



WHAT'S THE BUZZ ABOUT NATIVE BEES?

Jessica Rykken*

Denali National Park and Preserve, AK, United States

YOUNG REVIEWERS:



DISCOVERY
CHARTER
SCHOOL
AGES: 13–14



EVA
AGE: 13



MAPLE
AGE: 13

POLLINATOR

An animal that moves pollen from the male anther of a flower to the female stigma of a flower which begins the process of producing a new seed.

Most plants depend on insects for pollination. Honey bees pollinate many of the foods people eat, but did you know that wild plants, and animals like birds and bears, also depend on pollinators? Native bees are the most diverse and efficient pollinators. Thousands of bee species transport pollen between plants in deserts, forests, mountains, meadows, and many other habitats. This service helps plants reproduce successfully, and the plants provide food and shelter for other animals. Bees are important for keeping our wild landscapes healthy. Scientists are discovering that climate change and other human-caused threats are changing bee populations. Therefore, it is important that we learn more about pollinators in wild places like national parks and that we support bees in our own backyards.

THERE IS MORE TO BEES THAN HONEY

When you think of a bee, what kind of bee do you imagine? Most people are familiar with honey bees. These bees are important **pollinators** for many of the plants that farmers grow and that people

like to eat, like almonds, apples, and pears. But honey bees have not always lived in North America. People brought them from Europe hundreds of years ago, to help pollinate their crops and to make honey. Before honey bees arrived in North America, there were many native bees pollinating wild plants. Native bees continue to be essential pollinators in parks and other wild landscapes today.

You might wonder why we need pollinators in wild places where people do not grow food. If you have ever hiked in a mountain meadow full of wildflowers, walked along a stream early in the spring when the pussy willows have just emerged, or been lucky enough to see a super bloom of flowers in the desert, you have seen the work of pollinators. Without bees and other pollinators, most of these plants would quickly disappear [1].

Not only plants benefit from pollinators. Animals like bears and birds eat seeds and fruits from pollinated plants. In Denali National Park and Preserve in Alaska, grizzly bears eat huge numbers of blueberries at the end of the summer. This helps prepare bears for their winter hibernation, when they will not eat for many months. Bumble bees pollinate blueberry plants, so without them, the bears would not have enough to eat. American robins, blue jays, and other birds eat berries too, like cherries, raspberries, and elderberries. Bees also pollinate all these plants. Without native bees and other pollinators, our wild places would lack the beautiful colors and shapes of flowers and there would be less food for many animals.

NECTAR

A sugary liquid made by plants to attract pollinators. The sugar-filled nectar provides energy to pollinators.

POLLEN

Tiny dust-sized grains produced by the male part of a flower that contain the plant's sperm. Many pollinators eat pollen because it contains a lot of protein.

MUTUALISM

An interaction between two or more species in which each species benefits.

HOW DOES POLLINATION WORK?

Pollinators are animals that carry pollen between plants. Most pollinators are insects, such as bees, butterflies, beetles, flies, and wasps. These insects feed on **nectar** and **pollen** from flowers. As the insects move between plants to feed, tiny grains of pollen stick to their bodies and then later get brushed off onto other plants (Figure 1). Many plants must be pollinated by insects to produce seeds that will grow into new plants. This kind of win-win relationship, in which the plants need help from the pollinators to reproduce successfully and the pollinators need the plants for food, is known as a **mutualism**.

Of all the insect pollinators, bees are the best at carrying pollen on their bodies. That is because they feed on nectar and pollen just like other pollinators, but they also carry pollen back to their nests to feed their young. So, bees have areas on their bodies designed to carry big loads of pollen (Figure 2). Bumble bees have little baskets on their hind legs to carry pollen balls mixed with nectar. Other bees have hairy legs or hairy bellies where pollen grains can stick. The more pollen bees carry on their bodies, the more likely it is that some will accidentally brush off on the plants they visit, and this makes them really good pollinators.

Figure 1

A bee lands on a flower to feed and collect pollen. Pollen grains from the anthers (male part of the flower) stick to the bee's body. The bee flies to another plant and, while it is foraging, some of the pollen grains from its body accidentally brush off onto the stigma (female part of the flower). Pollen on the stigma will grow a long tube that reaches down into the ovary which contains the ovule (egg). Sperm from the pollen passes down the pollen tube and fertilizes the ovule to create a seed. Eventually the seed will grow into a new plant.

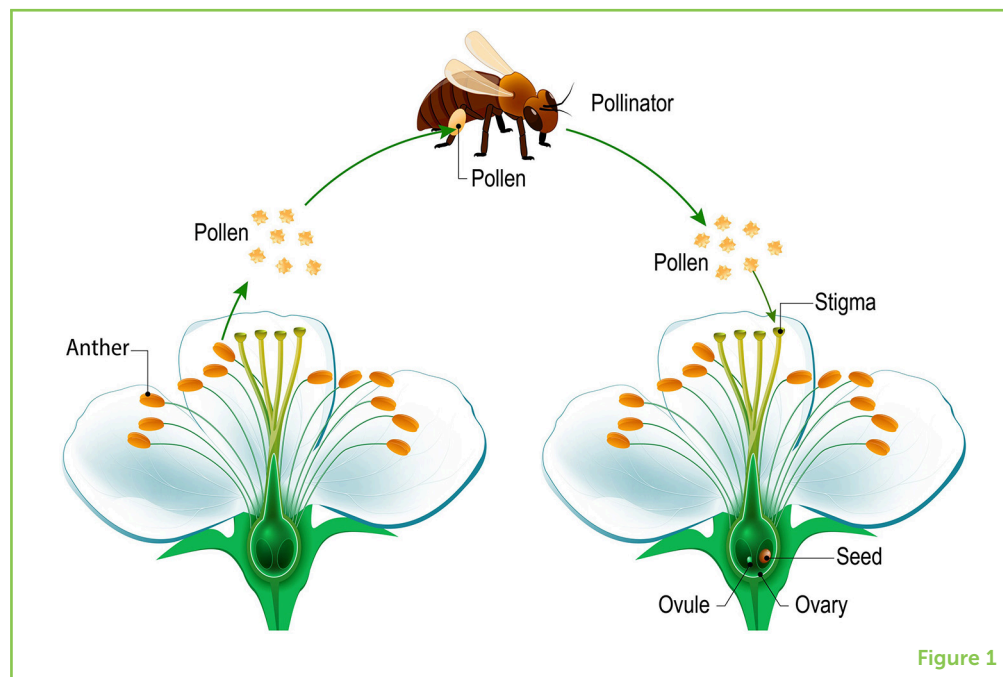


Figure 1

Figure 2

Most bees carry pollen back to the nest on various parts of their bodies. **(A)** Many bees carry pollen on brushes of hair. **(B)** Leafcutter bees have hairy bellies for carrying pollen. **(C)** Long-horned bees carry pollen on their hairy legs. **(D)** This tiny masked bee swallows most of the pollen it collects and then throws it back up when it returns to the nest!

[Image credits: https://education.eol.org/observer_cards (BY-NC-SA)].

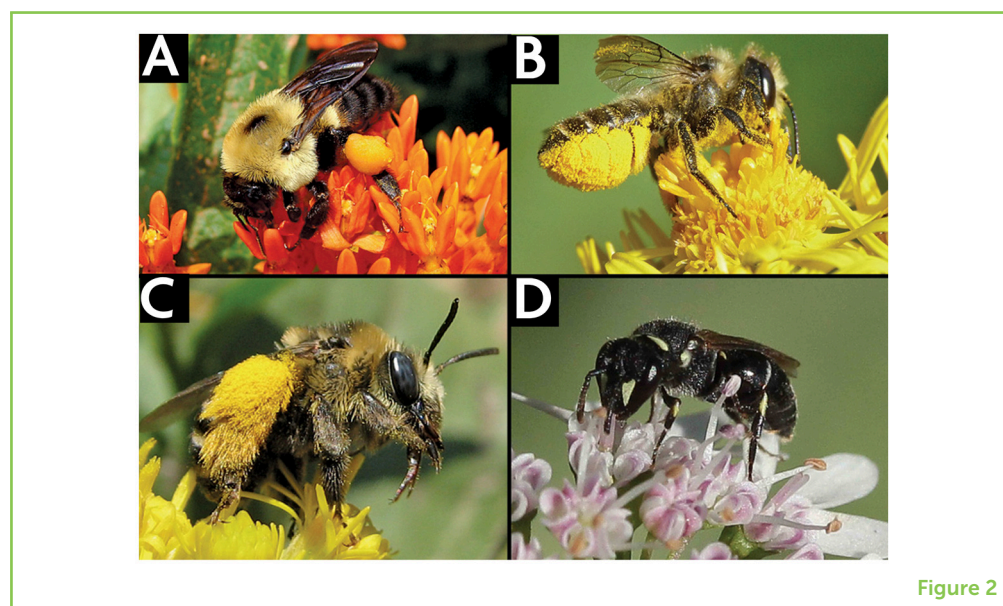


Figure 2

NATIVE BEE DIVERSITY

Native bees live all over the world, in almost every habitat where plants grow. In North America, there are close to 4,000 species. That is about four times the number of bird species found on the continent! Bees come in many colors, sizes, and shapes. They also have many different nesting, feeding, and social behaviors. The kind of plant a bee prefers to visit depends on the length of the bee's tongue. Bees with long tongues are best at getting nectar from flowers with deep necks, like blue bells. Bees with short tongues typically visit more open flowers, like sunflowers.

Native bees also vary in their social structure and nesting habits. Bumble bees are social bees. They live in colonies with one queen who lays all the eggs, and lots of workers who gather food from flowers and feed the young (Figure 3A). Bumble bees have thick, long fur and can shiver their bodies to warm up. They can live in cold places like mountain tops and way up north in the Arctic. If you wanted to go to one place in the world to see a lot of bumble bees, the Himalayan mountains in Nepal and Tibet have more species than anywhere else.

Figure 3

There are many kinds of bee nests. **(A)** Bumble bees often nest in abandoned mouse burrows under the ground. **(B)** About 70% of all bees nest in the soil, often in open patches of ground with few plants. **(C)** This mason bee is using an abandoned beetle hole in the trunk of a tree for her nest. **(D)** Cuckoo bees search out the nests of other bees (in this case, a mining bee nest in a sandy bank) in which to lay their eggs. [Photo credits: **(A)** GMarques CC BY-NC 4.0; **(B)** J. Rykken; **(C)** Panoramedia CC BY-SA 3.0; **(D)** Chipiok CC BY-NC 4.0].

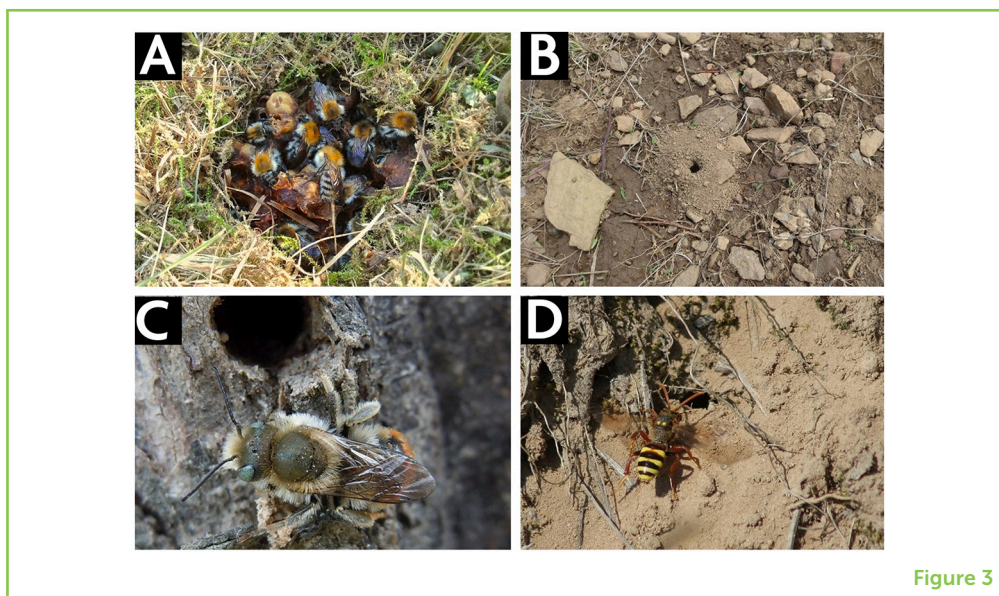


Figure 3

SOLITARY BEES BUILD MANY KINDS OF NESTS

Most other native bees in North America live a solitary lifestyle [2]. Each female bee makes her own nest, lays eggs, and provides each egg with all the nectar and pollen it needs to grow into an adult. Many solitary bees dig their nests in the soil or in sandy banks along rivers (Figure 3B). These include mining bees, digger bees, sweat bees, and polyester bees. Polyester bees get their name because they protect the insides of their nests with a waterproof lining that also keeps out mold. Some soil-nesting bees live in large groups, so you might see lots of little entrance holes in the ground near each other making up a bee neighborhood.

Other bees nest in dead trees in tunnels made by beetles (Figure 3C), cracks and cavities in wood and rock, hollow plant stems, and a few species even nest in empty snail shells! Some of these nests are lined with mud, chewed-up leaves, or plant resin. Leafcutter bees line their nests with almost perfectly round pieces of leaves that they cut out carefully with their huge jaws. Wool carder bees make very cozy nests, lined with soft hairs that they gather from leaves. Carpenter bees

chew into dead wood to make their nests, though they do not eat the wood.

About one fifth of all bees have a very different lifestyle—they are known as cuckoo bees. Like cuckoo birds, the females invade the nests of other bee species and lay their eggs next to the eggs already in the nest (Figure 3D). Once the cuckoo larvae emerge, they kill the resident eggs or larvae and eat their nectar and pollen. These greedy bees are also known as **cleptoparasites**. Although their lifestyle may seem underhanded, cuckoo bees are good indicators of a healthy bee community [3]. If there are lots of cuckoo bees at a site, it means there are also lots of other bees to steal food from!

CLEPTOPARASITE

An animal that takes food from another animal that caught or collected the food.

DO NOT TAKE BEES FOR GRANTED!

If you were to tour all the national parks in North America, you would find an amazing diversity of bees in every one, including the dry deserts of Mojave National Park, oak woodlands of Shenandoah National Park, alpine meadows of Rocky Mountain National Park, and sandy beaches of Cape Cod National Seashore. Fortunately, bees living in parks and other protected areas are usually safe from many threats that bees living elsewhere face. Human activities like farming, the use of pesticides, paving and building, and the introduction of **non-native** plants and diseases can all impact bee health. Climate change is one human-caused threat that impacts bees everywhere, even in very remote places. As temperatures rise around the planet, some bee species have been forced to move farther north or up mountainsides to seek cooler climates [4]. In places where climate change is causing spring to warm up earlier than normal, plants and their pollinators may be affected. For example, if plants flower earlier than bees emerge from their hibernation, the mismatch in timing may result in fewer plants being pollinated and reproducing successfully [5].

NON-NATIVE

A non-native species is one that occurs in a place where it did not naturally evolve. Often non-native species are unintentionally carried to new places by humans.

WHAT YOU CAN DO TO HELP NATIVE BEES

Bees are important pollinators in the wild. They are very diverse and live in many habitats. Bee health may be impacted by human-caused threats like climate change. It is up to all of us to make sure that pollinators and the plants they visit are still around for future generations. Parks and other protected areas support bees by preserving native habitats. We can support bees in our own backyards by providing food and nesting areas. Plant native wildflowers and shrubs of various colors, shapes, and blooming times, so that bees have access to nectar and pollen through the growing season. Bees love a messy yard for nesting! Leave patches of bare soil for ground-nesting bees (they can not nest in thick green grass), dead wood and last year's hollow berry canes for cavity-nesting bees (you

can also drill holes in blocks of wood to attract cavity nesters), and thick brush piles for bumble bees.

Most importantly, keep learning about your local pollinators! Even though there is still a lot we do not know about native bees, we do know that without them, even our wildest places will lack the busy buzz that keeps nature thriving.

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YOUNG REVIEWERS

DISCOVERY CHARTER SCHOOL, AGES: 13–14

Discovery Charter School is located south of Lake Michigan in Indiana. Our 8th grade class is very eccentric. We love to joke around, but we also enjoy exploring the trails outside our school and learning more about the wildlife. We are a hard working class. Participating in this article review allowed us to learn more about the things that we always see during the summer. It was pretty cool to be a part of something that would be made public.



EVA, AGE: 13

Hi, I am Eva. I love skateboarding, skiing, and running. I love to play music on my saxophone and guitar. I love hanging out with my friends and having fun.



MAPLE, AGE: 13

Maple is 13 year old who loves spending time outdoors. She likes camping, swimming & hiking but LOVES skiing/snowboarding and big, snowy winters. Maple enjoys science at school, especially learning about weather patterns and snow science; she gets daily reports and avalanche forecasts so she can get amazing turns all winter long. Maple also loves animals—her dog Winter & bunny Birdie, playing soccer and creating art.

AUTHOR

JESSICA RYKKEN

Jessica Rykken is an entomologist who has studied bees and other pollinators in national parks across the U.S. for more than 15 years. Currently she works in Alaska, where she spends a lot of her time in the mountains and in Arctic regions researching bumble bees. Her favorite landscape is tree-less tundra because of all the colorful wildflowers and pollinators and because you can see the bears coming! *jessica_rykken@nps.gov

