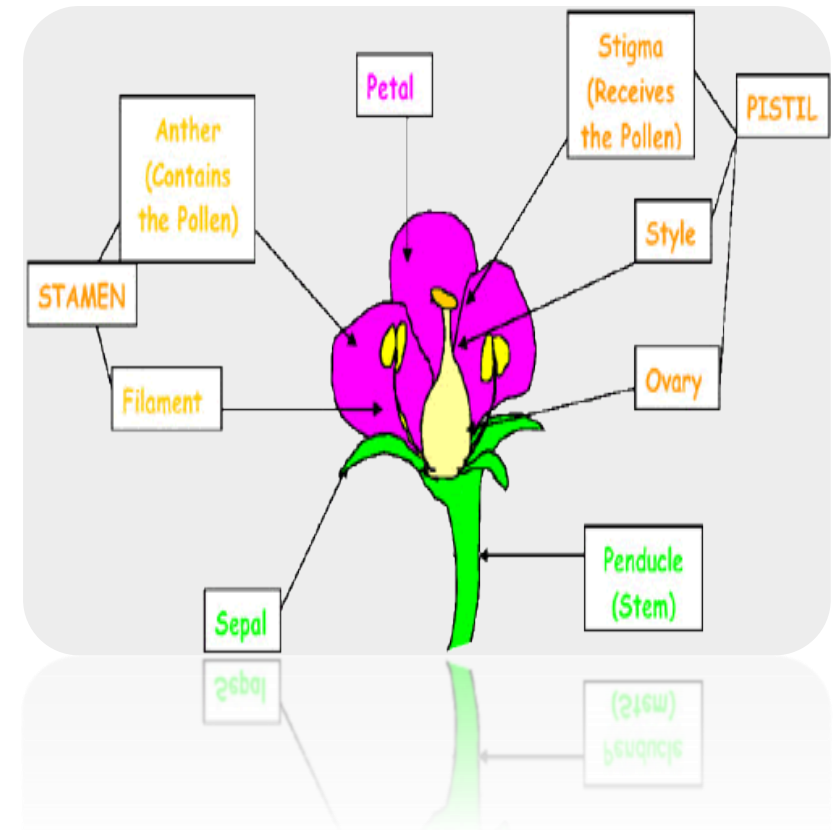


Importance of Bees in Pollination

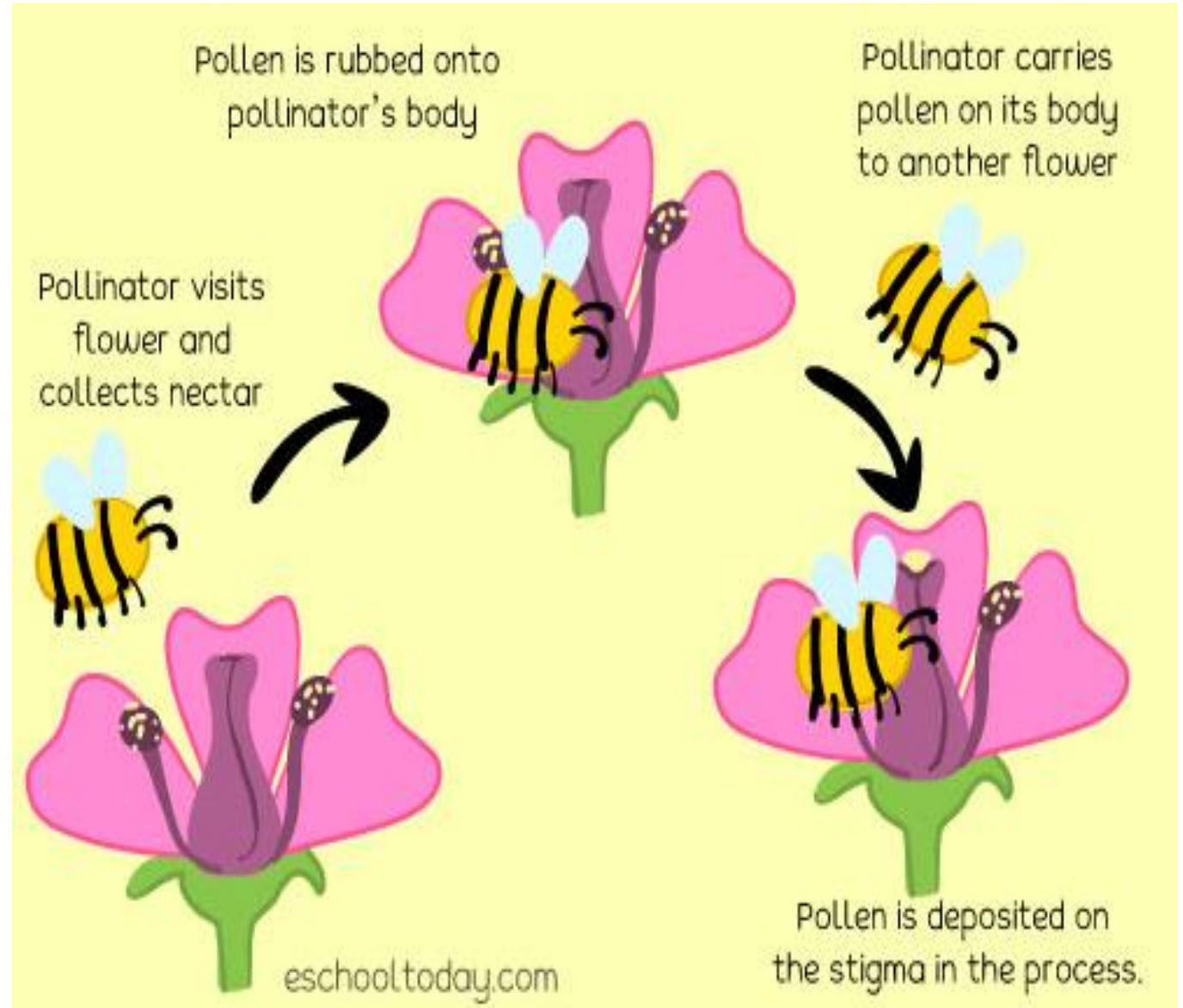
What is Pollination?

- Pollination is the act of transmitting the pollen grains from the flower anther to the female stigma. The goal of all living things, including plants, is to create offspring for the next generation. One of the ways plants can produce offspring is by making seeds. Seeds contain genetic information to produce a new plant. Seeds can only be produced when pollen is transferred between the same flowers.



What happens during pollination?

When a mature plant is ready to reproduce (produce and receive pollen), its buds will swell and open into a flower. Many plants that depend on pollinators produce very lovely and bright colors. They also give off very sweet smells (fragrance) that pollinators cannot resist, and they produce nectar with is free sugar for pollinators. Pollinators suck the sugar as food (energy).



Pollinators!

- ❑ Flowers must rely on vectors to move pollen. These vectors can include wind, water, birds, insects, butterflies, bats, and other animals that visit flowers. We call animals or insects that transfer pollen from plant to plant “**pollinators**”.

Why do pollinators visit flowers?

- ❑ To attract pollinators, flowers produce nectar, a sugary liquid that is high in energy. Bees and butterflies will land on the flower to feed and while doing so pollen becomes attached to their body. When they move on to another flower, the pollen is transported with them. Some will find its way into the stigma, allowing the plant to reproduce.

How do trees pollinate?

- ❑ Many tree species rely on pollinators to reproduce. Hazel, crab apple and rowan are all examples of flowering trees that are pollinated by bees and other insects. Conifer species produce cones rather than flowers and rely on wind pollination. Male cones generate pollen, which is carried by the wind to female cones, which then use it to develop seeds.



The importance of pollinators

- The honeybee is usually credited with pollinating the major crops in the United States and beekeepers tend to be well aware of the importance of honeybee pollination. But often folks are not fully aware that native bees, butterflies, moths, and flies are also important pollinators of crops, sometimes even more critical than the honeybee. (Roubik 1995; Buchmann & Nabhan 1996; Klein 2007; Winfree 2007; Holzschuh 2012)



Why are bees good pollinators?

- ❑ Bees make excellent pollinators because most of their life is spent collecting pollen, a source of protein that they feed to their developing offspring. When a bee lands on a flower, the hairs all over the bees' body attract pollen grains through electrostatic forces. Stiff hairs on their legs enable them to groom the pollen into specialized brushes or pockets on their legs or body, and then carry it back to their nest.



Importance of Honeybees

- ❑ Bees pollinate 80% of the world's plants including 90 different food crops.
- ❑ 1 out of every 3 or 4 bites of food you eat is thanks to bees.
- ❑ The honeybee is the only insect that produces food eaten by man.
- ❑ Man's first alcoholic beverage, mead, is a wine made with honey.
- ❑ Bees fly a few tenths of a mile up to 6 miles to gather nectar.
- ❑ Bees leave the hive 15 times per day and visit around 100 flowers each time – that's 1,500 flowers a day!
- ❑ The average worker bee produces about 1/12th tsp of honey in her lifetime.

Conti..

- ❑ Bees maintain a temperature of 92-93 degrees Fahrenheit in their central brood nest regardless of whether the outside temperature is 110 or -40 degrees.
- ❑ Bees can collect up to 4-5 pounds of nectar each day.
- ❑ 4 pounds of nectar = 1 pound of honey
- ❑ 8 pounds of nectar = 1 pound of beeswax
- ❑ 1 lb of honey = visiting two million flowers and flying 55,000 miles.



Economic importance of pollinators

- ❑ The honeybee is responsible for \$15 billion in U.S. agricultural crops each year
- ❑ Between \$235 and \$577 billion (U.S.) worth of annual global food production relies on the direct contribution of pollinators.

Pollinator:

HONEYBEES

Apis mellifera

Market Cap:

\$20 BILLION^B

- ❑ Honeybee pollination has helped make fruits, nuts, and vegetables more accessible to consumers.

Conti.. A sweet industry

- ❑ Honey is simply a by-product of pollination. But this sweet nectar is an economic driver in its own right. Used commercially for food, skin creams, anti-aging lotions, and medical wound dressings, over 160 million pounds of honey is produced in the U.S. alone by these remarkable insects every year. In 2013, the honey crop was valued at over \$300 million (U.S.)



Conti..Wild Bees

- ❑ Bumble bees, alfalfa leaf cutter bees, horn faced bees, and orchard bees
- ❑ Market Cap: **\$4 BILLION**
- ❑ Over 4,000 different species of bees contribute to pollination.



What Would Happen if All the pollinators Went Extinct?

- ❑ Without pollinators, more than 39 different crops would see a decline in production.
- ❑ If bees disappeared off the face of the earth, man would only have four years left to live.
- ❑ It's almost impossible to overstate the importance of pollinators in our ecosystem.

Major Threats to Pollinators

Habitat Loss:

- ❑ Much of the habitat is lost on agriculture, resource allocation, and urban and suburban development.

Degradation:

- ❑ Habitat degradation, the decline in habitat quality, is another serious concern.

Non-native Species and Diseases:

- Plants or animals brought here from other places can decrease the quality of pollinator habitat. When non-native shrubs such as autumn olive and multiflora rose take over open fields, they crowd out the wildflowers needed by certain butterfly and bee species for pollen, nectar, or larval food. For example, Japanese barberry shades out native spring ephemerals like Dutchman's breeches, which provide food for early spring bumble bees.

Pollution:

- Air pollution is a very real problem for bees and other pollinators that rely on scent trails to find flowers

Pesticides:

- ❑ Pesticide misuse and drift from aerial spraying are a major threat to insect pollinators, especially spraying with so-called persistent chemicals that remain in the environment for a long time before degrading. Systemic insecticides applied to seeds can contaminate the pollen grains that are an essential source of food for bees and their young. Pesticides often kill directly, but sub-lethal amounts can also be detrimental to bees and other pollinators by impeding their ability to navigate or forage

Climate Change:

- ❑ Studies predict that climate change will alter the close relationship between insect pollinators and the plants that depend upon them for reproduction



How Can We Save Pollinators

- ❑ Here are ten ways you can directly help pollinators and support National Wildlife Federation's efforts to protect and restore these critically important wildlife species.

1 Become a Wildlife Gardener:

- ❑ **Wildlife Gardeners** Join NWF's growing movement of Wildlife Gardeners

2 Plant Natives:

- ❑ **Plant Natives** Native plants co-evolved with the native wildlife of your region

3. Avoid Pesticides

- ❑ Bees are our most important pollinators, and they are insects. So are butterflies like the monarch. Using insecticides will kill these insects. Herbicides will kill important native plants

- **4. Plant Milkweed:**

- ❑ The iconic monarch butterfly has declined by over 90 percent in just twenty years. One of the main causes of this decline is a lack of milkweed, the species' only caterpillar host plant. Without milkweed, monarchs can't complete their lifecycle and populations plummet.



5 Adopt a Monarch:

- ❑ You can symbolically adopt a monarch butterfly and directly support NWF's work to save this declining pollinator.

6 Protect Grasslands:

- ❑ America's native grasslands are critically important for pollinators such as bees and monarch butterflies. Our grasslands are filled with native plants that offer nectar and pollen for bees, butterflies, hummingbirds and a wide variety of pollinators. They also provide milkweed, the only host plant for monarch caterpillars. Today, more than 90 percent of native grasslands have been converted to cropland and development. Grasslands are disappearing faster than any other ecosystem in North America, and that's a big problem for pollinators.