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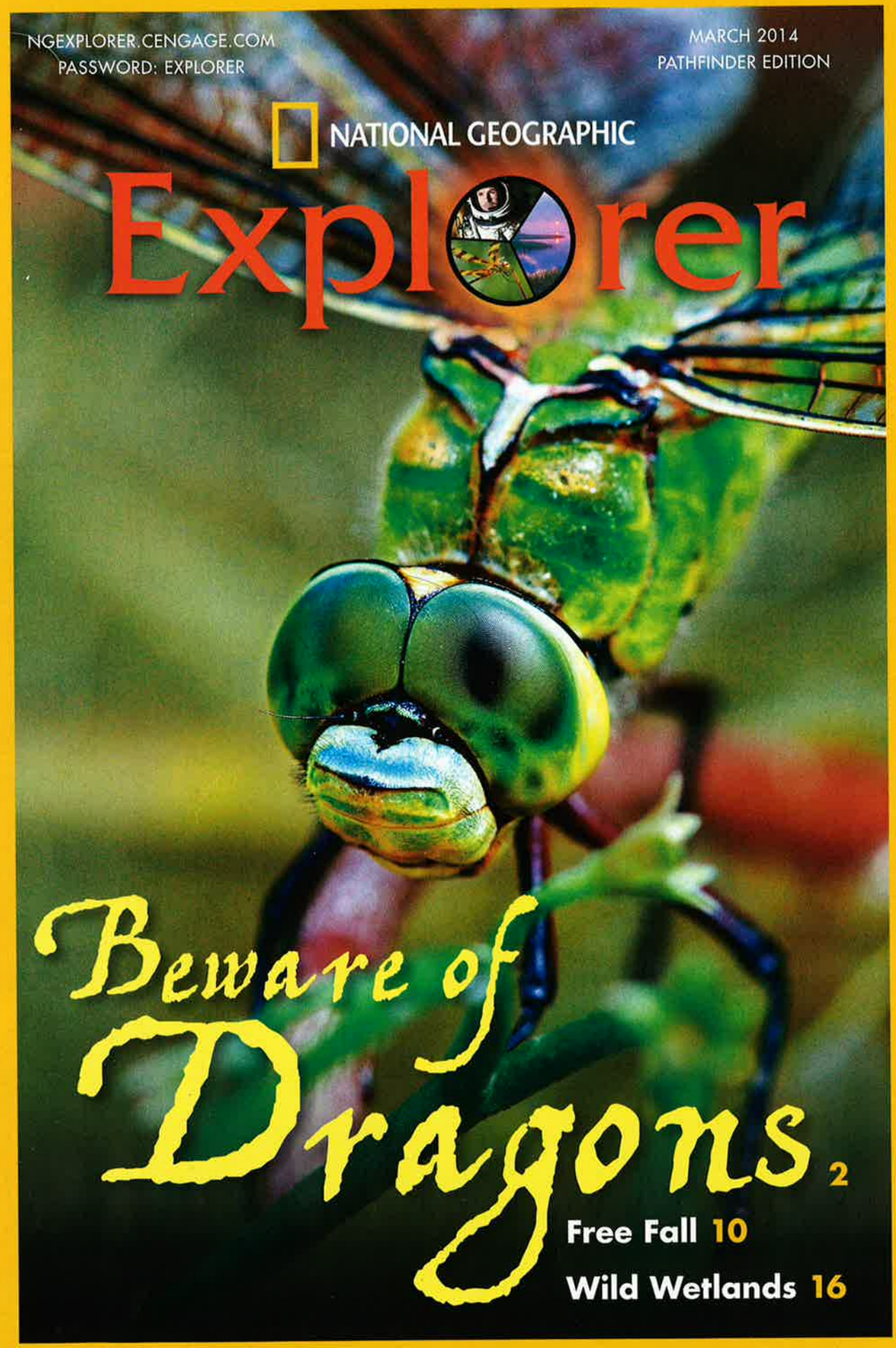
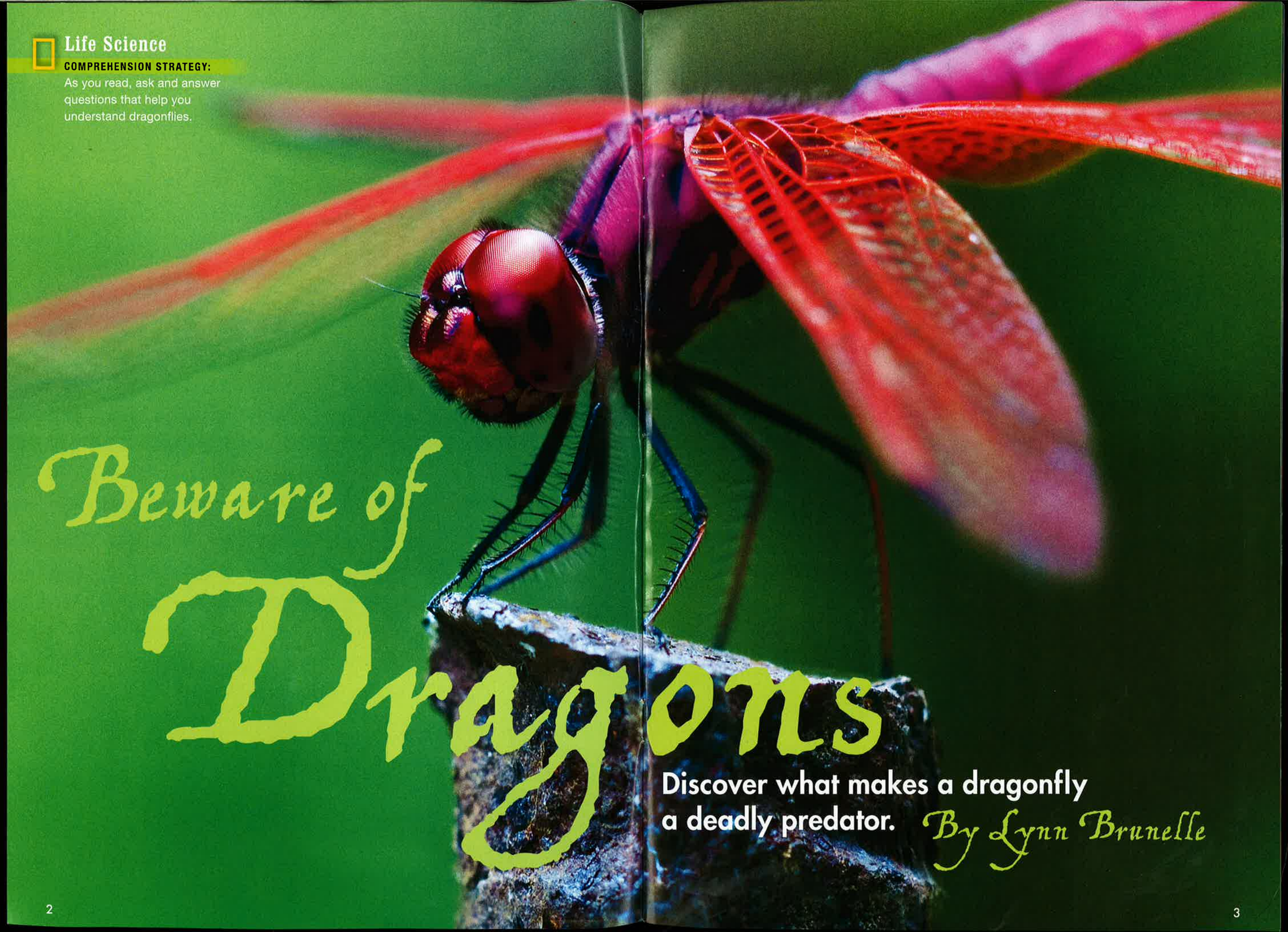


Beware of Dragons 2

Life Science

COMPREHENSION STRATEGY:
As you read, ask and answer questions that help you understand dragonflies.



Beware of Dragons

Discover what makes a dragonfly a deadly predator.

By Lynn Brunelle

A dragonfly darts through the air. It lands gently on a leaf. Stripes of glittery blue cover its long, skinny body. Its four wings sparkle. Its large, emerald eyes watch the world all around it. It waits. All is still.

Suddenly, a buzzing sound breaks through the silence. It's a mosquito flying by. Now the dragonfly takes to the air as the mosquito passes overhead. It follows the mosquito. Then it snatches the mosquito in midflight. The dragonfly crunches it up and swallows it.

Flies, midges, and mosquitoes aren't safe when a dragonfly is around. To them, a dragonfly is deadly. It's a **carnivore.** That means it eats meat. Some dragonflies eat moths, butterflies, and even other dragonflies.

A dragonfly is built to hunt. Its eyes, wings, legs, and jaws are useful tools. When used together, these tools make the dragonfly a powerful **predator.**

This dragonfly clings to a branch, looking for prey.

Mighty Hunters

There are many predators in the animal kingdom. Yet dragonflies may be the most successful hunters of all.

Think about this. The African lion is known for its skill as a predator. It zigzags through tall grasses to chase after **prey.**

Knifelike claws and teeth tear into prey. Yet this happens only when the lion catches its prey. Unfortunately for the lion, that's only about 25 percent of the time.

The great white shark is another top predator. It stalks prey over long distances. It slices into prey with its sharp teeth. Yet the great white catches the prey it chases only about 50 percent of the time.

When the dragonfly goes hunting, it's a different story. A dragonfly is successful about 95 percent of the time. Dragonflies often stalk their prey from below and behind. That helps them ambush their surprised prey.

A Dragonfly's Eyes

A dragonfly's hunt for prey begins with its eyes. A dragonfly's head is almost all eye. It has larger eyes than any other **insect.** These eyes aren't like yours, though. You have only one lens in each eye. A dragonfly has compound eyes. All insects do. Each compound eye has lots of lenses.

A fly's eye, for example, has 5,000 lenses. That may sound like a lot, but a dragonfly has even more lenses. Some dragonflies have as many as 30,000 lenses in each eye.

Each lens takes in bits of color and light. Together, these lenses help make a full image for the dragonfly to see.

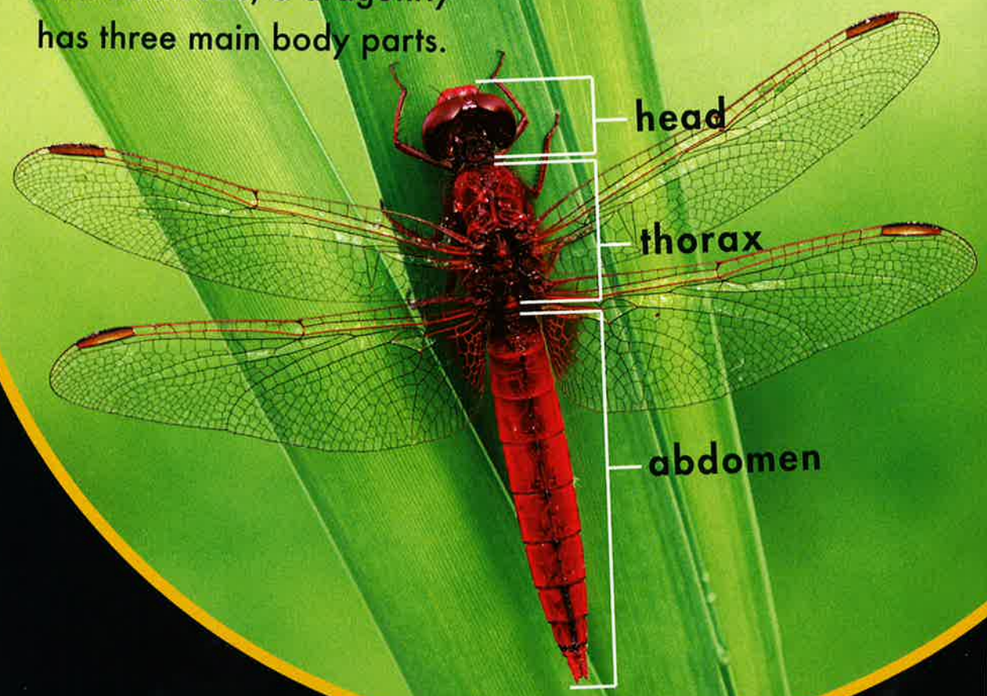
Using all those lenses takes a lot of brainpower. A dragonfly uses about 80 percent of its brain to piece together the bits of information it takes in from its lenses.

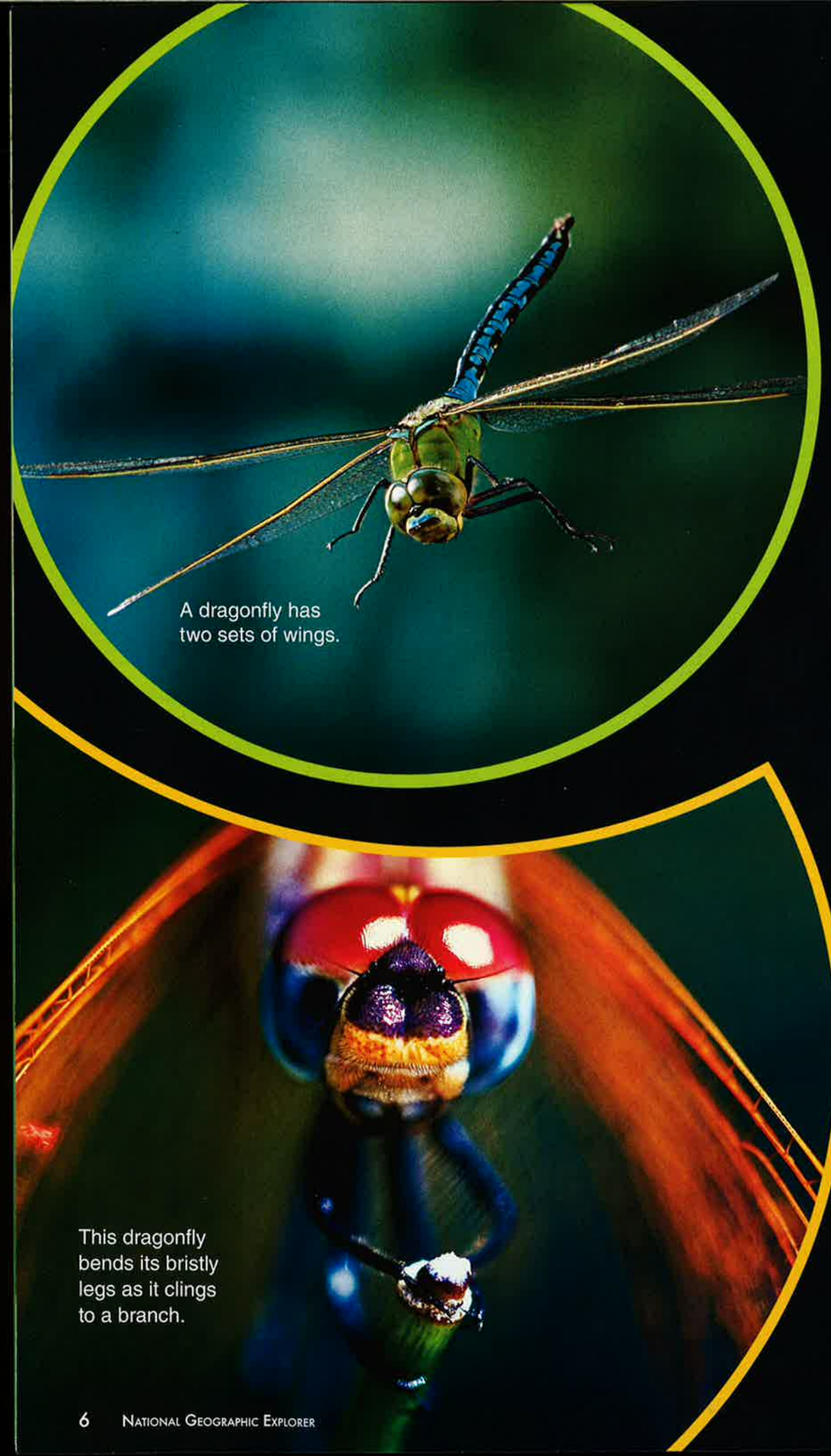
A dragonfly's eyes tell it three things. They tell it how far away prey is. They also tell it how fast it's moving and which way it's going.

Large, compound eyes help this dragonfly see in almost all directions.

A Closer Look

Like all insects, a dragonfly has three main body parts.





A dragonfly has two sets of wings.

This dragonfly bends its bristly legs as it clings to a branch.

Tracking Prey

The dragonfly uses its powerful brain to keep track of what each lens sees. It plots the prey it's chasing on a mental grid. Here's how it works. Out of the corner of its left eye, a dragonfly sees a mosquito. The brain plots the mosquito on the grid in the upper left corner.

As the dragonfly chases the mosquito, its eyes follow the mosquito's movements. During the chase, it always keeps the mosquito in the same part of its grid. The dragonfly stays on course, but speeds up. It reaches the mosquito, then attacks.

Using the grid helps the dragonfly focus on its prey. It can help in other ways, too. When the dragonfly sees a group of insects, it doesn't get distracted. It locks onto only one until it catches it.

Fantastic Fliers

After a dragonfly spots prey, it has to go after it. That's where its wings come in. Dragonflies are fantastic fliers.

They can move in many directions—up, down, forward, back, and side-to-side. They can glide through the air or hover like a helicopter. They can turn quickly. Dragonflies can even fly upside down!

The secret to fantastic flying is a dragonfly's wings. Some insects have one pair of wings. Yet dragonflies have two pairs of wings, one behind the other.

The wings are light and strong. Running through each wing is a network of veins. These veins add strength. The veins are thickest and strongest at the tip of the wing. That's where the wing cuts through the air.

The wings are strong, but they are flexible. If there is a heavy wind, for example, a dragonfly's wings may bend slightly but will not break. This flexibility also lets a dragonfly make quick changes. It can curve and cut through the air at high speed.

Wonderful Wings

Many insects' wings are attached to their bodies. When their bodies move, the wings flap up and down.

A dragonfly's wings are different. Powerful muscles are attached directly to each wing. So a dragonfly can beat its wings together or move each one independently.

Having two sets of wings means less work for a dragonfly. It doesn't have to beat them as hard as other insects to stay in the air.

A dragonfly beats its wings about 30 times per second. A mosquito must beat its wings about 600 times per second to keep flying. A fly has to work even harder. It flaps its wings about 1,000 times per second.

A dragonfly's unique wings help it fly higher and faster than most insects. Some dragonflies can speed through the air at 48 km (30 miles) per hour.

A Dragonfly's Legs

A dragonfly uses more than its large eyes and sturdy wings when hunting. It also uses its legs.

Like all insects, a dragonfly has six legs. Yet a dragonfly can't walk. Instead, on the ground, it uses its legs to cling to plants and rocks. There, it waits for passing prey. In the air, it uses its legs to catch prey.

Once a dragonfly spots a flying insect, it can easily overtake it in the air. As it gets closer, it uses its legs to make a trap.

It bends its bristly legs to form a basket. Then it scoops up the prey. Sharp spines on the dragonfly's legs cut into the trapped insect. The insect can't wriggle free.

FAST FACT: A dragonfly can eat hundreds of mosquitoes a day.

Meals on the Go

Once a dragonfly catches its prey, what happens next isn't pretty. The dragonfly's jaws open wide. Its mouth can open as wide as its face. This is helpful when attacking large insects. Its jaws clamp down and tear apart the insect's wings. Now the insect can't fly away.

Next, the dragonfly's powerful jaws crush the insect, turning it into pulp. The dragonfly swallows the mashed insect.

While hunting, a dragonfly rarely stops flying. It eats on the go.

Once it gobbles up an insect, a dragonfly looks for more. A dragonfly is an eating machine. It can eat its own weight in half an hour. A human being doesn't eat that much in a week!

Ancient Insects

Throughout time, dragonflies haven't changed much. One thing is a little different, though. Long ago, dragonflies were much larger than they are now.

Today, a dragonfly's wingspan can be as wide as your hand. Long ago, a dragonfly's wingspan could be as long as your arm.

Predator and Prey

Dragonflies are fierce predators. Yet they can't always avoid becoming prey. Birds, bats, spiders, frogs, and even bigger dragonflies hunt them. These predators have ways to catch dragonflies.

For example, some spiders weave strong webs which can catch dragonflies in flight. A wasp can quickly sting a dragonfly and then wait for its venom to take effect. Once it does, the dragonfly drops from the air, and the wasp eats it.

Bats and some birds hunt dragonflies, too. Many dragonflies are active at dusk and dawn. That's when these bats and birds are on the hunt. These bigger predators can fly faster than the dragonflies. So dragonflies have a hard time escaping them.

Predators don't only go after adult dragonflies. They also eat young dragonflies. Since a female dragonfly lays her eggs near a pond, fish and frogs often eat them.

After hatching, young dragonflies face a new danger. The young dragonflies can't fly, but they can swim. So they move into the pond. Kingfishers and other birds swoop down. They fly low over the water, filling their beaks with young dragonflies.

Powerful Predator

If a dragonfly isn't being hunted, then it's often looking for prey. Sometimes, a dragonfly hunts while another predator hunts it at the same time. Only the fastest flier survives!

A dragonfly is an awesome predator. Its large eyes lock onto prey. Its strong and flexible wings glide, hover, dart, and dive. A dragonfly's bristly legs quickly capture its meal. Its deadly jaws tear into its meal, mashing it into pulp. Few predators can outhunt a dragonfly. Few prey even see it coming.

Dragonflies can't always avoid becoming prey for other predators, like this frog.

WORDWISE

carnivore: an animal that eats other animals to survive

insect: an animal with three body parts, six legs, antennae, and usually wings

predator: an animal that kills and eats other animals

prey: an animal hunted or caught by another for food

This bird catches a dragonfly in flight.

FREE FALL

Physical Science

READING STRATEGY:
As you read, look for ways the writer supports the main points.

Join a skydiver as he tests how far and fast a person can fall—and still survive.

BY MACON MOREHOUSE

"I want to come back alive." That thought runs through Felix Baumgartner's mind. The skydiver has good reason to worry.

He's floating 39 km (24 miles) above Earth. He rode up there in a giant balloon. Now, there's only one way down. He has to jump.

Then he'll plummet toward the ground. He will fall farther and faster than any person has ever fallen before.

He wonders if he can survive long enough to open his parachute. There's only one way to find out.

Jumping for Science

On the ground hours earlier, Baumgartner prepared for the jump. He'd dreamed of it for seven years. If successful, he'd break records. He'd also provide important scientific data.

His team of scientists had questions only his jump could answer. They wanted to know how a human body would react to such a big fall from such a high place. They wanted to see how well the technology created to protect him worked. They wanted to find out how far and fast he could fall—and still survive.

This data could save lives some day. It could help future astronauts and space travelers who run into trouble high above Earth.

That day is sometime in the future. For now, Baumgartner is focused on surviving the next few hours. He squeezes into a special suit and helmet. It's a lot like a spacesuit.

Baumgartner hates this suit. He loves to skydive because it feels like freedom to him. This suit doesn't. It's heavy. It smells of rubber. It's so stiff, he can barely move.

Wearing it, he can't feel the air on his skin. He can't hear what's going on around him. All he can hear is his breathing as it echoes loudly inside his helmet. It makes him feel trapped in a cage. Yet he knows he must wear the suit. No one can survive where he's going without one.

Baumgartner will ride halfway to space in this capsule.

Danger in the Air

Baumgartner is headed higher than the clouds. In fact, it's a place nearly halfway to space. This part of Earth's atmosphere is called the **stratosphere.**

The stratosphere is a dangerous place for a human. There's less **air pressure** high above Earth. Air pressure is the force of air molecules pushing against a surface. On the ground, billions of air molecules press against us all the time. It doesn't feel like much, though.

Up in the stratosphere, though, lower air pressure does strange things to a body. It causes saliva, tears, and other liquids to turn into gases and expand. A person's body starts to swell. It can puff up to twice its normal size.

Breathing Problems

Less air pressure can cause a second deadly problem. It can make it harder to breathe. Close to the ground, air molecules are all pressed together. When air pressure drops, the molecules spread out. So every breath in takes in less air. That makes it impossible for a person to get enough oxygen to survive.

The suit protects Baumgartner from these problems. It presses on his body so he won't swell up. It has oxygen for him to breathe.

With his suit on, Baumgartner is ready to go. He crawls into a small capsule attached to the bottom of the world's largest helium balloon. It's time. The balloon lifts off the ground. He's on his way.

A giant balloon carries Baumgartner into the sky.

Going Up

The trip to the stratosphere takes a little more than two hours. So Baumgartner has plenty of time to think about what's next. He goes over the mission with his team on the ground. So far, so good.

Finally, he reaches 39 km (24 miles) above the ground. The balloon stops rising. The capsule door rolls open. Baumgartner steps out onto a ledge no wider than a skateboard.

Above him, space looks pitch black. Below him, he sees the curve of Earth's surface. He has no time to hesitate. He's only got enough oxygen for about 10 more minutes. That's about how long his fall will take. "I'm coming home," he says. He salutes. Then he hops forward.

A Change of Energy

At first, Baumgartner feels like he's floating. As he dives, though, he picks up speed. That's because Earth's **gravity** is pulling on him.

Gravity is a force that pulls on all objects. Earth's gravity pulls objects down to Earth. It also changes the energy in an object. Here's how it works.

As Baumgartner stands still on the edge of the capsule, he has a lot of **potential energy.** He isn't moving. Yet he has the potential to move really fast. That's because he's so high up and has so far to fall.

As he falls, gravity tugs on him. It changes his potential energy into **kinetic energy.** That's the energy of a moving object.

He falls faster and faster. Yet inside his suit, Baumgartner doesn't feel a thing. He doesn't hear a thing. He sees something, though. He sees that he's in trouble.

Spinning

About 30 seconds into the fall, Baumgartner starts spinning. It looks like he's doing cartwheels in the sky. Soon, he's whipping around 60 times a minute. If he spins too fast, he could faint.

An emergency parachute would open, so he wouldn't smash into the ground. He'd have failed, though. The parachute would slow his fall. He wouldn't break any speed records.

So Baumgartner fights the spin. First, he sticks out one arm. He spins faster. He pulls it back in, then sticks out the other one. The spin slows and finally stops.

Even as he fights for control, Baumgartner makes history. He falls 1,358 km (844 miles) per hour. It's a speed record! No human has ever gone that fast outside of a plane or other kind of vehicle.

Landing

Now Baumgartner's speed slows. He's closer to Earth. The air is thicker here. The molecules are closer together. They push up against him. This upward push acts against the pull of gravity. Gravity is stronger, so he's still falling. But he's no longer speeding up.

When he reaches 1.5 km (about a mile) above Earth, it's time to open his parachute. His free fall is over. The parachute catches the air. It yanks him upward. Then he floats the rest of the way to the ground.

Nine minutes and 18 seconds after he jumped, he lands safely. He pumps his fist in the air. All the planning, the fear, and the thrill were worth it. "Adventure," says Baumgartner, "is how we learn."

WORDWISE

air pressure: the force of air pressing on a surface

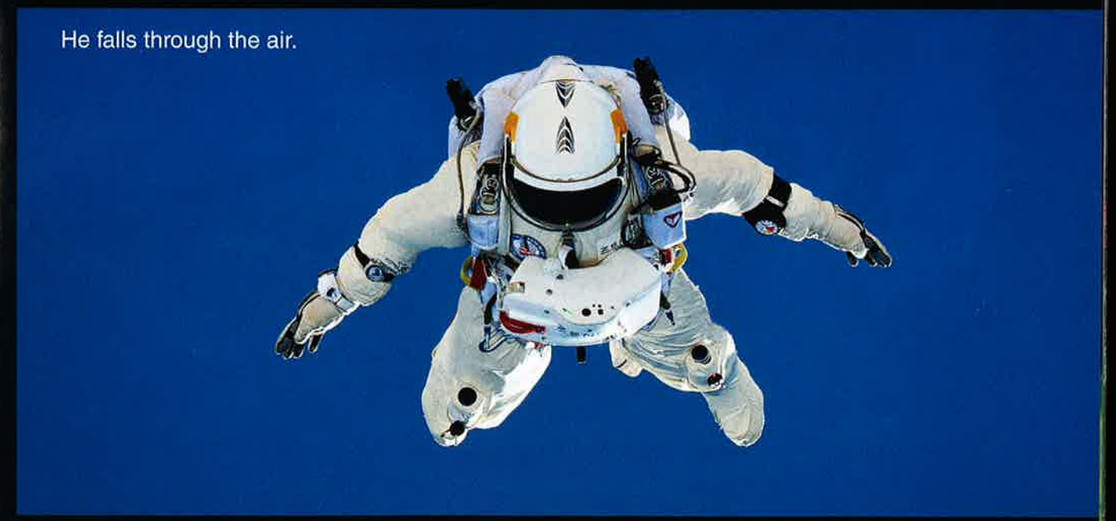
gravity: a force that pulls objects toward each other

kinetic energy: the energy of a moving object

potential energy: stored energy

stratosphere: a layer of Earth's atmosphere

Baumgartner hops forward to start his free fall.



He falls through the air.

He raises his arms in victory after landing safely.

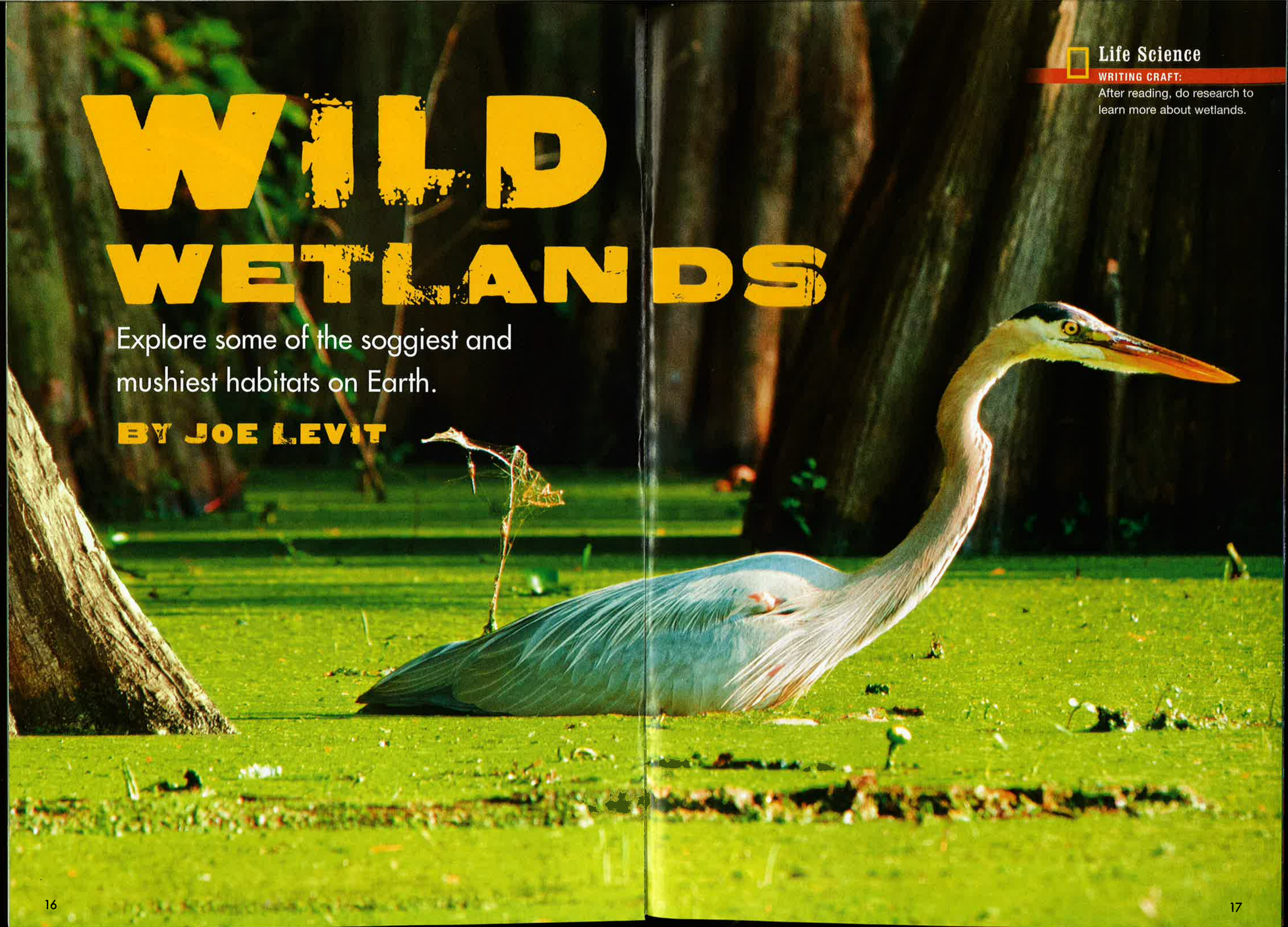
Life Science

WRITING CRAFT:
After reading, do research to learn more about wetlands.

WILD WETLANDS

Explore some of the soggiest and mushiest habitats on Earth.

BY JOE LEVIT



A group of monkeys sits near the edge of a pool of water. Some of them climb trees. Some birds dart overhead. Other birds paddle through the calm water.

None of these animals see the water monitor on the bank. It slips into the water and silently swims toward the monkeys. This large lizard is looking for prey.

The water monitor isn't a picky eater. It eats birds, fish, frogs, crabs, snakes, and just about anything it can find.

Suddenly, the monkeys spot the lizard. They call out a warning. Then they scramble to higher ground. The birds flap their wings and take flight. Their cries fill the air.

The lizard turns its tail and swims away—hungry. It won't go hungry for long. There's lots of prey in this **wetland** in India.

What's a Wetland?

The wetland in India, like other wetlands, is a habitat. It is home to many plants and animals. Wetlands can be found throughout the world.

Not all wetlands are alike, but they do have one thing in common. All wetlands are places that fill with water for at least part of the year.

Wetland water can be either salt water or fresh water. The water level in both kinds of wetlands is often changing. So wetlands have both water and land habitats.

The water that soaks wetlands comes from many places. Flooding rivers, melting snow, rain, and tides can all form wetlands. Water from under the ground can even seep into the land to form a wetland.

Many wetlands form along the edges of oceans, lakes, or rivers. They also form in low areas far from other bodies of water.

Many wetlands formed at the end of the last ice age. Moving glaciers cut out low places in the ground. Over time, water, soil, and other debris filled these low places, turning them into wild wetlands.

Why Wetlands Matter

Plants began to grow in the newly formed wetlands. And animals soon moved in, too. Some of these animals live in wetlands all their lives. Others just visit. They rest in wetlands when they migrate, or they go there to raise their young.

Wetlands are important for other reasons, too. They store water, then slowly release it. For instance, raging floodwaters can fill wetlands. Trees and other wetland plants then soak up the water. This traps some of the flooding water, protecting the surrounding land from floods.

Wetlands can also trap pollution in water. This pollution can come from many different places. Factories may dump chemicals in rivers, for example. Rainwater may carry pesticides or animal waste from farms. Too much of these things can harm wildlife. They can even end up in drinking water and harm people.

A wetland filters polluted water that flows through it. The soil traps some of the pollution. There, plants, bacteria, and other organisms slowly break down some of the pollution. They make it less harmful, protecting plants, animals, and people.

The world has many wetlands. They exist on every continent except Antarctica. Yet not all wetlands are the same. Let's take a look at three kinds—**swamps, marshes,** and **bogs.**

This giant river otter finds plenty of fresh food in its wetland habitat.

The sun rises over a marsh. This wetlands is home to many plants and animals.

What's a Swamp?

A swamp is a wetland in a forest. It's filled with large trees, shrubs, and other woody plants.

Water usually covers a swamp all the time. Yet the water is shallow enough so that plants can grow and reach the surface.

Swamps often form near deep bodies of water, such as large rivers or coastal areas. Some of the world's largest freshwater swamps form near major rivers like the Amazon, the Mississippi, and the Congo.

Ocean water fills most salty swamps. As tides come and go, the water level in these swamps changes.

Saltwater Swamp

A large saltwater swamp lies along the coast of the southeastern United States. It's called the Everglades. At low tide, water rushes out of parts of the Everglades. That's when wide sections of mud and sand bake in the sun.

Mangrove trees grow out of the mud. They sit high above the mud on curved roots. The roots make great hiding places for animals.

A mangrove tree crab crawls along the mud. It picks up bits of food with its pincers. As the tide comes in, salty ocean water grows deeper. It begins to cover up the arching tree roots.

An alligator floats by the trees looking for a meal. It sees the crab and slowly swims closer. The crab knows it's being hunted, though. It quickly scoots under a mangrove. It's safe among the maze of roots.

Freshwater Swamp

One of the largest freshwater swamps is in South America. It's called the Pantanal. During the wet season, this swamp fills with rainwater.

Each year, heavy rains cause the nearby rivers to flow over their banks. Water gushes onto a large floodplain. A floodplain is an area of low-lying ground near a river. As the floodplain fills, the Pantanal comes to life.

Towering fig and palm trees use their roots to suck up water. Freshwater stingrays and colorful tropical fish swim in the water.

Large flocks of birds come to hunt these fish. For instance, jabiru storks stand quietly in the water. Every now and then, one stabs the water with its long beak. It then tosses its head up to eat its fishy catch.

The storks share the water with other animals. One of them is the world's largest rodent, the capybara.

Capybaras are excellent swimmers. Often only their ears, eyes, and nostrils peek above the water. They aren't looking for fish, though. They're looking for plants to eat.

The wet season doesn't last long. Soon, the Pantanal enters its dry season. The water levels go down and dry land emerges.

Still, life goes on in this swamp. Pink trumpet trees bloom. Larger mammals come here to graze and to find food for their young. Marsh deer stroll through the water, looking for plants to eat. Tiny monkeys swing from tree to tree. Even rare jaguars and ocelots prowl through this swamp.

Capybaras splash into the water, looking for plants to eat.

Towering cypress trees grow in this swamp.

Marshes

A marsh is like a river of grass. Unlike swamps, trees do not grow in marshes. Instead, smaller plants like grasses, shrubs, and wildflowers grow in the shallow water that forms marshes.

Water plants like reeds, lily pads, cattails, and duckweed are plentiful. Duckweed floats on the surface of the water. Its leaves can grow so thick, they look like a green carpet.

Either fresh water or salt water can flow in a marsh. Freshwater marshes usually form along the edges of lakes and rivers. The water level in these marshes can change with the seasons. Saltwater marshes form near the sea. The water level changes with the tide.

That's what happens at Camargue. It is the largest river delta in western Europe. A delta is a landform at the mouth of a river. Plants like sea lavender and glasswort grow here.

An ancient breed of horse lives here, too. These wild beasts are known for their hardiness. They trek through the marsh's muddy waters, grazing on grasses.

This marsh is the only place in France where pink flamingos nest. As many as 20,000 can flock here at one time.

Flamingos mostly eat plankton on the edge of this marsh. They suck water in through their bills. Then they strain it over fine filters in their mouths. Plankton turns the birds' feathers pink.

Lots of other birds often live in marshes, too. Great blue herons look for fish to eat. They spear fish with their beaks and swallow them whole. Kingfishers dive from the sky to hunt fish, too.

This frog hides in the water under plants.

Bogs

Bogs get their water from the sky. It comes in the form of rain, sleet, or snow. Yet bogs need more than water. They also need moss.

Bogs form in two ways. Moss can slowly sprout on a small lake or pond. It grows and covers the water below. Little light and air gets through the moss. Plants and animals that live in the water die off. Over time, the pond becomes a plot of soggy soil.

Bogs also form when moss covers dry land. The moss grows in thick mats. It traps water in the soil. Over time, the moss and soil grow soggier and soggier. They form peat. Peat is a soil made up of the remains of dead plants.

Bogs usually form in cold areas. The largest bog in the world is in Siberia. Much of this bog is frozen. Its soil is waterlogged and has few nutrients. As a result, only a few kinds of plants and animals live here. Most of them are small.

What Lives in a Bog?

Few trees grow in most bogs. Most trees can't get enough nutrients. The wet soil can't hold heavy trees up, either. So they topple over when they grow too tall.

The sundew is one of the plants that can grow here. This small plant can't get enough nutrients from the soil, though. So it eats meat.

This carnivorous plant lures, traps, and eats insects. Sticky red hairs cover parts of the leaves. An insect that lands on the hairs gets stuck. Then the sundew eats it.

Like plants, most animals can't live here, either. Large animals can't find enough food. Some small animals, like shrews, beavers, minks, and muskrats visit the bog to nibble on plants. They don't stay long, though. Once they've had a snack, they move on.

Lots of small birds come here, though. The bog offers them a safe place to land. Birds that build their nests on the ground feel at home here. They don't have to look out for predators. Snipes, plovers, and lapwings are just a few kinds of birds that live in bogs.

Wonderful Wetlands

There are many kinds of wetlands. Swamps, marshes, and bogs are all wetlands. Yet each is different. They form different habitats. Different kinds of plants and animals live in each. Still, they're all important.

Plants and animals need wetlands to survive. They find what they need to survive in wetlands. We also need wetlands. They filter pollution out of water and stop some floods. They keep many places on our planet healthy and safe.

WORDWISE

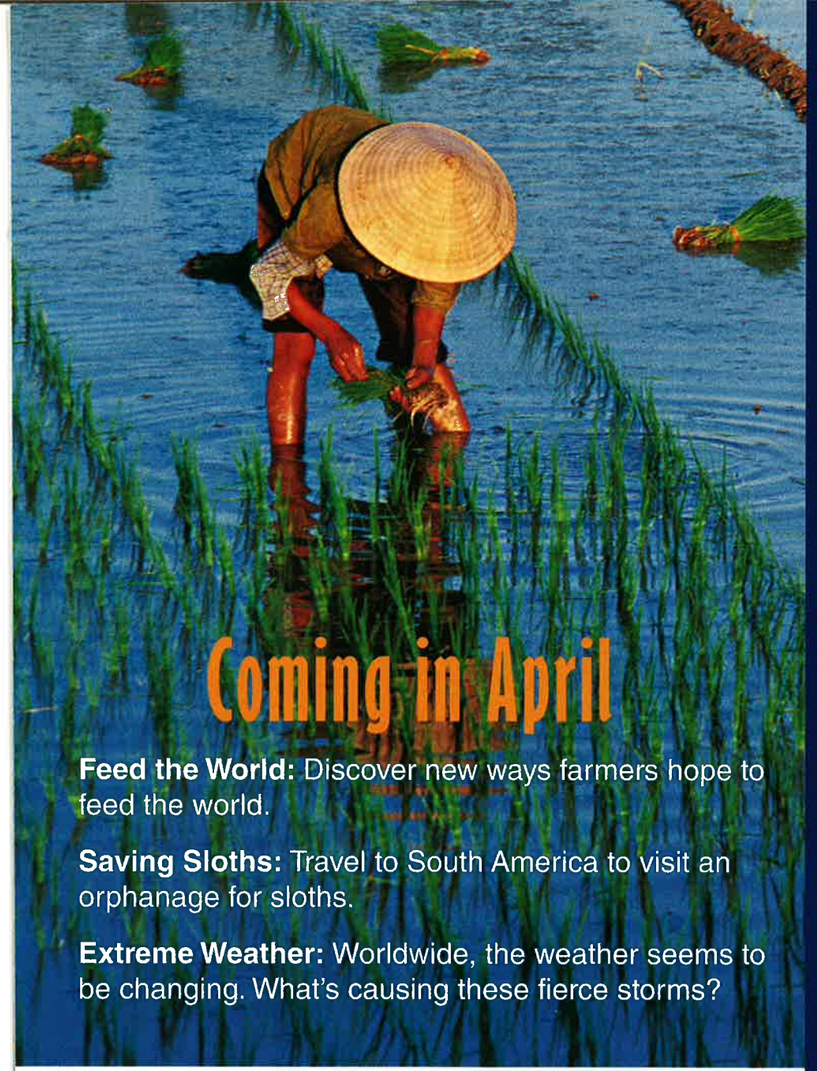
bog: an area of soft, wet land formed by water and moss

marsh: an area of low-lying land often covered by grasses

swamp: an area of spongy, muddy land, filled with water

wetland: land where there is a lot of moisture in the soil

Berries grow in this bog.



Coming in April

Feed the World: Discover new ways farmers hope to feed the world.

Saving Sloths: Travel to South America to visit an orphanage for sloths.

Extreme Weather: Worldwide, the weather seems to be changing. What's causing these fierce storms?

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