Background

INFORMATION FOR YOU

ANATOMY

Insects are characterized by 6 legs, 3 body parts [HEAD, THORAX, 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 legs, hard outer layer). They have 8 legs, compound eyes and an exoskeleton. Some spiders have defensive URTICATING HAIRS which when thrown temporarily blind a predator's eyes.

BEHAVIOR

Insects can be HERBIVORS or CARNIVORS, and some are PESTS to humans: mosquitoes feed on mammalian blood, aphids and scale insects infest our gardens and wasps produce a nasty sting. Most insects are BENEFICIAL: bees, beetles and butterflies POLLINATE our gardens and crops, making possible such foods as chocolate, nuts and most fruits; some insects are DECOMPOSERS, helping to breakdown dead material; and other insects, like ladybugs and praying mantis, feed on pest insects.

Flowers have adapted 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 eco-systems they form. Genetic diversity, species diversity and ecosystem diversity.
Carnivore – (Secondary Consumer) Animals that don't eat plants, but feed on animals that do eat plants.
Decomposer – Animal that breaks down dead or decomposing plant materials, thus recycling important nutrients and returning them to the environment.
Ecosystem – A dynamic system of plant, animal and micro-organism communities and 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 loss of habitat, over-exploitation, competition or disease.
Environment – Complex web of inter-relationships 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 interlinked 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 received 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 fruits.
Pollinator – Animal that carries pollen from the male parts of flowers to the female parts, fertilizing plant "eggs" with plant "sperm."
Primary Producer – All food chains begin with green plants ("primary producers") with a process called photosynthesis. Energy from the sun lands on plants and is collected by chlorophyll, with which plants make 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 foresee able 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 20) set of flower seed packets for your classroom.

1. Did you use the poster or lesson ideas in your classroom?
2. If so, were these materials helpful to you?
3. What grade(s) do you teach? Where 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

Make your classroom

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:

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

North American Pollinator Protection Campaign

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.

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.