



NATURE'S

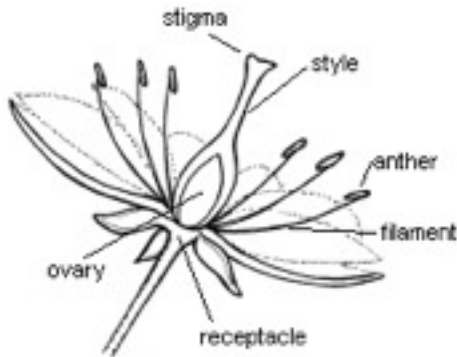
Insect Pollinators, Plants, and



The pedigree of honey
Does not concern the bee;
A clover, anytime, to her
Is aristocracy.

Emily Dickenson

The basics of cross-pollination

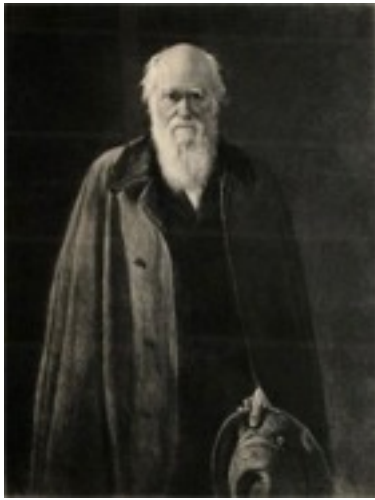


1. The **petals** attract and provide platforms for insects, bats, birds, & other pollinators.
2. Pollinators touch the flower's reproductive organs on their way to the **nectar**, produced at the base of the petals.
3. Pollen grains from the **anther** have a rough surface to stick to the animal-pollinator.
4. Pollen is rubbed off at next flower onto the strategically placed **stigma**.
5. The pollen descends down the style of the stigma and fertilizes the **ovule**, leading to seed production.
6. Once fertilized, the ovary becomes the **fruit**, which surrounds and protects the developing seeds.

Pollinators are essential to the survival of over ninety percent of the 250,000 flowering plants species on the planet today.



Pollinators are as important as moisture, sunlight, and soil fertility to the reproductive success of the world's flowering plants.



Darwin himself recognized the importance of the bee-flower relationship and mentioned bees on at least 87 different pages of his works.

Thirty percent of the food we eat is dependent upon pollinators for production

Oil Palm Olive Pear Cashew Date Cherry Plum
Papaya Apple Passionfruit Kiwi Pomegranate
Strawberry Raspberry Cranberry Blackberry
Blueberry Gooseberry
Grapes Fig Artichoke
Asparagus Balsam Pear
Beet Broccoli Brussels Sprouts
Cauliflower Cherry Chicory
Cucumber Cress Alfalfa
Pepper Parsnip Pumpkin Squash Rutabaga
Tomato Turnip Watermelon White Gourd
Radish Coffee Dill Parsley Lavendar
BlackPepper Mustard Sunflower Vanilla
Sesame Nutmeg Fennel Guava Plum Parsley



Flower Preferences of Pollinators

Bees — Yellow, blue, purple flowers



Butterflies — Red, orange, yellow, pink, blue flowers; flat-topped clusters for landing



Moths — Light-colored flowers that open at dusk

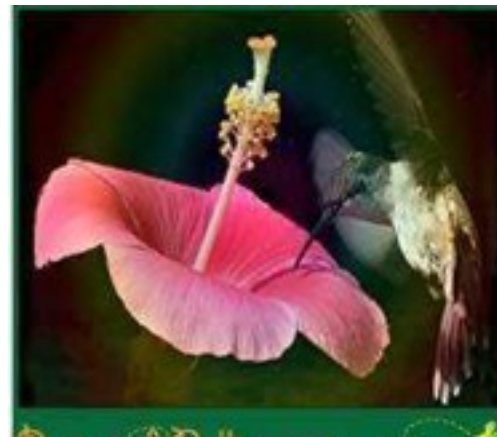
Pollinating Bats — Large, light-colored, night-blooming flowers with strong fruity odor



Beetles — White or dull-colored, fragrant flowers



Flies — Green, white, cream flowers; some like flowers with foul odors



Hummingbirds — Red, orange, purple/red tubular flowers



Mining bee carrying load of yellow pollen entering nest.



Common eastern bumble bee nectaring on purple coneflower.

NATIVE BEES

1. There are about 20,000 species of bees worldwide.
2. About 4,000 species are native to the U.S.
3. They range in length from less than 1/8 of an inch to more than one inch.
4. Most are 'solitary' (Queen prepares cells and deposits eggs until workers hatch - not a colony.)
5. Some are gregarious and prefer to nest near others.
6. About 70 percent of native bees excavate underground nests .
7. About 30 percent nest in wood tunnels.



Mason bee on berberis.



Metallic green sweat bee.



Native bee habitat

Two major components:

1. a place for the nest
2. flowers to forage



Leafcutter bee foraging on pea flower.



Digger bee at entrance turret to nest in steep bankside.



Mounds of excavated soil surround the entrance to bee nests.



Male longhorn bee nectaring on cosmos.

Native bee efficiency

Many native bee species are more effective than honey bees at pollinating flowers on a bee-for-bee basis.

REASONS:

1. Greater tolerance for cold and wet weather.

2. Foraging behavior differs.

3. **BUZZ POLLINATION!** Bumble bees in particular have ability to grasp a flower and vigorously vibrate their flight muscles, releasing pollen from the anthers. Important for some plants such as blueberries, cranberries, tomatoes and peppers (similar to salt being shaken from a salt shaker).



Bumblebees

Pollen mass and eggs
inside reed stem



Bumble bees are the only social bees native to the U.S.

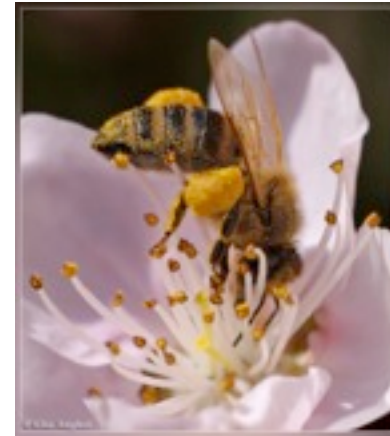
- approximately 45 species,
- live in a colony with a caste system of workers, males and a single egg-laying queen,
- share the labor of foraging and rearing their young
- make a nest in cavities,
- colony grows through three or four generations, but does not survive over the winter.

Bumblebee Comb



Similar to honey bees, bumble bees construct a wax comb.

HONEYBEES (*Apis mellifera*)



The European Dark Bee (*Apis mellifera melifera*) was imported in 1621 by The Virginia Company.



The Italian Bee (*Apis mellifera ligustica*) was introduced into the U.S. in mid-1800's.

Advantages of Honeybees

1. They produce more honey and wax than they need.
2. The entire colony (except for non-productive drones) can over-winter.
3. They are “generalist pollinators,” and are as happy to visit a tulip poplar or blackberry bloom as they are an apple tree.
4. Their hives can be moved to the area requiring pollination.



5. They tend to fixate on a single species of flower at a given time, so pollination of that species is assured.
6. They swarm, creating new (and likely feral) colonies.



Honeybee swarm



SWARM = 1 queen +
10,000 workers



Scout worker bees locate possible nest sites, which they describe in a “waggle dance”. *

* The direction of a waggle run indicates the angle from the sun and its duration indicates the distance.

Decline in the Pollinator Population

Four reasons for the alarming decline in the pollinator population are:

- **1. Habitat loss and fragmentation.**
- **2. Agricultural and grazing practices.**
- **3. Pesticides.**
- **4. Introduced species.**



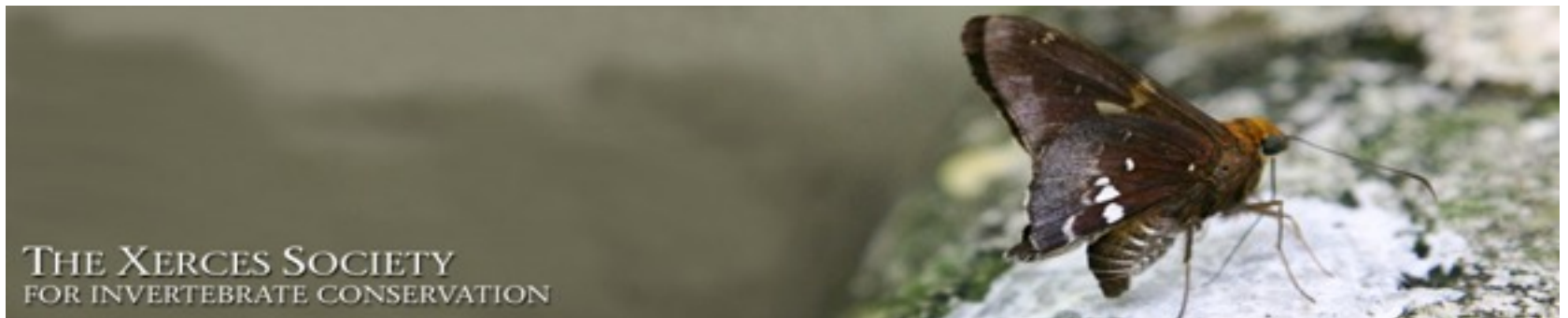
SUPPORTIVE ORGANIZATIONS

The U.S. Department of Agriculture (**USDA**) Forest Service, the USDA Natural Resources Conservation Service (**NRCS**), and the North American Pollinator Protection Campaign (**NAPPC**) hosted a **symposium on October 18, 2006**, to "to increase attention to the importance, and potential peril, of pollinating insects and other animals and the plants which depend on them for reproduction."



The North American Pollinator Protection Campaign (NAPPC)

is working to encourage the health of resident and migratory pollinating animals in North America.



By [proclamation](#), Virginia Governor Timothy M. Kaine declared June 22–28, 2009 VIRGINIA POLLINATOR WEEK



IN JUNE OF 2007, THE U. S. POSTAL SERVICE RELEASED A POLLINATION STAMP

The intricate design of these four beautiful stamps emphasizes the ecological relationship between pollinators and plants and suggests the biodiversity necessary to ensure the viability of that relationship.

save The HIVES

healthyhives for healthy lives



This is a feral bee project seeking to locate colonies of feral bees in order to develop a new genetic profile for them.

Commercial and feral bee populations are genetically distinct. Feral populations of bees are more diverse.

What we need to know about feral colonies:

- Effective breeding population
- Supersedure rates
- Swarming rates
- Pathogens

Sustainable beekeeping

– a movement afoot

Sustainable beekeeping must first consider the place of honey bees within an ecosystem and their impact on its ecological services. The relationship between bees and people has become central to this understanding. People have the potential to disturb irretrievably the balance between bees and their environment, as the advent of exotic Varroa mites in many countries of the world has demonstrated.

At the heart of sustainable beekeeping is the welfare of honey bees: not just at the level of the individual colony or apiary, but at the level of the whole bee population of the region. Beekeepers have often focused effort on their colony and apiary, ignoring their relationship with the wider bee populations of the locality or region.

A BACKYARD TOP BAR HIVE

