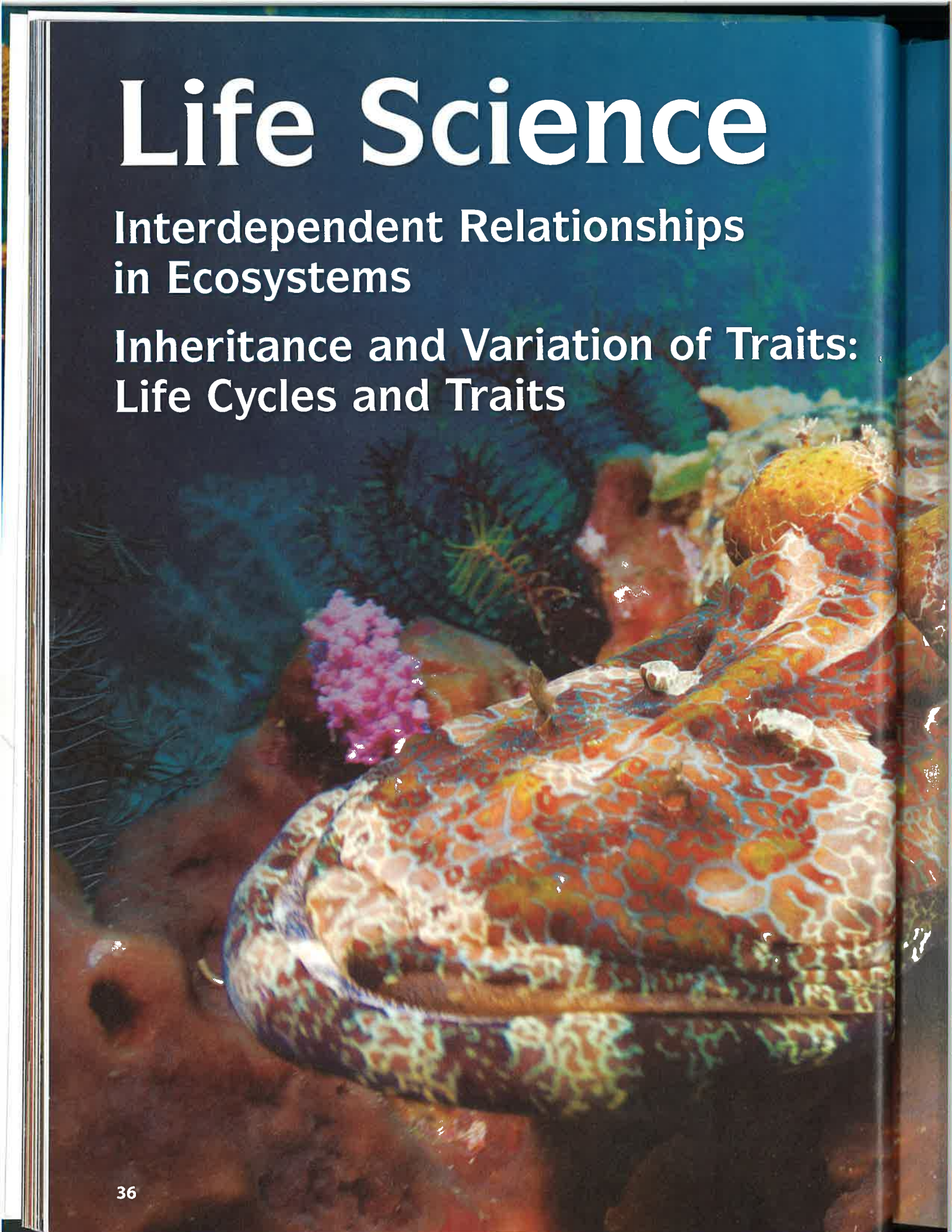
Life Science

Interdependent Relationships in Ecosystems

Inheritance and Variation of Traits: Life Cycles and Traits

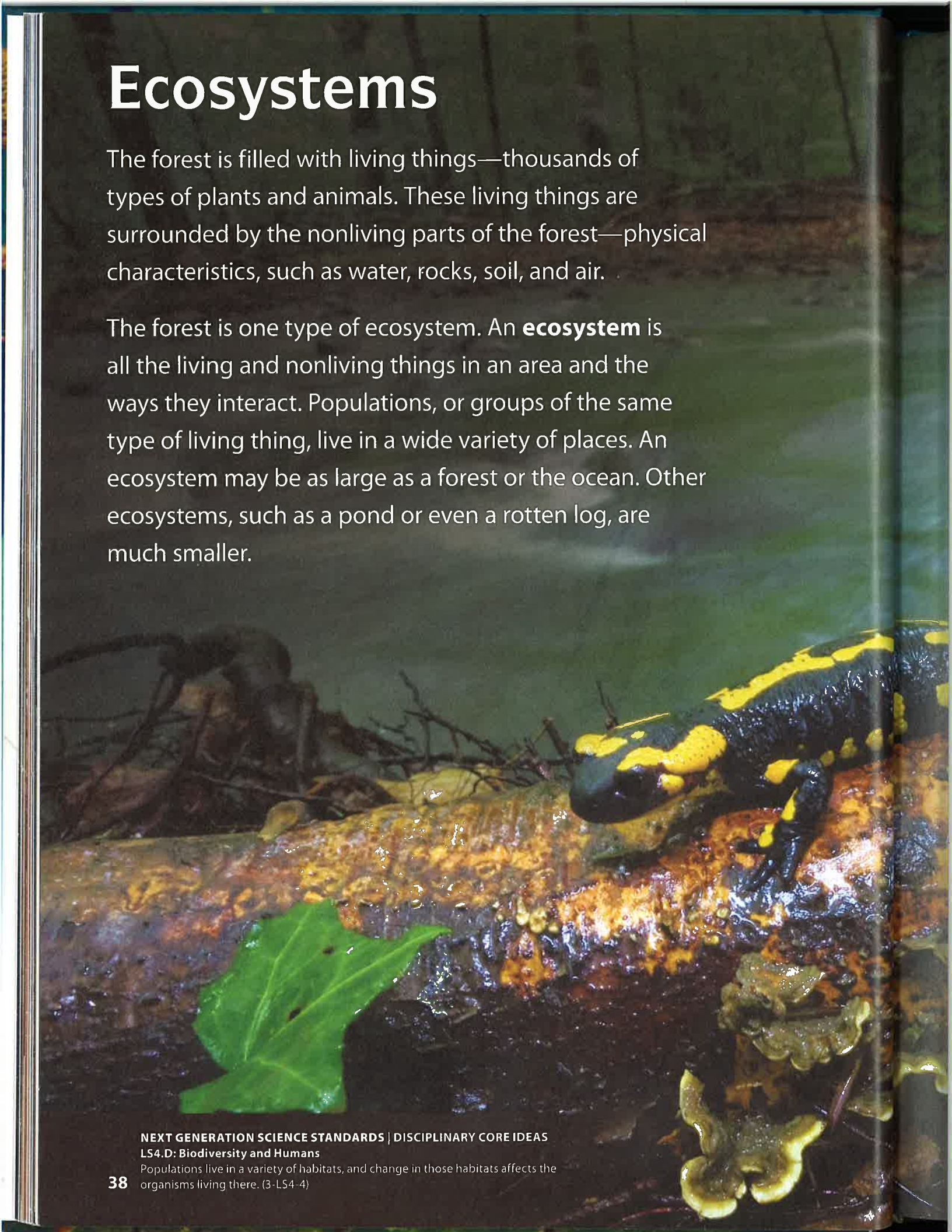


The Beaufort's crocodilefish blends in with its surroundings.

Ecosystems

The forest is filled with living things—thousands of types of plants and animals. These living things are surrounded by the nonliving parts of the forest—physical characteristics, such as water, rocks, soil, and air.

The forest is one type of ecosystem. An **ecosystem** is all the living and nonliving things in an area and the ways they interact. Populations, or groups of the same type of living thing, live in a wide variety of places. An ecosystem may be as large as a forest or the ocean. Other ecosystems, such as a pond or even a rotten log, are much smaller.



NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.D: Biodiversity and Humans
Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

The European salamander is one living part of this forest ecosystem.

Wrap It Up!

My science notebook

1. **Define** What is an ecosystem?
2. **Interpret photos** Look at the photo of the forest. What are some of the living things in this forest ecosystem?
3. **Infer** Name some of the nonliving things you cannot see that may live in this forest ecosystem.

Forests Change

Fires, storms, and other natural events change the physical characteristics of a forest. A forest fire burns the trees and other plants. Afterwards, the ground is black and bare. There is less sheltered space. Such physical changes affect the organisms, or living things, that live there.

Soon after a fire, trees and wildflowers begin to grow.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

LS4.D: Biodiversity and Humans

Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

There are no leaves for deer, rabbits, or insects to eat. Some of these animals move to other places to find food and shelter. Other animals die.

But a fire also helps some things grow. The burned wood adds nutrients to the soil. Grasses and wildflowers soon grow from the enriched soil. The heat of the fire makes the seeds of certain pine trees sprout. After a while, a new forest grows. Birds, deer, and other populations can move in.

A forest fire burns the trees and shrubs in the forest. There is little food for animals such as deer and rabbits.

Wrap It Up!

My science notebook

1. **Describe** How does a fire change a forest?
2. **Cause and Effect** How does a fire affect the deer in a forest?
3. **Infer** After a forest fire, wildflowers soon begin to grow. How might the wildflowers eventually affect the number of rabbits in the area? Why?

Searching for Water

In the grasslands of East Africa, part of the year is rainy, and part of the year is dry. Water is a resource that plants and animals need. During the rainy season, water is plentiful. Water fills dried up rivers and ponds, and the soil is moist. Grasses and other plants grow well. Herds of animals such as zebras, wildebeests, and white-bearded gnu eat the grass.

During the dry season, the habitat changes. Rivers and pools dry up. The soil is so dry that grasses turn brown. The herds migrate to other places where there is grass to eat and water to drink. To **migrate** is to move to a different place to meet basic needs. Each year the zebras, wildebeasts, and white-bearded gnu may travel up to a thousand miles to find water and green grass.

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During the rainy season, watering holes provide animals with plenty of water to drink.

During the dry season, white-bearded gnu migrate in search of fresh grass and water.

Wrap It Up!

My science notebook

1. **Identify** What are the two main seasons in the grasslands of East Africa?
2. **Cause and Effect** How does the dry season affect the grasses? Why?
3. **Infer** What might happen to the population of wildebeests if they did not migrate? Explain.

Changes in Temperature

In places with cold winter climates, winter air grows colder and the ground can freeze. There are fewer hours of daylight. With these changing physical characteristics, many populations of plants cannot grow. Some plants die in the winter but leave seeds that sprout into new plants in the spring.

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Deciduous trees shed their leaves in the fall. They become dormant so they don't use as much energy. When it gets warmer, they grow new leaves.

Cold winter weather makes it hard for many animals to find food. Many birds migrate to places where more food is available. Other animals eat extra food in the fall and store it in their bodies as fat. Their bodies use the fat for energy during the cold winter.

During the summer, bees use nectar from flowers to make honey. The bees eat the honey through the winter.

The dormouse hibernates during the winter. While it **hibernates**, the animal's body does not use much energy, so it does not need to eat.

Wrap It Up!

science notebook

1. **Describe** What are two ways that plants respond to changes in the environment, such as fewer hours of daylight and the cold weather of winter?
2. **Explain** How does hibernation help a dormouse survive?
3. **Generalize** How does the cold weather of winter affect the amount of food available to most animals?

Living Things Make Changes

Sometimes plants and animals change the environment. The pond in the picture was once a stream. Beavers used sticks and mud to build a dam. The dam holds back the water and turns the stream into a pond.

The new pond is a good habitat for beavers. A **habitat** is the place where a plant or animal lives and gets

Beavers use their teeth to chew down small trees into sticks to build their dams.

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everything it needs to survive. The deeper water of the pond lets beavers enter their dens underwater. This protects beavers from **predators,** or other animals that want to eat them. The beaver dam also affects other living things. The pond formed by the dam is a good habitat for marsh plants, turtles, dragonflies, and sunfish.

The beaver dam holds back the water and changes a stream into a pond. A small amount of water passes through the dam.

Wrap It Up!

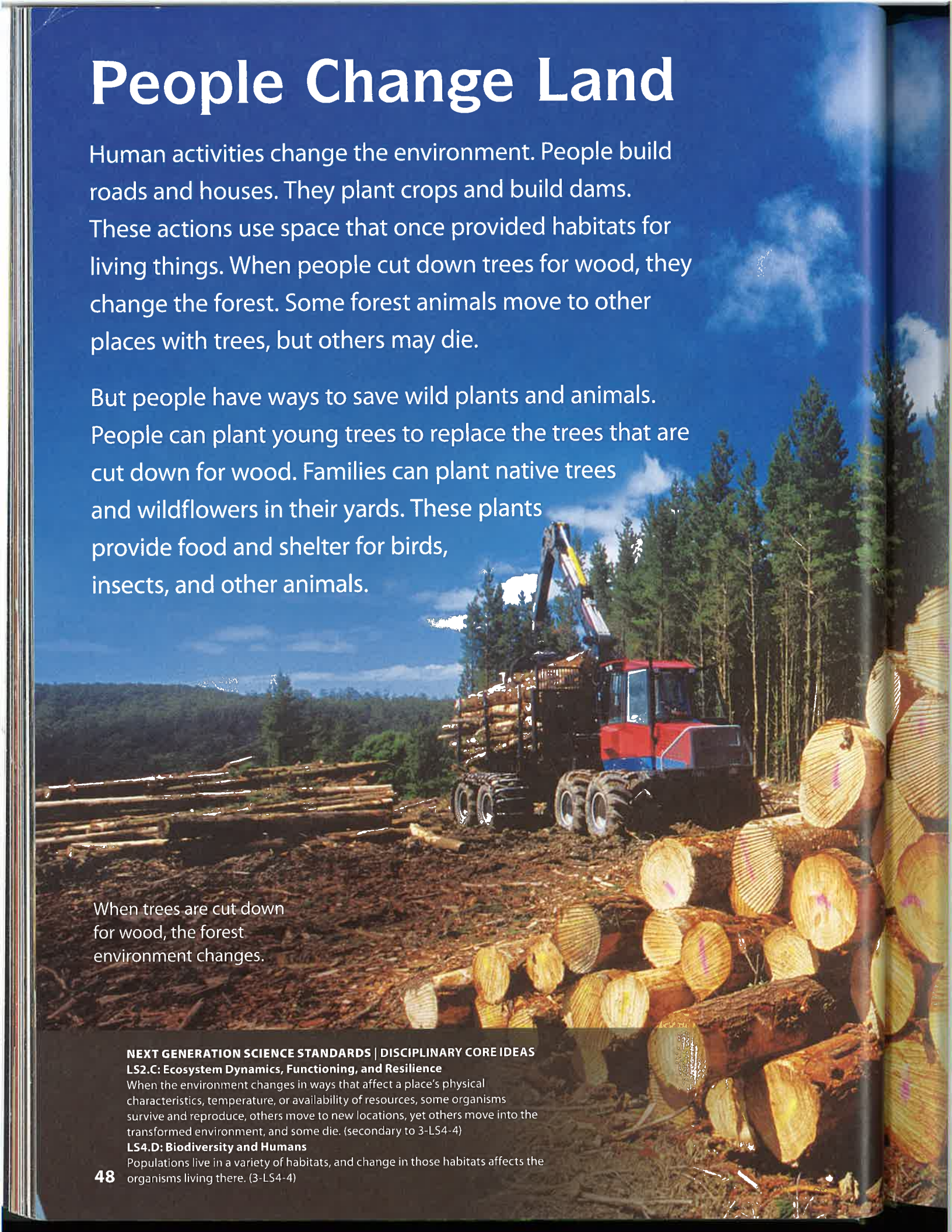
My science notebook

1. **Describe** How does a beaver dam change a stream?
2. **Cause and Effect** How do beaver dams affect other animals in the ecosystem?
3. **Apply** Beavers use their teeth to cut down trees to make their dams. How might cutting down trees affect the animals in the nearby forest?

People Change Land

Human activities change the environment. People build roads and houses. They plant crops and build dams. These actions use space that once provided habitats for living things. When people cut down trees for wood, they change the forest. Some forest animals move to other places with trees, but others may die.

But people have ways to save wild plants and animals. People can plant young trees to replace the trees that are cut down for wood. Families can plant native trees and wildflowers in their yards. These plants provide food and shelter for birds, insects, and other animals.



When trees are cut down for wood, the forest environment changes.

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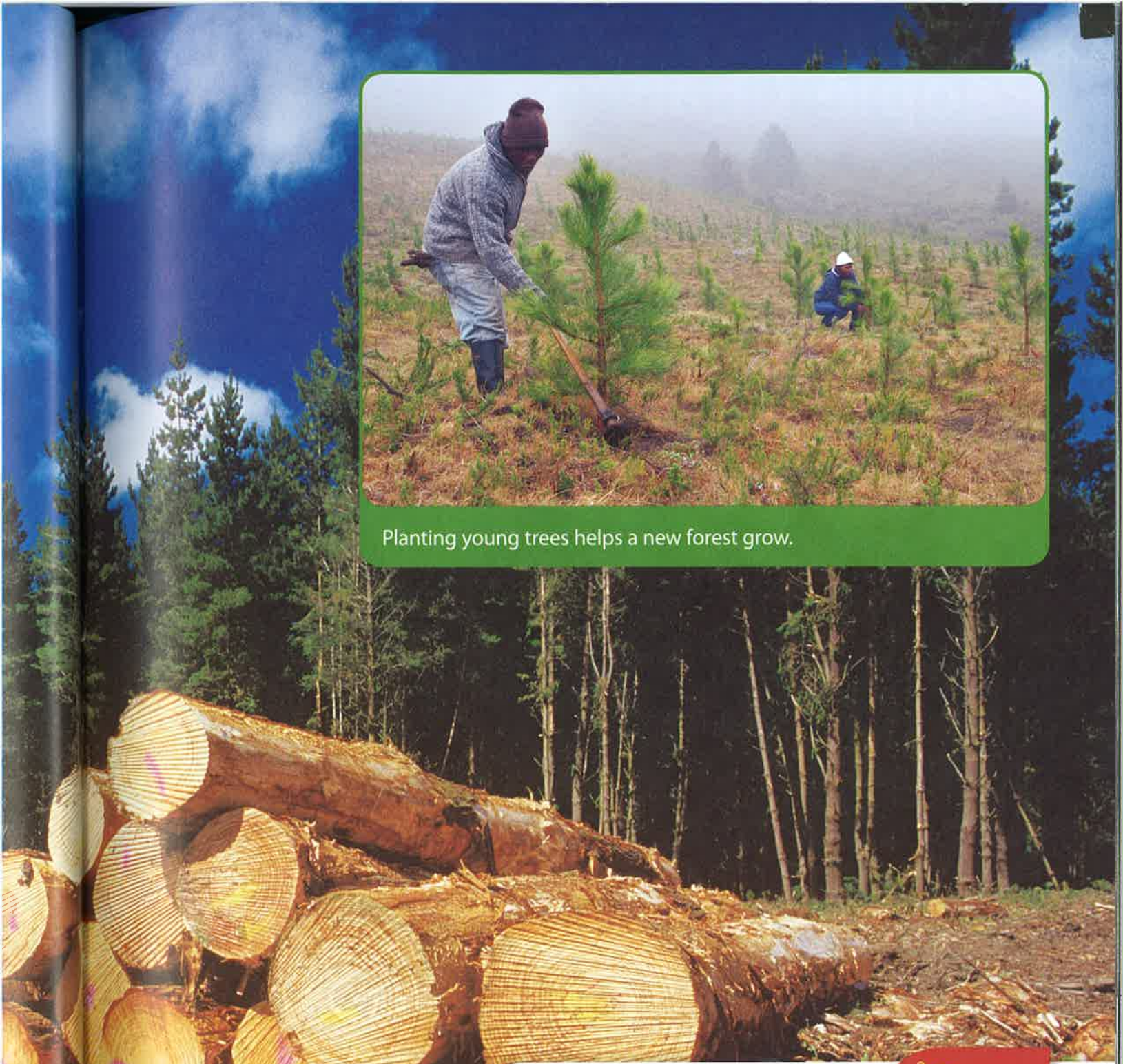

Planting young trees helps a new forest grow.

Wrap It Up!

My science notebook

1. **List** What are some human activities that change the environment?
2. **Cause and Effect** How does cutting down trees in a forest affect the animals that live there?
3. **Make Judgments** What do you think is a good way to protect the animals that live in forests? Explain.

People Change Ecosystems

People change the physical characteristics of environments when they construct buildings and roads. These changes affect the populations of living things in the ecosystem.

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In cities, most of the ground is covered with buildings and pavement. Little can grow. Some people build gardens on flat rooftops. The plants give off oxygen and help clean the air. They help keep the buildings below them cooler. The plants and soil on the rooftop gardens capture rainwater that would otherwise wash away. These gardens can also provide people with fresh fruits and vegetables.

Paved streets and buildings absorb the sun's energy and make cities hotter than natural areas in the same region.

Plants on city rooftops provide a new habitat for birds and insects.

Wrap It Up!

My science notebook

1. **Describe** How do rooftop gardens change the rooftop environment?
2. **Compare** In summer, how would the temperature of a rooftop garden differ from that of a bare roof?
3. **Infer** How might building rooftop gardens affect the number of birds in a city? Why?

Compare Solutions and Make a Claim

1. Set the scene.

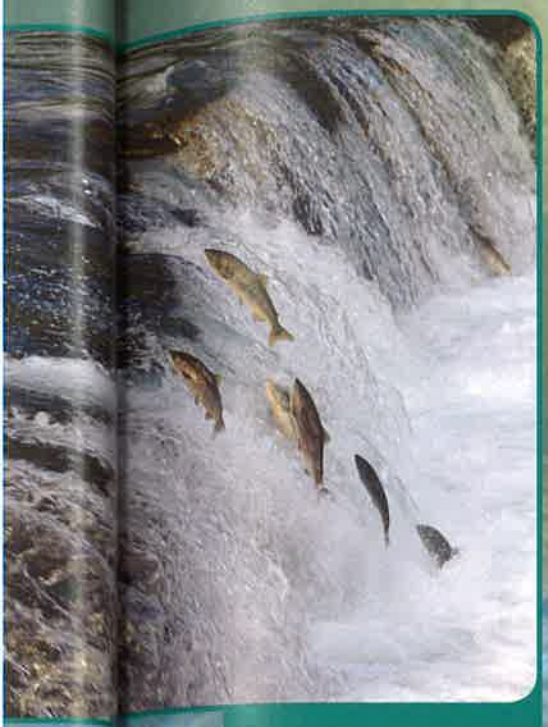
The Columbia River flows from the Canadian Rockies to the Pacific Ocean. Hundreds of streams and rivers flow into the Columbia. Once the Columbia was filled with migrating salmon. Salmon are fish that spend much of their lives in the ocean. But they lay their eggs inland in freshwater streams. After young salmon hatch, they swim downstream to the ocean. Years later, they return as adults to the freshwater streams to lay their eggs.

2. Define the problem.

In the past, more than ten million salmon migrated up the Columbia every year. Today, fewer than two million make the trip. Why? People have built huge dams on the Columbia and the rivers that flow into it. The dams produce electricity and store water for crops. But the dams keep the fish from swimming up and down the rivers. The drop in salmon population also affects other animals that feed on salmon.

This map shows dams on the Columbia and other rivers.

NEXT GENERATION SCIENCE STANDARDS | PERFORMANCE EXPECTATION
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.



Salmon can jump up small waterfalls and swim against strong currents.

The John Day Dam is 56 meters (183 feet) tall. It completely blocks salmon migrating upstream. Water rushing through the power plant turbines also presents a danger to young salmon migrating downstream to the ocean.

Some adult salmon migrate for more than 900 miles! Many must pass through rapids to reach the streams where they lay their eggs.

3. Compare solutions.

Read the captions with these photos to find out what people are doing to try to increase the number of salmon in the Columbia River system. Some efforts help adult salmon migrate upstream to reproduce. Other efforts try to increase the numbers of young salmon and help them migrate to the ocean. Make a table that summarizes and compares the solutions.

4. Make a claim.

Suppose you are working with a team to design a new dam in the Columbia River system. You only have enough money to incorporate two of these four solutions into your design. Make a claim about which two solutions would be the best to include. Write a paragraph that explains why you chose to recommend those two solutions.

5. Support your claim.

Share your recommendation for the two best solutions with your classmates. Use details from your paragraph to defend why you believe your choices are the best for helping protect the salmon populations.

SPILLWAYS Spillways increase the amount of water that flows over the dams. They allow young fish to pass over the dams safely on their way to the ocean. The young fish also get a free ride in the fast currents.

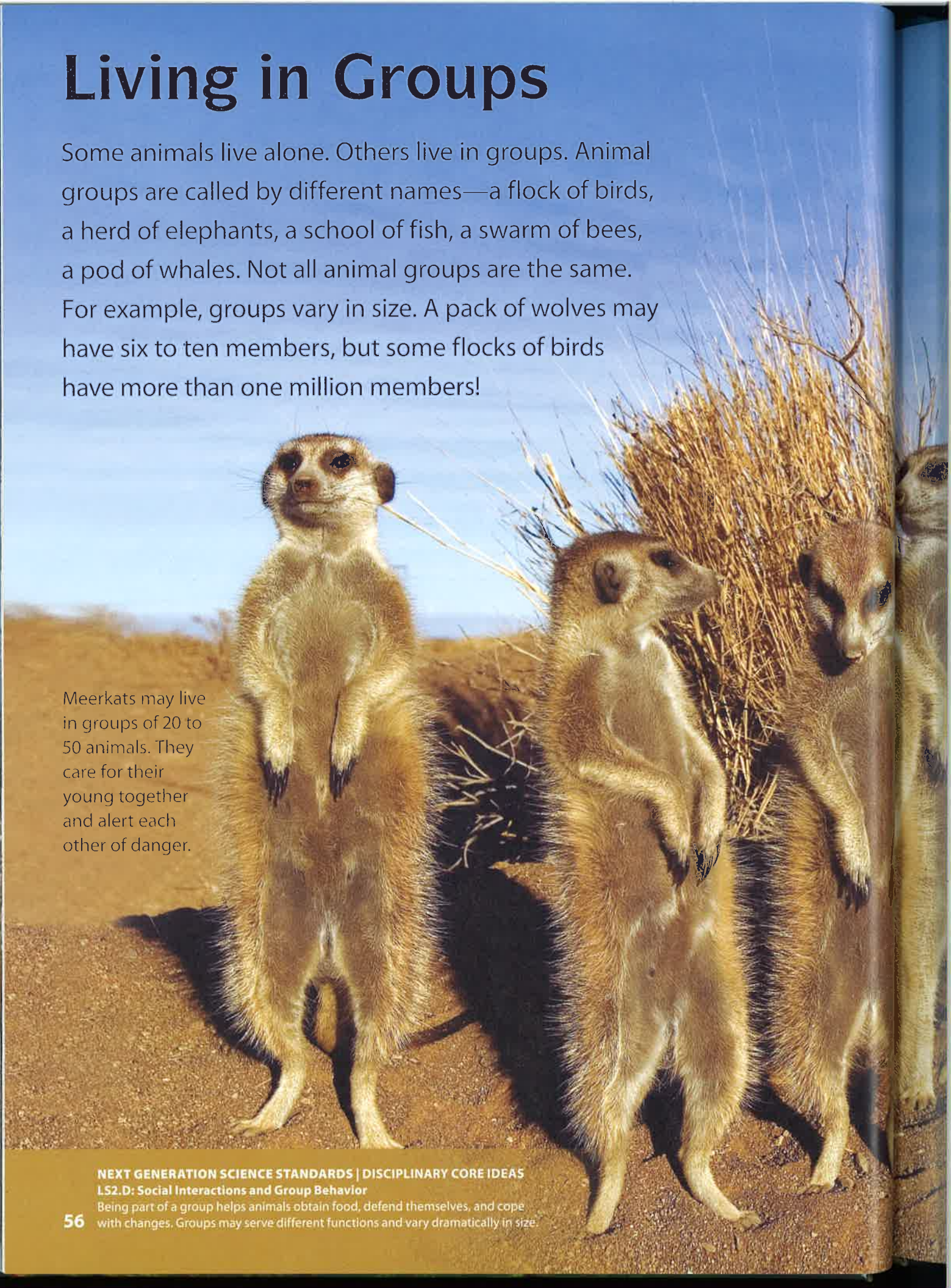
FISH HATCHERIES Biologists raise salmon in hatcheries. The young salmon are released and swim downstream. This increases the number of salmon in the rivers.

FISH SCREENS Fish screens prevent fish from swimming into dangerous places. The screens shown here keep fish out of an unsafe channel. Similar screens are placed across turbine openings in dams. Young salmon caught in spinning turbines can be killed or stunned and then eaten by larger fish.

FISH LADDERS Many adult salmon are lost because they cannot swim up the water falling from the tall dams. A fish ladder is like a stairway with sets of small rapids. Salmon can jump from one step to the next. They can also swim through openings at the bottom of each step of the ladder.

Living in Groups

Some animals live alone. Others live in groups. Animal groups are called by different names—a flock of birds, a herd of elephants, a school of fish, a swarm of bees, a pod of whales. Not all animal groups are the same. For example, groups vary in size. A pack of wolves may have six to ten members, but some flocks of birds have more than one million members!



Meerkats may live in groups of 20 to 50 animals. They care for their young together and alert each other of danger.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS2.D: Social Interactions and Group Behavior
Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.

Some animals live in groups because it helps them get food. Others live in groups to defend themselves or to help care for their young. Living in groups helps some animals cope with changes in the weather or their environment.

Emperor penguins live in Antarctica, where it is very cold. They flock together when it is time to produce their young.

Zebras are among many types of African animals that live in herds.

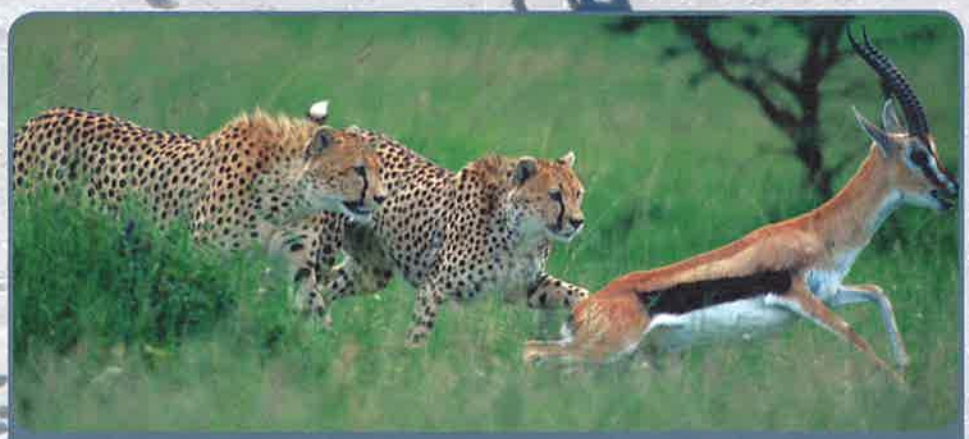
Wrap It Up!

My science notebook

1. **Name** What are some of the names used for groups of animals?
2. **Contrast** Animal groups come in different sizes. Describe how the size of a wolf pack is different from the size of a large flock of birds.
3. **Summarize** How does living in groups help animals survive?

Getting Food

A bison runs through the snow, surrounded by a pack of wolves. A **pack** is a group of closely related animals that live and hunt together. Like a relay team, individual wolves have taken turns chasing the bison. Now the bison is too tired to run much longer. The bison tries to defend itself with its horns and hooves, but it cannot match the strength of the pack. Soon the pack closes in, and the hungry wolves share a meal of fresh meat.



Male cheetahs often hunt in small groups of two or three.

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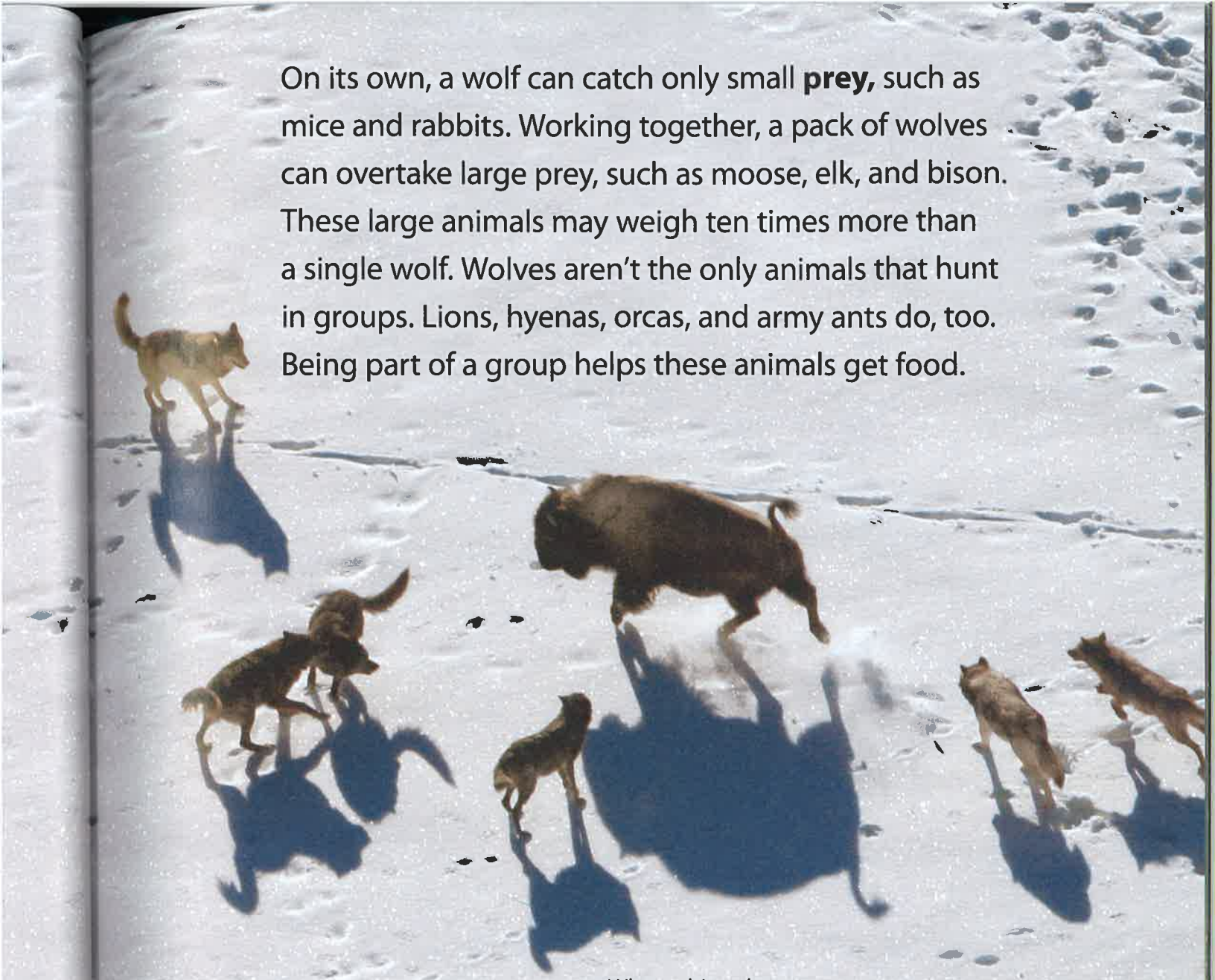
LS2.D: Social Interactions and Group Behavior
Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.

On its own, a wolf can catch only small **prey,** such as mice and rabbits. Working together, a pack of wolves can overtake large prey, such as moose, elk, and bison. These large animals may weigh ten times more than a single wolf. Wolves aren't the only animals that hunt in groups. Lions, hyenas, orcas, and army ants do, too. Being part of a group helps these animals get food.



When a bison becomes separated from its herd, it is in danger.

Wrap It Up!

My science notebook

1. **Define** What is a pack?
2. **Contrast** What kind of prey can a single wolf catch? How is this different from the prey that a pack of wolves can catch?
3. **Generalize** How does hunting in groups help animals survive?

Protection and Defense

Living in groups helps some animals defend themselves against predators that would eat them. For example, fish such as the mackerel shown here swim in schools. A **school** is a group of fish that swim very close together. Swimming in a school provides "safety in numbers." There are many eyes to spot predators. The huge number of mackerel makes it hard for a predator to target a single fish.

Living in large groups can also protect animals that live on land. Wildebeests and zebras live in large herds. This helps protect them from lions and other predators. Flying in large flocks helps protect blackbirds and starlings from hawks.

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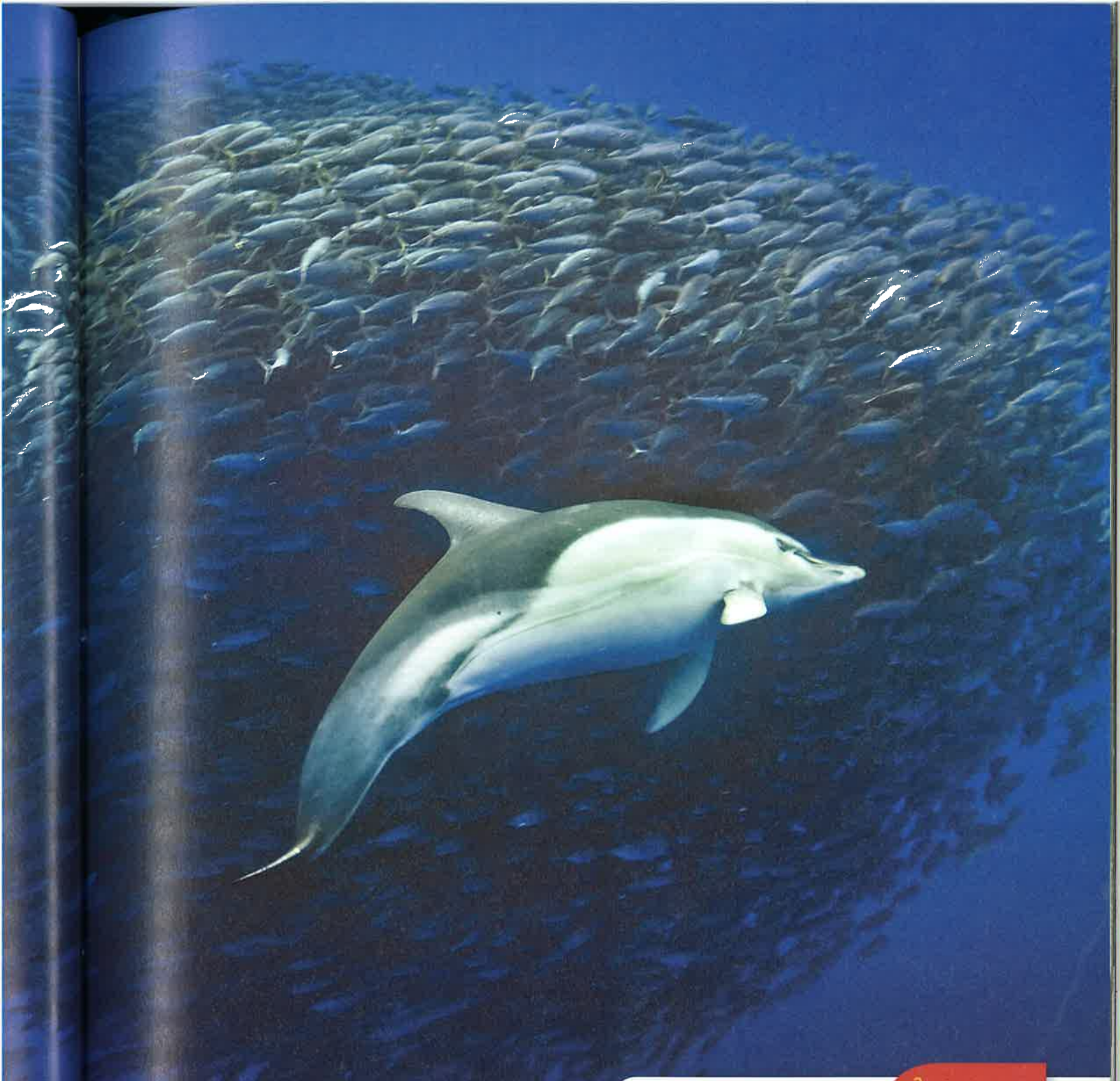


Even though swimming in a school provides protection for most of the mackerel, dolphins will catch some of them!

Wrap It Up!

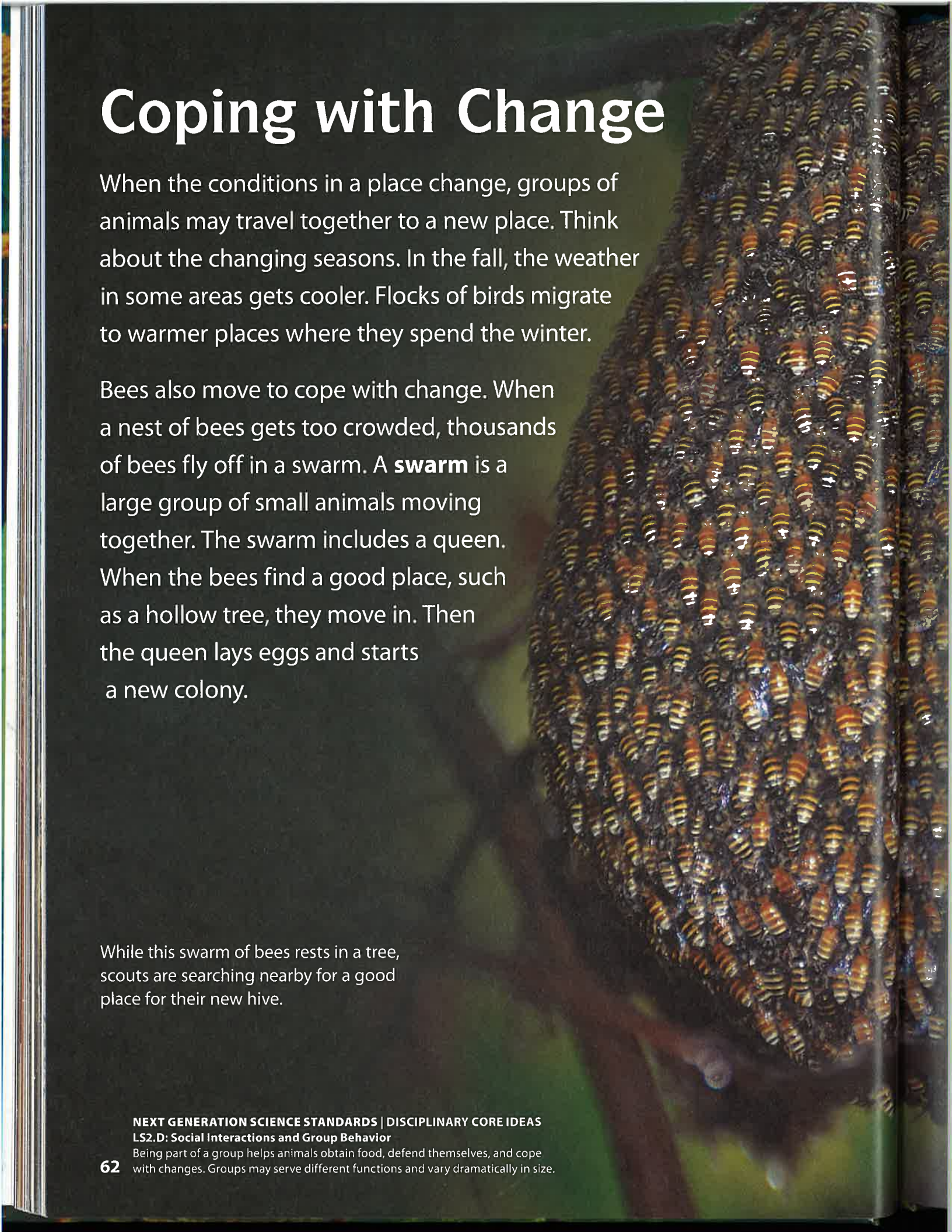
My science notebook

1. **Define** What is a school of fish?
2. **Explain** How does swimming in a school help protect fish?
3. **Infer** How might swimming in a large school not help fish survive?

Coping with Change

When the conditions in a place change, groups of animals may travel together to a new place. Think about the changing seasons. In the fall, the weather in some areas gets cooler. Flocks of birds migrate to warmer places where they spend the winter.

Bees also move to cope with change. When a nest of bees gets too crowded, thousands of bees fly off in a swarm. A **swarm** is a large group of small animals moving together. The swarm includes a queen. When the bees find a good place, such as a hollow tree, they move in. Then the queen lays eggs and starts a new colony.



While this swarm of bees rests in a tree, scouts are searching nearby for a good place for their new hive.

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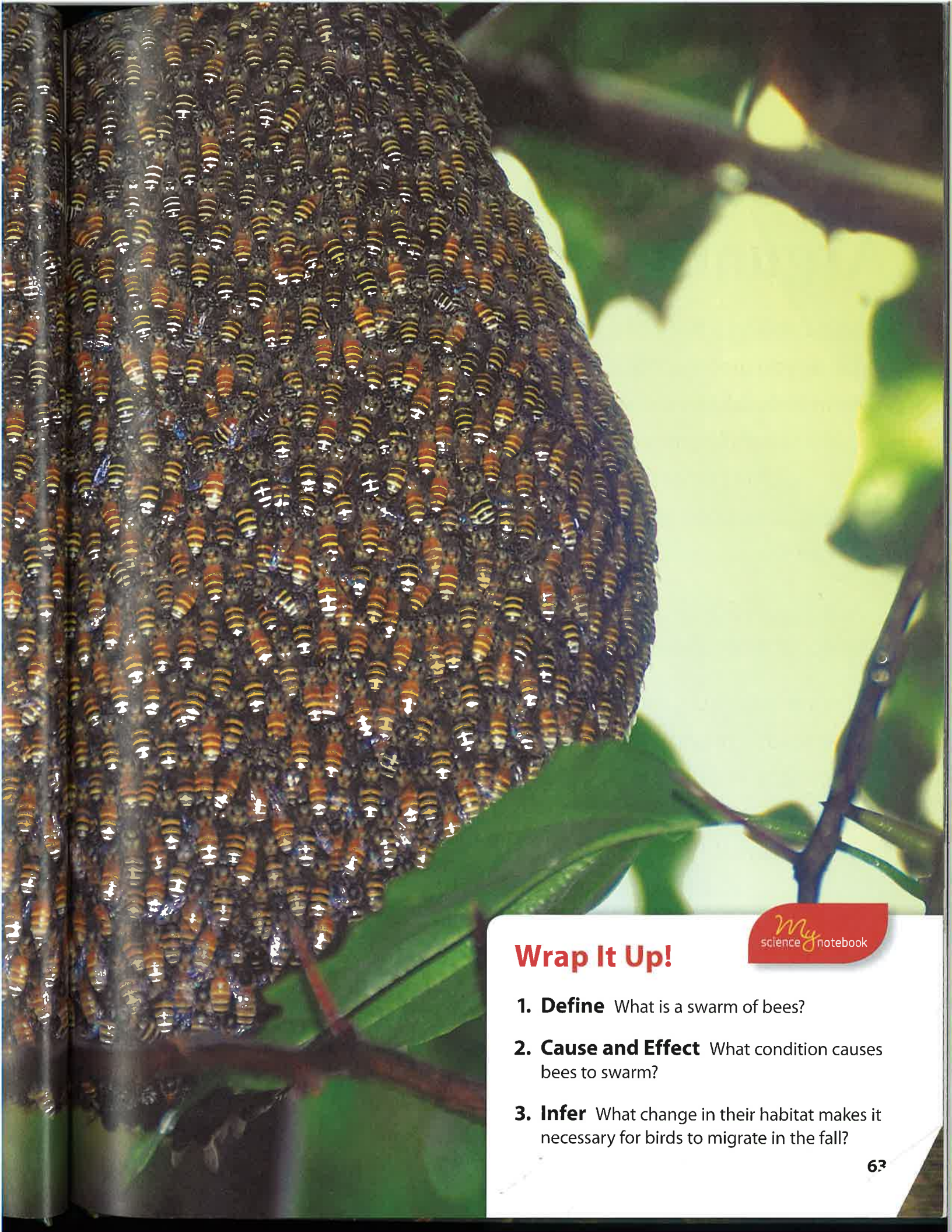


Wrap It Up!

My science notebook

1. **Define** What is a swarm of bees?
2. **Cause and Effect** What condition causes bees to swarm?
3. **Infer** What change in their habitat makes it necessary for birds to migrate in the fall?

Construct an Argument

Imagine seeing a flock of thousands of birds almost as tall as you are! You could if you visited the Platte River in Nebraska in spring. That's when as many as 300,000 sandhill cranes come together as they migrate north. Sandhill cranes fly, flock, and nest in groups of different sizes. Look at the pictures of sandhill cranes and read the captions. Then, follow the steps below.

1. Ask a question.

Why do sandhill cranes form groups at various times?

2. Gather information.

You've read in previous lessons about reasons animals form groups. Recall that information as you read these pages. Prepare a list of ways that migrating and living in groups probably helps sandhill cranes survive.

3. Construct an argument.

Write a paragraph that argues how the formation of groups helps sandhill cranes survive. Write about the different size groups they form at different times of the year, during and in between migrations.

NEXT GENERATION SCIENCE STANDARDS | PERFORMANCE EXPECTATION

3-LS2-1. Construct an argument that some animals form groups that help members survive.

In summer, the sandhill cranes settle in marshes in the north to lay eggs and raise young. Pairs of parents care for the eggs and chicks. What are the advantages of both parents caring for the young?

In spring, sandhill cranes travel north to nest. In the fall, they travel south to warmer places to find food. The birds flock together in very large groups as they migrate. What are the advantages of resting in large flocks during migration?

In migratory flight, sandhill cranes fly in v-shaped formations. What are the advantages of flying in this type of group?

Fossils

What are the strange creatures in this picture? They are animals that lived in the sea between 450 and 500 million years ago. Today many of these animals are extinct. When an animal is extinct, it is no longer living anywhere on Earth.

The hard shells of many trilobites were preserved in fossils. Can you find the large head and eyes on this trilobite fossil?

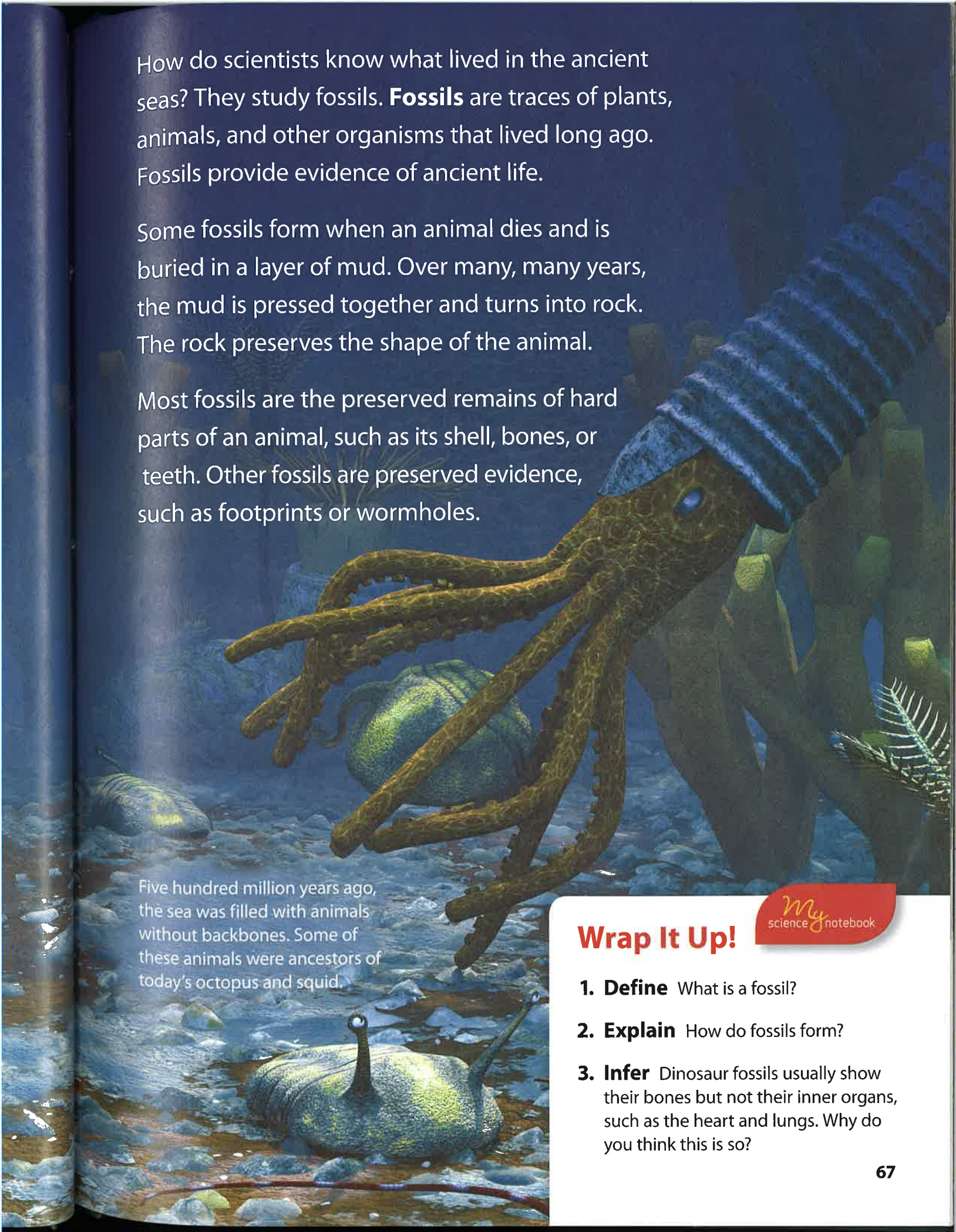
NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.A: Evidence of Common Ancestry and Diversity

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (3-LS4-1)
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

How do scientists know what lived in the ancient seas? They study fossils. **Fossils** are traces of plants, animals, and other organisms that lived long ago. Fossils provide evidence of ancient life.

Some fossils form when an animal dies and is buried in a layer of mud. Over many, many years, the mud is pressed together and turns into rock. The rock preserves the shape of the animal.

Most fossils are the preserved remains of hard parts of an animal, such as its shell, bones, or teeth. Other fossils are preserved evidence, such as footprints or wormholes.



Five hundred million years ago, the sea was filled with animals without backbones. Some of these animals were ancestors of today's octopus and squid.

Wrap It Up!

My science notebook

1. **Define** What is a fossil?
2. **Explain** How do fossils form?
3. **Infer** Dinosaur fossils usually show their bones but not their inner organs, such as the heart and lungs. Why do you think this is so?

Fish in the Desert

Fossils provide evidence about plants and animals that lived long ago. They also provide evidence about the habitats in which they lived. Scientists study fossils to find out how the environment in a place has changed over time.

Today, many fish fossils can be found in a layer of rock called the Green River Formation. The formation spans through Utah, Colorado, and Wyoming. This area is now mostly a large, rocky, desert. But fish live only in wet places, such as lakes or the ocean. These fossils show that the whole area was once covered by water!

This fossil was found in Wyoming. The fish once lived in a very large lake.

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This Utah canyon shows what much of the area looks like today.

Wrap It Up!

My science notebook

1. **Contrast** How is the environment of Utah today different from the environment when the fossils in the picture formed?

2. **Draw Conclusions** Scientists have found fossils of clams in rocks at the top of mountains. What do these fossils suggest about the rocks?

Plants in the Antarctic

Sometimes the leaves and branches of plants are preserved in fossils. The fossil leaves shown here are from a type of extinct fern that grew as tall as trees! Like today's ferns, these plants grew in warm places.

This fern would have grown in a climate that was warm and humid.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.A: Evidence of Common Ancestry and Diversity

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Where was this fossil found? In Antarctica! Today Antarctica is so cold that the land is frozen all year long. Huge layers of ice cover most of the continent.

The fern fossil provides evidence that the rocks in Antarctica came from a place with a much warmer climate. They tell scientists that Antarctica was once warm enough for ferns and forests to grow.

Antarctica is now far too cold for most plants to survive.

Wrap It Up!

My science notebook

1. **Identify** Where do ferns grow today?
2. **Describe** Contrast the present environment of Antarctica with the environments where ferns grow today.
3. **Infer** Why do you think fossil ferns can be found in a place that is frozen all year long?

Investigate

Fossils

How can you use a model to infer about past environments?

Layers of rock often contain fossils. These fossils give scientists clues to the past. In this investigation, you will make a model of rock layers that contain fossils. First read the Fossil Environment chart below.

FOSSIL ENVIRONMENT

Layer Color	Environment When Layer Formed
Green	Dry land; warm temperatures
Yellow	Ice-covered land; dry, cold climate
Red	Warm, shallow, ocean water; warm, humid climate
Tan	Cool, freshwater lake; warm temperatures

Materials

4 lumps of clay

4 small objects

plastic knife

craft stick

tooth pick

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.A: Evidence of Common Ancestry and Diversity
Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

1 Flatten one lump of clay. This represents a layer of soil laid down millions of years ago. Press an object into the clay. The object represents an animal that died. Over time the soil formed rock. The animal became a fossil.

2 Add another layer of clay. This represents soil that covered the first layer and became rock. Press an object into this layer. Add two more layers with objects.

3 Exchange model rocks with another group. Cut through all of the layers. Draw the layers of the model in your notebook.

4 Use a toothpick or craft stick to remove the model fossils. Draw each one in the layer in which it was found. Use the chart to learn about each organism's environment. Record the data on your drawing.

The hard shells of sea animals can form very clear fossils.

Wrap It Up!

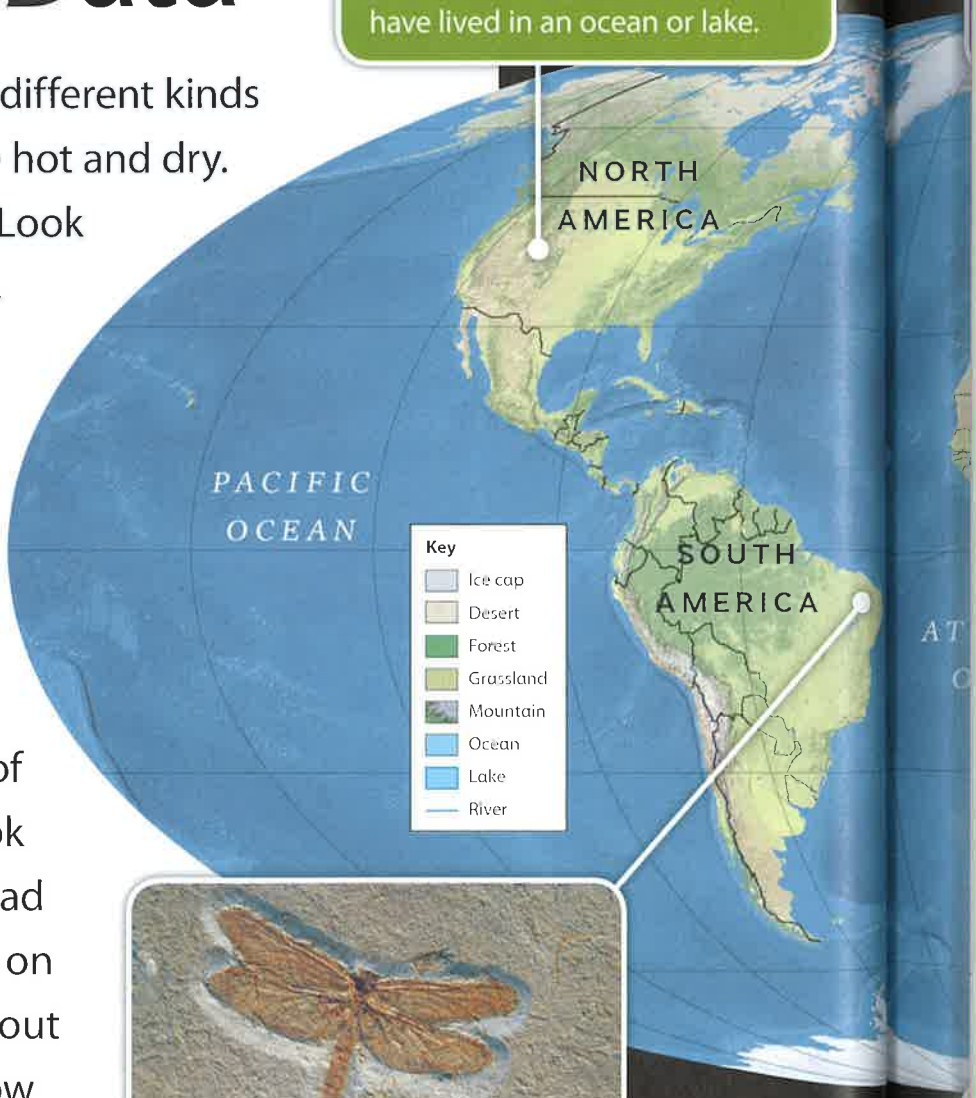
1. **Conclude** Describe the environment of animal fossils found in the red layer of rock.
2. **Infer** What can you infer about how the environment of the area represented by these layers changed over the years?

Analyze and Interpret Data

Today the world has many different kinds of environments. Some are hot and dry. Others are wet or icy cold. Look at the map to find deserts, rain forests, and other environments around the world.

Fossils are found in many parts of the world. The pictures show fossils that have been found in some of the places on the map. Look at the fossil pictures and read the captions. Using places on the map, find evidence about how the environment is now different from long ago.

This fossil fish was found in the Green River Formation. It would have lived in an ocean or lake.



This dragonfly fossil was found in Brazil. The dragonfly would have lived in a warm, forested area.

NEXT GENERATION SCIENCE STANDARDS | PERFORMANCE EXPECTATION
3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

Crinoids were ocean animals. This one was found in rock in Germany.

This fossil arthropod was found in China. The segmented animal would have lived at the sea floor.

This crinoid was found in rock in Australia.

EUROPE

ASIA

AFRICA

ATLANTIC OCEAN

INDIAN OCEAN

AUSTRALIA

ANTARCTICA

N

W E

S

0 1,000 2,000 Miles

0 1,000 2,000 Kilometers

This trilobite, an ocean animal, was found in Morocco.

Wrap It Up!

My science notebook

1. **Interpret Maps** What do the different colored regions on the map represent?

2. **Interpret Data** Which of the fossils shown here came from a land area that was once covered in water? How do you know?

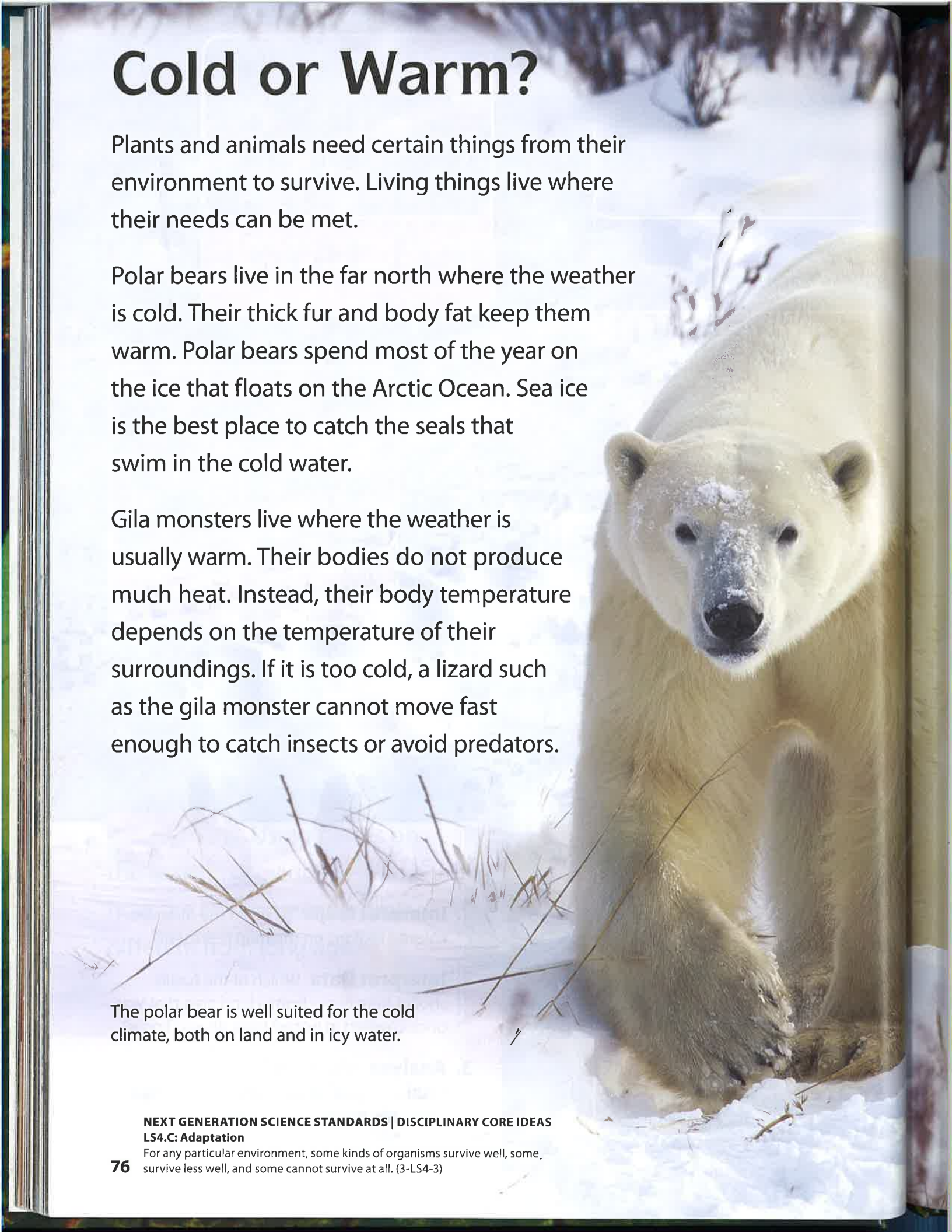
3. **Analyze** What kind of fossil was found in South America? What does this fossil show about the environment of that area a long time ago?

Cold or Warm?

Plants and animals need certain things from their environment to survive. Living things live where their needs can be met.

Polar bears live in the far north where the weather is cold. Their thick fur and body fat keep them warm. Polar bears spend most of the year on the ice that floats on the Arctic Ocean. Sea ice is the best place to catch the seals that swim in the cold water.

Gila monsters live where the weather is usually warm. Their bodies do not produce much heat. Instead, their body temperature depends on the temperature of their surroundings. If it is too cold, a lizard such as the gila monster cannot move fast enough to catch insects or avoid predators.



The polar bear is well suited for the cold climate, both on land and in icy water.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.C: Adaptation
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

Gila monsters warm themselves in sunlight. They catch insects that live around the desert plants.

Wrap It Up!

My science notebook

1. **Describe** Where do polar bears live? What is the temperature like there?
2. **Explain** How are polar bears able to survive in their environment?
3. **Draw Conclusions** Could a lizard survive where polar bears live? Why or why not?

Wet or Dry?

Leopard frogs live where it is wet. You might see one jumping at the edge of a pond or in a moist meadow. Like most frogs, they lay their eggs in water. The young frogs, or **tadpoles,** live underwater and breathe with gills. Adult leopard frogs have lungs and can breathe air. Gases can also move through the skin.

The leopard frog's smooth skin would dry out quickly in a desert environment.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.C: Adaptation
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

For this to happen, they need to keep their skin moist. If a leopard frog's skin gets too dry, the frog will die.

Unlike leopard frogs, camels are well suited for living in dry places. Camels can survive for weeks without drinking water. When they find water, camels can drink many gallons at a time. Their bodies store it for later. Their thick, tough lips let them eat thorny desert plants.

Camels can survive many weeks without food. They use fat stored in the humps on their backs for energy.

Wrap It Up!

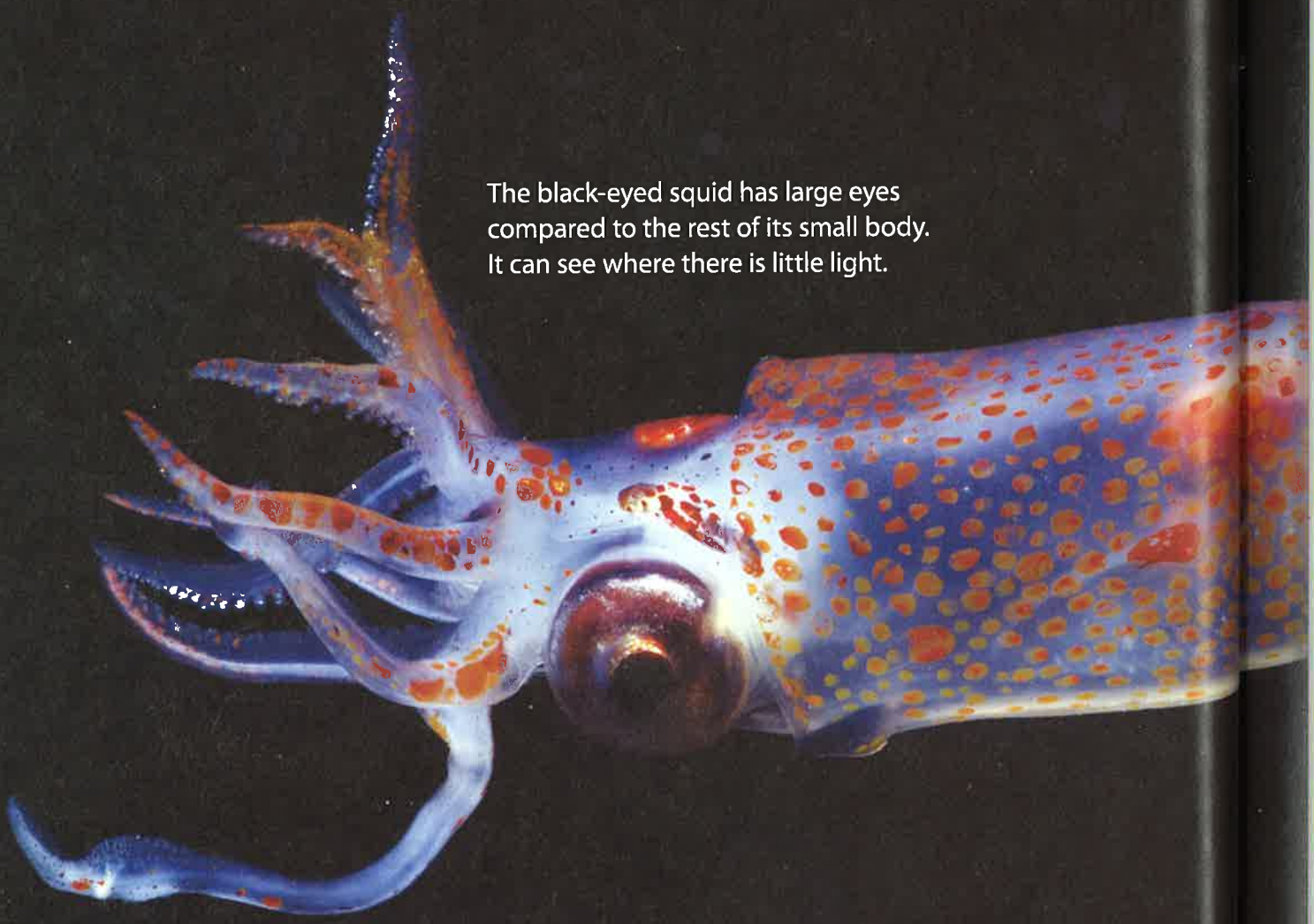
My science notebook

1. **Recall** Where do most frogs lay their eggs?
2. **Explain** How do camels survive in deserts?
3. **Infer** Could a leopard frog survive where a camel lives? Why or why not?

Light or Dark?

Just like temperature and moisture, different living things need different amounts of light to survive. Plants use sunlight to make food, so plants cannot live in totally dark places. Animals such as hawks, hummingbirds, and butterflies need bright light to find food. Bats, owls, and moths can find food without much light.

The amount of light varies in the ocean, too. The surface of the ocean is brightly lit. Seaweed and corals need bright light to survive. They live near the surface.



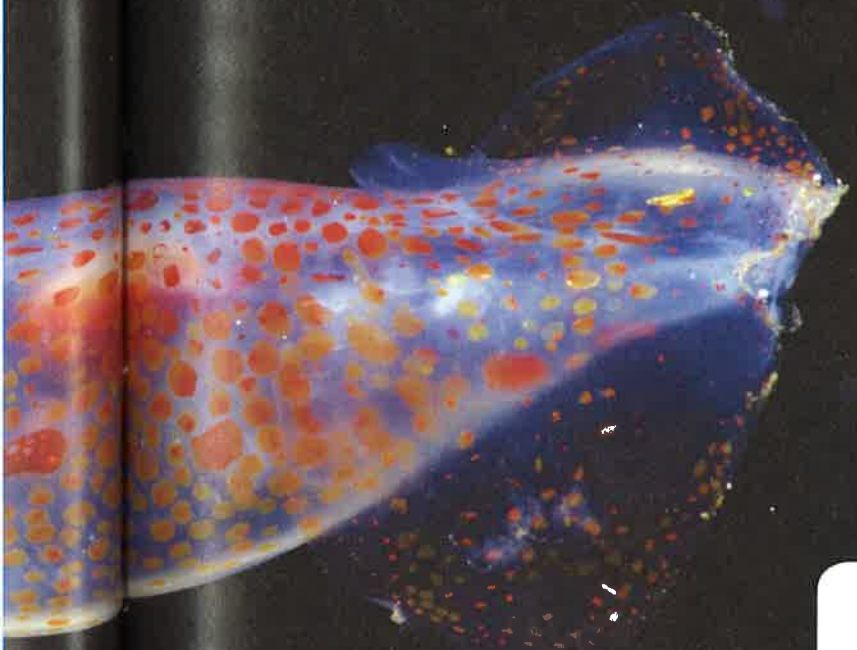
The black-eyed squid has large eyes compared to the rest of its small body. It can see where there is little light.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS4.C: Adaptation
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

But sunlight cannot reach below about 200 meters (656 feet). It is always dark there. Even so, many animals live in the dark parts of the ocean. Some of these creatures, such as the deep sea angler, make their own light! The fish has an organ that glows in the dark. It uses this organ to lure shrimp and fish into its mouth.

The verbena plant needs light to make its own food. The blue morpho butterfly needs light to find the flowers that provide it with nectar.

Without the photographer's light, only the lure dangling atop the deep sea angler's head would be visible.



Wrap It Up!

My science notebook

1. **List** What are some animals that need bright sunlight to find food?
2. **Explain** Why do plants need sunlight?
3. **Evaluate** Could plants grow in the deep ocean? Explain.

Construct an Argument

Animals live in many different habitats. Some animals live where it is wet; others live only where it is dry. Some live where it is cold and dark; others live where it is warm and sunny. Look at the pictures of animals shown here and read the captions. Then follow the steps below.

1. **Ask a question.**
   In what kind of habitat do the particular animals shown here survive well?

2. **Read and observe.** My Science Notebook
   You've read in previous lessons about animals that survive well in very different habitats. Recall that information as you read these pages. Prepare a list of the kinds of things each animal needs to survive well.

3. **Construct an argument.**
   Use your list as evidence. Construct an argument that describes the particular habitat in which each animal can survive well. Write a paragraph describing each animal's ideal habitat.

Mallard ducks have webbed feet and wide yellow bills. They eat the roots and stems of plants that grow underwater. They also eat small animals that live underwater.

NEXT GENERATION SCIENCE STANDARDS | PERFORMANCE EXPECTATION
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

This strange creature is a star-nosed mole. The mole is practically blind. But its highly sensitive nose has many long feelers that help it find worms to eat. How do you think it uses its big, clawed feet?

A muskox is a large animal with long, shaggy hair. It eats grasses, mosses, and lichens. Its sharp hooves help it dig through snow to find these plants.

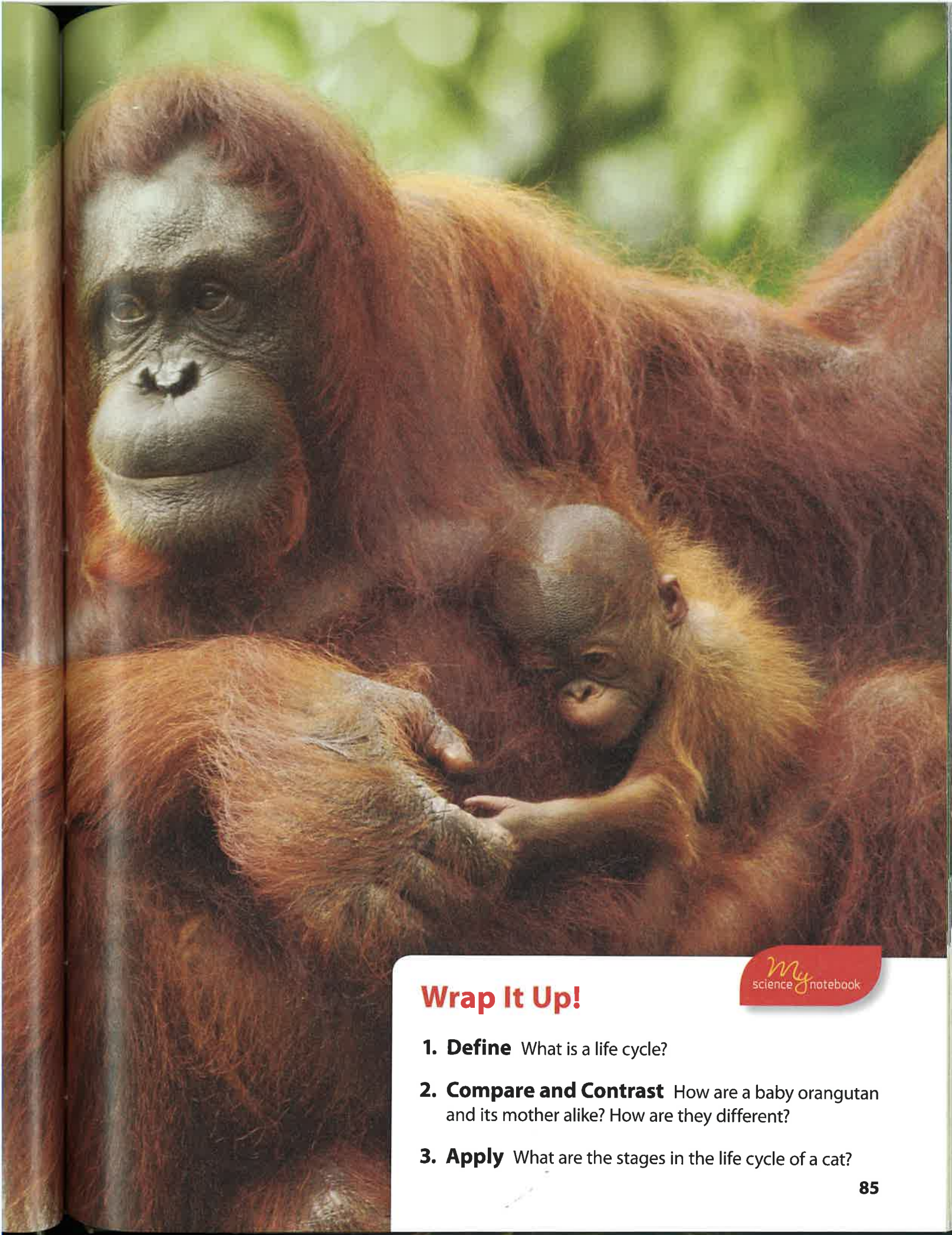
Life Cycles

A baby orangutan is at the beginning of its life. It looks like its mother, but it is also different. As the young orangutan grows, its body will change, or develop. In 10 to 15 years, the orangutan will become an adult. Then it will have young, or **reproduce.** After many years, the orangutan will grow old and die.

A **life cycle** is a series of changes a living thing goes through during its lifetime. Each kind of organism has its own particular life cycle. Living things begin life, and then grow and develop. Many reproduce, and all finally die. Individuals do not live forever. Reproduction lets each kind of plant and animal continue to live on Earth.

A baby orangutan depends on its mother after birth. The baby and its mother show two stages in the life cycle of an orangutan.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS1.B: Growth and Development of Organisms
Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)



Wrap It Up!

My science notebook

1. **Define** What is a life cycle?
2. **Compare and Contrast** How are a baby orangutan and its mother alike? How are they different?
3. **Apply** What are the stages in the life cycle of a cat?

Life Cycle of a Jalapeño Pepper Plant

Have you ever eaten a jalapeño pepper? If so, you know that they are spicy hot! Those peppers are the fruits of jalapeño pepper plants.

Jalapeño pepper plants are flowering plants. Most flowering plants go through similar stages of life. Look at the diagram of the life cycle of the jalapeño pepper plant. Read about each stage.

Jalapeño peppers contain chemicals that make them taste HOT!

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS1.B: Growth and Development of Organisms
Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

SEED Each fruit holds many seeds.

SEEDLING Given moisture and the right temperature, a pepper seed can grow into a seedling.

YOUNG PLANT The seedling grows into a young pepper plant.

ADULT PLANT Flowers can grow on an adult pepper plant. The flowers may produce fruit—the jalapeño peppers.

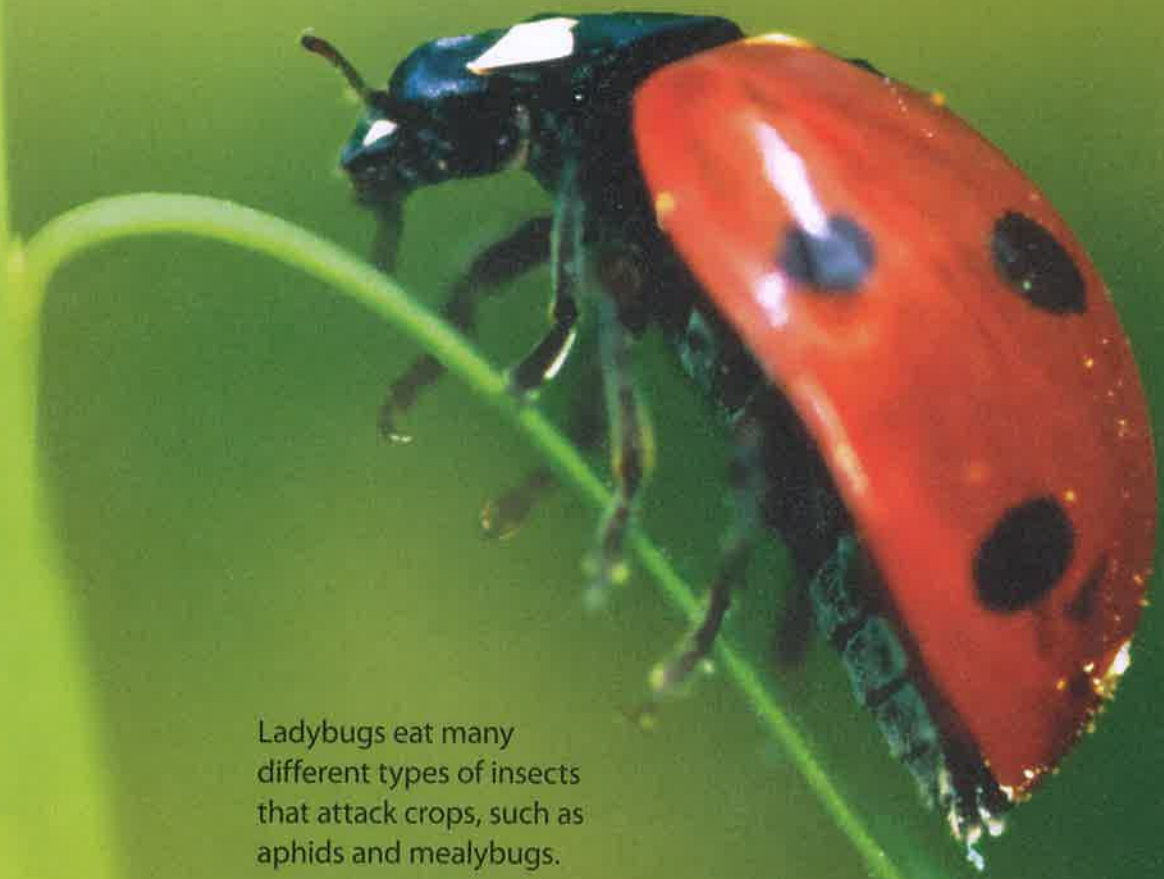
Wrap It Up!

My science notebook

1. **Identify** Which parts of a pepper plant produce fruit?
2. **Sequence** Put these life cycle stages in order: young plant, seedling, seed, adult plant. Start with a seed.
3. **Analyze** In which stage of its life cycle does a pepper plant reproduce?

Life Cycle of a Ladybug

Ladybugs are small, spotted, oval-shaped insects. The ladybug looks different during each stage of its life cycle. Trace the diagram of the ladybug life cycle as you read about each stage.



Ladybugs eat many different types of insects that attack crops, such as aphids and mealybugs.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS1.B: Growth and Development of Organisms
Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

EGG An adult female ladybug lays its eggs on a leaf.

LARVA The ladybug **larva** may eat small insects. It sheds its outer covering as it grows.

PUPA The ladybug changes form during the **pupa** stage.

ADULT An adult ladybug has wings and can fly. It looks very different from the other stages.

Wrap It Up!

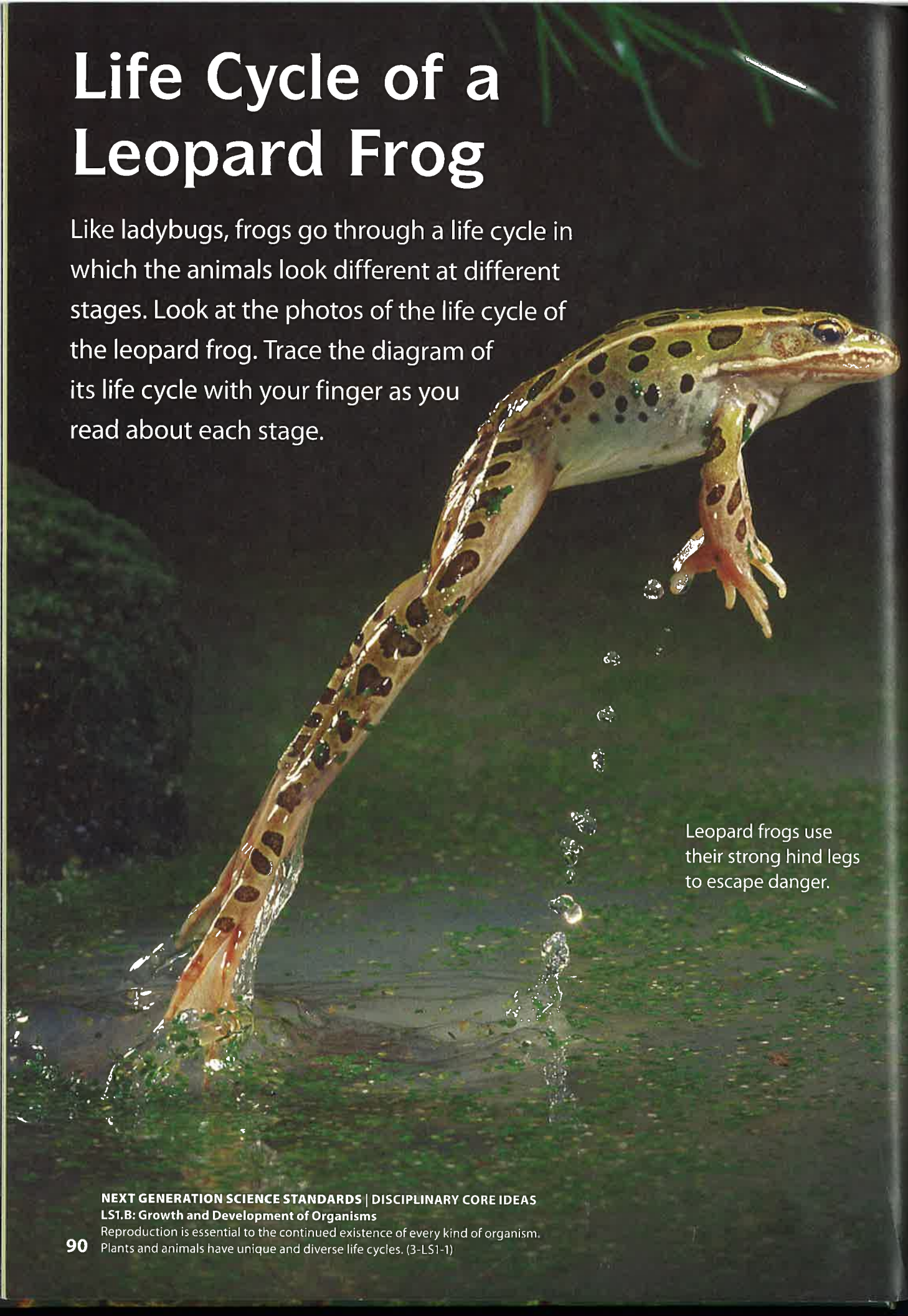
My science notebook

1. **List** What are the stages of a ladybug's life cycle?

2. **Contrast** List some differences between the pupa and the adult stages in the ladybug life cycle.

Life Cycle of a Leopard Frog

Like ladybugs, frogs go through a life cycle in which the animals look different at different stages. Look at the photos of the life cycle of the leopard frog. Trace the diagram of its life cycle with your finger as you read about each stage.



Leopard frogs use their strong hind legs to escape danger.

NEXT GENERATION SCIENCE STANDARDS | DISCIPLINARY CORE IDEAS
LS1.B: Growth and Development of Organisms
Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

EGG An adult female leopard frog lays its eggs in a pond or swamp.

TADPOLE A tadpole has a tail and no legs. It lives underwater and breathes through gills.

YOUNG FROG The young leopard frog begins to grow legs. Its tail begins to shorten.

ADULT An adult leopard frog breathes air and is often found on land or swimming in water.

Wrap It Up!

My science notebook

1. **Recall** What are the stages in the life cycle of a frog?

2. **Contrast** Describe some differences between the tadpole stage and the adult stage of the frog.