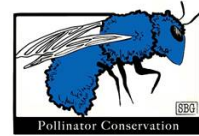




EXPLORE | LEARN | CONSERVE

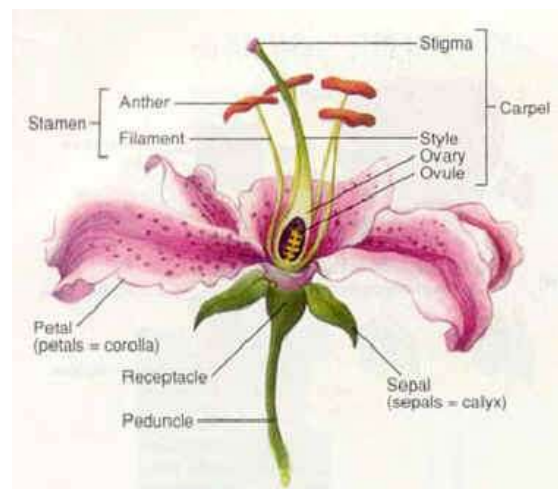
State Botanical Garden of Georgia
at the University of Georgia



What is pollination?

Most plants reproduce by the process of pollination. This process involves the movement of pollen from the anthers, which are the “male” organs of the flower which produce the pollen, to the stigma, or “female” part of the flower. This process eventually leads to the fertilization of the ovule within the middle of the flower, and subsequently, the plant will produce a fruit. This fruit will contain seeds that, when dispersed, will eventually produce a new plant. Pollination can occur between two different plants, which is referred to as cross-pollination, or it can occur within the same plant or even the same flower, which is called self-pollination.

There are two types of pollination: abiotic and biotic. Abiotic pollination does not require the assistance of any other organism but instead relies on environmental components such as wind and water. Some plants that commonly use this form of pollination are grasses, coniferous and some deciduous trees, and aquatic plant species. Biotic pollination is much more common and involves the participation of other organisms to distribute pollen. These organisms are referred to as pollinators and often maintain a very close relationship with the plants that pollinate. The petals of plants are often brightly colored and the flowers themselves are fragrant and produce sweet nectar, all of which attract animals to the plant and encourage pollination.



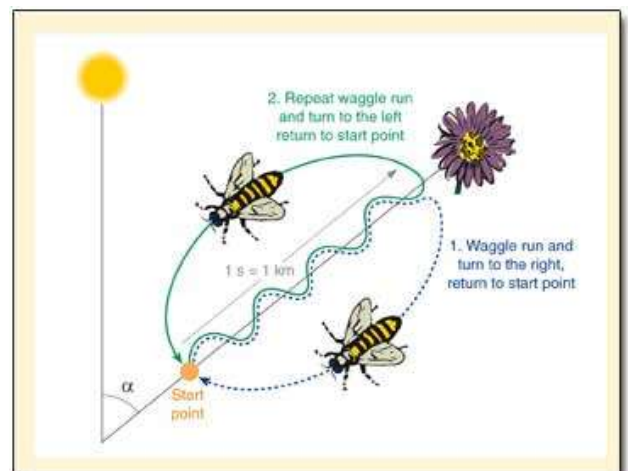
Who Can Be a Pollinator?

A pollinator refers to any animal that helps

with the distribution of pollen on a regular basis. Some of the most important pollinators are insects, especially bees and other wasps.

Bees

Bees are social organisms closely related to wasps. They have a complex hierarchy within their hive with the majority of the bees being female workers, and a small percentage being male (drones) or queens. The drones' main job is to mate with a queen bee, who then produces eggs. The worker bees are typically the main source of nutrition as they forage for nectar and pollen to bring back to the hive. Once a bee has found a good source of both of these, it returns to the hive and performs a dance which serves as directions to the source. The waggle dance consists of a long zig zag pattern, the length of which denotes the distance from the source, and a turn, the direction of which indicates the orientation of the hive to the flower-rich area using the sun as an anchor point.



Once the bees receive the information from the waggle dance, they will embark on the journey to retrieve nectar and pollen. As a bee visits the flower to retrieve nectar, it brushes against the anthers and collects pollen on its legs in its pollen basket, or corbicula. This structure is a group of hairs found on the rear legs of the insect, and while its primary purpose is to store pollen until the bee returns to the hive, it often aids in pollination as pollen granules fall off during the bee's visits to other flowers.

Once a bee has collected enough pollen and nectar from surrounding flowers, it



will return to the hive to deposit its spoils and make honey. Honey is made by breaking down the complex sugars in the nectar into much simpler compounds. Once enzymes have broken these sugars down, some of the moisture in the watery mixture is removed by the bee regurgitating it and holding the processed nectar in its mouthparts while its wings to

evaporate excess liquid. The mixture then becomes honey, which the bees can store indefinitely and use for their own nourishment. Honey is such a stable compound that it can resist mold, fungi, and bacteria. Additionally, bees may also consume the pollen that they collected by harvesting it off one another. Young worker bees use pollen to produce what is known as royal jelly, which is fed to larvae and bees that are chosen to become queens. This rich diet is packed with fertility compounds and nutrients that allow a queen bee to double in size and produce up to 2,000 eggs a day!

Wasps

These insects can either be social like bees, or solitary. Many species visit flowers to collect nectar as a source of energy, but they do not process it into honey or store it like the bees do. Additionally, a female wasp will feed on pollen and return to her nest prior to laying her eggs in order to line the egg chambers with partly digested pollen paste. The female then lays her egg in the chamber so when it hatches, its home has a nutrient rich food supply.



Some wasps are predatory and therefore have little interest in flowers, but nonetheless they are tricked into becoming accidental pollinators. Some orchid species produce a chemical scent that is almost identical to the pheromone that a female wasp releases when she is ready to mate. These orchids also have a lower lip that is shaped similarly to the body of a female wasp. The male wasp will then be tricked into grasping the imitation female and in the process crashes into the flower structure containing the pollen and the stigma, and the pollen will stick to

its body. The wasp will eventually repeat this with another flower, and pollen from one orchid is carried to another.

Butterflies

Because butterflies often have bodies covered in scales, they can transmit pollen fairly easily on accident. They have specialized mouthparts that are elongated into a proboscis that is designed to fit into the throat of flowers and acts like a straw to extract nectar. However, because their mouthparts are so specialized, they cannot ingest pollen as bees and wasps can. In spite of this, the hairs on their body collect small amounts of pollen and transfer the granules from one flower to another as they feed on multiple plants.

Since butterflies do not have the capacity to store pollen or nectar for their young, caterpillars instead feast upon the leaves of plants that their parents frequent. They can do this because they have different mouthparts which are used for chewing. By specializing in a different diet from their parents, the multiple generations live more harmoniously as adults and larvae do not need to compete for resources.

Non-insect pollinators

While insects are perhaps the most well-known pollinators, many other animals can aid in pollen transfer as well. Birds and bats commonly pollinate plants because they too are attracted to the nectar that the flowers produce. Plants that rely on bats to pollinate them are often large, pale in color, and bloom at night in order to coincide with the most active time for these mammals. The pollen easily sticks to the fur of the bat as it carries the pollen to the next flower it visits to collect nectar. Those plants which rely on birds such as hummingbirds and small songbirds typically have a tubular shaped flower, forcing the bird to put its head down the throat of the flower and cover itself with pollen. When it repeats the process at other flowers, the pollen is rubbed onto the stigma and that plant is pollinated. Insectivorous (insect-eating) bats and birds may also serve as accidental pollinators by grabbing insects that are getting their meal from flowers and inadvertently covering themselves in pollen.