The Case of the Disappearing Honeybees

A Reading A–Z Level Y Leveled Book
Word Count: 1,527

Connections

Writing

Write a letter to the editor persuading readers to help save honeybees. Use the information from this book and outside resources to explain the importance of honeybees and what people can do to help them.

Science

Research two different species of bees and write a report comparing and contrasting them.

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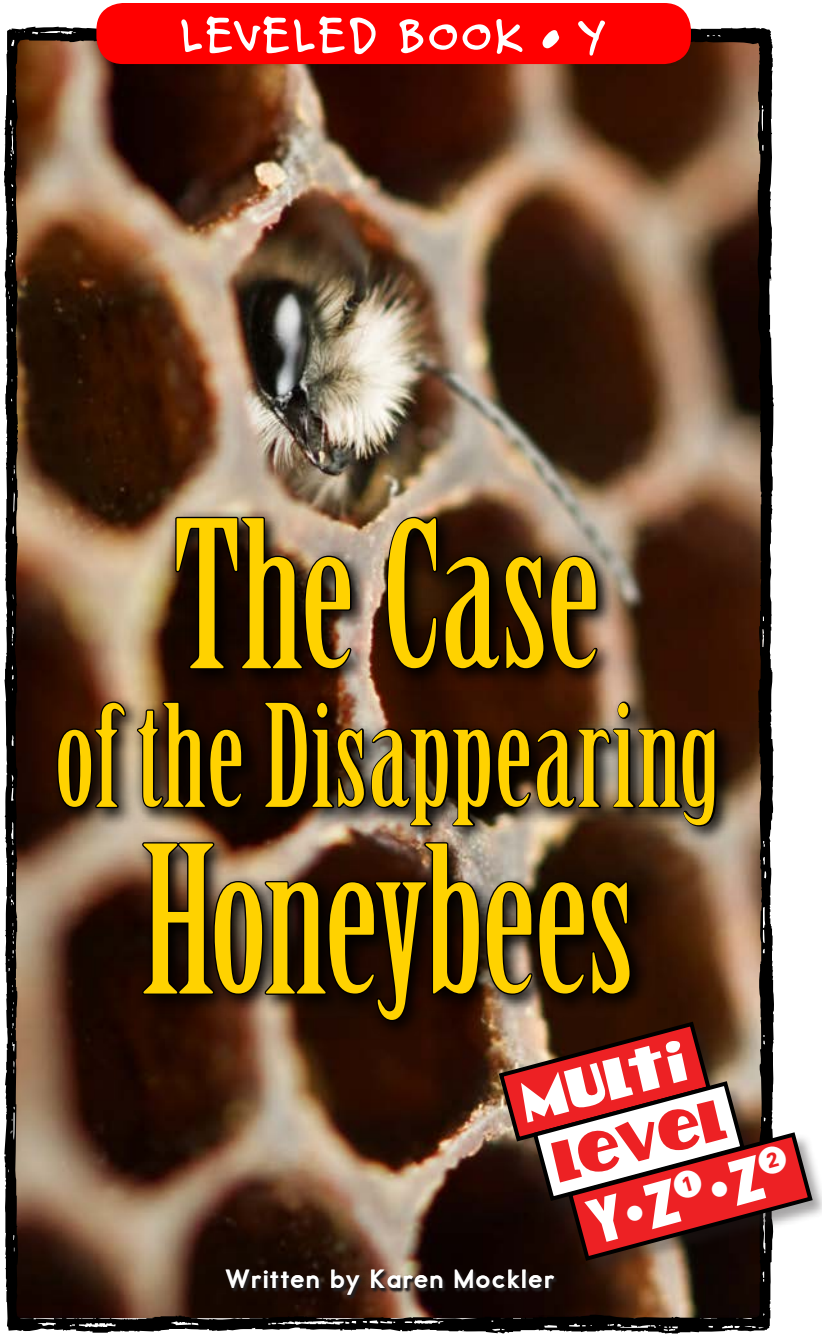

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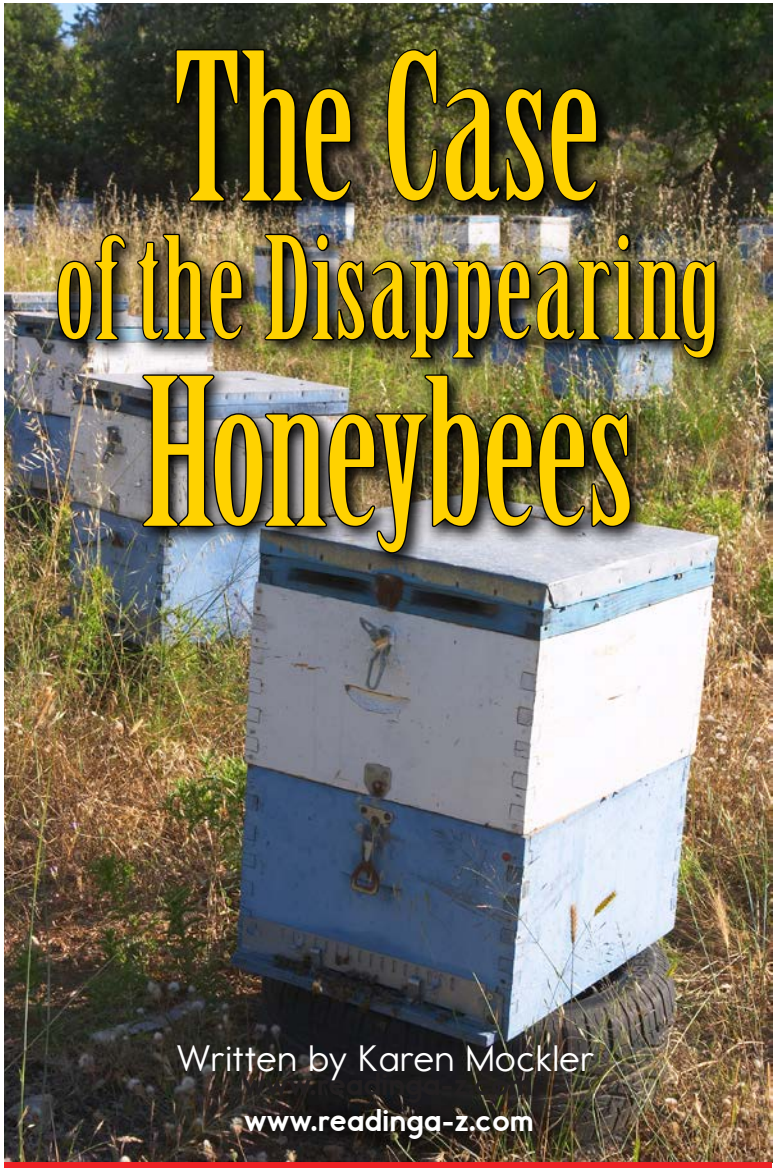

Focus Question

What are some factors contributing to the disappearance of honeybees?

Words to Know

colonies	fertilization	pollinate
compromised	forage	sanctuaries
disorder	parasites	surveyed
dissected	pesticides	systemic

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The Case of the Disappearing Honeybees
Level Y Leveled Book

Written by Karen Mockler

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Correlation

LEVEL Y	
Fountas & Pinnell	T
Reading Recovery	40
DRA	40

Table of Contents

A healthy honeybee colony moves into a new hive.

Who Took My Strawberries?

Think of your favorite fruit.

Now imagine a world in which that fruit—or any other fruit, or many nuts, vegetables, or flowers—is extremely rare.

Without honeybees to **pollinate** the flowers of these plants, our diets would be very bland and boring. In fact, one in three bites of the food you eat is thanks to honeybees.

Yet honeybees are vanishing around the world, and the reasons have puzzled scientists for a long time. Scientists have evidence, however, that the disappearance might have everything to do with humans.

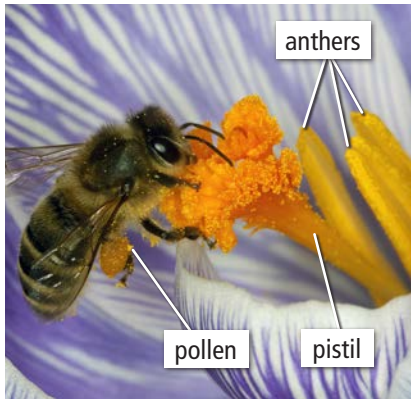
Busy Bees

Bees live in **colonies**, which are busy, well-run places where each bee has a job to do, and all the bees in the colony depend on one another. Outside of the colony, a lone honeybee can't survive for more than twenty-four hours.

Honeybees from a single hive can visit more than 100,000 flowers in a day. Once a bee finds a flower in bloom, it collects pollen for food and nectar to make honey. At the same time, the honeybee performs—unintentionally—one of the most critical processes in nature: pollination.

As the bee brushes against the anthers on the inside of a flower, the bee's body picks up pollen grains from that flower. When the bee lands on another flower, the pollen on its fur brushes off onto the pistil inside that flower. This leads to **fertilization**, a process that will eventually result in a seed.

Without fertilization, plants can't reproduce, and when the plants are gone, the species that depend on them for survival also disappear.



A bee pollinates a flower.

Missing in Action

In October 2006, an American beekeeper arrived at one of his apiaries, or beeyards, in Florida to pick up 400 hives. Three weeks before, the hives had appeared healthy, but now he found the hives nearly empty. Food, baby bees, and a few queens were all that remained. The beekeeper kneeled down, looking for dead bodies, but 20 million bees had disappeared.

This beekeeper was not alone. Reports of other losses began to surface across the United States, Europe, Argentina, China, and other countries.

During the winter of 2006–2007, roughly 750,000 of the estimated 2.4 million colonies in the United States had vanished. On average, U.S. beekeepers lost 38 percent of their colonies. In 2008, the largest known disappearance occurred in the almond tree groves of California—2 billion bees vanished.

Both farmers and beekeepers were desperate for science to shed some light on the mystery.


A frame from a honeybee colony before and after the bees vanished.

On the Case

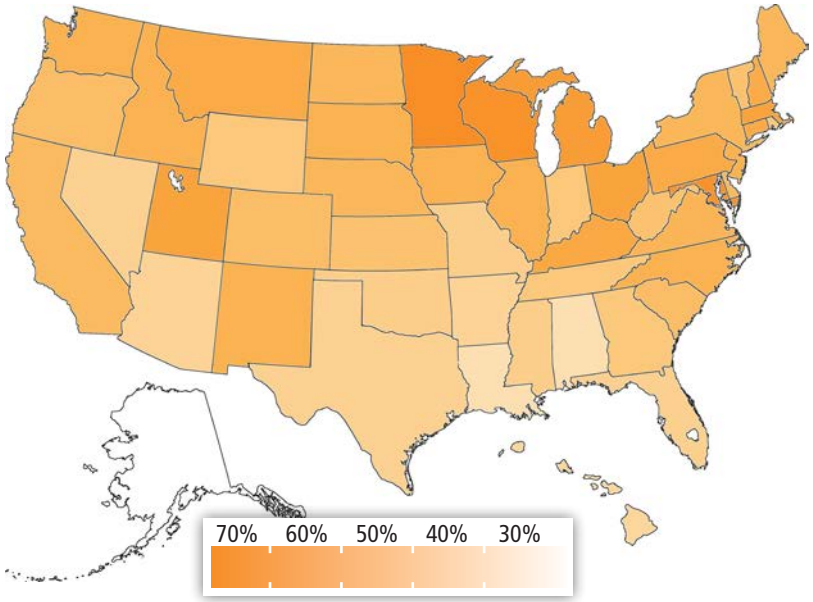
Scientists named the problem *colony collapse* ***disorder*** (CCD) and quickly determined the symptoms. CCD happens in a matter of weeks when what seems to be a healthy hive collapses, yet few, if any, dead bees can be found. The only bees remaining are the very young and the queen—members of the colony that normally would never be left alone.

Honeybee scientists from around the country started working on CCD with a simple goal: to find out what's killing the honeybees and stop it. Reaching that goal has proven far more complicated than anyone expected.

CCD scientists **surveyed** beekeepers and took samples of wax, pollen, and live and dead bees (when they could find them). The samples were shipped to laboratories to be studied. When scientists **dissected** the bees, they found that the bees had many diseases. It seemed that their immune systems were **compromised**—but why?

A scientist takes samples from a hive with CCD.

Average Annual Hive Loss by State, 2012–2013



Source: Bee Informed Partnership

The scientists investigated the usual suspects that might damage honeybees' immune systems. These included several **parasites**, such as a mite that feeds on bee blood, transmits viruses, and lays eggs in the same hive cells as baby bees. They looked at fungal bacteria that make it difficult for bees to eat and leave them too weak to **forage**. Scientists also found a virus that causes paralysis in a large number of CCD hives.

While these are all extremely dangerous to bees, researchers decided that none were the cause of CCD, so their investigation turned to farming practices.

A truck sprays pesticide over young plants.

Just One Crop

Once upon a time, farms were small and grew many different crops. Today, most farms are massive and grow a single crop, such as wheat, corn, or soybeans. This arrangement is called a *monoculture.*

Some farmers like a monoculture because it's very efficient, but bees can't survive on such a farm for long because once the single plant crop stops blooming for the year, the bees starve to death.

Monocultures present bees with other complications, too. Because pests love monocultures, farmers must spray chemical **pesticides** to eliminate them. In American agriculture, a large portion of the food we eat is treated with pesticides. According to the Environmental Protection Agency, more than a billion pounds of these chemicals are used on our crops annually. It's challenging for farmers to find chemical pesticides that kill harmful insects but leave the beneficial ones, such as bees, alone.

Pesticides spell trouble for many creatures, bees in particular. So farmers try to spray crops at times when plants aren't blooming and honeybees are less likely to be nearby. Still, scientists found pesticides in the samples they'd collected from hives with CCD, and a new class of pesticides has some scientists particularly concerned.

These pesticides are **systemic**, which means that the seeds are treated with chemicals that then infiltrate every part of a plant as it grows. A single treatment lasts a long time and kills various crop pests—a seemingly good thing—but the bee losses coincide with the appearance of these new pesticides.

Pesticides might weaken the bees' immune systems, letting diseases like the paralysis virus take hold. Beyond this, though, systemic pesticides target the nervous system. They might affect the bees' ability to learn, remember, and navigate, all of which would contribute to the bees' failure to return to the hive after foraging. If bees can't find their way back to the beehive, they die.

Scientists found evidence that systemic pesticides exist in beehives that have had CCD, and the timing of the introduction of these new pesticides coincides with the appearance of CCD. They cannot, however, state conclusively that these pesticides cause the disease. Still more factors must be considered.

Do You Know?

Despite the fact that systemic pesticides are widely used in Australia, the honeybees there haven't seen the same problems as others around the world. It could be because Australian winters are short and mild. Perhaps it's because Australia doesn't move its bees from one monoculture to the next. So far, the mite that feeds on honeybees hasn't made it to Australia, either.

Do You Know?

Ancient Egyptians floated beehives on rafts down the Nile River to follow the bloom.

Today, trucks like this one transport hives all over the country.

Keep On Trucking

Bees have been buzzing around the world for 150 million years, but in the last 10,000 years, the relationship between bees and humans has transformed. From hunters of wild honey, humans have become beekeepers. Today, many bees depend on us as much as we depend on them.

Since honeybees are excellent pollinators, moving them into a field while crops are blooming is a great way for farmers to ensure a plentiful crop. Once bees began to live in hives constructed by humans, the hives became mobile. Today in the United States, semi-trailer trucks drive hives all over the country. The honeybees they carry annually pollinate $15 billion worth of food in the United States alone.

The thought of trucking a million bees down the highway may seem strange, but it makes sense with modern monocultures. Farmers might need bees to pollinate one crop in February and another one across the country in April.

Almond trees, for example, are completely dependent on honeybees for pollination. In California, almond farmers require the use of 1.4 million colonies of honeybees. That's about 60 percent of all managed honeybee colonies in the United States. Around Valentine's Day, bees are trucked to the California groves, and when the almond trees start to bloom, they go to work.

For two weeks, those 600,000 acres (242,811 ha) of blooming trees are a busy and beautiful sight. For the other fifty weeks of the year, those groves are terrible habitat for bees—there's nothing to eat.

Transport isn't great for the bees, either. Millions of bees die from the stress each year, and once they're on the road, the bees don't have access to natural food sources. What beekeepers feed them instead, some scientists liken to junk food. Bringing in bees from different parts of the country (or the world) also spreads pests at a rapid rate. This is just one more piece of the complex puzzle of CCD.

A beekeeper is on his way to check on the more than 100,000 honeybees that live in hives around the garden on top of City Hall in downtown Chicago, Illinois.

Help the Bees

Because of the complexity of CCD, scientists have yet to find an undeniable cause or cure for the disorder. However, there is still hope for honeybees. By making a few changes, humans can begin to create honeybee-friendly environments.

One thing honeybees need is diversity; lots of different wildflowers means lots of forage. To answer this need, honeybee **sanctuaries** full of blooming plants are springing up. In these places, bees can escape pesticides and find plenty to eat.

More and more people in cities are keeping bees, such as this woman in London, England.

A movement of rooftop and backyard beekeepers is growing, too. For a long time, it was illegal to keep bees in New York City, but that ban was overturned in 2010. Cities such as Seattle, Chicago, and San Francisco have also made it legal to keep bees. These beekeepers keep fewer hives and don't truck them around.

People who don't keep bees can plant blooming plants. Even monoculture farmers can take a small portion of their land and grow plants that would sustain bees all year long, not just for a couple of weeks each year. They might also use different pesticides, or none at all.

We all can make choices that help the honeybee. After all, the honeybee helps us every day.

Glossary

colonies *(n.)* groups of animals that live together; places where groups of ants or certain other social insects live (p. 5)

compromised *(adj.)* damaged or impaired in some way (p. 7)

disorder *(n.)* a physical or mental condition that is unhealthy or not normal (p. 7)

dissected *(v.)* cut open or separated something into parts in order to study it (p. 7)

fertilization *(n.)* the process of combining male and female cells to create a new animal or plant (p. 5)

forage *(v.)* to search for or gather food or other supplies (p. 8)

parasites *(n.)* plants or animals that grow on or feed off others (p. 8)

pesticides *(n.)* chemical or biological substances that kill harmful animals or plants (p. 10)

pollinate *(v.)* to put pollen in a flower in order to fertilize it (p. 4)

sanctuaries *(n.)* safe places (p. 14)

surveyed *(v.)* asked or questioned a group of people in order to collect information for analysis (p. 7)

systemic *(adj.)* of, relating to, or affecting an entire system or body (p. 10)