Amazing Migrations

A Reading A–Z Level Z Leveled Book
Word Count: 1,733

Connections

Writing

Research to learn more about one animal from the book and its migration. Create a poster to display what you learn, including when and why the animal migrates. Include a map to show the route it takes.

Science

Salmon use their sense of smell to find their way back to the streams and lakes where they were born. Think of a place you often go to. Draw a map of the path you take to get there. Include details that draw on your five senses.

LEVELED BOOK • Z

Amazing Migrations

Written by Susan Virgilio

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www.readinga-z.com

Focus Question

How and why do animals migrate? What challenges do they face?

Words to Know

celestial bearings	multigenerational
dormant	navigational
hazards	obligates
imprinted	optimal
magnetic field	relocation
monitor	triggers

Front cover, back cover: A herd of wildebeest migrate north across the Mara River in Tanzania.

Title page: A gray whale mother and calf swim in the warm waters off Mexico's Baja Peninsula.

Page 3: Caribou cross a river in Alaska's Arctic National Wildlife Refuge.

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Correlation

LEVEL Z	
Fountas & Pinnell	U–V
Reading Recovery	N/A
DRA	50

Table of Contents

African elephants migrate through Kenya. During a very dry season, they may cover more than 100 kilometers (62 mi.).

The Journey Begins

It has been said that a journey of a thousand miles begins with a single step. It may also begin with a swish or a flutter. Traveling by land, sea, and air, many animals journey hundreds and even thousands of miles yearly to feed and breed. This seasonal or annual **relocation** is known as *migration*. Such long hauls are not only impressive because of their great distance and exact routes. They are also amazing because of the many challenges migrating animals face as they travel.

The Migration Mission

In many parts of the world, the presence or absence of certain wild animals marks the seasons. Forests filled with birdsong in summer grow quiet in winter. The stillness of early spring is broken by the chirps of tiny frogs as temperatures start to rise.

Some of the creatures that seem to come and go may simply be **dormant** during months when food is scarce and conditions are harsh. Frogs, for example, burrow underground in winter or when extreme dry spells occur. Many other animals, however, do not go dormant. Instead of reducing their need for food and water, these animals temporarily relocate to habitats where they and their young will have plenty of both.

In Australia, burrowing frogs emerge from the ground after the first winter rains.

Do You Know?

In the Northern Hemisphere, many animals head south for the winter. In the Southern Hemisphere, it's just the opposite—they head north. That's because on the bottom half of the globe, the seasons are reversed.

A road closing helps Christmas Island red crabs cross safely during their annual migration.

Some migratory animals travel a relatively short distance. Australia's Christmas Island red crabs, for example, make an annual 8-kilometer (5 mi.) journey from the island's forests to breed on nearby beaches at the start of the rainy season. Compare their migration to that of North America's monarch butterflies. These beautiful, delicate insects fly up to 4,800 kilometers (3,000 mi.) in the fall and again in the spring!

Monarch butterflies pollinate many types of wildflowers. However, they need milkweed plants to lay their eggs and reproduce.

Timing Is Everything

All animal migrations are cyclical, meaning they take place regularly at certain times of the year. How animals know just when to begin their migrations, however, is a bit of a mystery. Getting started before food supplies run out is key, but what **triggers** migrators to get moving?

Day length cues some birds to begin migrating. These migrators are called **obligates**—they are hardwired to go at a certain time, no matter what. One example of such a migrator is semipalmated sandpipers. These birds breed and nest on Arctic coasts in summer. There, they feast on coastal marine life to build up fatty reserves. Plumping up is important to these long-distance migrators. As the days begin to shorten, the sandpipers set out on an amazing 4,000-kilometer (2,500 mi.) nonstop journey. They fly south to their winter homes in South America. Most of the route is over open waters with nowhere to stop for a snooze or a snack!

semipalmated sandpiper

Half a million migrating sandhill cranes are common along Nebraska's Platte River in early spring.

Other bird species, such as sandhill cranes, seem to start their spring and fall migrations based on changes in temperature and weather. The cranes' long migration between the Arctic Circle and Mexico may be delayed or advanced by days or even weeks. That's because the cranes use tailwinds and rising columns of warm air called *thermals* to carry them up to 650 kilometers (400 mi.) in a single day. Waiting for **optimal** conditions reduces the birds' effort as they journey over North America.

Optimal conditions may also trigger migration in other animal species. For instance, gray whales summer in the cold waters between Siberia and Alaska. There, they spend up to twenty hours a day eating. The whales begin to migrate south when ice cover expands over the sea in the fall. Gray whales seek warmer water where pregnant females can safely give birth to calves. The whales eat very little as they migrate between 16,000 and 23,000 kilometers (10,000–14,300 mi.). Instead, they live off the fatty blubber they have built up during the summer.

Which Way Do We Go?

Humans use memory, maps, and technology to help them find their way. Long-haul migrators use a mix of **navigational** tools as well.

Airborne migrators like birds and insects have a built-in sense of direction that is based on something called **celestial bearings**. During daylight hours, they determine their position in relation to the Sun's position in the sky. Migrating birds that travel at night, such as warblers and blackcaps, use the stars.

One scientist projected images of night skies on a domed ceiling to study how some of these night travelers determine direction. He noticed that when caged indigo buntings were placed beneath a display of the night sky, they fluttered and turned themselves in the direction they would normally migrate. When he rotated the starry display, the birds shifted to realign themselves. The experiment showed that birds use the position of the stars as a guide.

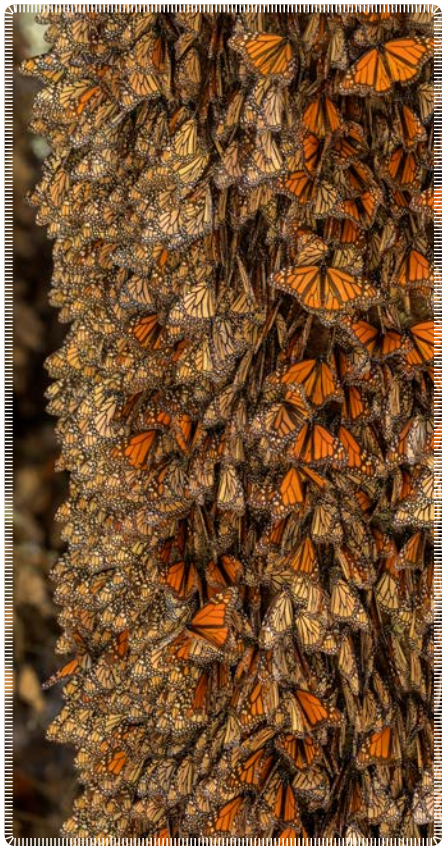
What do birds do when skies grow cloudy? Birds and some other animals use Earth's **magnetic field** to navigate. Earth is sort of like a giant magnet surrounded by this field. Certain animals can sense the pull of the magnetic field at their location and use it to guide them. Researchers are still studying just how animals do this.

One theory is that animals such as sockeye salmon have an internal compass that points them to their destination. When salmon are born, they can somehow sense exactly where they are within Earth's magnetic field. This location becomes **imprinted** in their memory. After spending up to four years in the Gulf of Alaska, the salmon return to their freshwater birthplace. They travel thousands of kilometers to release eggs, or spawn, at this exact spot. The salmon are able to reference this point as they make their way back from the sea.

Sockeye salmon return to their birthplace in British Columbia to spawn.

But what accounts for the **multigenerational** migration of monarch butterflies? The round-trip migration from Hudson Bay to Mexico takes longer than a monarch's life span. The generation that is born in Mexico must find its way back to a place it has never been.

Just as some animals have the instinct to begin migration on specific days, monarchs have the instinct to follow the same routes taken by previous generations. The idea of a magnetic "map" stored within their genes may explain this instinct. Genes are basic units of heredity that transfer a trait from one generation to the next. In the case of monarchs, their genes somehow code their destination in their memory.



Thousands of monarch butterflies cover a single tree in the oyamel fir forest of central Mexico. They pack in tightly for warmth, wait out the winter, then fly north in spring.

Many migrating mammals depend on landmarks and a sharp sense of smell to guide them. Africa is home to two of the largest mammal migrations known. The great Serengeti wildebeest migration takes place yearly when 1.5 million wildebeest make their way between feeding grounds in Tanzania and Kenya. Their journey takes them 2,900 kilometers (1,800 mi.) across grassy plains and the rushing Mara River. As they follow the rain and greener pastures to the north, the wildebeest are often joined by zebras and gazelles.


The bats that come to Kasanka National Park each fall bring their appetites. By the time they leave in late December, they have devoured more than a billion fruits!

Just as impressive is the Kasanka bat migration—the biggest mammal migration on Earth. From almost every corner of sub-Saharan Africa, ten million straw-colored fruit bats gather on a patch of swamp forest in northern Zambia. For several weeks, they feast on the fruit that grows after the start of the rainy season. By day, they cover the trunks of the trees and fly out to forage at dusk.

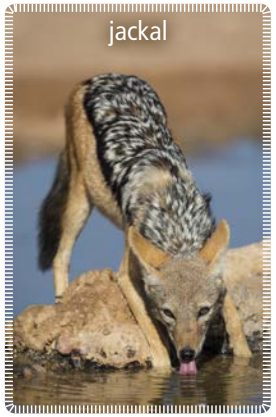
Math Minute

The sooty shearwater is a dark seabird that migrates great distances over ocean waters. Its migration route can stretch 14,000 kilometers (8,700 mi.) between New Zealand and the North Pacific Ocean. If it takes a shearwater 29 days to make the trip, how far does the bird travel in an average day?

Answer: 483 kilometers (300 mi.)

Overcoming Obstacles

Knowing when and where to go are just two of the problems migratory animals face. An increasingly bigger problem is dealing with both natural and constructed **hazards**.


jackal

Many migrators are prey animals that must be wary of predators as they travel. The wildebeest of the Serengeti are a main food source for lions and jackals as well as crocodiles lurking in lagoons and rivers. Hawks and humans hunt African fruit bats, which grow plump from eating dates and figs. Hawks also hunt the migratory routes of songbirds that travel North America's flyways.

Bad weather presents other challenges to migrating species. Sudden storms can disrupt the flight plans of migrating birds and force large flocks to land unexpectedly in unusual locations. This type of event is known as a fallout. One songbird fallout occurred in South Texas in April 2013. Thousands of tired and hungry migrating songbirds landed on South Padre Island, off the coast of Texas. Island residents put out fruit and worms to help the birds gain enough strength to resume their migration north.

Shifting weather patterns have sometimes interrupted land and water migrations as well. Warm spells can cause early snowmelt, leading to flooding that complicates the migration of animals such as elk. Flooded rivers can overrun their banks and send migrating salmon off course, leaving them high and dry when waters recede. Droughts can not only make food scarce but can also spark wildfires that put migrating herds in peril.

Human-made barriers threaten long-haul migrators as well. Dams block waterways that migrating fish once used. Highways that cross migration routes put animals and people on a collision course. Fences block migrating range animals from following centuries-old trails that lead to important feeding grounds.


A herd of migrating pronghorn encounter a barbed wire fence in Wyoming. A closer look at the bottom wire, however, reveals that it is not barbed, so pronghorn can slide under it without cutting themselves.

Even well-intentioned structures harm migrators. The huge blades of giant wind turbines used to generate clean electricity are deadly to migrating birds and bats. Large-scale solar farms, such as the Ivanpah solar plant in California's Mojave Desert, are responsible for killing thousands of birds that fly into the concentrated beams of sunlight and are instantly burned to death.

To address these problems, researchers use tracking devices to **monitor** migratory animals. They include the information in studies showing the impact of construction on the environment in hopes that new construction can be placed away from migration corridors. New awareness of migration routes and the behavior of migrators has inspired people to find ways to help rather than hurt them.

A young loggerhead sea turtle in Florida is tagged by a scientist before it sets out on a journey of 7,250 kilometers (4,500 mi.). Even more incredible, turtles make the trip in just seventy days.

The Grand Champion of Migration

If any one species deserved to be crowned the grand champion of migration, it would be the arctic tern. Tiny tracking technology enabled scientists to follow the flight of this bird on its long migration between the North and South Poles. What researchers learned was astounding: the tern's journey was twice as long as once thought, an unbelievable 70,800 kilometers (44,000 mi.)!

Instead of following a straight north-south line, many Arctic terns zigzag from Greenland to Antarctica and back again. They do this to take advantage of swirling wind currents that carry them on their way. The additional distance saves these birds the tremendous effort of having to fly directly into the wind.

Some regions now have wildlife overpasses and underpasses where roadways and land migration routes cross. These wildlife-only bridges and tunnels help keep migrators and drivers away from each other and safe. Engineers are working to improve clean-energy devices that unintentionally harm migrators. Vertical wind turbines in development may one day replace the giant horizontal propellers on wind farms.

Specially constructed "fish ladders" have been placed next to dams on salmon migration routes so that the fish can safely reach their spawning grounds. Information about how pollution affects migrators already stressed from their long journeys could lead to regulations designed to keep migrators safe.


A salmon leaps up a fish ladder in Alaska.

What's most impressive about amazing migrators is how, despite these obstacles, they set out on their epic journeys year after year. These migrations across land, in the air, and through the sea are critical to the survival of these species. Understanding their importance can inspire us to take action to ensure that these important journeys continue for many years to come.

Glossary

celestial bearings *(n.)* an understanding of one's location in space and time as it relates to the Sun, Moon, stars, and other celestial bodies (p. 10)

dormant *(adj.)* not active but able to become active again (p. 5)

hazards *(n.)* possible dangers or risks (p. 15)

imprinted *(v.)* fixed permanently in the mind or memory (p. 11)

magnetic field *(n.)* an area around a magnetic material, electric current, or moving electric charge where there is a magnetic force (p. 11)

monitor *(v.)* to observe or check the progress of something over time (p. 17)

multigenerational *(adj.)* relating to or occurring over more than one generation or life cycle (p. 12)

navigational *(adj.)* relating to steering a course toward a destination (p. 10)

obligates *(n.)* animals that must repeat a certain behavior or live in certain conditions to survive (p. 7)

optimal *(adj.)* best or most well-suited (p. 8)

relocation *(n.)* the act of moving from one place to another (p. 4)

triggers *(v.)* causes something to happen (p. 7)

Butterfly Café

A Reading A–Z Level H Leveled Book

Word Count: 180

Reading a-z

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Butterfly Café

Written by Karen Mockler • Illustrated by Pamela Johnson

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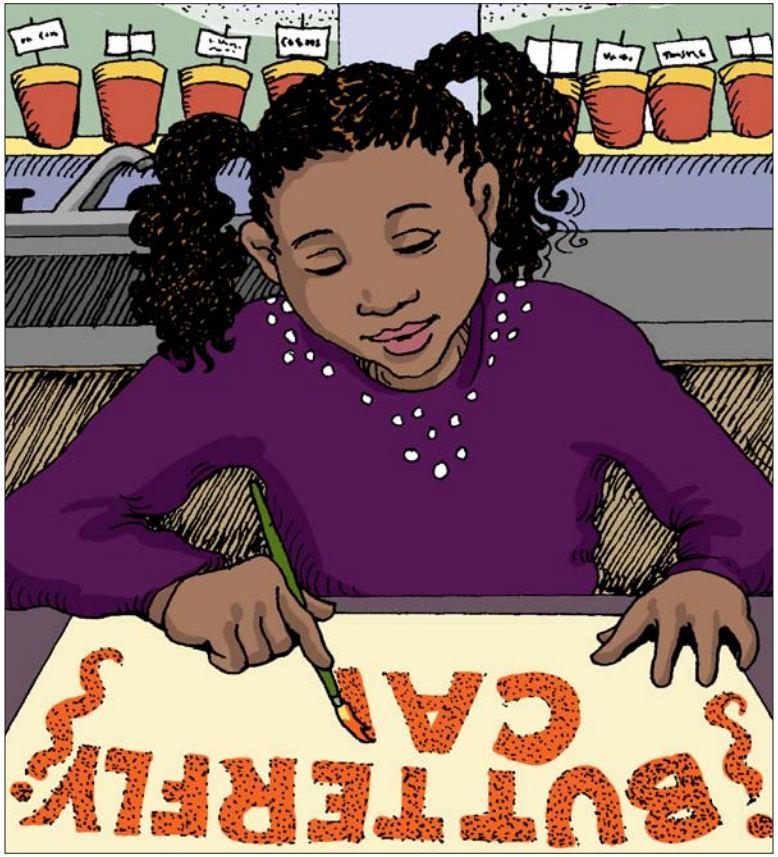
Butterfly Café



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Correlation

LEVEL H	
Fountas & Pinnell	H
Reading Recovery	13-14
DRA	14

Our seeds came in the mail today.

We could wait until May and plant them outside.
But May is three months away!

So we start our seeds inside.
We plant the seeds in pots of soil.

We water the pots at the kitchen sink.

We place the pots in a sunny window and we wait.

Some seeds will grow into food, but the food is not for us.
Some seeds will grow into **shelter**, but the shelter is not for us.

While we wait, I make a big sign.
I use orange and black paint.
The sign reads: Butterfly **Café**.

In early spring, the **sprouts** grow into plants.

In late spring, we move the plants outside.

I place my sign beside the plants. Butterfly Café is open.

I hope our **customers** will lay their eggs on the **milkweed** plants.
I hope our customers will eat the **nectar** from the food plants.

Our first customer arrives!
She is orange and black with white spots.
She is a **monarch** butterfly.

Soon our plants are full of butterflies.
Our café is a hit!

Glossary

café *(n.)* a small restaurant that sells drinks and light meals (p. 9)

customers *(n.)* buyers of a product or service (p. 13)

milkweed *(n.)* a type of plant with milky juice (p. 13)

monarch *(n.)* a large, colorful butterfly found in North America (p. 14)

nectar *(n.)* the sweet liquid that flowering plants make (p. 13)

shelter *(n.)* a structure or other place that gives protection from bad weather or danger (p. 8)

sprouts *(n.)* young plant growth (p. 10)

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.

Reading A–Z

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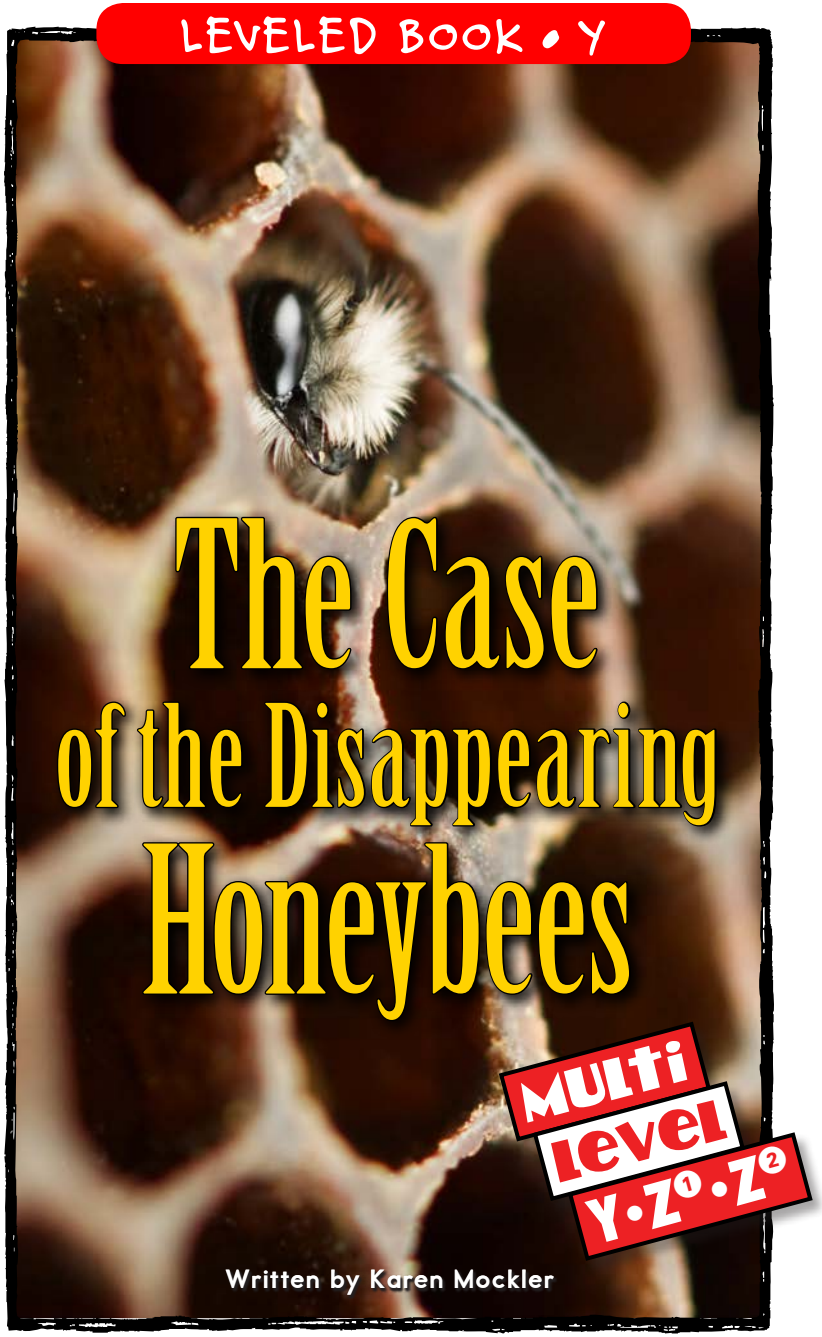

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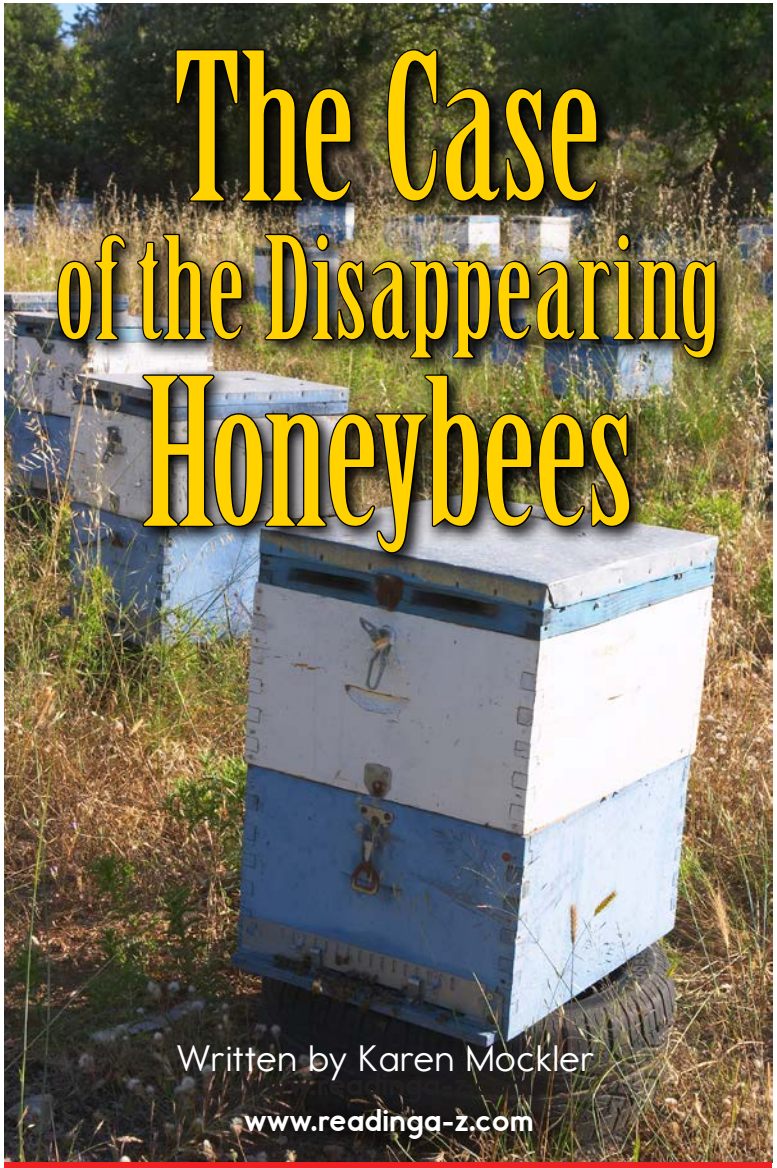

Focus Question

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

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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.

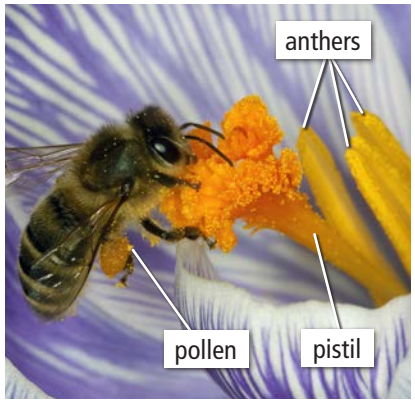
Busy Bees

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

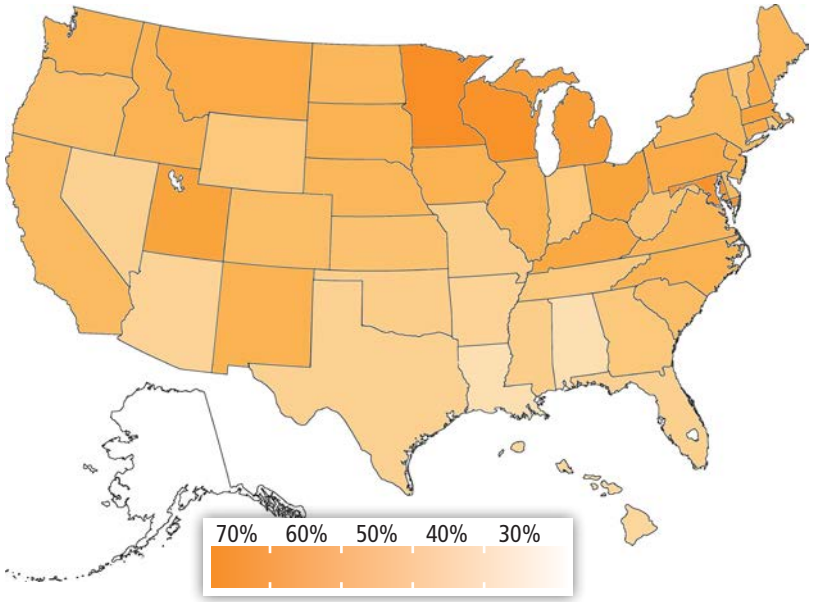
Scientists named the problem *colony collapse* ***disorder*** (CCD) and quickly determined the symptoms. CCD happens in a matter of weeks when what seems to be a healthy hive collapses, yet few, if any, dead bees can be found. The only bees remaining are the very young and the queen—members of the colony 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)

CLOSE READ PASSAGES

Birds, Bats, Bees, and Butterflies

Animals such as birds, bats, bees, and butterflies help plants make seeds. Human actions have destroyed many of the homes of these animals, so a lot of them are dying. You can help give these animals food and homes. Ask an adult to help you try some of these ideas:

1. Plant a flower garden. Flowers native to the area where you live will give bees and butterflies lots of food. Then they can help other plants grow.

2. Make a bat house. Hang a wooden box on a pole or the side of a building. This will give bats a safe place to rest.

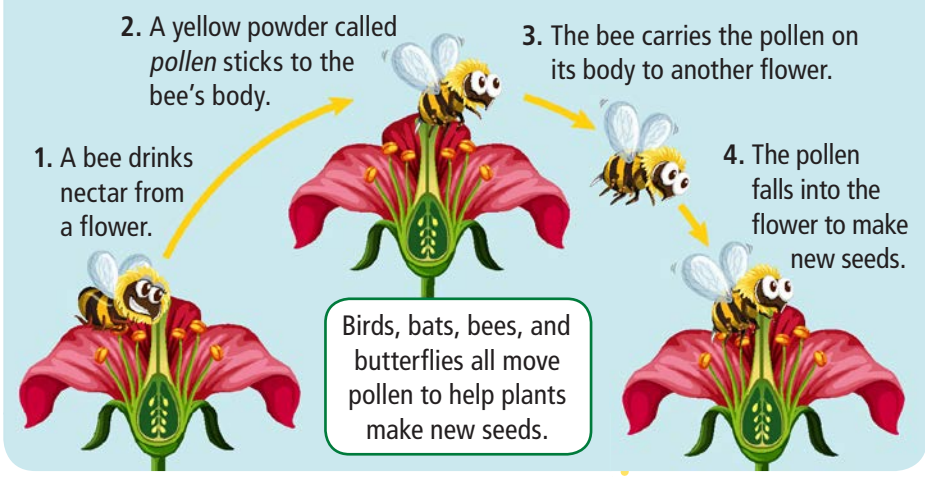
3. Hang hummingbird feeders. You can make a mixture of sugar and water to feed hummingbirds. Make sure to clean the feeders often.

4. Tell others how to help. When more people help, it will be easier for these animals to live.

Do You Know?

People use plants for food, medicine, and clothing. Birds, bats, bees, and butterflies help flowers make seeds to grow new plants, nuts, and fruit. Without those animals, we would lose many kinds of plants, foods, and other products.

How Bees Help Flowers



Genetic Basis of Butterflies

by ReadWorks

If you've ever been in a park during the summer, you may have seen butterflies flitting from flower to flower. They are quite beautiful, and like humans, seem to have individual traits. There are orange butterflies with big brown eyes, blue butterflies with black markings on their wings, and white butterflies with small black antennae. According to some butterfly experts, there are approximately 20,000 kinds of butterflies in the world. Each species (or type) of butterfly has its own genetic information that dictates what characteristics it will have and distinguishes it from other butterflies.

Inherited genetic information explains why certain species look different from others. Monarch butterflies, orange butterflies with black markings and white spots on their wings, are most common in Mexico and the United States. Their bright color makes them easily noticeable to predators, but also acts as a warning that they are poisonous if eaten.

The poison of monarch butterflies can be traced back to a plant they feed on during an earlier stage in their lives. What we think of as butterflies are the adult versions of caterpillars. As caterpillars, monarchs feed on milkweed, which contains a toxin that is poisonous to most vertebrates but not to monarch caterpillars. When the caterpillars become adult monarch butterflies, the milkweed in their bodies is poisonous to any predators that might try to eat them.

An unsuspecting predator that did not know the monarch butterfly was poisonous would soon realize its mistake. After tasting the poisonous bug, most predators quickly spit out the monarch and learn not to eat them again. Unlike other butterflies, whose genetic information (and therefore their

coloration) helps them blend into their habitats in order to defend themselves from predators, monarch butterflies rely on their bright coloration to keep them safe. An interesting fact: another species of butterfly, the viceroy, mimics the coloration of the monarch in order to keep predators from eating it!

Even though there are many kinds of butterflies that look very different, all butterflies share a certain number of traits, which are also determined by their genetic information. They all have the same life cycle. First a caterpillar hatches from an egg. The caterpillar eats plants and grows bigger. Then it covers itself in a hard case called a chrysalis, and it enters a stage of transformation. During this stage, the insect is called a *pupa*. Inside the chrysalis, the pupa grows the legs, wings, and other parts of an adult butterfly. Once the butterfly is fully developed, the chrysalis splits apart, and the butterfly emerges. All butterflies have four wings-two upper, two lower-that are covered in tiny colored scales. A butterfly's genes determine the color of its scales, and more-they dictate the insect's size and shape as well.

Colorful decorations are key to the survival of the monarch butterfly. Vivid colors signal danger to the predators which might otherwise eat the butterfly. Other species of butterfly, with different genes, rely on different survival strategies, and have their own distinctive designs. But no matter the pattern, the blueprints for each of the 20,000 different species' development are written in their genetic codes.

Name: _____ **Date:** _____

1. What does genetic information dictate, or control?

A. what characteristics an organism will have

B. where an organism will live and die

C. which predators will eat the organism

D. who the organism's parents were

2. The passage describes the sequence of a butterfly's life. Which of the following shows the life cycle of a butterfly in the correct order?

A. egg, pupa, adult, caterpillar

B. pupa, egg, caterpillar, adult

C. egg, caterpillar, pupa, adult

D. egg, pupa, caterpillar, adult

3. Monarch butterflies are protected by their bright coloration. What evidence from the passage supports this conclusion?

A. Their bright coloration makes monarch butterflies easily noticeable to predators.

B. The monarch's color warns predators that they are poisonous, so they don't get eaten.

C. Unlike other butterflies, monarchs do not blend into their surroundings to protect themselves.

D. If a predator eats a monarch, it can taste the poison and will spit the butterfly out.

4. Butterfly A is blue with black markings. Butterfly B is green with brown spots. What conclusion can you make about these two butterflies?

A. Both butterflies protect themselves by blending into their surroundings.

B. The two butterflies have different life cycles.

C. Both butterflies have the same genetic information.

D. The two butterflies have different genetic information.

5. What is this passage mostly about?

A. monarch butterflies
B. viceroy butterflies
C. milkweed toxins
D. caterpillars and pupae

6. Read the following sentences: "Inside the chrysalis, the pupa grows the legs, wings, and other parts of an adult butterfly. Once the butterfly is fully **developed**, the chrysalis splits apart, and the butterfly emerges."

What does the word "**developed**" mean?

A. young and small
B. changed and grown
C. safe and protected
D. soft and vulnerable

7. Choose the answer that best completes the sentence below.

Monarch butterflies are brightly colored; _____, they are highly visible to predators.

A. however
B. for example
C. as a result
D. initially

8. Why are monarch butterflies poisonous?

9. How do predators know that monarch butterflies are poisonous?

10. How does the monarch's coloration help both the butterfly and predators?

How to Build a Pollinator Garden

This text is from the U.S. Fish & Wildlife Service.

Courtney Celley/USFWS

Pollinator garden in Minneapolis, Minnesota. Creating habitat, no matter the size, is helpful for monarchs and pollinators.

Monarch butterflies and pollinators are in trouble. You can help by planting a pollinator garden! You can plant a garden anywhere - your yard, school, church, business, or even in a pot for your front steps.

A simple, native flower garden will attract beautiful butterflies to your yard and help pollinators stay healthy. In addition to nectar from flowers, monarch butterflies need milkweed to survive, so if you notice the leaves on your milkweed have been chomped, don't worry, it's a great sign!

Joanna Gilkeson/USFWS

Despite its namesake, milkweed is not a weed. These beautiful wildflowers are the only source of food for monarch caterpillars and essential for their survival. Plant milkweed that is native to your area, and attract all kinds of pollinators.

Before gardening

Gather your supplies, and research what varieties of milkweed and wildflowers are native to your

area. You can also look up pollinator-friendly plant lists for your region. If you're starting from seeds, find a local seed supplier.

What you'll need

- A yard, raised bed, or some flower pots
- Garden tools to break the soil or build a raised bed
- Extra dirt and mulch
- Native milkweed and nectar plants

Seven easy steps

1. **Choose your location:** Butterflies enjoy basking in the sun. Gardens should be planted in sunny spots, with some protection from the wind.
2. **Take a look at your soil:** Break ground to see the consistency of the soil in your yard. Soil may influence the kinds of plants you can grow, or may require special considerations. If you find that your soil type doesn't match the plants you'd like to plant, you might consider building a raised bed or using flower pots.
3. **Prep your soil:** If you're planting in your yard, remove the lawn and current plant cover and rake the soil. Additional dirt can be helpful no matter the location and is necessary for raised beds and flower pots - add your soil to the bed or pot.

4. Jim Hudgins/USFWS

Native wildflower gardens add a pop of color to your garden, help bumblebees and butterflies, and need less maintenance. This purple coneflower attracted both bumblebees and a crab spider! What's not to love?

Choose your plants: Find a nursery near you that sells native and local plants and milkweed for your area. Native plants are the ideal choice because they require less maintenance and tend to be heartier.

1. Choose plants that have not been treated with pesticides, insecticides, or neonicotinoids.

2. Plant perennials to ensure your plants come back each year and don't require a lot of maintenance.
3. Choose a diversity of plants that bloom throughout the seasons to ensure pollinators benefit in the spring, summer, and fall. This will also ensure that your garden is bright and colorful for months!

5. **[Choose] seeds or small plants:** Small plants that have already started growing in a nursery are simple and show instant return on pollinator visits, especially if you are planting in a small space. Seeds are best if you have more time. If you'd like to use seeds, plan ahead to plant in spring or fall, giving the seeds time to germinate. Seeds can also be best if you are doing a very large garden as they tend to cost less. Remember to water your seeds even before you see plants.
6. **Plant your flowers and milkweed:** For small plants, dig holes just big enough for the root system. Cover the roots with dirt, and reinforce with dirt or straw mulch to reduce weed growth. For seeding, spread seeds across your freshly prepared garden, and cover them with dirt. Consider adding some flat rocks so butterflies can bask in the sun!
7. **Wait, watch, water, and weed your garden:** It may take some time, but you will eventually see butterflies and other pollinators enjoying your garden. Make sure to weed and water your garden to keep it healthy.

Best of luck, and thank you for helping monarchs, bumble bees, and other pollinators!

Vocabulary

ideal

adjective

definition: seen or understood as the best of its kind or the best under certain conditions.
That is an ideal restaurant for a party.

Spanish: ideal

maintenance

noun

definition: the act of maintaining.
Maintenance of the kitchen is the cook's responsibility.

Spanish: mantenimiento

reinforce

verb

definition: to add strength to or increase the effect of.
They reinforced the fence with more posts.
You should reinforce your argument by giving more facts.

Spanish: reforzar

forms: reinforced, reinforces, reinforcing

Monarch Butterflies

Have you ever seen a butterfly with orange, white, and black markings? That may have been a monarch butterfly! Monarch butterflies are beautiful. They are also important.

Monarch butterflies often can be found near flowers. They feed on the nectar those flowers make. While they go from flower to flower eating nectar, they also pollinate the flowers. Because of this, those flowers can grow new seeds. Then those seeds can grow into new plants! So monarch butterflies are important pollinators.

Many monarch butterflies live in the United States and Canada. But they make a very special trip in the winter. The butterflies that are born late in the summer travel to Mexico and Southern California. That trip can be up to 3,000 miles long! That's a far way to go for an insect. The butterflies make this trip to get away from the cold weather. They go to the same forests

every year. Some scientists say that up to a billion butterflies go to the mountain forests of Mexico each year!

The number of monarch butterflies has gone down a lot over the past twenty years. Problems in their environment can make it hard for them to survive. For example, there has been a loss of milkweed plants. Those are the plants that monarch butterflies lay eggs on. Cities and farms have gotten rid of a lot of milkweed. Hot, dry weather has hurt milkweed, too. All of this hurts the monarch butterflies.

The forests of Mexico where butterflies go for the winter have also been shrinking. People have cut down parts of the forest. Changing weather has hurt the forest as well. This puts the butterflies at risk.

Name: _____ **Date:** _____

1. According to the text, what might be a butterfly with orange, white, and black markings?

A. a milkweed plant

B. a monarch butterfly

C. a Mexican butterfly

2. Monarch butterflies pollinate flowers while they go from flower to flower eating nectar. What can the flowers do because monarch butterflies pollinate them?

A. The flowers can grow new seeds.

B. The flowers can make more nectar.

C. The flowers can travel to Mexico.

3. Monarch butterflies can't survive in cold weather. What evidence from the text supports this conclusion?

A. "Many monarch butterflies live in the United States and Canada. But they make a very special trip in the winter. . . . The butterflies make this trip to get away from the cold weather."

B. "For example, there has been a loss of milkweed plants. Those are the plants that monarch butterflies lay eggs on."

C. "The forests of Mexico where butterflies go for the winter have also been shrinking. People have cut down parts of the forest."

4. Read these sentences from the text.

> The number of monarch butterflies has gone down a lot over the past twenty years. Problems in their environment can make it hard for them to survive. For example, there has been a loss of milkweed plants. Those are the plants that monarch butterflies lay eggs on. . . .
>
> The forests of Mexico where butterflies go for the winter have also been shrinking. . . . This puts the butterflies at risk.

What inference can you make about the number of monarch butterflies?

A. Fewer milkweed plants and smaller forests of Mexico mean a smaller number of monarch butterflies.

B. More milkweed plants and larger forests of Mexico mean a smaller number of monarch butterflies.

C. Changes in milkweed plants and forests of Mexico do not change the number of monarch butterflies.

5. What is the main idea of this text?

A. Monarch butterflies are beautiful butterflies with orange, white, and black markings, and they go from flower to flower eating nectar.

B. Monarch butterflies that live in the United States and Canada travel every winter to forests in Mexico and Southern California.

C. Monarch butterflies are important for flowers, but the number of monarch butterflies has gone down because of changes in their environment.

Save Monarch Butterflies with Milkweed

This text is provided courtesy of the National Fish and Wildlife Foundation.

iStock

a monarch butterfly on milkweed

When you think "butterfly," what image appears in your mind? You might picture a monarch butterfly. Monarch butterflies have orange and black wings, and they are considered to be one of the most well-known butterflies in North America.

In addition to being beautiful, monarchs have an amazing story. Monarch butterflies travel as many as 100 miles a day during their 3,000-mile migration south from Canada and the northern United States to Mexico, where they spend their winters. As they travel, monarchs smell with their antennae to find food. They taste nectar from flowers using special hairs on their legs and feet.

Every fall, millions of monarch butterflies return to the same fir trees in the mountains of Central Mexico. There, they are protected from winter weather by the trees and the mountain climate, which keep the temperatures neither too warm nor too cold. The butterflies rest until winter is over.

The butterflies head north in the spring. Some stop in Texas, where they mate and lay eggs on milkweed plants. Caterpillars with black, white, and yellow stripes emerge from the eggs.

They munch on massive amounts of milkweed, form a chrysalis, and then transform into a butterfly. The new butterfly continues the journey north, always looking for more milkweed. They will lay more eggs to make more caterpillars that will become more butterflies.

Butterflies are important to people for reasons beyond their beauty. Butterflies are pollinators, which are insects and other animals that help plants make seeds. Without pollinators, much of the food we eat could not grow.

But the monarch is in trouble. Over the past 20 years, the number of North American monarch butterflies has shrunk by more than 90 percent. This is partly caused by a lack of milkweed. Sometimes when farmers try to kill weeds that hurt crops such as corn, the chemical they use also kills milkweed. Monarch caterpillars can't grow on any other plant.

Conservationists are helping monarch butterflies by planting milkweed, and by helping other people plant milkweed, too. So far, one program run by the National Fish and Wildlife Foundation has helped restore or enhance about 300,000 acres with milkweed. That's about the size of about 230,000 football fields!

You can help save monarch butterflies, too, by planting milkweed. If you don't have space where you live, ask your school or an organization in your community to plant milkweed. You can be part of the conservation effort to provide milkweed and save the monarchs!

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These conservation efforts are supported by the National Fish and Wildlife Foundation (NFWF), which specializes in bringing together individuals, government agencies, nonprofit organizations, and corporations to restore our nation's fish, wildlife, plants, and habitats for current and future generations.

Name: _____ **Date:** _____

1. What migration route do monarch butterflies follow in the fall?

A. from Colombia to Argentina

B. from Canada and the northern U.S. to Mexico

C. from Maine and Massachusetts to Florida

D. from Canada to Argentina

2. What happens after a monarch butterfly mates and lays an egg on a milkweed plant?

A. A caterpillar hatches from the egg, eats milkweed, forms a chrysalis, and becomes a butterfly.

B. A butterfly hatches from the egg, eats more milkweed, goes back into its cocoon, and keeps flying

C. A caterpillar hatches from the egg, eats milkweed, gets bigger and stronger, and crawls up to Canada.

D. A butterfly hatches from the egg, lays more eggs, waits until its eggs hatch, and then eats milkweed.

3. Monarch butterflies rely on milkweed to survive.

What evidence from the text supports this conclusion?

A. "There, they are protected from winter weather by the trees and the mountain climate, which keep the temperatures neither too warm nor too cold. The butterflies rest until winter is over."

B. "As they travel, monarchs smell with their antennae to find food. They taste nectar from flowers using special hairs on their legs and feet."

C. "Butterflies are important to people for reasons beyond their beauty. Butterflies are pollinators, which are insects and other animals that help plants make seeds."

D. "Over the past 20 years, the number of North American monarch butterflies has shrunk by more than 90 percent. This is partly caused by a lack of milkweed."

4. Which of the following sentences best describes conservationists' efforts to help save monarch butterflies?

A. They are helping by destroying predators that harm butterflies.

B. They are helping by restoring a plant that the butterflies rely on.

C. They are helping by flying the butterflies to Canada in an airplane.

D. They are helping by capturing the butterflies and studying them.

5. What is the main idea of this text?

A. Endangered monarch butterflies rely on milkweed to survive during their migration every year, so conservationists are planting more milkweed for them.

B. Monarch butterflies live in North America and travel a route between the northern and southern parts of the continent every year.

C. Monarch caterpillars eventually turn into butterflies, but when they are born they are caterpillars with white, black, and yellow stripes.

D. Farmers use chemicals to kill weeds so that their plants can grow healthy and strong, but sometimes those chemicals kill plants that are important.

Thank You, Bees, Butterflies, and Bats

This text is provided courtesy of the National Fish and Wildlife Foundation.

iStock

a bumblebee pollinates blueberry flowers

The next time you take a big bite of a delicious chocolate bar, thank a bat. Why? Because chocolate is made from cocoa beans. Those cocoa beans come from cocoa plants. And cocoa plants depend on the bats!

Bats are pollinators. That means that when bats fly from cocoa plant to cocoa plant and drink nectar from the flowers, they are helping the cocoa plants produce seeds. The seeds become beans, which are harvested to make chocolate. Scientists have done studies to learn more about the bats and cocoa plants. They found that in Indonesia, when the bats were kept away from the plants, there were fewer cocoa beans to harvest!

You might know that bees and butterflies are pollinators, too. Just like bats, bees and butterflies help to produce food. Bees buzz around plant flowers to collect food. While doing this, they pollinate apple trees, cranberries bushes, melon plants, and more, helping the plants to produce fruit. Bumblebees, for example, are important for growing blueberries.

Conservationists are scientists and other professionals who work to protect the environment and wildlife. They are conducting research and providing advice to people to make sure pollinators such as bats, bees, and butterflies have plenty to eat and safe places to live.

Conservationists have been working with landowners to help butterflies that live in or travel through their land. Through just one program managed by the National Fish and Wildlife Foundation, 300,000 acres of land have been restored or improved to support butterflies and other pollinators. More than 750,000 milkweed seedlings have been planted. Milkweeds are the only plants that monarch caterpillars eat, so without milkweed, there would be no more monarch butterflies. Since butterflies and other pollinators help to make so many of the foods we eat, the least we can do is to make sure they get food to eat, too.

The next time you eat some juicy blueberries, or take a bite of a nice, crisp apple, remember that without bees, butterflies, and bats, there would be none of these delicious foods to enjoy. Thank you, pollinators!

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These conservation efforts are supported by the National Fish and Wildlife Foundation (NFWF), which specializes in bringing together individuals, government agencies, nonprofit organizations, and corporations to restore our nation's fish, wildlife, plants, and habitats for current and future generations.

Name: _____ **Date:** _____

1. What animals do cocoa plants depend on?

A. ants
B. bats
C. dogs
D. horses

2. What effect do pollinators have on the plants that they visit?

A. They help them produce seeds or fruit.
B. They help them look more beautiful.
C. They help them smell better.
D. They help them live longer.

3. Read the following sentences from the text.

"Bees buzz around plant flowers to collect food. While doing this, they pollinate apple trees, cranberries bushes, melon plants, and more, helping the plants to produce fruit."

What can you conclude about a bee's relationship to a flower that it pollinates, based on this information?

A. Bees are not very helpful animals because they sometimes sting humans.
B. Bees do not know how to pollinate until they are taught.
C. Without pollinators like bees, there may be fewer of these fruits.
D. Some bees have good relationships with flowers, and some don't.

4. What is one way that conservationists are working to protect important pollinators?

A. by planting more of the plants that they eat
B. by playing music to encourage them
C. by capturing them and bringing them to a zoo
D. by creating more lakes for them to drink from

5. What is the main idea of this text?

A. Butterflies, bats, and bees are all pollinators that help plants produce seeds and fruit, so conservationists are working to make sure they stay safe and protected.

B. Bumblebees are one kind of pollinator: they collect food from blueberry plants and then spread the blueberries' seeds so that more plants grow.

C. Milkweeds are the only plants that monarch caterpillars eat, so without milkweeds, there wouldn't be any monarch butterflies.

D. Bees pollinate many different kinds of plants, including apple trees, cranberry bushes, melon plants, and more.

