

Pollinators We Never Talk About



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Why Do Plants Need Pollination?

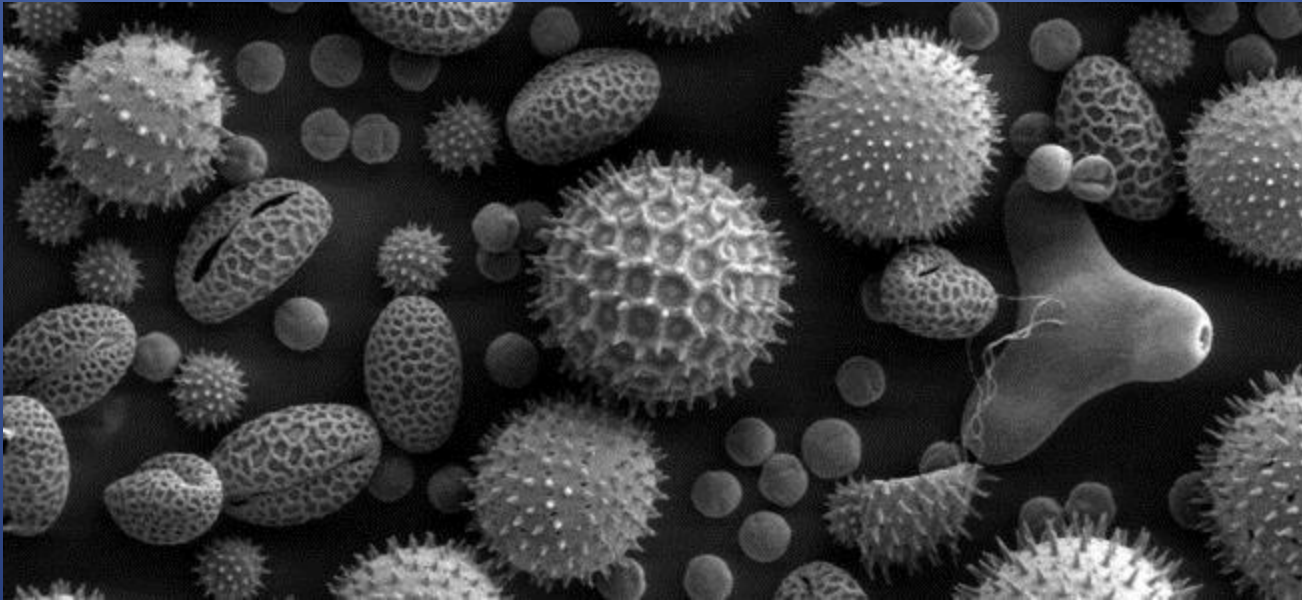
- To move pollen from plant to plant
- To prevent inbreeding
- Move genes around

What Do Plants Need

Ways to outcross

Someone/something to carry pollen to
someone else's flower

With lowest possible investment



Kinds of Pollination

- Wind
- Water
- Animals: Insects, birds, mammals



Wind Pollination

Imprecise

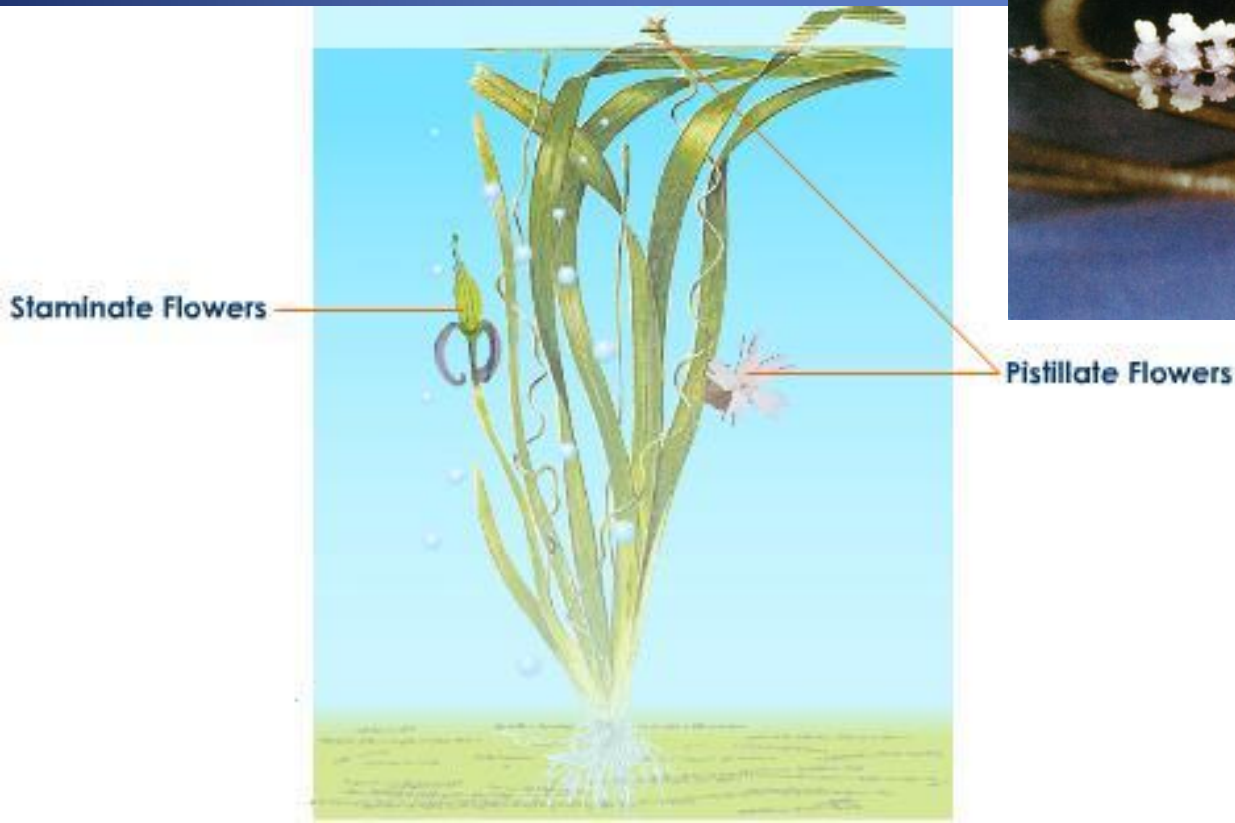
Requires huge amounts of pollen - costly

Everyone gets some...



Water Pollination

Imprecise
Water passively carries pollen
to flowers and everything
else



Animal Pollinators

- Most effective agents for plants
- Take pollen directly to right kind of flower
- Flower determines how pollen collected
- Flower determines how pollen is deposited

What Do Animals Need

To get animals to help plants provide:

- food (pollen, nectar)
- scents/perfume
- oils
- nest materials



So what does it take to be a pollinator?

1. You have to be hairy
2. You have to spend time in flowers, mucking about
3. You have to contact the flower's reproductive parts
4. You have to visit multiple flowers of the same species



Its All About Moving Pollen



Bees

Bees are very hairy
Their hairs are feathery
For collecting pollen



We always talk about bees as pollinators
But mostly think of honey bees
There are many, many others...



Different Bees Carry Pollen Differently

legs



Bumble bee



Digger bee

abdomen



Leaf cutter bees



Sweat
bee

Non-Bee Insect Pollinators



Flower flies



Ants



beetles



Butterflies



Mosquitoes



Moths



Wasps

What Am I?



What About Flies?



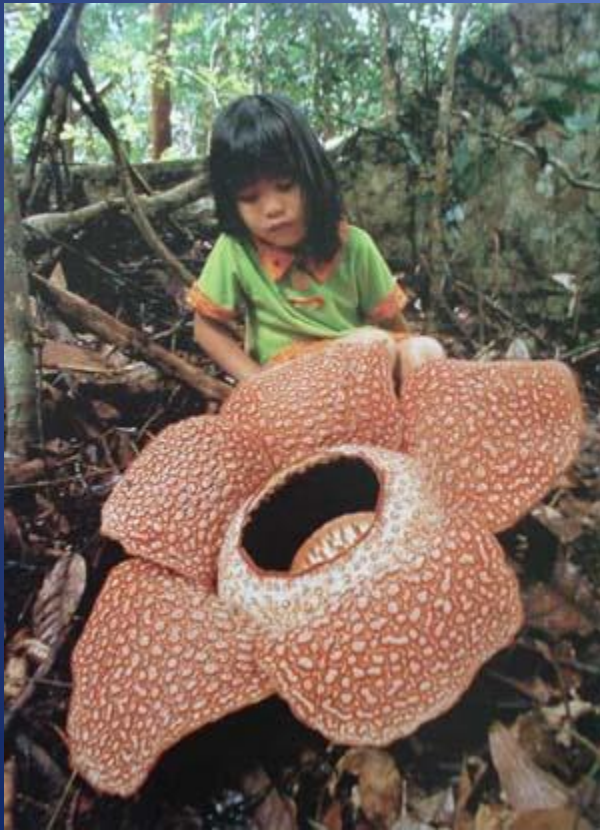
Flesh fly



Soldier fly

What About Flies?

Everyone's perfume is different
Some flowers pollinated by
blowflies



Butterfly & Moth Pollinators

Bodies hairy

Have no way to groom

Tongues also collect pollen

Generally pollinate tubular
flowers

Though may visit many
different flowers



Moths

Hawkmoth pollinated flowers
Have narrow long tubular flowers
Tongue picks up pollen grains
Same as hummingbird flowers



Moths

Moth pollinated flowers:

- Tend to open at night
- Only produce fragrance at night
- Generally pale colored



Beetles



Soldier beetles

Beetle pollinated flowers:

- Have open corollas
- Or many tiny clustered flowers
- With many exposed anthers
- Shed pollen easily



Long-horned
beetles

Hummingbird Pollination

Pollinate flowers with tubular corollas

Anthers dust feathers around front of head

Stigma touches this area when bird visits



Bat Pollination

Flowers have short wide openings
Lots of anthers
Thick walls
Offer lots of nectar



Bats have short tongues

What About Color?

Who's the pollinator



Who's the pollinator



Birds, flies



Bees, wasps, beetles, butterflies



Bees, wasps, butterflies, moths



Bees, moths, mostly

What A Bee Sees

Insects cannot see red or orange

See into the UV

Flowers have patterns in UV to guide insects



Regular light (left)



UV pattern seen by bees



Flowers Regulate Who Pollinates Them

By what they offer:

- Nectar
- Pollen
- Both

Flower structure:

- Corolla length – tongue length must match corolla length to reach nectar
- Pollinator body size and weight to open flower



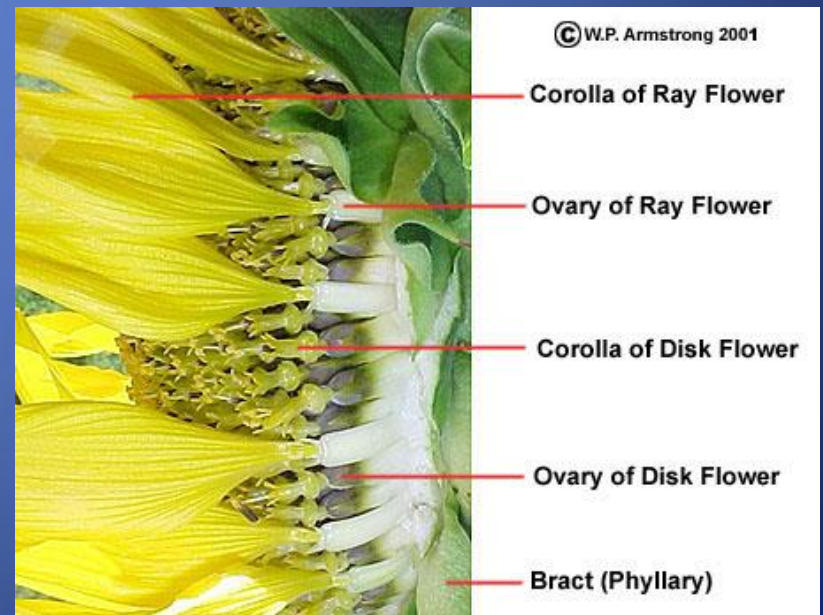
Tubular Flowers



Sunflowers and Their Relatives

The flowers consist of:

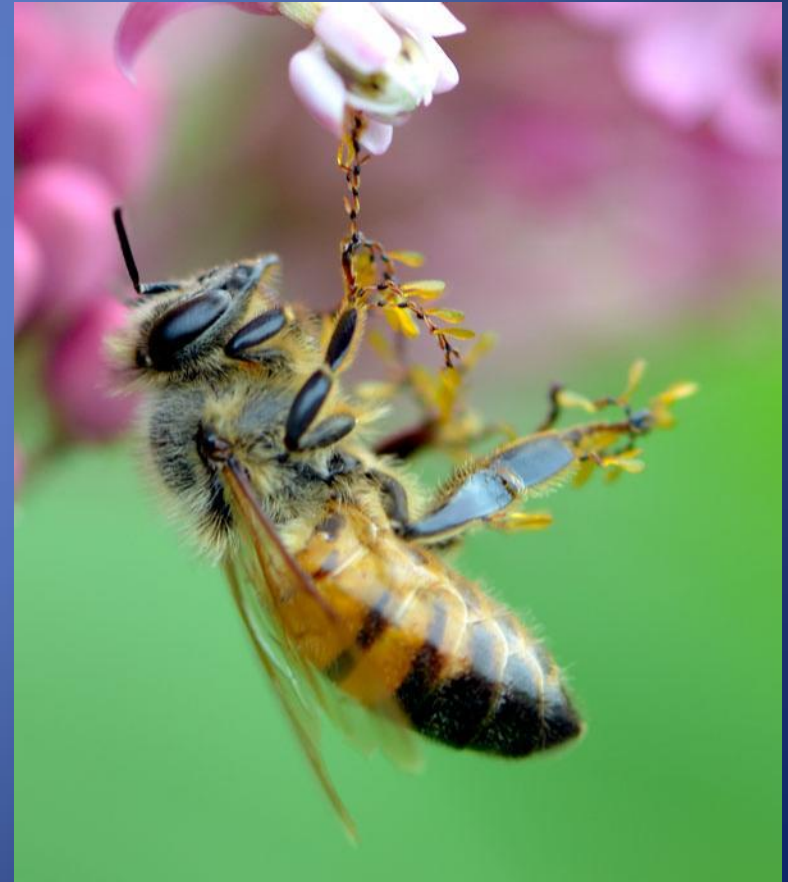
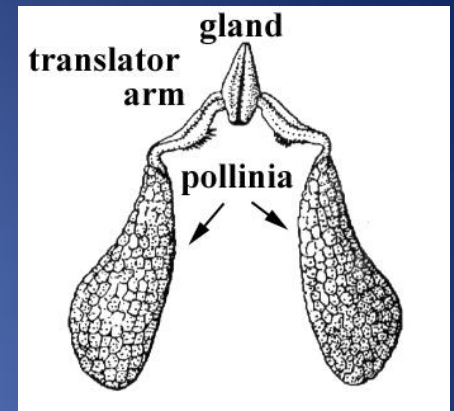
- 100's or 1000's of individual flowers
- Simply moving on the flower picks up pollen



Milkweed Pollination



Flower attaches pollinia to insect visitor legs or tongues



Pollination of Magnolias

Primitive flowering plants

Pollinated by beetles walking over reproductive parts



Sages

Only bees of right weight can push into the flower to reach nectar

Causes anthers to bend down and dust pollen on bee

Or stigma to bend & touch pollen on bee's back



Salvia Pollination

Mostly bees large and strong enough
Butterflies in small flowered species where
tongue touches anthers



Squash Pollination

Squash bees, *Peponapis*, best pollinators of squash, gourds, melons



Nectar Thieves

Carpenter Bees:

- Enter tubular flowers the wrong way
- Miss the reproductive parts entirely
- Rob flowers of nectar



Buzz Pollination

Found in nightshades and their relatives, like tomatoes

Anthers tubular

Bees have to vibrate anthers to collect pollen

Only large bees can do this.



Extreme Pollination

Darwin's hawkmoth pollinates an
Angraecum orchid

Needs 9 in. tongue to reach nectar



Extreme Pollination

Orchid bees

- Males visit orchid flowers
- Collect fragrance
- We don't know why



Orchid pollinia



So what do insect pollinators need?

- Nest Sites
- Larval food
- Adult food

Bee Pollinators

Bees need nest sites:

Twig nesters

- Leaf cutter bees
- White faced bees



Bee Pollinators

Bees need nest sites:

Ground nesters

- Sweat bees
- Digger bees
- Bumblebees



(c) Kathy Keatley Garvey



Mulch is Their Enemy!

The majority of bees nest in:

- Bare soil
- Sand
- In the sun



Moth Pollinators

Need caterpillar food

You can't have a moth pollinators

Without caterpillar food plants



Butterfly Pollinators

Need caterpillar food
You can't have a butterfly garden
Without caterpillar food plants



Adult monarchs feed on
many flowers
Caterpillars only feed on
milkweeds

Bird Pollinators

Birds need nest sites:
Need sources of hatchling food
Hummingbirds feed insects/spiders



Gleaning spider webs



Feeders



Nectar feeding



Feeding babies

Bat Pollinators

Bats need roost sites:
Adults need insects and nectar



Bottom Line

- Just planting flowers isn't enough
- Pollinators need specific flowers
- And more than flowers
- Consider pollinators in your area
- Don't mulch everything
- Don't ground cover everything



No pollinators in this garden