Background

ANATOMY

Insects are characterized by 6 legs, 3 body parts (HEAD, THO R.AX, and ABDOMEN), a hard EXOSKELETON, and compound eyes. Most insects have a pair of antennae and 2 pairs of wings.

Insects grow by MOLTING, shedding their old exoskeleton and growing a new, roomier one. After molting and before the new exoskeleton hardens, insect bodies are soft and vulnerable. Insects go through COMPLETE METAMORPHOSIS. Life cycle stages are EGG, LARVA, PUPA, and ADULT. Butterflies, bees and beetles are insects whose larval forms are distinctly different from the adult form, insects whose larval form resembles the adult, such as crickets and cockroaches, go through INCOMPLETE METAMORPHOSIS.

Spiders are NOT insects, but like insects are arthropods (jointed leg, hard outer layer). They have 8 legs, compound eyes, and an exoskeleton. Some spiders have defensive URTICATING HAIR with which they can make themselves appear to be more dangerous.

BEHAVIOR

Insects can be HERBIVORES or PREDATORS (bird-eating, insect-eating, etc.) and some are PESTS to humans: mosquitoes feed on mammalian blood, aphids and scale insects feed on plants, and ladybugs and praying mantis, feed on pest insects.

Flowers have various attributes (COLOR, SCENT, SHAPE, SIZE) to attract specific pollinators such as bees, butterflies and hummingbirds. These pollinators sip NECTAR from the flower, collect POLLEN and carry this pollen to the next flower of the same species (or in some cases, the pollinator moves the pollen within the same flower), thus fertilizing the flower.

VOCABULARY

Adapt: To grow and change in response to environmental conditions.

Adaptation: Special body features or behaviors adapted to the environment.

Biodiversity: The diverse variety of life forms: different plants, animals and micro-organisms; and the ecosystems they form. Genetic diversity, species diversity and ecosystem diversity.

Carnivore: Animals that eat primarily meat.

Decomposer: Animal that breaks down dead or decomposing plant and animal material, thus recycling important nutrients and returning them to the environment.

Ecosystem: A system of plants, animal and micro-organisms and the non-living components interacting as an ecological unit.

Endangered: Animal or plant species in danger of extinction throughout all or a significant portion of their range due to loss of habitat, over-exploitation, competition or disease.

Environment: Complex web of interactions between living organisms and non-living components, which sustain all life on earth.

Fauna: All of the animals found in an area.

Flora: All of the plants found in an area.

Food Web: A group of interconnected food chains. Involves herbivores, omnivores, carnivores, scavengers and decomposers, so that no available source of energy is allowed to go to waste.

Habitat: Place where an animal or plant lives which provides food, water, shelter.

Herbivore: (Primary Consumer) Animals that eat primarily plants.

Metamorphosis: The process of change from young to adult.

Migration: The seasonal usually 2-way movement from habitat to another to avoid unfavorable climatic conditions.

Native: Indigenous to and dwelling within a specific area for an entire lifespan.

Nectar: A sugary fluid produced by flowers to attract animal pollinators.

Petal: Colorful flower parts that surround the floral reproductive structures.

Pistil: The collective female floral reproductive parts including the stigma, style and ovary.

Pollen: Pollen bears sperm for plant reproduction.

Pollen Tube: Tube formed after germination of the pollen grain. It carries the male reproductive information to the ovule.

Pollinated: A flower in which the female parts of a flower have been fertilized after pollen from the male parts of the same flower, or another flower.

Pollination: The spreading of pollen from the male parts to the female parts of a flower of the same species, resulting in the production of seeds and fruit.

Pollinator: Animal that carries pollen from the male parts of flowers to the female parts, fertilizing plant "eggs" with plant "sperm."

Primary Producer: All plants begin with green plants ("primary producers") with a process called photosynthesis. From the sun's energy, plants create sugar and oxygen, food for other animals.

Seed: Part of the plant that is capable of growing (germinating) and producing a new plant.

Stamen: Name for the male floral reproductive parts, including the anthers and filaments.

Threatened: Species likely to become endangered within the foreseeable future, without special protection and management efforts.

We want to hear from you!

Your feedback will help us improve our materials.

E-mail your feedback to us (at info@coevolution.org) and you will be entered into a drawing to receive one (of 30) set of flower seed packets for your classroom.

1. Did you use the poster in your classroom?
2. If so, were these materials helpful to you?
3. What grade(s) do you teach? What is your school located (state, rural or urban)?
4. How can we improve these materials so that they would be more useful?

Thank you!

With sunny regards,
The People and Pollinators of NAPPC

A visit to www.nappc.org or www.coevolution.org offers more information and a way to make a tax-deductible donation to the work of NAPPC. Or call 415.362.1137 to find out more.

For more information contact:
NAPPC via the CoEvolution Institute at (415) 362-1137
Kim Winter, NAPPC Coordinator at (301) 405-2666 or send us an email at info@coevolution.org

Bloom with ideas!

Enclosed you will find a fun and educational poster from The Great Pollinator Partnership, an exhibit created and co-sponsored by the U.S. Botanic Garden (USBG) and the North American Pollinator Protection Campaign (NAPPC). Many educators have asked to receive this exhibit poster. Inside are some ideas for how you can use this poster in your classroom.

The poster is a gift to you from NAPPC, the USBG and the National Gardening Association. The NGA is proud to serve as one of the many wonderful NAPPC partners. NAPPC, coordinated by the non-profit CoEvolution Institute, is a collaboration of over 80 participants from government, non-profits, environmental groups, industry, agriculture, academics and research science. Each partner works individually and in concert to help protect the health of pollinators of North America, including butterflies, birds, bees, bats and beetles.

Pollinators are the foundation of life. They are responsible for bringing us an estimated 1 out of every 3rd bite of food, assisting 90% of the world's flowering plants to reproduce, and providing an indispensable food source for countless other animals, as well as providing beauty and educational opportunities to gardens, fields and farms.

Here are 5 things you can do right now to help pollinators:

1. Plant native plants in your garden, yard, flower box or farm to provide habitat and forage for local pollinating animals.
2. Reduce or eliminate your use of pesticides, and if you must use them, follow directions carefully.
3. Educate yourself about the native pollinators in your area.
4. Make wise consumer choices; purchase organic produce, cut flowers, and fibers wherever possible.
5. Join NAPPC or other organizations that are increasing public awareness to the importance of protecting pollinators.

Make your classroom more useful!
Here’s how to make your classroom bloom!
Use the enclosed poster to talk with your students about exciting pollinator partnerships.

Some lesson ideas:

**K – 2nd**

*Language Arts*
- Choose a pollinator and flower duo and write a sentence or short story about their relationship.
- Create paper hand puppets by tracing the pollinators on the poster. Write and act out a pollination play.

*Math and Science*
- Count the pollinators on the poster. Graph the number of pollinators students have seen in the real world.
- Categorize the pollinators into insects and non-insects, flying and non-flying, or night and day feeders.

**3rd – 5th**

*Language Arts*
- Read the back of the poster as a class. Students can then create their own posters with information about a particular pollinator or a tip on how to help pollinators.
- Students read the back of the poster and do further research in order to label the animals and flowers on the poster.
- Have students write a story, “day in the life” from a pollinator’s point of view.
- Create a neighborhood “Butterfly (or Bee or Hummingbird) Gardening Guide.”

*Math and Science*
- Categorize the pollinators into insects and non-insects, flying and non-flying, or night and day feeders. Do further research to add more pollinators to your graphs.

**6th – 8th**

*Language Arts*
- Use the pollinator information on the back of the poster to initiate a research project about a particular pollinator.
- Write a play/story about pollinators and their relationship to the food chain.
- Have students write a story, “day in the life” from a pollinator’s point of view.
- Create a neighborhood “Butterfly (or Bee or Hummingbird) Gardening Guide.”

*Math and Science*
- Use the poster as an introduction to the biology of pollination. Draw detailed diagrams of the male and female parts of a flower (use the big red flower with bumble bee as a model). Don’t forget to outline the role animal pollinators play in pollination.
- Count the pollinators on the poster. Graph the number of pollinators students have seen in the real world.
- Categorize the pollinators into insects and non-insects, flying and non-flying, or night and day feeders.

**Extensions**

(Note: You will need to gather additional information/do some research in order to do these.)
- Students design and make bat or bee boxes. They research the needs of each desired species. Students calculate the number of bats that would be able to roost in the bat box, and the number of holes that each bee box should hold, then estimate the number of larvae that native bees could place in each tunnel.
- Students create an experiment in which they estimate how many flowers a hummingbird must visit in order to survive a migration trip from one point on the map to another. They would have to calculate the calories provided by a given nectar source, energy spent per day, and distance traveled.