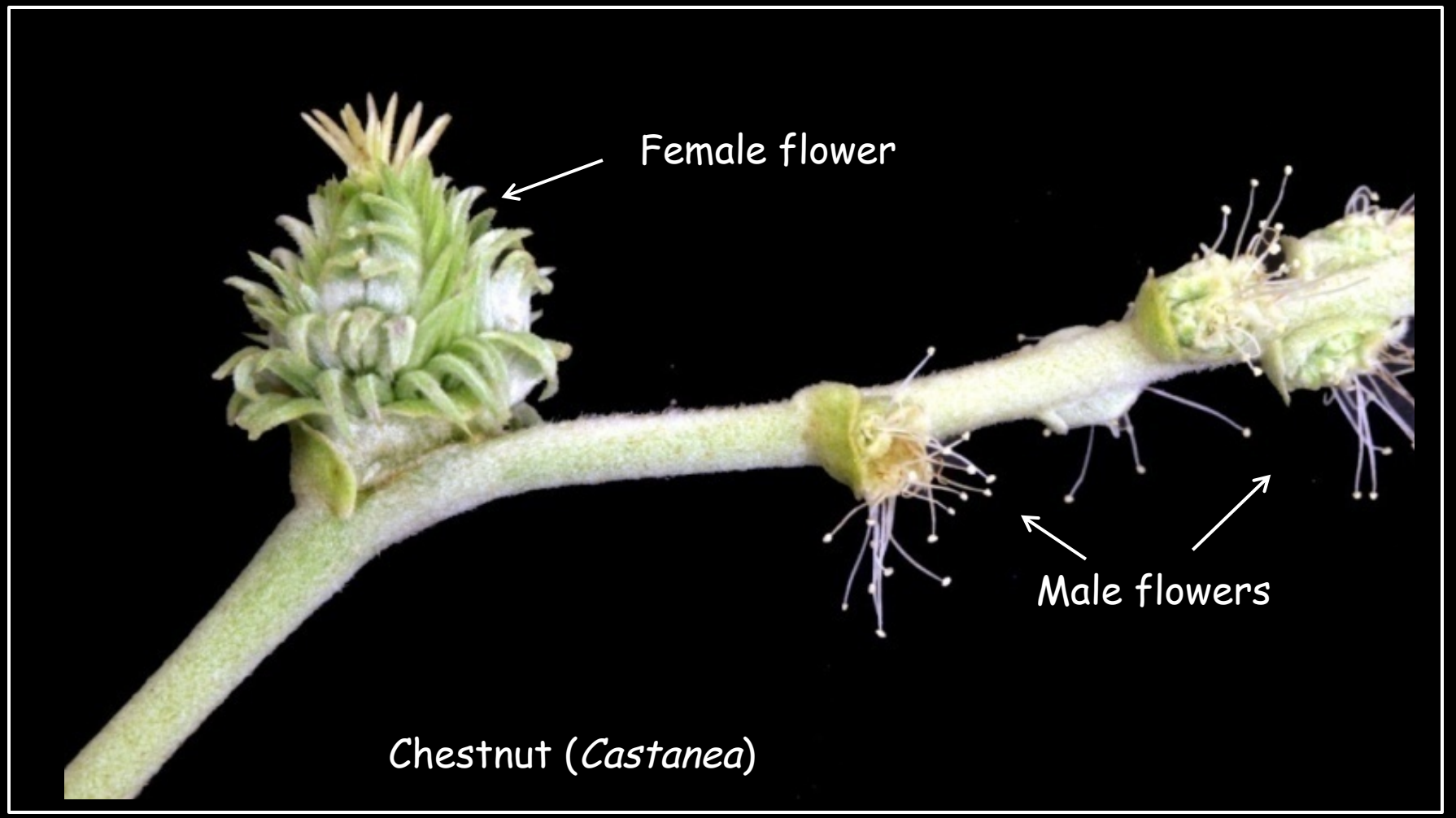
Pollination systems

Dioecious plants have pistillate (female) and staminate (male) flowers present in separate plants.



Pollination systems

Monoecious plants have pistillate (female) and staminate (male) flowers in separate flowers on the same plant.



Pollination systems

Bisexual flowers

Trillium

Ipheion

Pollination systems

Dichogamy

Dichogamy is the separation of female and male flower function in time in bisexual flowers.

Male phase

Female phase

Pollination systems

Polymorphisms

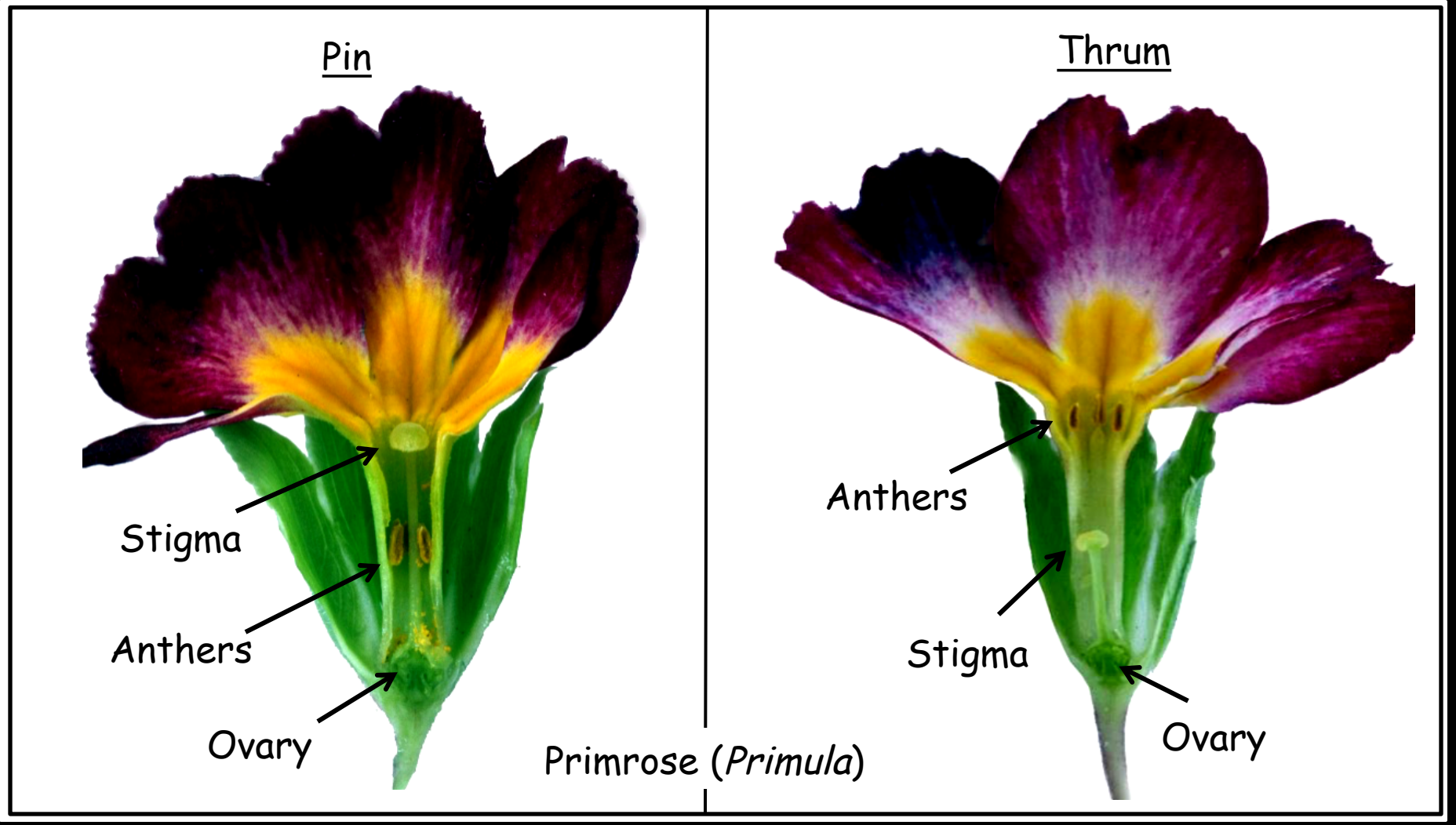
Darwin described the different flower forms in primrose called heterostyly.

Primrose (*Primula*)

Pollination systems

Polymorphisms

In primrose, the different flower forms are called pin and thrum.



Pollination systems

Pollination systems differ depending on how the flower opens and where and when the flower parts become receptive or shed pollen.

Chasmogamous

The flower is open when shedding pollen.

Echinopsis

Cleistogamous

The flower never opens and self-pollinates.

Bleeding heart

Pollination systems

Chasmogamous

Chasmogamous flowers are common in Angiosperms.

Hibiscus

Pollination systems

Cleistogamous

Cleistogamy is found in over 200 (mostly herbaceous) species.

The reproductive effort invested in the cleistogamous flowers is smaller than in chasmogamous flowers.

Peanut (*Arachis*)

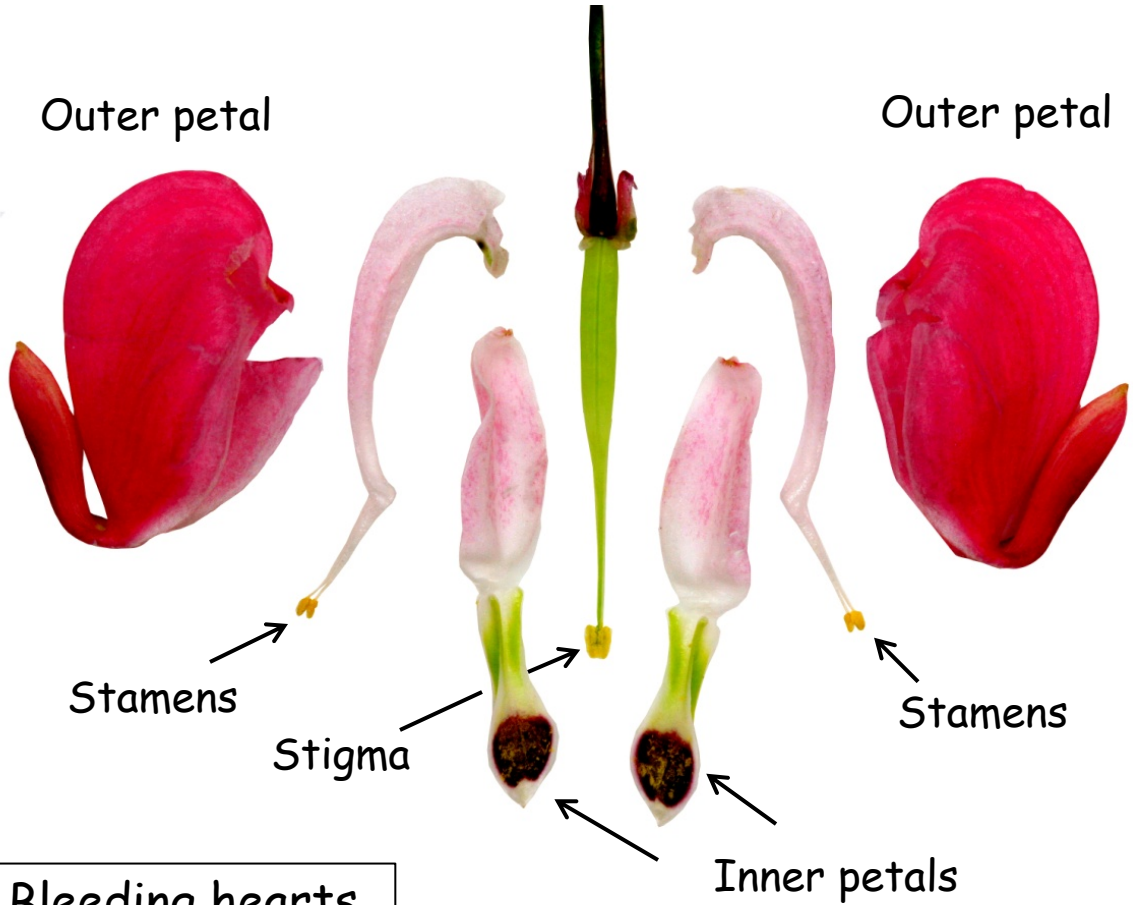
Pollination systems

Cleistogamous

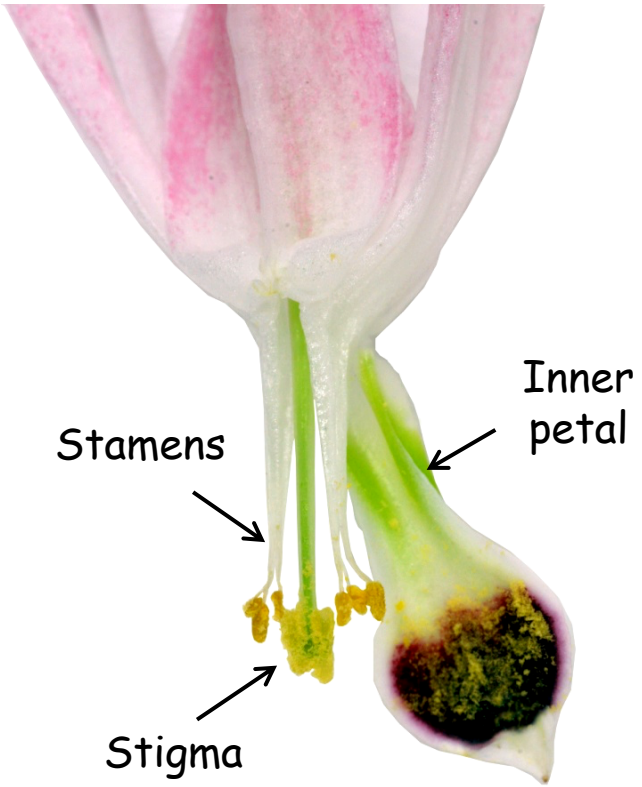
Bleeding hearts (*Lamprocapnos spectabilis*) has cleistogamous flowers.

Pollination systems

Cleistogamous



Bleeding hearts



Pollination systems

Chasmogamous and Cleistogamous

Violets can produce both chasmogamous and cleistogamous flowers.

Chasmogamous flowers are produced in the spring or summer when pollinators are active.

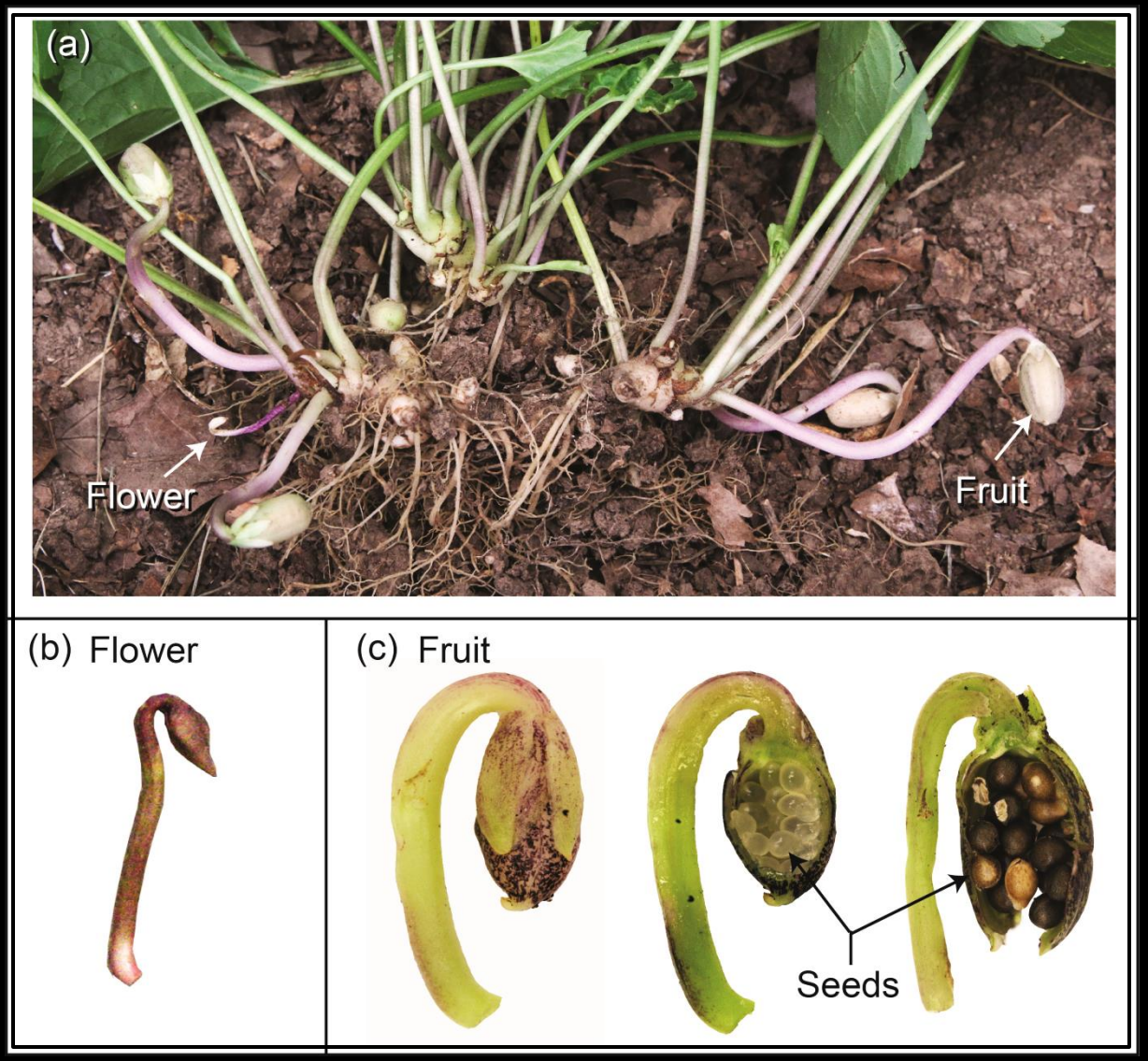
Cleistogamous flowers are produced in the fall and are self-pollinated.

Sweet violet (*Viola odorata*)

Pollination systems

Chasmogamous and Cleistogamous

Cleistogamous violet flowers are produced at and under the soil surface and do not require pollinators.



Pollination systems

Pollination

Flower morphology adapts to accommodate either wind or insect pollination.

Pollination systems

Wind pollination

Wind pollination occurs most often in plants with separate male and female flowers.

It occurs in both gymnosperms and angiosperms, but is the primary mechanism for pollination in gymnosperms.

Pollen

Pollination systems

Wind pollination in gymnosperms

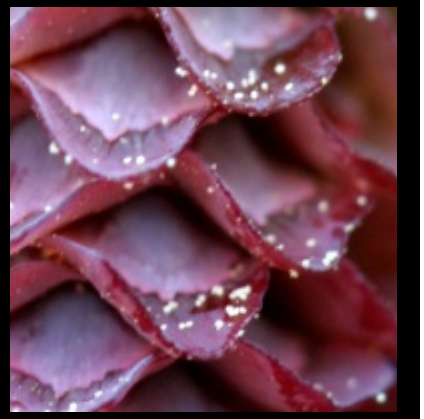
Gynmosperms evolved prior to the rise in insects and therefore most gymnosperms rely on wind-pollination.

Pollination systems

Wind pollination in gymnosperms

Pollen is moved from the male to the female sexual cones.

Male spruce (*Picea*) staminate cone shedding pollen.

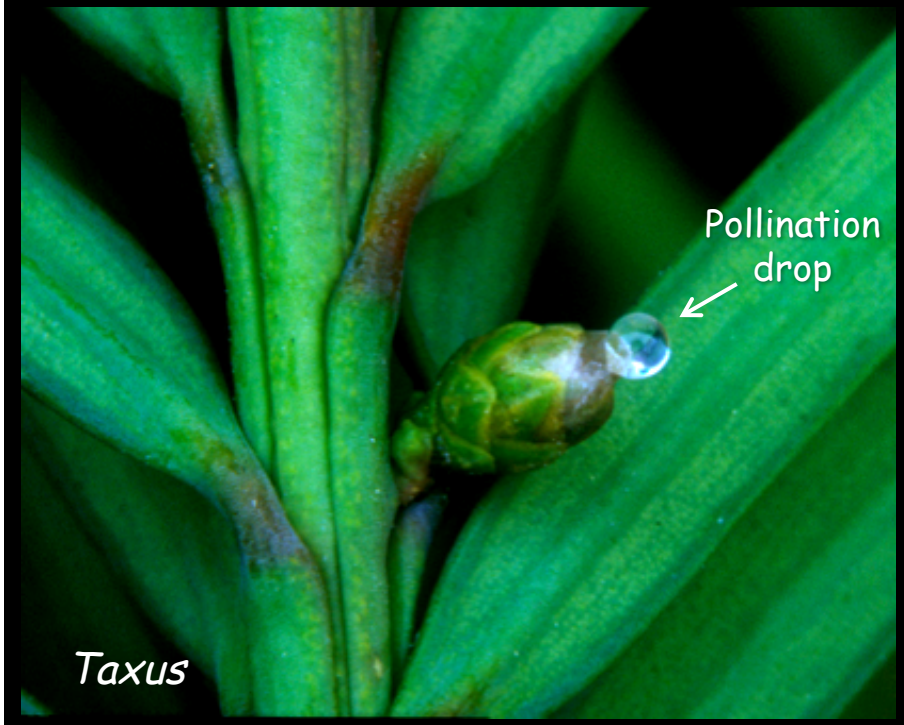


Female spruce ovulate cone accepting pollen.

Pollination systems

Wind pollination in gymnosperms

In some gymnosperm female ovulate cones, there is a drop of fluid (pollination drop) at the tip of the ovules.



Gymnosperm reproductive cones

Gymnosperm reproductive cones

Juniperus virginiana

Gymnosperm reproductive cones

Gymnosperm reproductive cones

Gymnosperm reproductive cones

Pseudolarix

Gymnosperm reproductive cones

Metasequoia

Gymnosperm reproductive cones

Picea pungens

Gymnosperm reproductive cones

Picea abies

Gymnosperm reproductive cones

Pinus nigra

Gymnosperm reproductive cones

Larix

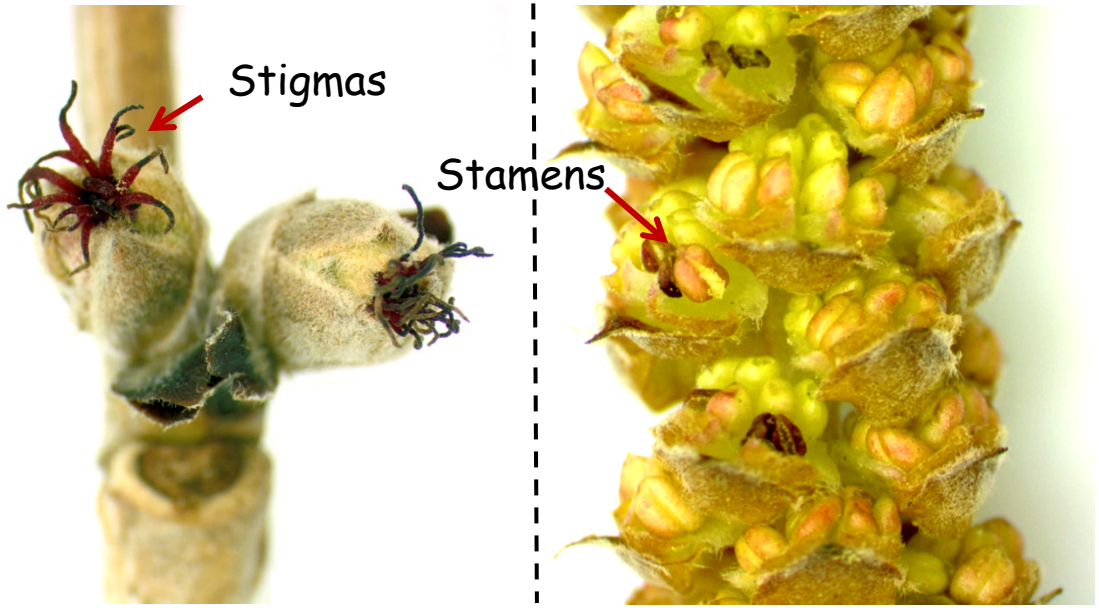
Gymnosperm reproductive cones

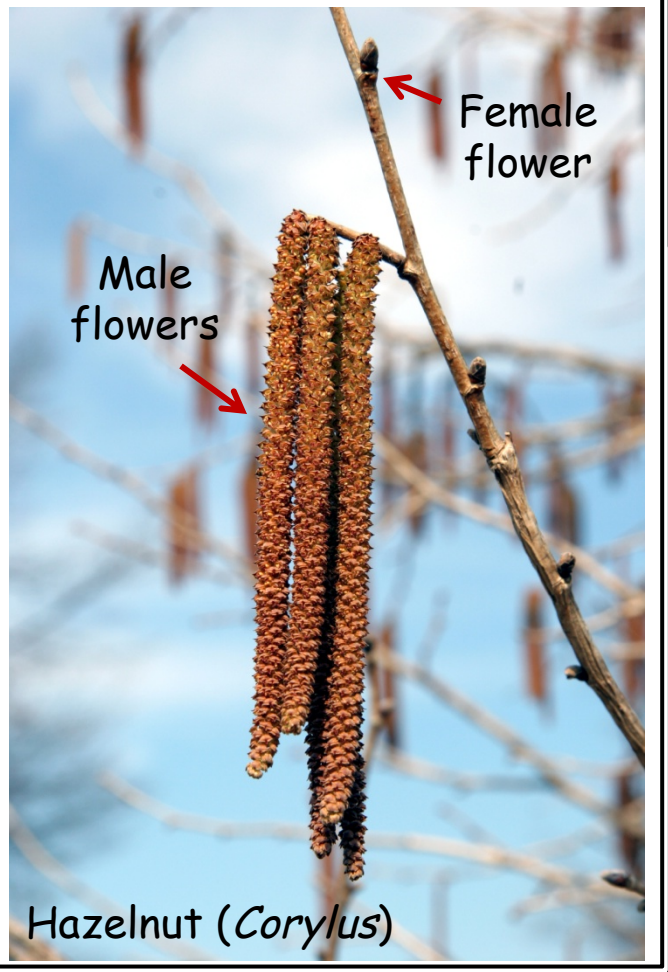
Larix

Pollination systems

Wind pollination in angiosperms

Wind-pollinated male flowers are often held in pendulous catkins exposing pollen to the wind. Female flowers have no petals to expose stigmas to capture pollen.

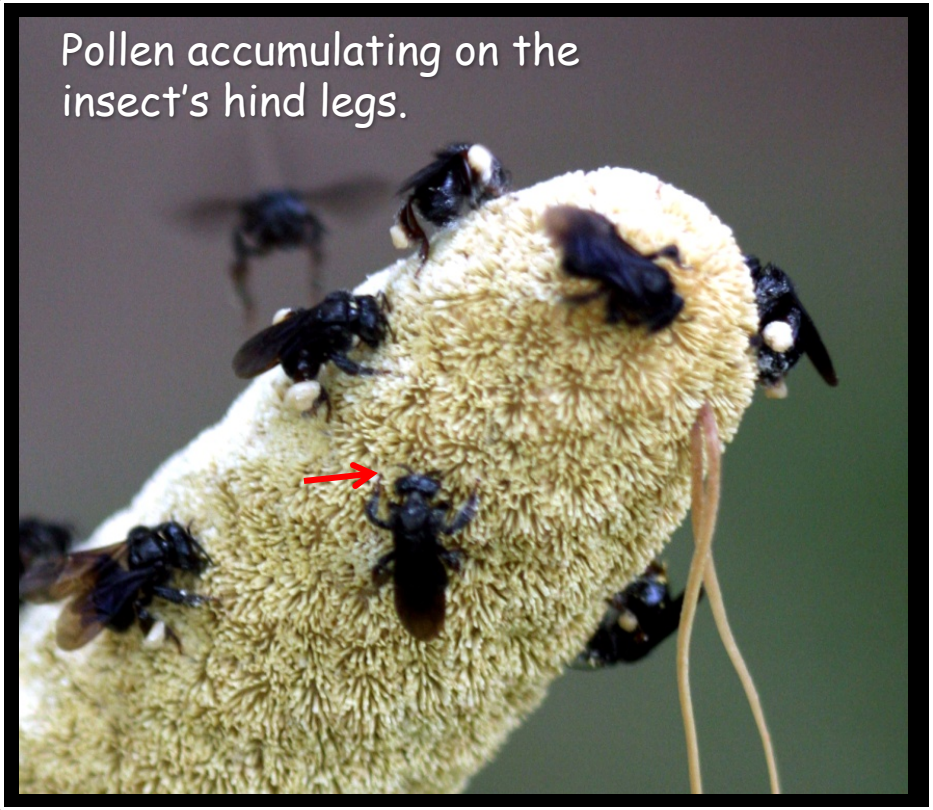




Pollination systems

Pollination in angiosperms

The evolution of the angiosperm flower is connected with the success of insects as pollinators in the Cretaceous period.



Since plants are basically immobile, flying insects gave them the ability to move the male gamete (pollen) over a much greater distance compared to wind pollination.