The Pollinators:
Disappearing Without a Trace

by Jim Cornish

The next time you walk through the produce section of your local supermarket, imagine about one-third of the displayed food suddenly disappearing. As you walk through the remaining aisles, imagine the packaged and processed food based on those same fruits and vegetables gone too. According to some researchers, seeing that much of our food supplies vanish is not that far fetched. Farmers worldwide have noticed that bees, a key factor in food production, are disappearing and agri-scientists are at a loss to explain why.

Helping Scouters realize the importance of pollinators and to better understand why the disappearance of some species is of great concern, begins with a short lesson on the "birds-and-bees" of flowering plants — the ones that directly or indirectly help supply most of our foodstuffs.

The Flower

Flowers are the sexual reproductive structures of a group of plants called angiosperms. With over 230,000 species worldwide, flowering plants are the most widespread group of land plants on earth. Based on pollen fossils, paleontologists believe they emerged during the Cretaceous period, some 130 million years ago. Their incredible variety in size, shape, colour, structure and arrangement forms the basis of flower identification and is part of the reason we appreciate flowers so much.

The purpose of flowers is to produce seeds. A typical blossom is a collection of reproductive and sterile tissues usually arranged in a tight whorl. Each flower has four sets of organs — non-reproductive green sepals and often colourful petals on the outside, stamens (the male reproductive structures which include the filament, anthers and pollen) and pistils (the female style, stigma, ovary and ovules) on the inside. Some flowers, such as lilies, have just one set of reproductive structures. Other flowers, such as dandelions and sunflowers, have more than one set of flowering structures. Known as composite flowers, they are by far the dominant type among angiosperms.

Photos: Jim Cornish

Pollination

Pollination, the transfer of pollen grains from the male anther to the female stigma, is the first process in a flower's reproductive cycle. Nearly 80% of our food production requires this process.

Some plants achieve this transfer themselves — a process called self-pollination. Most plants however, require cross-pollination (the transfer of pollen from one plant to another of the same species) and have developed either chemical or physical barriers to prevent self-pollination. Once deposited on the stigma, a pollen grain grows a tube down through the style to the ovary. Fertilization takes place when the sperm nucleus combines with an egg. The result of fertilization is endosperm and a seed. In some plants, the ovary swells to produce seed-bearing fruit such as tomatoes, apples and oranges.

Introducing the Pollinators

A pollinator is defined as a biotic agent that moves pollen from one flower to another to accomplish fertilization and the production of seeds. Biotic pollinators include many species of insects, small mammals and birds. Abiotic agents include wind and water. Probably the most recognized pollinators are bees. Their fuzziness and slight electrostatic charged bodies attract and easily hold the dust-like pollen grains. As the bees gather nectar (a concentrated energy source used to nurture their young), and pollen (a source of protein for growth), they inadvertently transfer pollen to and from their bodies as they move from plant to plant.

In the agricultural world, pollination is a managed event and has been so for centuries. Since agriculture requires alteration of the landscape, wild bee habitats have been destroyed, leaving farmers to replace them with honey bees. Farmers either keep their own hives or rent them during the season when plants are ready for pollination. A single fruit farm could require hundreds of bee hives.

Pollinators in Crisis

Since bees are responsible for most pollination, a serious decline in their numbers is a concern. Over the past decade, honey bee populations, which normally decline by 20% over the winter, have dropped sharply or disappeared altogether from some hives. Similar declines and range constrictions have been noticed in some wild bee populations, leading researchers to look at the commercial bee industry as the cause.

Researchers call the disappearance of bees *Colony Collapse Disorder* (CCD). In CCD afflicted hives, most

Flower and Pollinator web sites

For some extraordinary photographs, visit www.betterphoto.com **and use flowers as a keyword search.**

Structure of a Typical Flower, http://www3.uakron.edu/edtech/web/Flower.html

Label a Flower Worksheet, http://www.teachervision.fen.com/tv/printables/0876281811_5-56.pdf

Flower basics, visit Backyard Nature: www.backyardnature.net/botany.htm.

For an easy to make bee house, visit: Solving the Pollinator Problem: Give Bees An Invite
http://www.groovygreen.com/groove/?p=1234

Pollination (Interactive Diagram)
http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=635
http://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=451

North American Pollination Protection Campaign (N.A.P.P.C.) recommendations to help protect pollinators in your world
http://www.pollinator.org/Resources/WhatYouCanDoForPollinators.pdf

From farm to supermarket to your dinner table
http://gears.tucson.ars.ag.gov/ic/lesson/index.html

adults have simply vanished, leaving behind only the queen bee, some younger bees and some bees in the pupa stage of their development. Surprisingly, no carcasses are found near the CCD hive. The bees are simply gone.

Agri-scientists believe either a new pathogen or a new kind of chemical product which weakens the insects' immune systems is the cause of CCD. Agriculture pesticides such as the widely-used neonicotinoides, are known to be poisonous to bees. Scientists have pointed to habitat destruction or alteration, pesticide poisoning, pollution, disease, parasitic mites and invasive species as culprits. This syndrome may even be linked to natural pest or predator population cycles**.** In 2005, climate change was blamed for the loss of many hives. Unseasonably warm winter temperatures apparently tricked the bees into thinking it was spring, causing them to starve when no flowers were found to provide nourishment. Studies of commercial bees have found that shipping them great distances to farms across the country places a great deal of stress on the bees, making them more susceptible to other CCD contributing factors. Although it has yet to be proven, some observers have suggested that radio waves from increased cell phone use are playing havoc with the bees' ability to find their way back to their hives.

One common element discovered in many wild and commercial hives are parasitic mites. In 1984, mites attacked the breathing tubes of bees. In 1987, another mite called the *varroa destructor* weakened broods and adult bees by sucking their hemolymph — an insect's equivalent to blood. In the process, it transferred a virus which spread through the hives. Infected bees were left deformed and unable to perform their duties.

Your Role in Protecting Pollinators

Halting, and possibly reversing the decreasing numbers of pollinators is of crucial environmental importance. Preserving healthy bee species helps to maintain and even restore ecologically fragile habitats, protecting endangered species and the global food supply. We can help by returning once bee-rich habitats to their former size and ecological balance, by changing our mega-farm agricultural practices and by including bee friendly spaces in urban and suburban planning. Some of the following activities will help Scouters realize what they can do on an individual basis.

POLLINATOR-RELATED ACTIVITIES

1. Studying a Typical Flower
Materials: fake or real flowers (lupins are great because they are common, have plenty of flowers and attract pollinators).

Directions:
Using a fake or real flower, locate and identify the parts of a flower. Prepare a display on Bristol board. Use pictures cut from flower catalogs to demonstrate the variety of flower types or explore web sites that archive its members' pictures, using "flowers" or "bees" as a keyword search. The sidebar on page 5 offers several great web sites on flowers.

2. Visit Your Local Supermarket
Visit your local market to determine how much of the produce it carries depends on pollination. Make a list. Use the market's weekly sales flier to cut out examples of such food and include as part of the display on pollination.

3. Reduce, Reuse and Recycle
Human impact on the environment knows no boundaries. For example, researchers have found high concentrations of toxins in animals and humans living in the far north, at great distances from where these toxins are released into the environment.

Researchers have also found that bee populations have been declining worldwide. Regions as remote as the Sonoran Desert and the Malaysian rainforests are all experiencing fewer numbers of pollinators.

You can reduce your own demand on the environment by reducing your consumption of goods, reusing what you can and recycling what is left. As one measure of your impact, have your carbon footprint evaluated at: www.carbonfootprint.com.

4. Protect Local Bee and Wildflower Habitats
Bees live all around us and while they are a nuisance when playing and relaxing outside, their important role in agriculture and the natural world cannot be underestimated. If you are aware of areas where bees are foraging, work to protect it by preserving and cultivating the natural flowers, especially those that provide nectar or larval food for pollinators and reduce/eliminate the use of pesticides.

Install houses for bats and nest boxes for native bees. Supply salt/mineral licks for butterflies and water for all wildlife.

5. Interview a Beekeeper
Is there an amateur or professional beekeeper in your area? If so, visit his farm or invite him to your meeting as a special guest. Be prepared before his/her arrival by making a list of questions about procedures, safety and processing honey.

The Buzz About Bees and Pollination

- Honeybees are not native to North America. They were imported here from Europe in the 1600s.
- Bees pollinate 66% of the world's 1,500 crop species and are directly or indirectly essential for an estimated 15–30% of food production.
- 80 percent of insect pollination is accomplished by honeybees.
- Nearly 80% of our crops require pollination.
- Twenty varieties of vegetables produce seeds only if their flowers are pollinated.
- About 200,000 species of animals act as pollinators. Of those, 1,000 are hummingbirds, bats, and small mammals such as mice. The rest are insects such as beetles, bees, ants, wasps, butterflies and moths.
- One ragweed plant can release as many as *one billion* grains of pollen.
- It is estimated that one bee hive can pollinate a field of watermelons.
- One wild bee hive can contain about 4000 bees. A managed one can contain 80,000 bees.
- The largest managed pollination event in the world is in Californian almond orchards, where nearly half (about one million hives) of the honey bees in the United States are trucked to the almond orchards each spring.

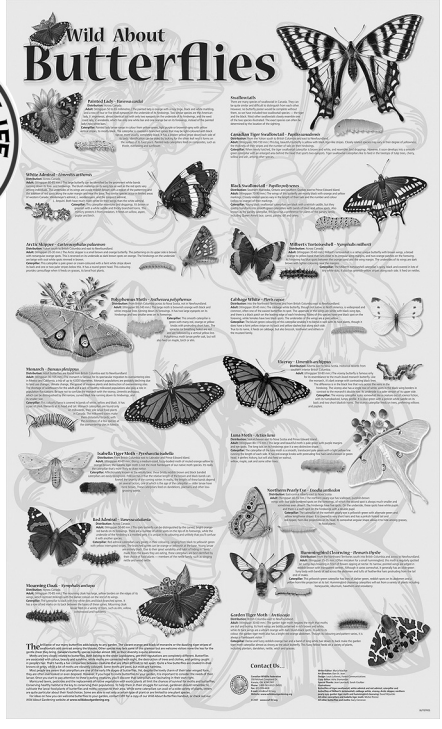
No Pollinators? No Chocolate!

by the Canadian Wildlife Federation

Without pollinators we would not have some of our favourite foods like bananas, apples or chocolate! We would also lose more than half the world's diet of fats and oils. Oil producing plants such as canola and sunflower are dependent on pollination.

Working Together To Help Pollinators

Scouts Canada and the Canadian Wildlife Federation collaborated to develop resources and information about pollinators and how people can help maintain their natural habitat. For a beautiful FREE poster called Wild About Butterflies, Scouters can order copies from the Canadian Wildlife Federation (CWF) by calling 1-800-563-9453 or e-mailing: info@cwf-fcf.org. Visit the CWF web site www.cwf-fcf.org for a variety of nature related activities.



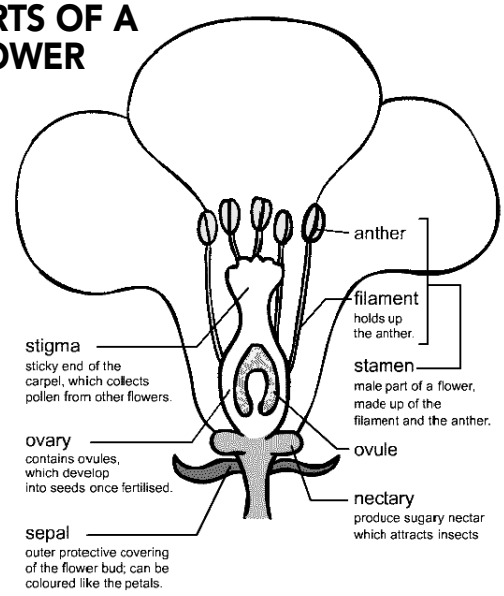
6. Visit a Farm

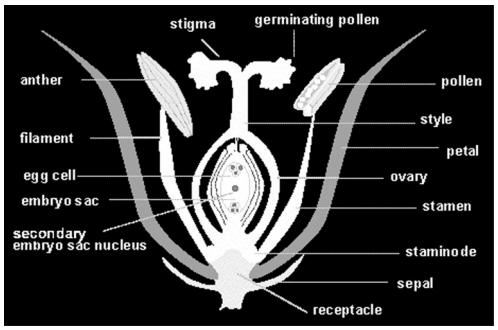
If you live in an agricultural area, visit a farm and see how it depends on pollinators. Check to see if the farmer has his own bee hives, what types of bees he uses and if he has set aside some land as bee habitats; bare mounds for ground nesting bees, lines of wild flowers along field edges, artificial bee nests, natural buffers along streams, around ponds, water holes and tree windbreaks.

– Jim Cornish is a teacher in Gander, NL, and an amateur photographer.

Program Links: Cubs: Black Star A2; Black Star B3; Gardener 3d; Observer 4, 5
Scouts: Naturalist 1, 3; Individual or Troop Specialty Badge; Agriculture

PARTS OF A FLOWER





BEE Courteous, Bee Safe

by the Canadian Wildlife Federation

- Only bumblebees, which are semi-social, will protect their nest towards the end of the season.
- Bees are most likely to sting when they are near their hive (where their young are raised) and feel threatened. If you see lots of bees in an area this may tell you there is a hive nearby and it is best to keep a safe distance.
- When bees are away from their hive gathering water, pollen and nectar they are very busy and not likely to sting unless they are bothered.
- Other insects, such as wasps, can also sting.

How to protect yourself from stinging insects:

- Be cautious and respectful of all bees and flying insects.
- Don't disturb bees – contact an adult if you find a nest or swarm.
- Be alert – if you hear loud buzzing it usually means there is a nest or swarm of bees nearby.
- Use care when entering sheds where bees may nest.
- When you are outdoors in a rural area, a park, or wilderness reserve, wear light-colored clothing and avoid wearing floral or citrus perfumes.
- Know what to do if you are stung.

If you are stung:

- Quickly go to a safe place to avoid being stung again.
- Tell a responsible adult.
- Remove the stinger as soon as possible by scraping the stinger out with a fingernail or flat object. Don't squeeze the stinger – this only releases more venom.
- Wash the sting area with soap and water like any other wound.
- Apply an ice pack for a few minutes to relieve pain and swelling.
- Get immediate medical attention if you begin to have trouble breathing, if you are stung numerous times or are allergic to bee stings.

Join us Saturday, May 10th for the 11th Annual

Jamboree on the Trail (JOTT) 2008

Members of the World Scout Movement hiking together toward a better future through Scouting.

For details check **http://jott.org** or contact Dave Wiebe at **sctrdave@niagara.com** or phone **(905) 635-9614**

A great linking activity for your group, area or council.

Leave only footprints, take only garbage