

Title: Flower buds: world-famous scientist E.O. Wilson speaks out on the importance of saving the planet's pollinators
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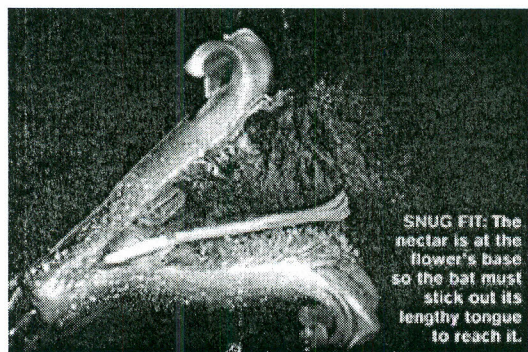
In late spring, as Arizona's red, sunset-filled sky turns a deep blue, a lesser long-nosed bat takes flight. The 1,600 kilometer (1,000 mile) journey from its winter home in Mexico has left this nocturnal bat famished. Fortunately, the nighttime flier detects a musky odor--a signal that a **saguaro cactus** is nearby. Hovering above the 15 meter (50 foot)-tall **cactus**, the bat dives snout-first into a creamy-white bloom. To refuel, the bat laps up the flower's sweet liquid, or nectar, with its tongue.

The syrupy drink isn't free: The flower's stamen (male reproductive part) is dusted with tiny grains of pollen that become sperm, or male sex cells. These particles stick to the bat's snout and head. When the bat visits another **saguaro**, it unwittingly transfers the pollen to that flower's pistil, or the female reproductive part. Called pollination, this pollen delivery is the way flowers produce seeds and fruits, and finally new plants.

But Edward O. Wilson, a world-renowned biologist from Harvard University, is concerned. In 1988, the lesser long-nosed bat--the saguaro's main pollinator--was listed as endangered. That means it is in danger of becoming extinct (no organisms of the species remain), and a recovery plan had to be established. This flying mammal is just one pollinator that has seen a decrease in numbers. From bees and beetles to hummingbirds and butterflies, the world's pollinators are dwindling.

Wilson has spent his life studying nature, particularly small insects, like ants, that act as pollinators. Wilson says: "I like to say about my own life, that every kid has a bug period, and I just never grew out of mine." He talks to *Science World* about pollinators and their role in the world.

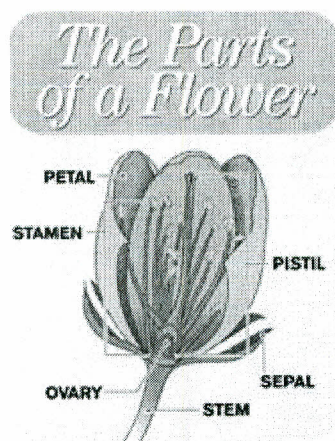
HOW DID FLOWERS AND POLLINATORS PARTNER UP?



The first plants in the world, which include the present-day firs and pines, depended on the wind to transport their pollen. Toward the end of the age of dinosaurs, about 100 million years ago, a new kind of plant--the flowering plant [or angiosperm]--evolved that formed partnerships with insects and other pollinators.

Insects, for their part, found the first flowers and fed on the nectar and some of the pollen. They would then fly on to the next plant, and thus serve as efficient transporters of pollen, better than the wind.

WHAT SIGNED INSECTS TO VISIT THESE FLOWERS?



The earliest flowering plants had to develop the ability to secrete a little bit of sugary material that might attract a potential pollinator. Then, plants that acquired this advantage of using insects had to advertise.

That meant they had to be good at flowering at the time when the particular pollinators that they depend on [arrive at the flowers]. They also needed to have the right colors and scents to attract them. The plants with mutations, or changes to DNA (the chemical carrying hereditary information), that produced the best advertisement would get the best pollinators and the best results.

YOU OFTEN SAY: "IT'S THE LITTLE THINGS THAT RUN THE WORLD." WOULD THAT INCLUDE POLLINATORS?

It would definitely include pollinators. If human beings were not so fascinated with big creatures, then we would consider an ant even more interesting than a rhinoceros. These little things are so small that most people don't even know they exist. Yet if we didn't have pollinators, the plant world would deteriorate rapidly. That would also mean the disappearance of a large part of the life on Earth on which human beings depend. It's [the little things in] this world--literally at our feet, or buzzing around our heads--that keep us alive.

LET'S SAY THE "LITTLE" POLLINATORS WENT EXTINCT. WHAT WOULD HAPPEN?

If we didn't have pollinators, the diversity of plants, including many crops on which human life depends, would disappear. All the animals that depend on the flowering plants for food and shelter would also disappear. There would be a general collapse of life on land.

And the candy industry would be in big trouble without pollinators. Tiny flies called midges pollinate cocoa trees. So without these flies, you wouldn't have chocolate bars.

Many flowers depend exclusively on certain pollinators. Orchids attract only the euglossine bees, which are specialized to pollinate their flowers (see bottom right). If this pollinator were to disappear, you would lose the orchids, because there wouldn't be substitute pollinators.

WHY ARE THE WORLD'S POLLINATORS TAKING A PLUNGE?

The decline of pollinators fits the general pattern of extinction that's occurring around the world, including the United States. The foremost cause is the destruction of the natural habitat where the wild flowers and the pollinators live. If you reduce the amount of habitat, then some pollinators start to go extinct.

WHAT ARE SCIENTISTS DOING TO HELP STOP THE DECLINE OF POLLINATORS?

Scientists are making thorough studies of both the pollinators and the flowering plants. They are determining where the different species live and which ones are declining. Then, they can develop recommendations to increase natural

habitats in the areas where the declines are the worst.

YOU ARE A MEMBER OF THE NORTH AMERICAN POLLINATOR PROTECTION CAMPAIGN. HOW IS THIS GROUP PROTECTING POLLINATORS?

By increasing public awareness, which is extremely important. Public awareness has been very low. It's a strange situation: Everybody knows and loves flowers. Everyone knows, and I think loves, the sounds of nature such as the buzzing of bees. But few people have ever put it together and said, "What really is going on here?" Something very important is going on. We need a lot more awareness about [the process of pollination]. That's because other forms of life and part of our livelihood depend on it.

WHO ENCOURAGED YOU TO STUDY NATURE, YOUR PARENTS? DO YOU HAVE ANY ADVICE FOR KIDS INTERESTED IN SCIENCE?

My parents were not scientists and didn't know anything about natural history. But they let me develop substantially on my own. I remember one summer I spent on Perdido Bay in northwest Florida. I was allowed to roam up and down the beach. Without any instruction, I began looking at marine life. I saw so many wonderful things, and gained a sense of self-reliance. You should learn self-reliance and not be afraid to explore and learn on your own.

Nuts Bolts

The bucket orchid lures its exclusive pollinator--the euglossine bee--with perfumed oil that the bee needs to attract mates.

1. TRICKLE: The flower produces pungent oil that drips slowly into a bucket structure.

[ILLUSTRATION OMITTED]

2. SLIP AND SLIDE: A male euglossine bee lands on the slippery landing pad, called a hypochile, where it collects the oils. Often, it slips into the flower's bucket.

[ILLUSTRATION OMITTED]

3. SPLASH: The bucket is full of the oily fluid. Covered in the substance, the bee is unable to fly out.

[ILLUSTRATION OMITTED]

4. TIGHT SQUEEZE: To escape, the bee must crawl up a dry tunnel-like path. As it squeezes through the tiny opening to freedom, two pollen packets stick to the bee's back.

[ILLUSTRATION OMITTED]

5. FLY FREE: If this pollen carrier falls into another bucket orchid, it will deliver the packets to that flower. Pollination accomplished!

[ILLUSTRATION OMITTED]

DID YOU KNOW?

* It takes up to five months for a female, lesser long-nosed bat to travel from Jalisco, Central Mexico, to Arizona during its spring migration. The journey is 1,600 kilometers (1,000 miles) long.

* One out of every three bites you take is a result of pollinator-flower partnerships.

CRITICAL THINKING:

* Make a grocery-shopping list for a class picnic. There's one catch: All the bee pollinators are gone. For hints, visit: <http://ag.udel.edu/extension/information/beekeeping/pollination.htm>

CROSS-CURRICULAR CONNECTIONS:

ART: Create a poster on a flowering plant's life cycle. Be sure to show where pollinators fit in.

RESOURCES

* For a profile on Edward O. Wilson, visit:
www.cnn.com/SPECIALS/2001/americasbest/science.medicine/pro.eowilson.html

* Learn more about hummingbird pollinators at: <http://dev.sandiegozoo.com/animalbytes/t-hummingbird.html>

* This National Geographic feature describes how flowering plants changed the world:
<http://magma.nationalgeographic.com/ngm/0207/feature6/>

DIRECTIONS: On a separate piece of paper, use details from the article to help you write the following:

1. Suppose you are a member of your school's pollinator protection club. To raise awareness about the world's dwindling numbers of pollinators, the club plans to convert a small area in the schoolyard into a habitat that will attract a great variety of pollinators. Write a proposal to your school principal, describing the characteristics of the different plants the club hopes to include.

2. You are a male euglossine bee. Recount your day's adventures to your fellow bees. Be sure to include a description about your visit to a bucket orchid.

1. Answers will vary, but it should include the following points:

To attract a great variety of pollinators to the schoolyard habitat, choose flowering plants that bloom at different times of the day and during different seasons. Also, select plants that use a different variety of ways to attract pollinators. For example: scent, shape, color, and if the plant has sugary nectar.

2. Answers will vary, but should include the following steps: The bucket orchid lures the bee with perfumed oil that the bee needs to attract mates. The flower produces pungent oil that drips slowly into a bucket structure. The bee lands on the slippery landing pad, called a hypochile, where it collects the oils. Often, it slips into the flower's bucket. Because the bucket is full of the oily fluid, the bee gets covered in the substance and is unable to fly out. To escape, the bee must crawl up a dry tunnel-like path. As it squeezes through the tiny opening to freedom, two pollen packets stick to the bee's back. If this pollen carrier falls into another bucket orchid, it will deliver the pollen packets to that flower.

LANGUAGE ARTS/CRITICAL-THINKING SKILLS

WANTED: PERFECT POLLINATION PARTNER

In "Flower Buds" (p. 8), you learned that flowers use many different methods to attract pollinators. Use this activity to discover what makes a flower and its pollinator a perfect match.

Directions: Read the "Pollinator Profiles" (below). Based on the information provided, use color pencils to draw a picture of a "floral match" for each in the space provided. Then, select a pollination pair from this worksheet and further research their relationship. On a separate sheet of paper, use your research to write a short story about the pair's first meeting from the points of view of the flower and its pollinator.

Hummingbird

Floral Match

Favorite colors: red and orange +
Favorite food: nectar
Dining manner: laps up food with a long
tongue while hovering in midair
Ideal partner features: long and tubular shape;
blooms during the day

Honeybee

Favorite colors: color blind to red, but can see +
ultraviolet rays
Favorite foods: nectar and pollen
Dining manner: can dive deep into flowers for
food; often gets food stuck on the body
Ideal partner features: stamens with lots of
pollen; easy-to-spot "bull's-eye" center;
strong petals to walk on

Fly

Favorite colors: green and white +
Favorite foods: rotting meat or plant; nectar
Dining manner: eats a variety of things
Ideal partner features: open or bowl shape for
easy access to food; stinky; strong petals to
walk on

Mouse

Favorite colors: dull brown, maroon, or cream +
Favorite food: very thick, syrupy nectar
Dining manner: nibbling
Ideal partner features: night bloomers; short
stems; musty or yeasty odor

Bryner, Jeanna

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