



Honey Bees: Nature's Pollinators

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- The pollination dance between bee and flower is threatened.
- Our food chain depends very heavily on the role of the bee as pollinator.
 - One-third of the food we eat comes from crops pollinated by honey bees.
- Pollination is responsible for over \$15 billion of food crops in the U.S. alone.

Honey Bees: Nature's Pollinators

- Over 20,000 known species of bees.
- Scientific name is *Apis mellifera*.
- Sub-family has about 5,750 members.



Honey Bees: Nature's Pollinators

- Many bees (mason, carpenter) are solitary and do not produce honey or beeswax.
- Colony can be 60,000 while bumble bee colony is 50 to 300.

Honey Bees: Nature's Pollinators

- Honey bees are highly collaborative.
- The brain of a honey bee is only 1 mm in size (sesame seed) but supports impressive complex behavior.

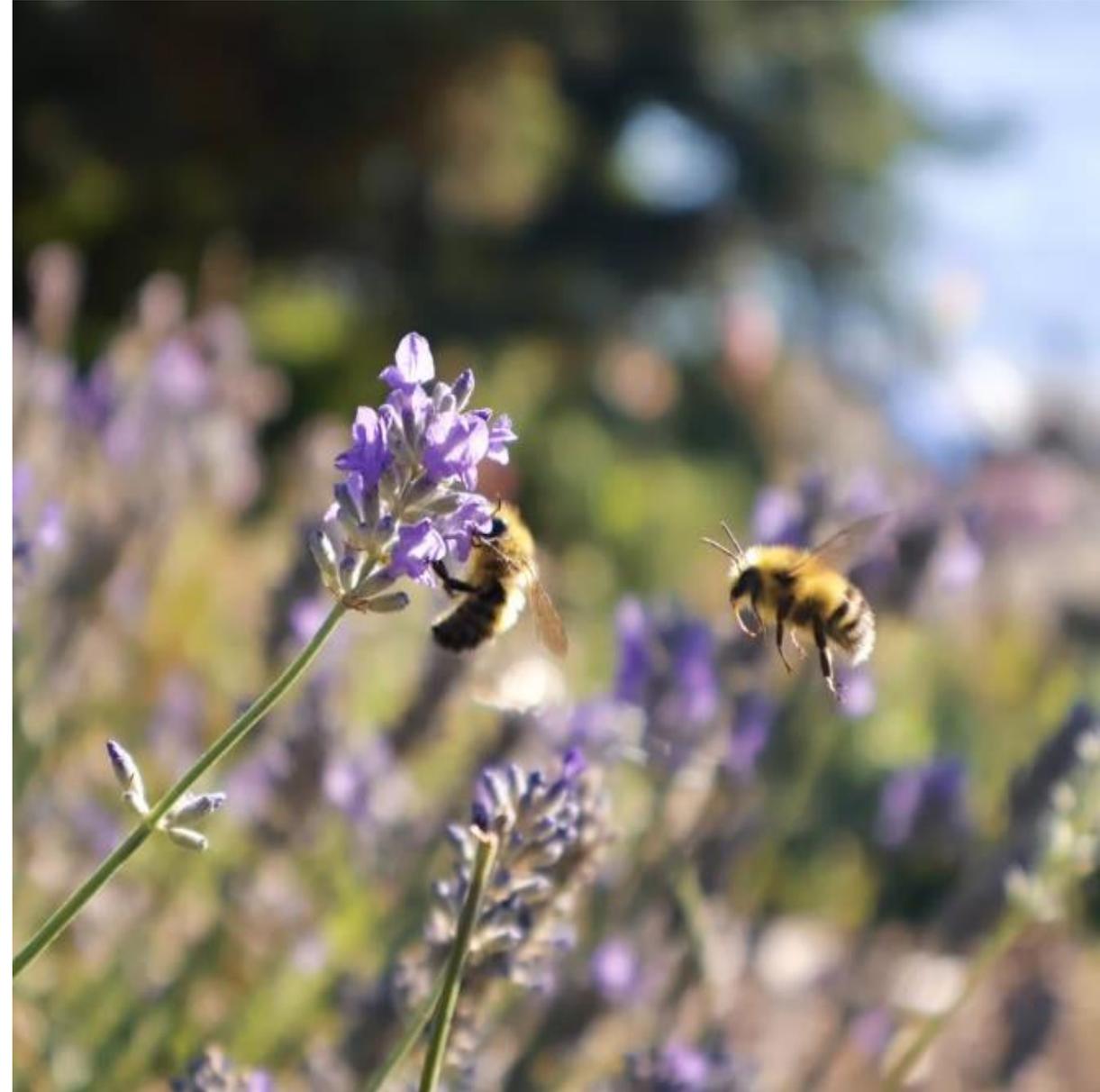




Pollination - Definition

The way plants achieve fertilization and genetic diversity.

Occurs when pollen from the male part of one flower (anther) is transferred to the female part (stigma) of another flower.





Pollination - Process

Flowers and honey bees need each other to survive.

Bees have evolved to extract the pollen and nectar.

Fine hairs on legs pick up pollen which clings.

Bits fall off when land on next flower.

Pollination - Process



Bees evolve to have pollen baskets to carry to hive.

Plants hide nectar deep in flower.

Bees evolved to have long proboscis to extract nectar.





Pollination – Benefits to Flowers



Plants require pollination to reproduce.



Allows plants to improve genetic diversity.



Cross-pollination with other flower varieties – new species or hybrids.

Pollination - Types

Wind pollination:
corn, rice and
wheat.

Insects:
every fruit and
vegetable

Almond and
blueberry farmers
rent hives.

Pollination - Studies

MIT study examined the cost of pollen dusting and hand pollination.

More cost-effective to spend money saving bees than mechanical methods.

Pollination - Studies

Decline of bee population led to the creation of the Pollinator Health Task Force in 2014.

Publication of *National Strategy to Promote the Health of Honey Bees and Pollinators*.



Mechanics of Pollination

Sonication – vibrating their flight muscles to dislodge pollen.



Pollination – Benefits to Bees

- Most bee species collect pollen from a variety of different flowers.
- Bees store pollen in specific comb cells at the edge of the brood.
- Nurse bees use it for royal jelly and making bee bread.

Pollination – Benefits to Individuals



Pollen is why local, raw honey is beneficial to allergy sufferers.



Acts like an immunization, providing a small dose to trigger an immune response.





How Bees Find Flowers

- Foraging bees are female worker bees, at 14 days old.
- Up to 10 trips a day.
- Live around six weeks in the summer.

How Bees Find Flowers

Sense of direction driven by sense of smell.

Can detect pollen from several yards away – 40x of humans.

170 odor receptors in the antennae alone.

Tremendous visual skills – polarized vision.

How Bees Find Flowers

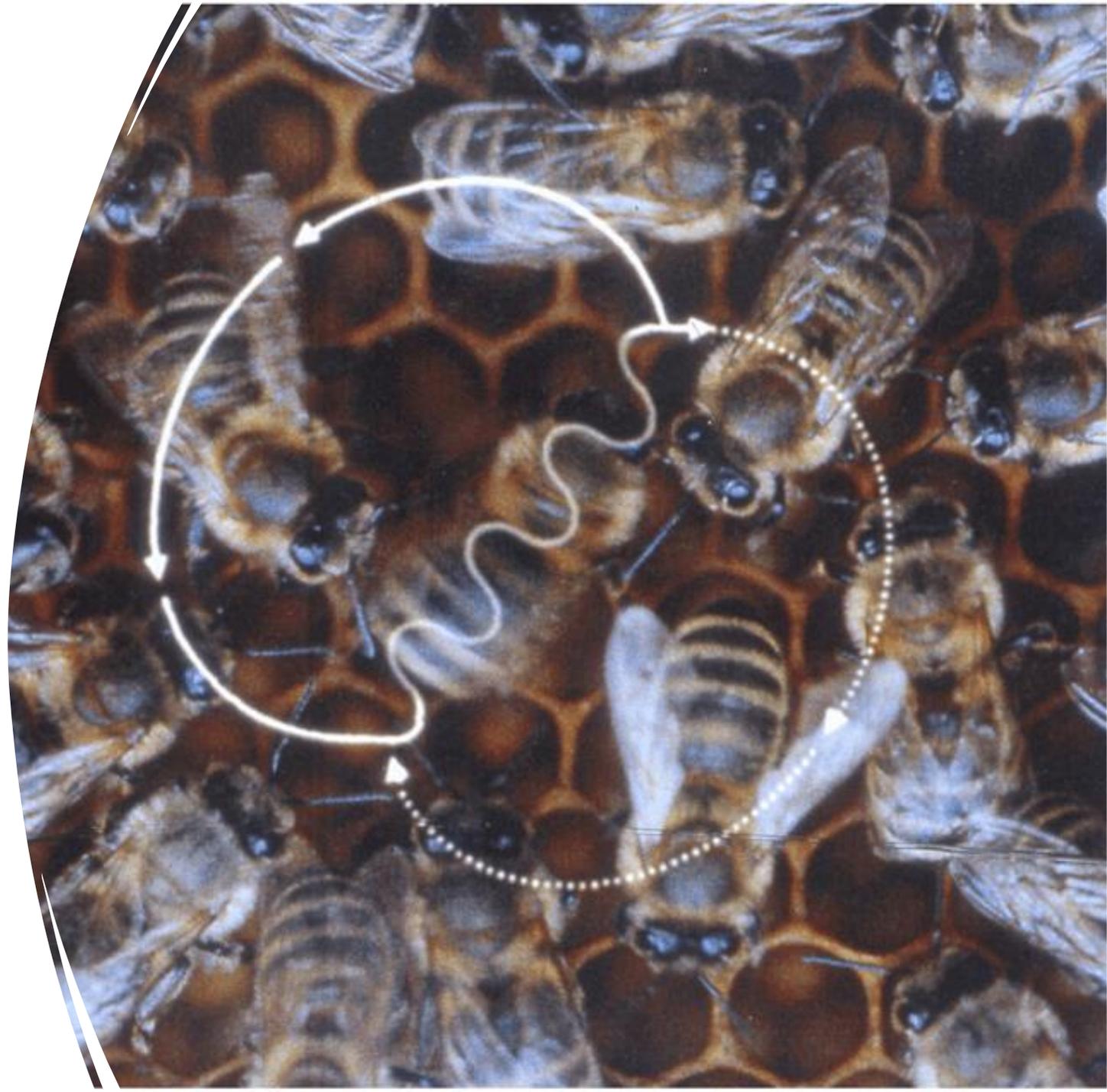
Waggle Dance – highly complex series of steps.

Every 75 milliseconds of dance is 330 feet to location.

End of dance, bee shares the scent of the flowers.

Waggle Dance

<https://youtu.be/-7ijl-g4jHg>





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How Flowers Evolved to Attract Bees

SHAPE

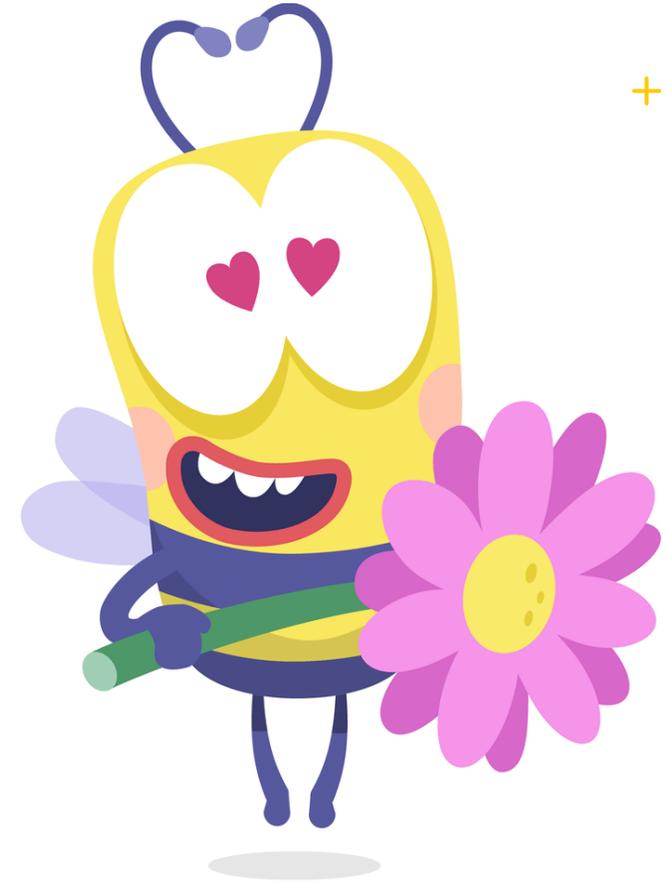
- Anther, with pollen, near top of flower.
- Wide open mouth – Hosta.
- Flat flowers – Daisies or Queen Anne's Lace.

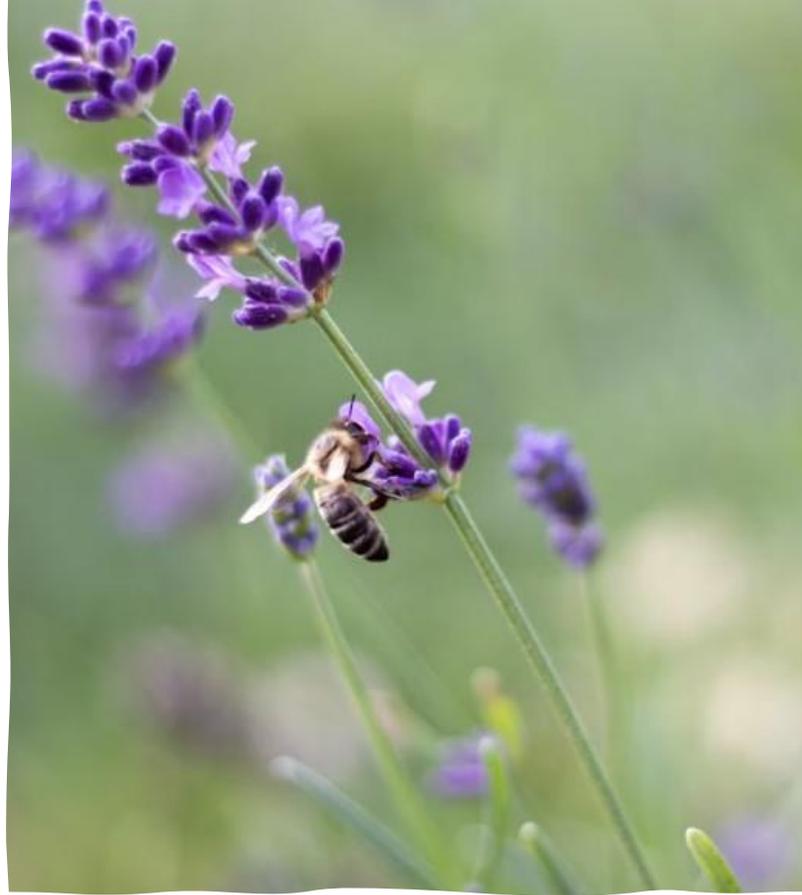


How Flowers Evolved to Attract Bees

SMELL

- Sweet smells – high nectar content.
- Bitter smells are less likely to attract honey bees.





How Flowers Evolved to Attract Bees

COLOR

- Bright-colored flowers – clover and salvia.
- Bees seem most attracted to blue, purple, and yellow flowers.

How Flowers Evolved to Attract Bees

- Shape, Smell and Color –
- Bees like apples, blackberry, dandelion, clover, golden rod, lavender, lime trees, ivy and rosemary.
- Flowers with sugary nectar and high protein.



Flower Constancy - Aristotle



Only visit one type of flower on each foraging trip.



Flowers get pollination without crossing species.



Bees get a consistent food source, but may skip a better source.



Flowers Visited

- Honey bee will visit 50 to 100 flowers, all the same species.
- Bees must visit two million flowers to create one pound of honey.



Flowers Visited

- Not uncommon to see yields from an orchard grow by 50% or more when a hive is installed.
- Single hive can produce 60 to 100 pounds of honey.



Key Takeaways

Bees and flowers are highly connected.

Plants need bees for cross-pollination.

Bees need plants for their pollen and nectar.

Benefits of pollination extend up the food chain with impacts on every species on the planet.



Key Takeaways

Gardeners can choose and plant flowers to bloom across the seasons to extend the periods for collection of pollen and nectar.

Reduce the use of pesticides around the home.

Advocate for pollinator fields before local government.



