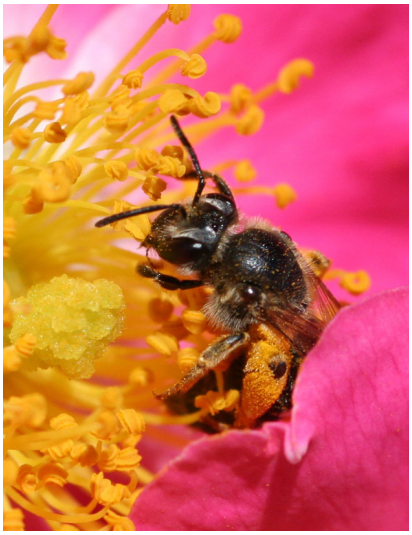
POLLINATOR'S JOURNEY

February 8, 2017 | 10th Grade IQ

OUR GOAL:

Students will learn about and present a presentation about a threatened migratory pollinator. Deepen their understanding and stewardship of pollinator species and their interdependence on their ecosystem.



An Andrena bee collects pollen among the stamens of a rose. The female carpel structure appears rough and globular to the left. The bee's stash of pollen is on its hind leg.

BACKGROUND

Flowering plants are much more common than non-flowering plants. Many people believe that the success of flowering plants is due in large pan to the flower's close relationship with animals in the process called pollination.

Many flowering plants depend on animals to reproduce. Bees, butterflies, hummingbirds, bats, ants, moths, beetles and others visit flowers in search of food. In the process, animals pollinate the flowers, bringing their reproductive cells from one plant to another of the same species. Pollination leads to fertilization, the development of new seeds and, in some plants, fruit. The young seeds (either in fruit or not) may be carried by wind, water or animals to new locations where, if all goes well, they will grow into new plants.

How does the process of pollination work? Flowers contain a plant's reproductive parts, including the male anther and the female pistil. (See diagram). The structure of the flower forces the male anther, holding pollen grains, to brush up against the pollinating species while it is looking for its food, the nectar. The female pistil includes the stamen, which is sticky and collects pollen from the bodies of animal visitors, and the egg, called an ova. When pollen grains fertilize an ova, a new seed begins to develop.

Plants, rooted in one place, must face the challenge of transferring pollen to another flower of the same species. Some flowers rely on wind to carry pollen grains, while others use water. Animal pollinators, however, give plants an advantage as may deliver pollen directly to the flower. While collecting nectar from the base of a flower, pollinators like bees brush against pollen from the flower's anther. The bee ends up carrying a Load of pollen on its body. At the next flower the bee visits.

Hummingbirds often feed from deep-throated flowers in warm colors like red, yellow and orange.

Some of that pollen reaches the female reproductive parts while the bee feeds. For other animals, the exact way they collect and deliver the pollen is different (hummingbirds sometimes collect pollen on their heads!), but the function is the same. The pollination relationship is mutually beneficial to flower and animal one gets food while the other receives help reproducing.

Over time, flowers have developed adaptations to ensure that the best pollinator for their species will visit and return often to feed. In fact, flowers' fragrance, bright colors, nourishing nectar and varied shapes are considered adaptations to attract certain pollinators. For example, the bright colors of flower petals are thought to help flowers stand out against a green background. Many flowers, such as a Black-Eyed Susan, have a bull's-eye pattern of color to focus animal attention on the part of the flower with pollen and nectar. Violets have both a weak bull's-eye pattern as well as "nectar guides" - a pattern that radiates out from the nectar cup and leads animals to the part of the flower where the nectar, anther and stamen are found. Many flowers have nectar guides, which aren't always visible to the human eye.

Birds and bees find different flowers attractive largely due to differences in the animal senses. Birds have a poor sense of smell, but keen color vision. Bees use both color and odors to find a suitable flower. The shape of the flower also plays a role in determining the kind of pollinator who can feed from the flower. Butterflies must have a perch to land on while feeding. Hummingbirds can hover in front of the flower and so don't need a place to land. Pollinators have also adapted to ensure that they will have access to flower nectar. Animal adaptations include sense of smell, color preferences, beak shape (especially noticeable in hummingbirds) and tongue length.

Pollinators have a critical role in both agricultural and natural ecosystems. Crop plants depend on pollination to produce much of the food we eat—from wheat and oats to corn and tomatoes. In fact, scientists estimate that every third bite of food humans eat is made possible by the act of pollination. Pollinators are also key to maintaining the health and biodiversity of wildlife habitat. Many flowering plants will not produce seeds for the next generation, such as new oak trees or milkweed plants, without the aid of animal pollinators.

A habitat that doesn't have young to replace the old of all species will eventually become less diverse—a few types of plants may become dominant, and in turn , the habitat will be able to support fewer animal species. In this decade, conservation biologists discovered a disturbing trend. Pollinator populations have declined drastically. Domesticated honeybee populations dropped 25% between 1990 and 1998, mostly due to the spread of a parasitic mite. Wild bee populations face risks from pesticides and habitat loss, and other pollinators, such as birds, bats and butterflies, have also suffered declines. Migratory pollinators appear especially vulnerable to habitat loss and other threats. In the United States many migratory pollinators are in peril. For example, the lesser long-nosed bat pollinates cacti such as the organ pipe and saguaro common to the Sonoran desert landscape. The bat, along with migratory pollinators such as the rufous hummingbird, white-winged doves and monarch butterflies, must move from bloom to bloom to take in enough energy on its 2,000 mile or more journey to Mexico to survive.

The Sonoran Desert covers southwestern Arizona, southeastern California, most of Baja California, and the western half of Sonora, Mexico.

Along this nectar corridor, human development, extensive planting of non-native species (that pollinators can't feed on) and the destruction of "stopover" areas by pesticides and human alterations work together to reduce the number of these migrants. For instance, monarch butterflies depend on the milkweed plant for food and a place to raise young. The milkweed is often a target of large-scale herbicide spraying along roads and on farms.

PRESENTATION PROCEDURE

The following items must be present on your slide show. You can have as many slides as you need to answer the bullets below. Be sure to include images and requested items.

Your Migratory Pollinator: _____

Slide Content Must Contain:

- Pollination Definition: Use your own words
  - Include images
- Your chosen migratory pollinator (include scientific name)
  - Include images
  - Scientific drawing describing pollinator
- Relationship to the plant they eat from more often
  - mutualism, commensalism, or parasitism?
  - Add definition: use your own words
  - Is your migratory pollinator a Nectarivore
  - Include images
- Why your migratory pollinator eats from a certain plant
- What is a migratory corridor?
  - Ways to protect these migratory corridors?
  - Include image
  - Include map
  - Include facts about the corridor
- Why is your migratory pollinator so important?
- How is your migratory pollinator threatened?
- What would happen if your pollinator began to disappear?
- Works Sited
  - Include the websites you used with the links

Name: _____

Pollinator: _____

Research Project Presentation

If you give yourself a 5 for any reason, you must justify your answer below.	Exceeds Standard 5	Meets Standard 4	Below Standard 3	Poor 2	Not Attempted 1	Your Points	Teacher Points
Content - Relevant information on required topics - Required questions were answered - Information is organized - Included relevant images						_____	_____
Work quality/effort - Time and Effort - Reflects best work						_____	_____
Visuals/Graphics - Visual elements of the presentation - Visuals add to the learning - Includes an element of creativity and individualism						_____	_____
Time Used Effectively - Proper use of lab time - Appropriate behavior during lab time						_____	_____
Presentation - Clearly presented - Display a reasonable understanding of information researched						_____	_____
					Grade	_____	_____

Comments: