Flowers are Magic

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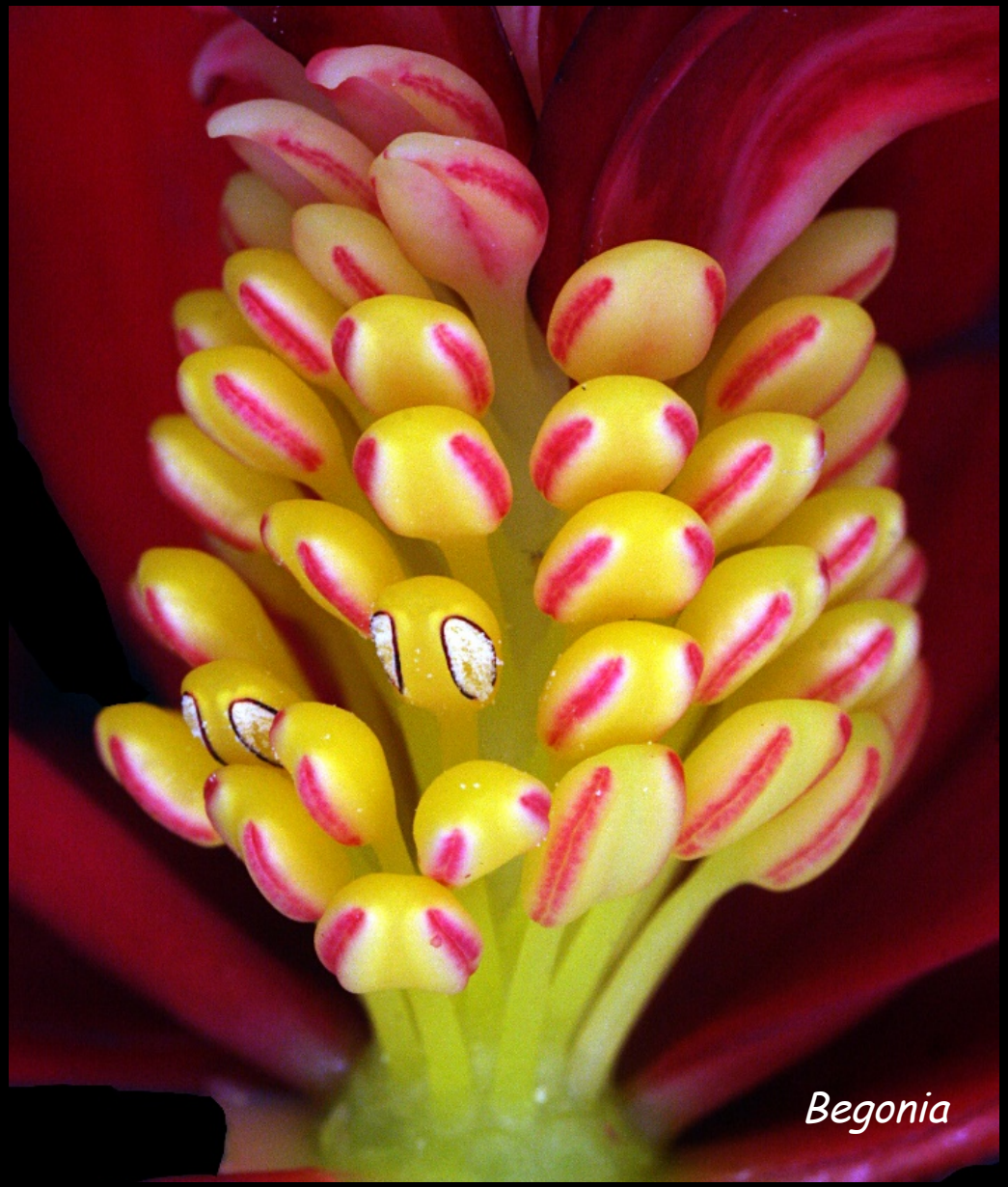
Flowers are Magic

A closer look at floral diversity

Pollination



Begonia

Pollination

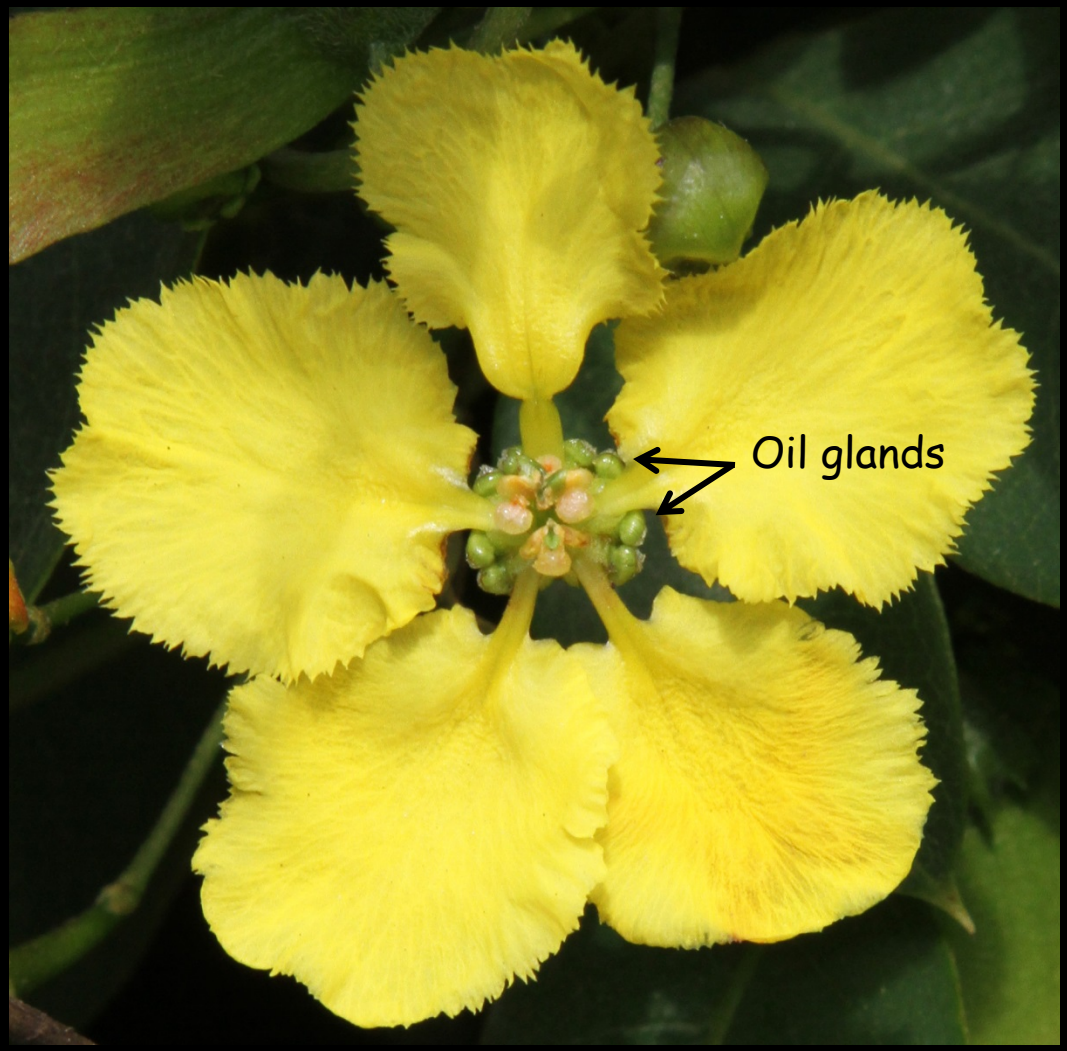
Pollination is the process of transferring pollen from the stamens to the stigmatic surface.

Pollination adaptations

Floral adaptations – Oil producing flowers

Oils are produced on trichomes or in secretory glands called elaiophores.

The oils are harvested by bees that use it with pollen to feed larvae.



Butterfly vine (*Mascagnia macroptera*)

Pollination adaptations

Floral adaptations – Oil producing flowers

Oil producing flowers occur in over 2,300 species including:

- Malpighiaceae
- Orchidaceae
- Scrophulariaceae
- Solanaceae
- Primulaceae
- Iridaceae

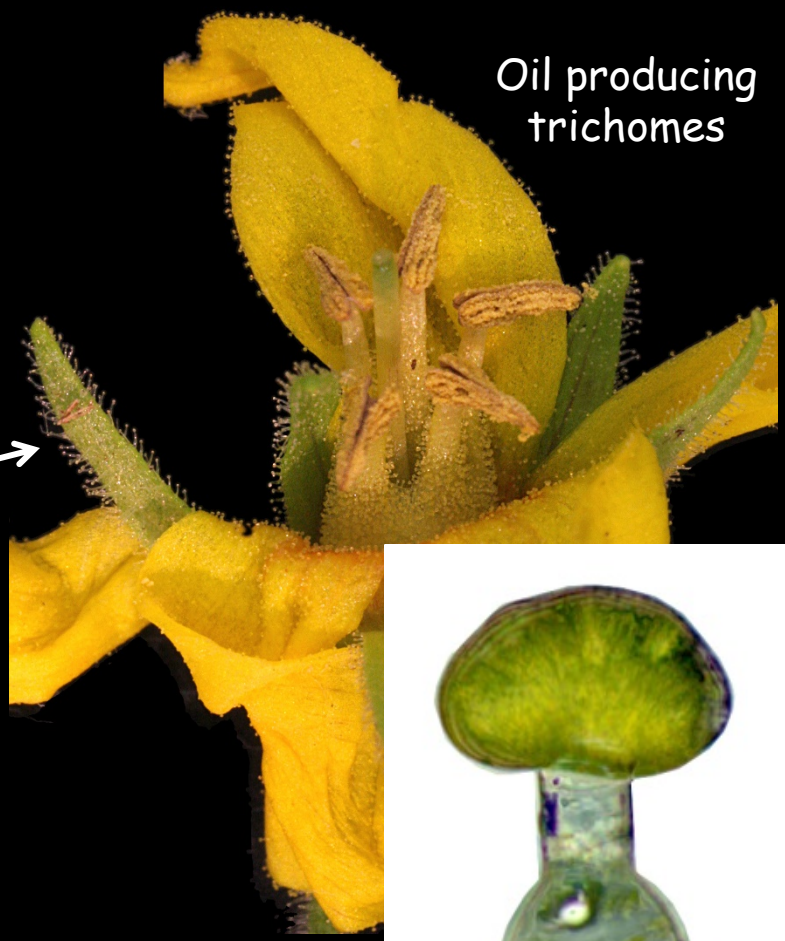
Byrsonima umbellata

Pollination adaptations

Floral adaptations – Oil producing flowers

Lysimachia have oil producing flowers with oil trichomes located on sepal, petal and anther filaments.

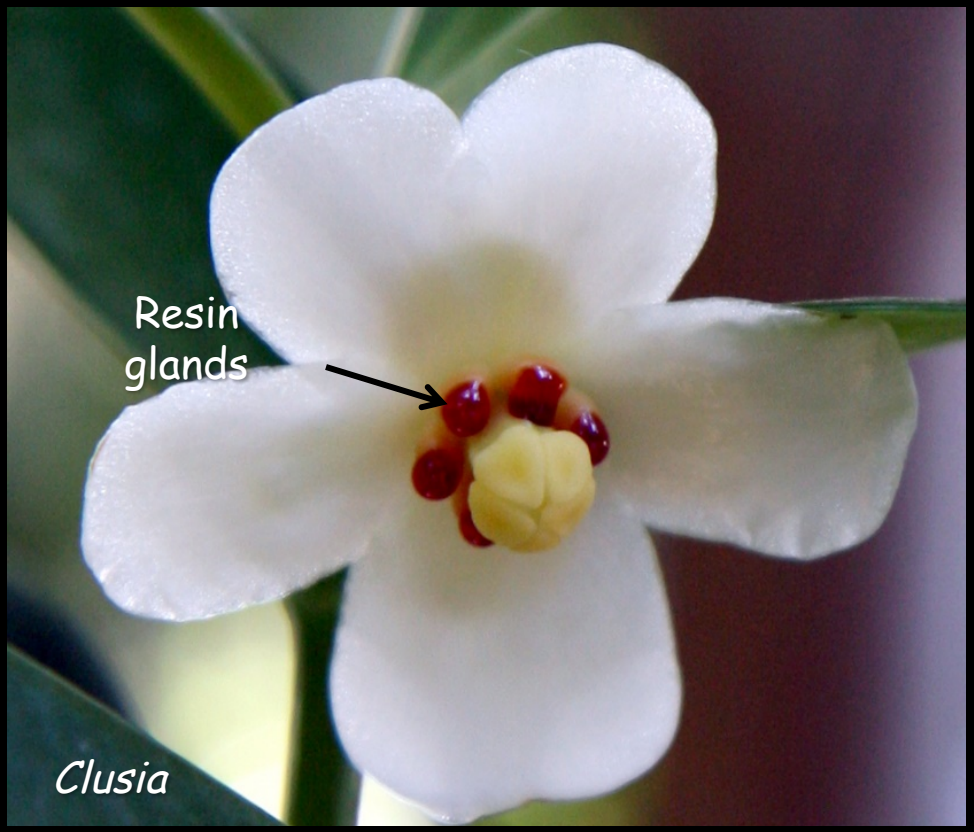
Loosestrife (*Lysimachia punctata*)

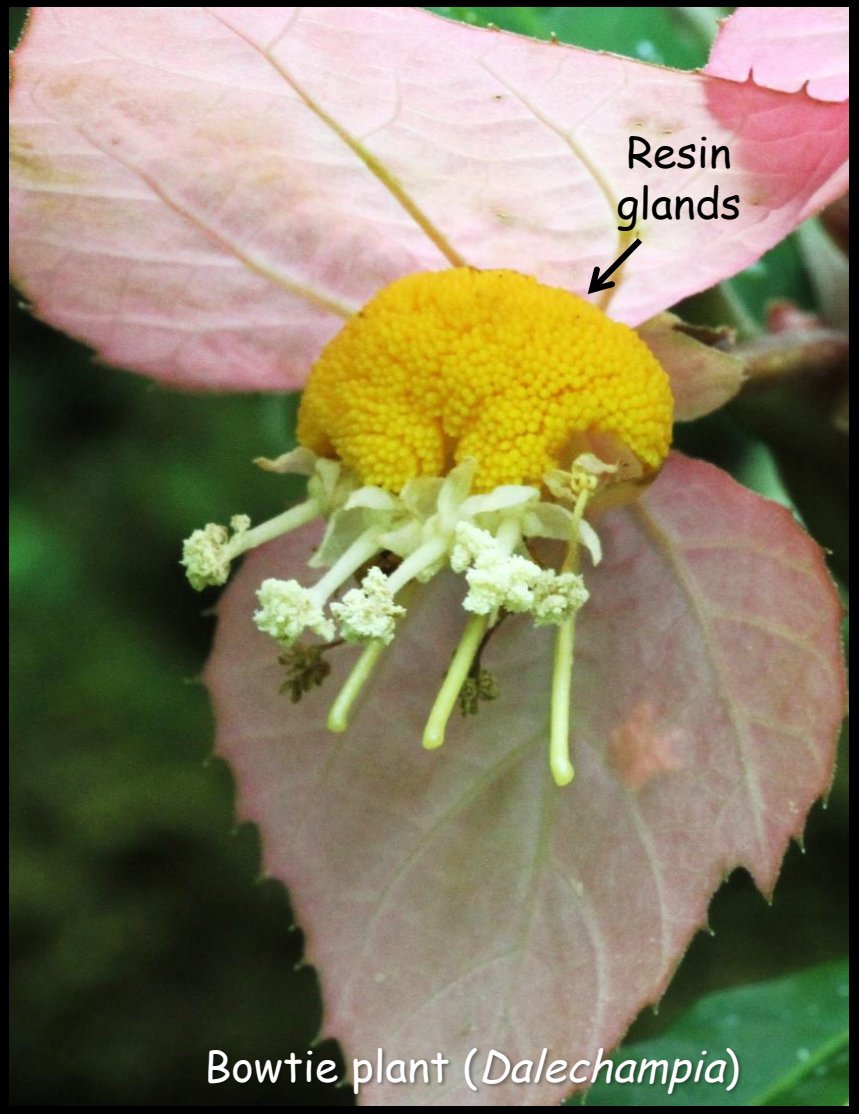


Pollination adaptations

Floral adaptations – Resin glands

Terpene resins are collected by bees and have antibacterial and antifungal properties for nest lining.





Pollination adaptations

Floral adaptations – Nectar guides

Flowers often have contrasting colors on the petals that act as nectar guides to signal a floral reward for visiting the flower.

Phlox

Morning glory
(*Ipomoea*)

Pollination adaptations

Floral adaptations – Nectar guides

Some insects perceive color differently than humans and the nectary guides may not always to be obvious to us.

A Potentilla flower viewed under a simulated UV spectrum shows the "insect view" of the flower and nectar guides.

Pollination adaptations

Floral adaptations – Nectar guides

In some Caesalpinoid legumes like royal Poinciana (*Delonix*), the upper flag petal has color nectar guides for pollinators.

Pollination adaptations

Floral adaptations – Color change

Flower color can be a signal used by pollinators to locate preferred flowers.

Lungwort (*Pulmonaria*)

Borage (*Borago*)

In the borage family, flowers change from pink to blue.

Pollination adaptations

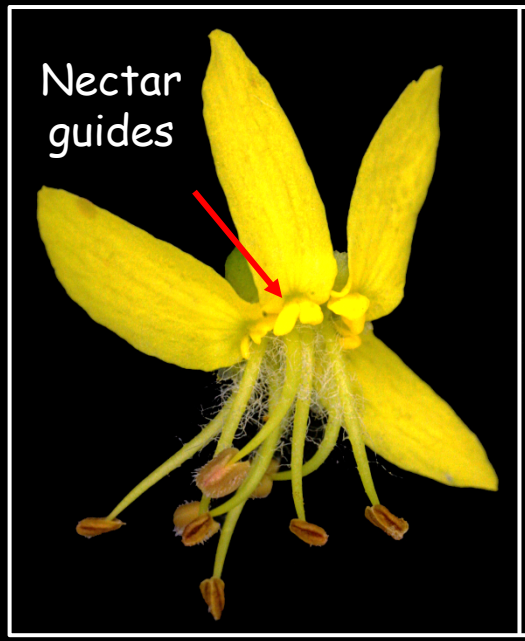
Floral adaptations – Color change

Horsechestnut flowers have nectar guides that change from yellow to orange to red as the flower ages.

Pollination adaptations

Floral adaptations – Color change

Golden raintree (*Koelruteria*) has petals with a bi-lobed nectar guides.



Color change in nectar guides in paired flowers.

Pollination adaptations

Floral adaptations – Color change

In some members of the rose family, like chokeberry (*Aronia*), the anthers change color to signal pollinators.

Pollination adaptations

Floral adaptations – Color change

Color change can signal different pollinators.

Flowers open white and are pollinated by hawkmoths.

As the flowers change to red, they hang down and are pollinated by bees and flies.

Pollination adaptations

Floral adaptations – Color change

The flowers in a *Lantana* inflorescence that initially emerge from the bud are yellow for one day, then turn orange on day 2 and finally change to pink-red.

One type of butterfly prefers to visit only yellow and orange flowers, while a different butterfly species prefers older pink-red flowers.

Pollination adaptations

Pollination specialists – Buzz pollination

Bees cling to the cone-like shaped stamens and their buzzing shakes pollen out of the anthers and onto the bee.

Borage (*Borago*)

Shooting star (*Dodecatheon*)

Pollination adaptations

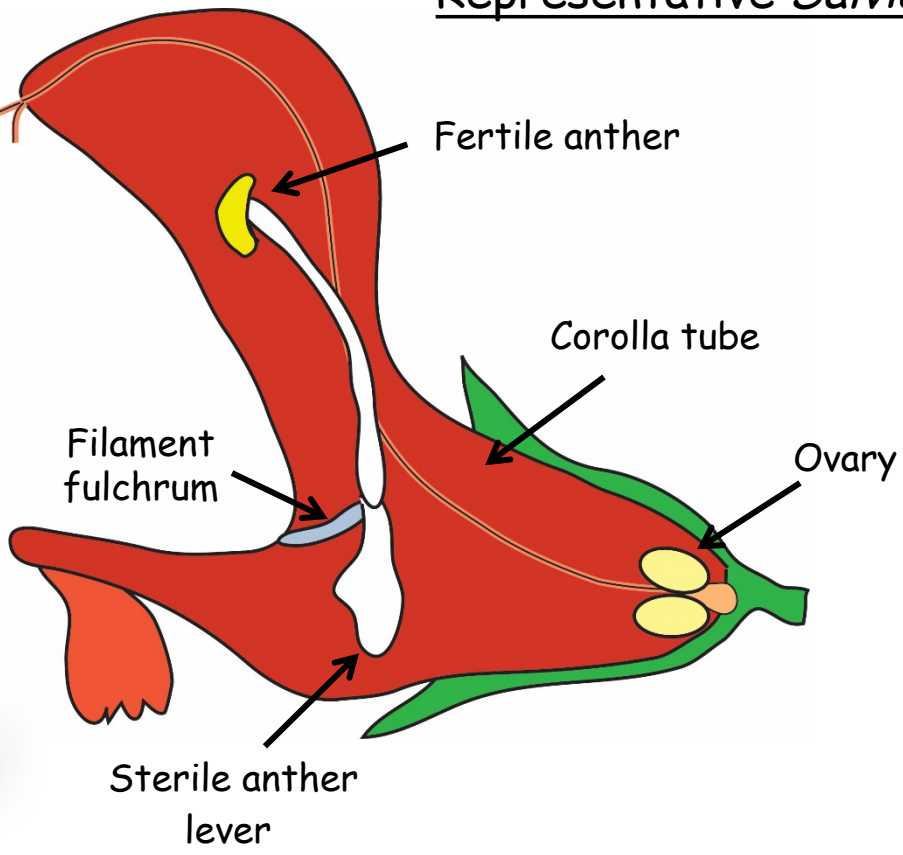
Pollination specialists – Staminal lever

Salvia flowers have a unique stamen morphology that allows the anther to swivel using a lever mechanism.

An insect or bird probing the base of the flower for nectar causes the anther to hinge down coating the head with pollen.

Pollination adaptations

Pollination specialists – Staminal lever



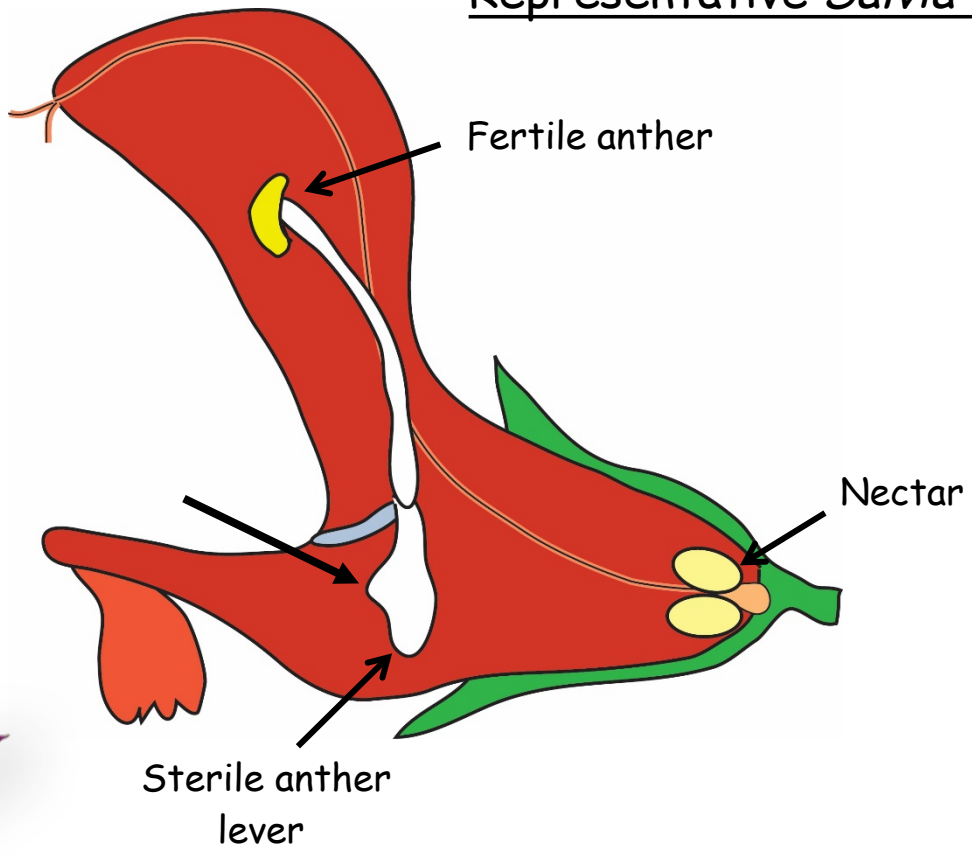
Pollination adaptations

Pollination specialists – Staminal lever

Swivel mechanism

① Pollinator pushes on lever portion of the stamen to get access to nectar at the base of the flower.

Representative *Salvia* flower



Pollination adaptations

Pollination specialists – Staminal lever

Swivel mechanism

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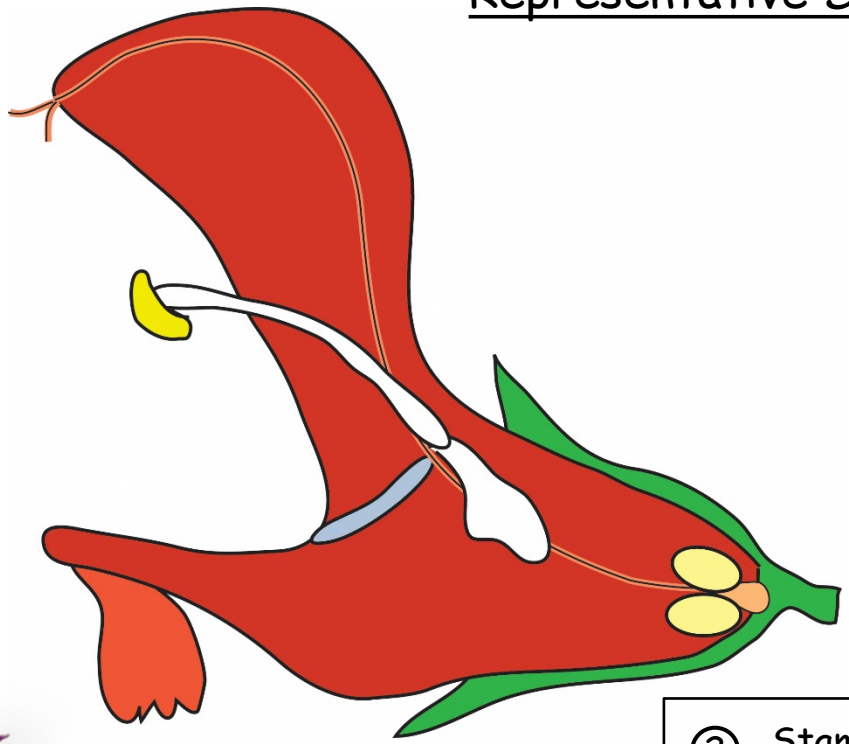
Representative *Salvia* flower



② Stamen rocks on filament fulcrum.

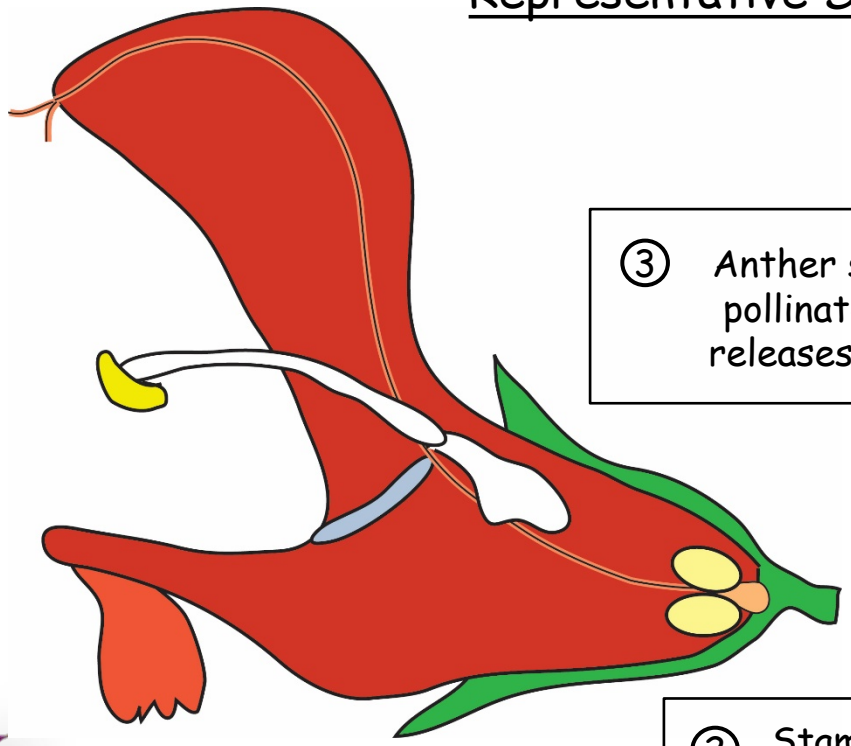
Pollination adaptations

Pollination specialists – Staminal lever

Swivel mechanism

① Pollinator pushes on lever portion of the stamen to get access to nectar at the base of the flower.

Representative *Salvia* flower



② Stamen rocks on filament fulcrum.

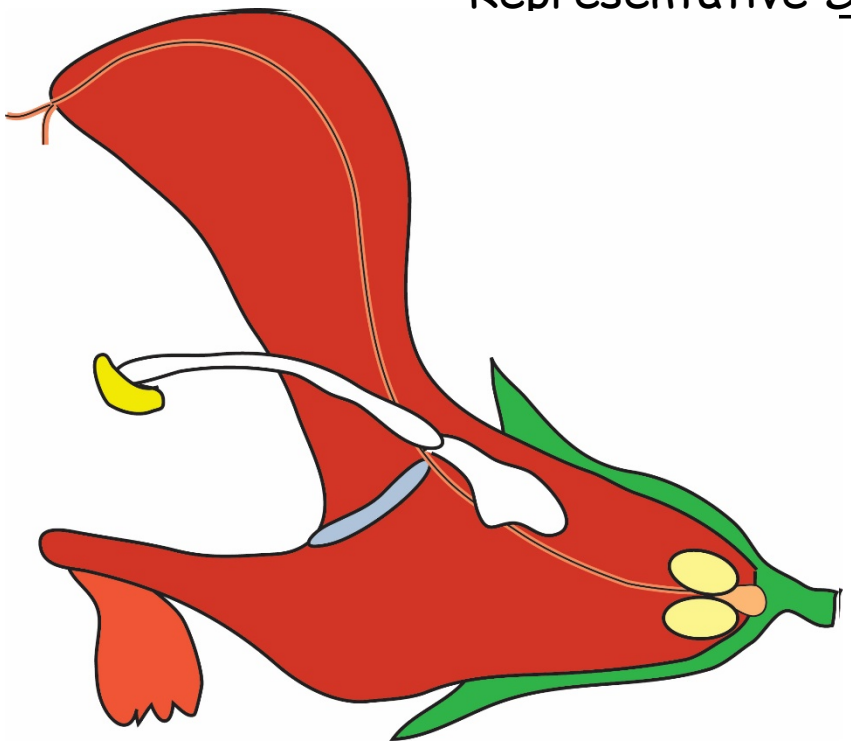
③ Anther strikes pollinator and releases pollen.

Pollination adaptations

Pollination specialists – Staminal lever

Swivel mechanism

Representative *Salvia* flower

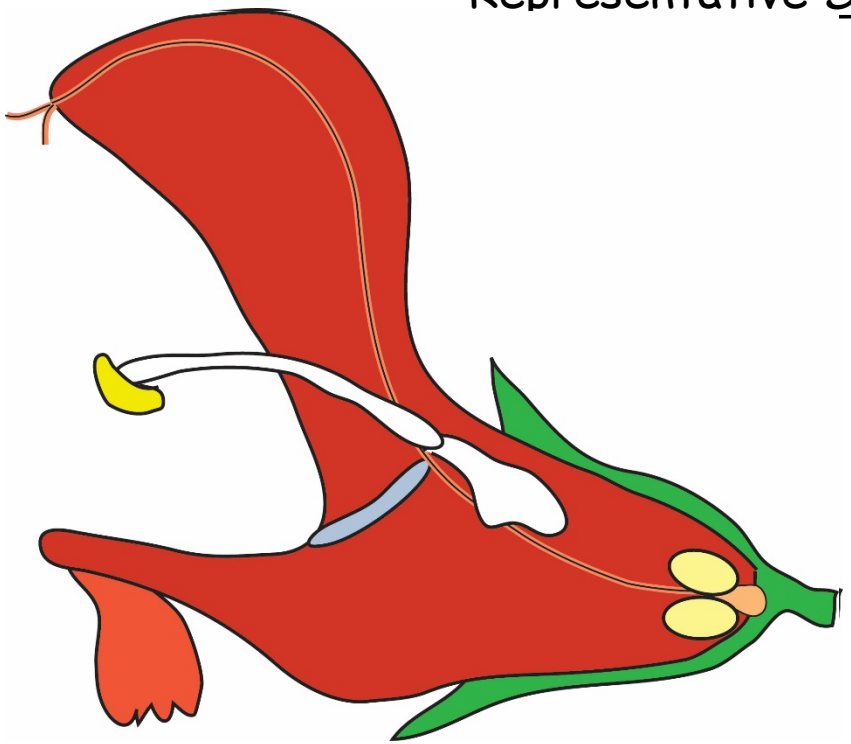


Pollination adaptations

Pollination specialists – Staminal lever

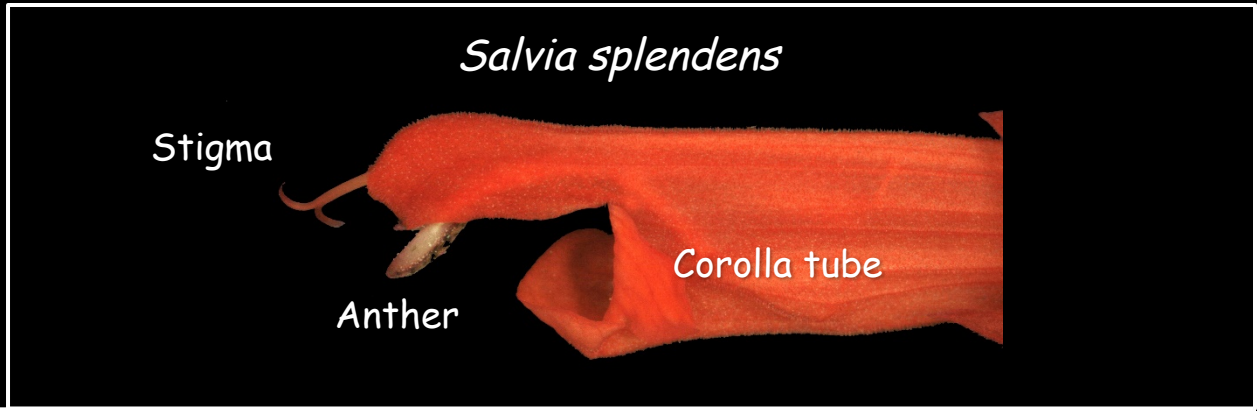
Swivel mechanism

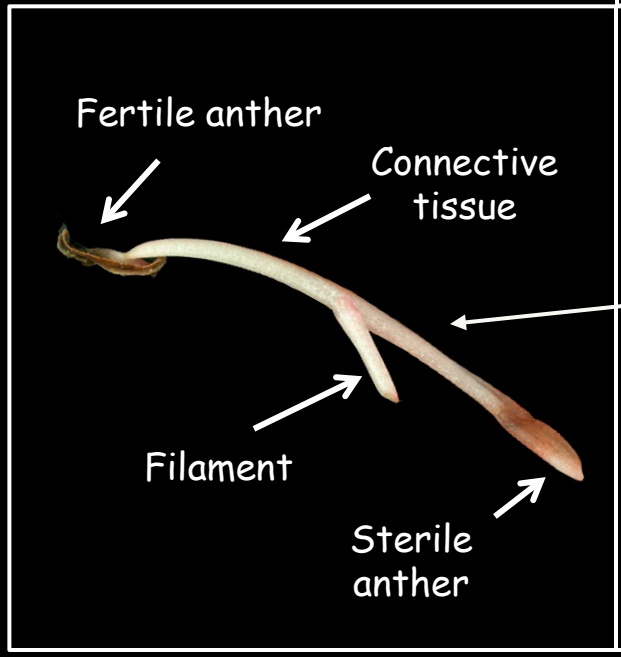
Representative *Salvia* flower

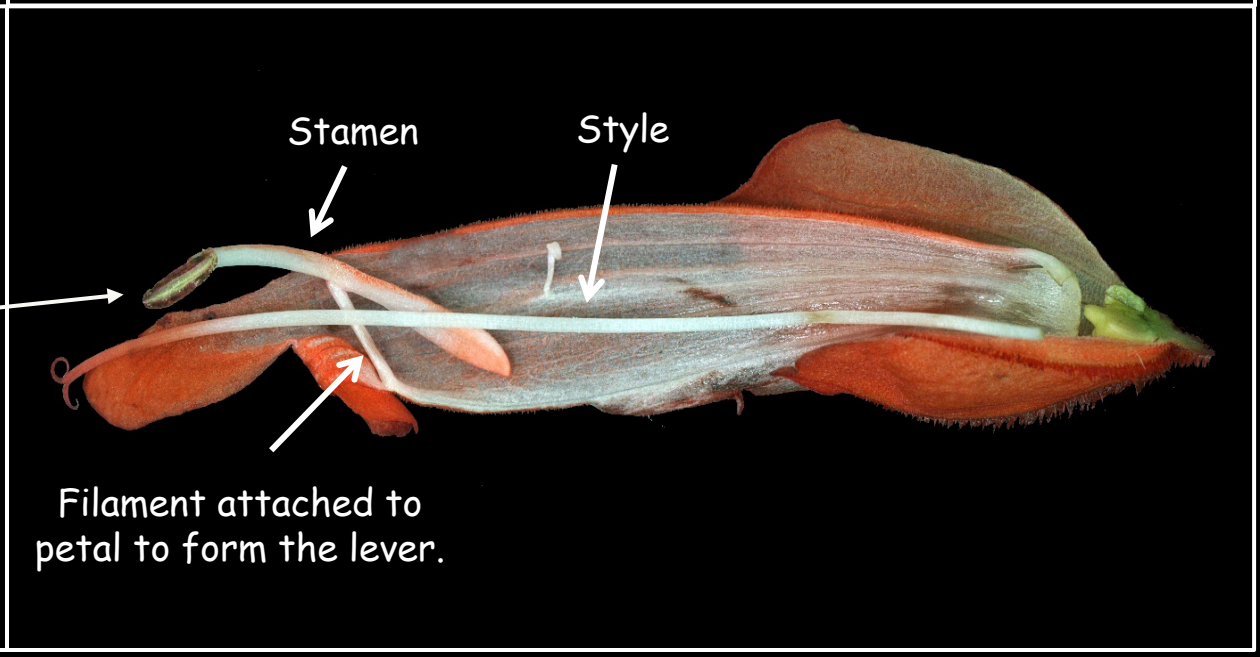


Pollination adaptations

Pollination specialists – Staminal lever



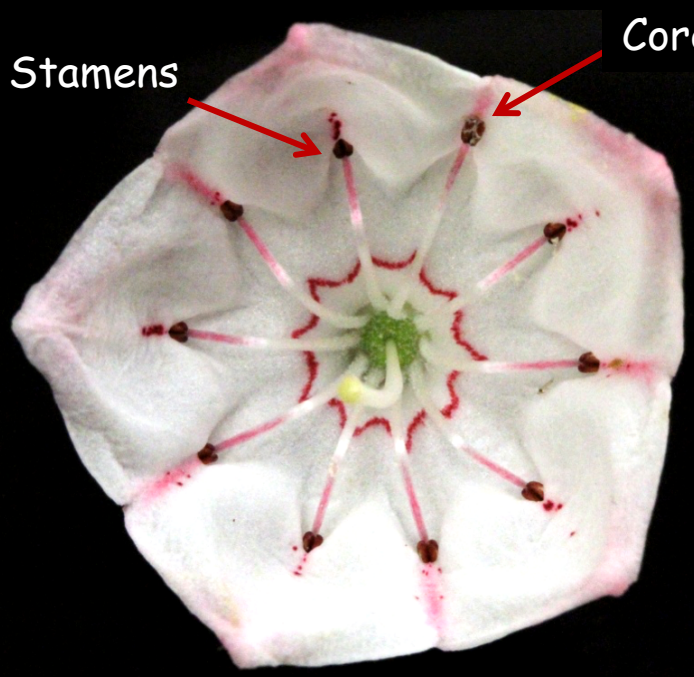




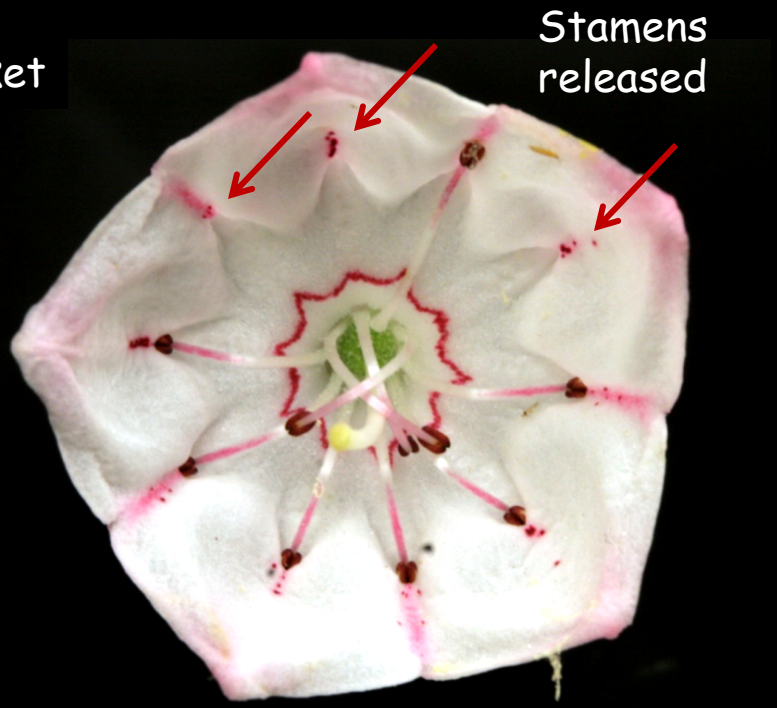
Pollination adaptations

Pollination specialists – Active stamen movement

Mt. Laurel (*Kalmia*) stamens are "spring loaded".



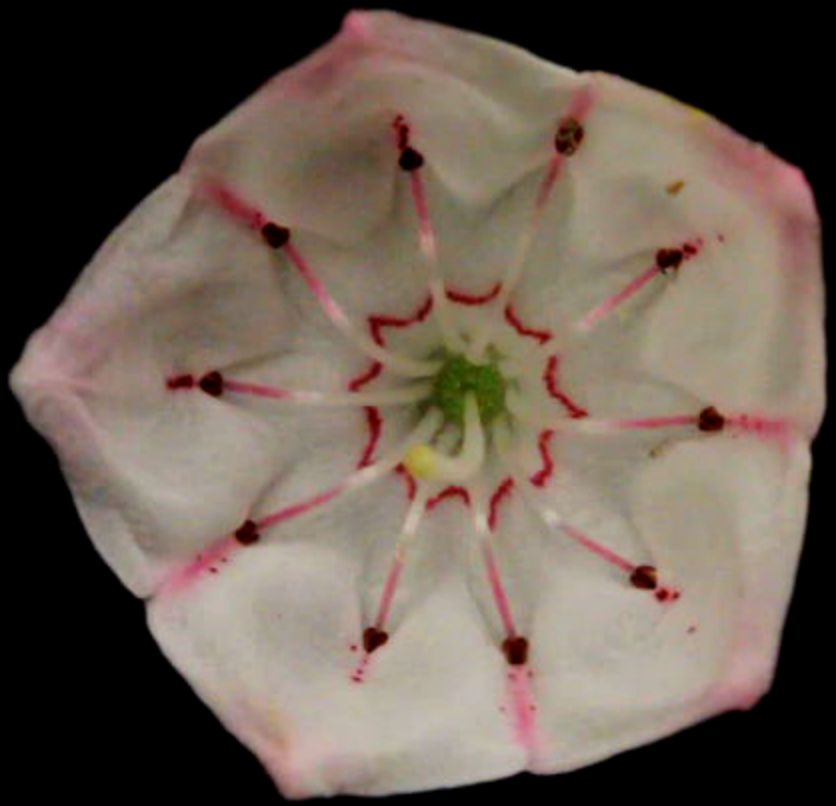
Stamens in place



Three stamens released

Pollination adaptations

Pollination specialists – Active stamen movement



Pollination adaptations

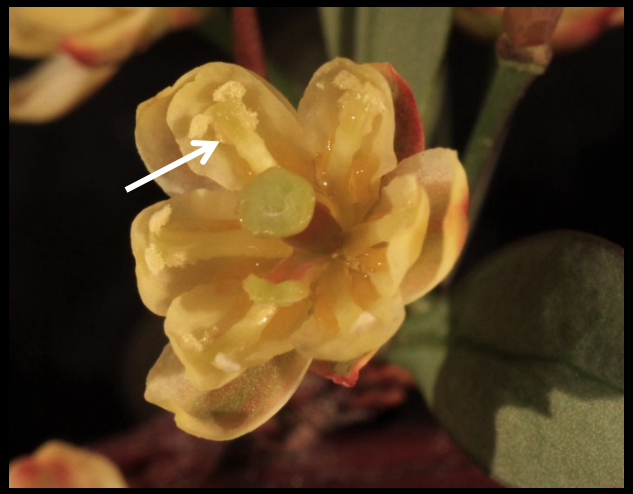
Pollination specialists – Active stamen movement

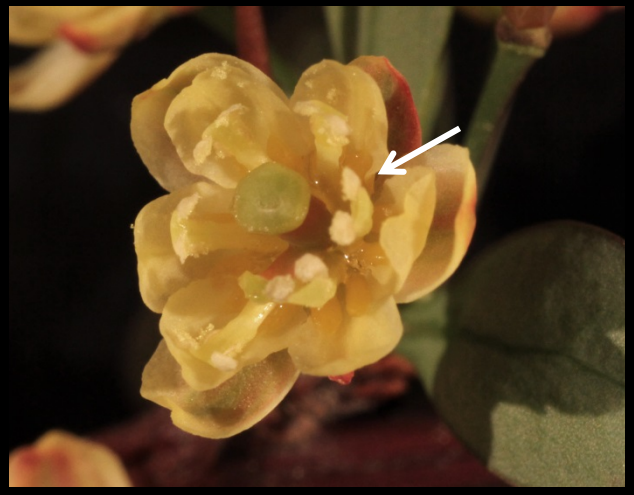
Barberry (*Berberis*) stamens react to the touch of a pollinator to abruptly move toward the visiting insect and release pollen and then resets.

Pollination adaptations

Pollination specialists – Active stamen movement

Stamen closure movement is rapid, but the stamens will gradually reset after about 5 minutes.





Pollination adaptations

Pollination specialists – Active stamen movement

Pollination adaptations

Pollination specialists – Active stamen movement

The cactus, *Opuntia* also has irritable stamens that move toward the center of the flower when touched.

Before touch stimulation.

After touch stimulation the stamens have moved.

Pollination adaptations

Pollination specialists – Active stamen movement

Irritable stamens in *Opuntia* flowers.

Pollination adaptations

Pollination specialists – Active floral movement

An example of thermonasty can be seen in some early spring flowering plants that open and close petals in response to temperature.

A cycle of opening and closing of the petals in bloodroot (*Sanguinaria*).

Pollination adaptations

Pollination specialists – Active floral movement

Thermonastic petal movement in tulips.
Temperatures below about 50°F (4°C) cause petals to close.