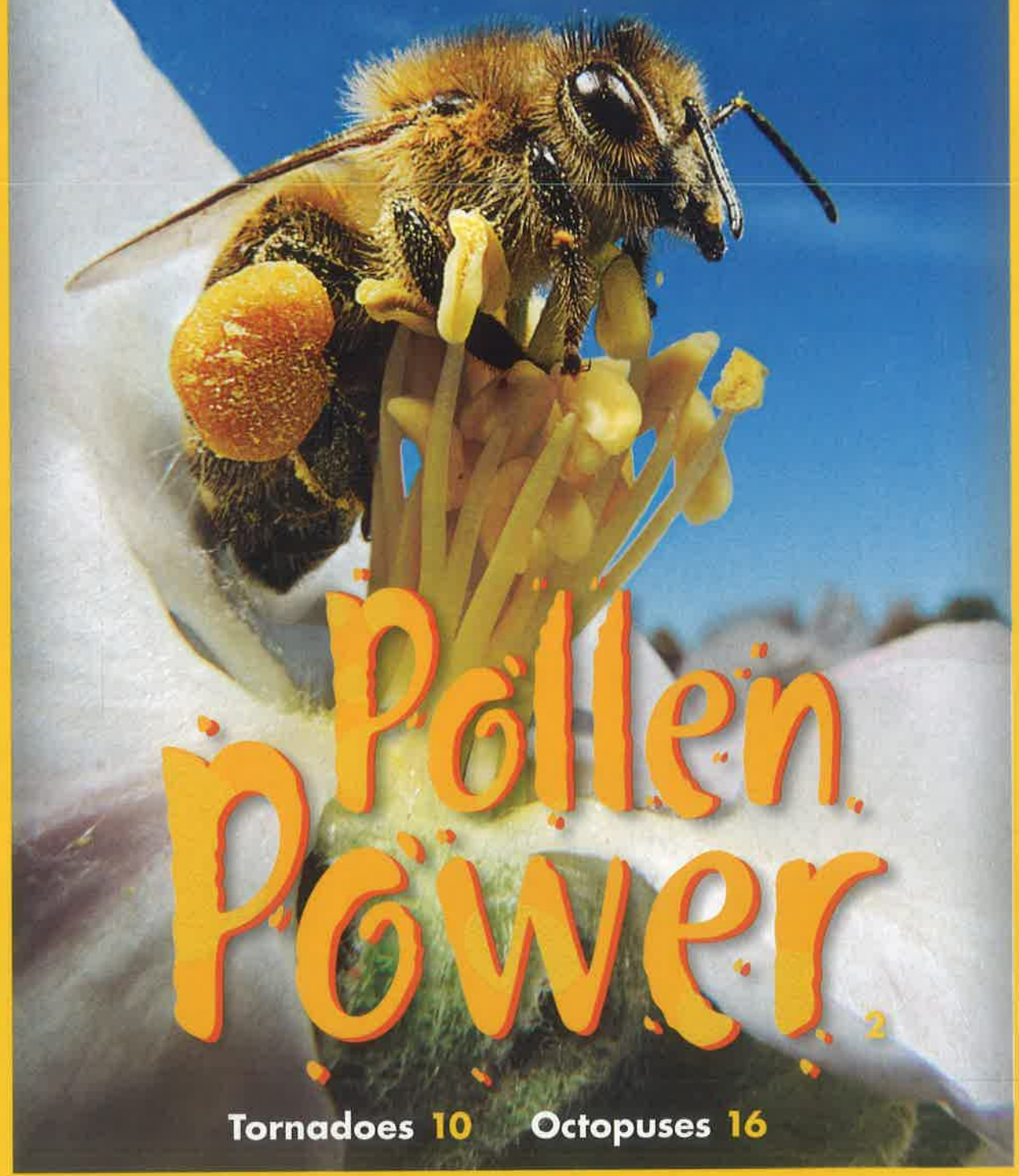
PIONEER EDITION NGPIONEER.ORG APRIL 2011

Explorer



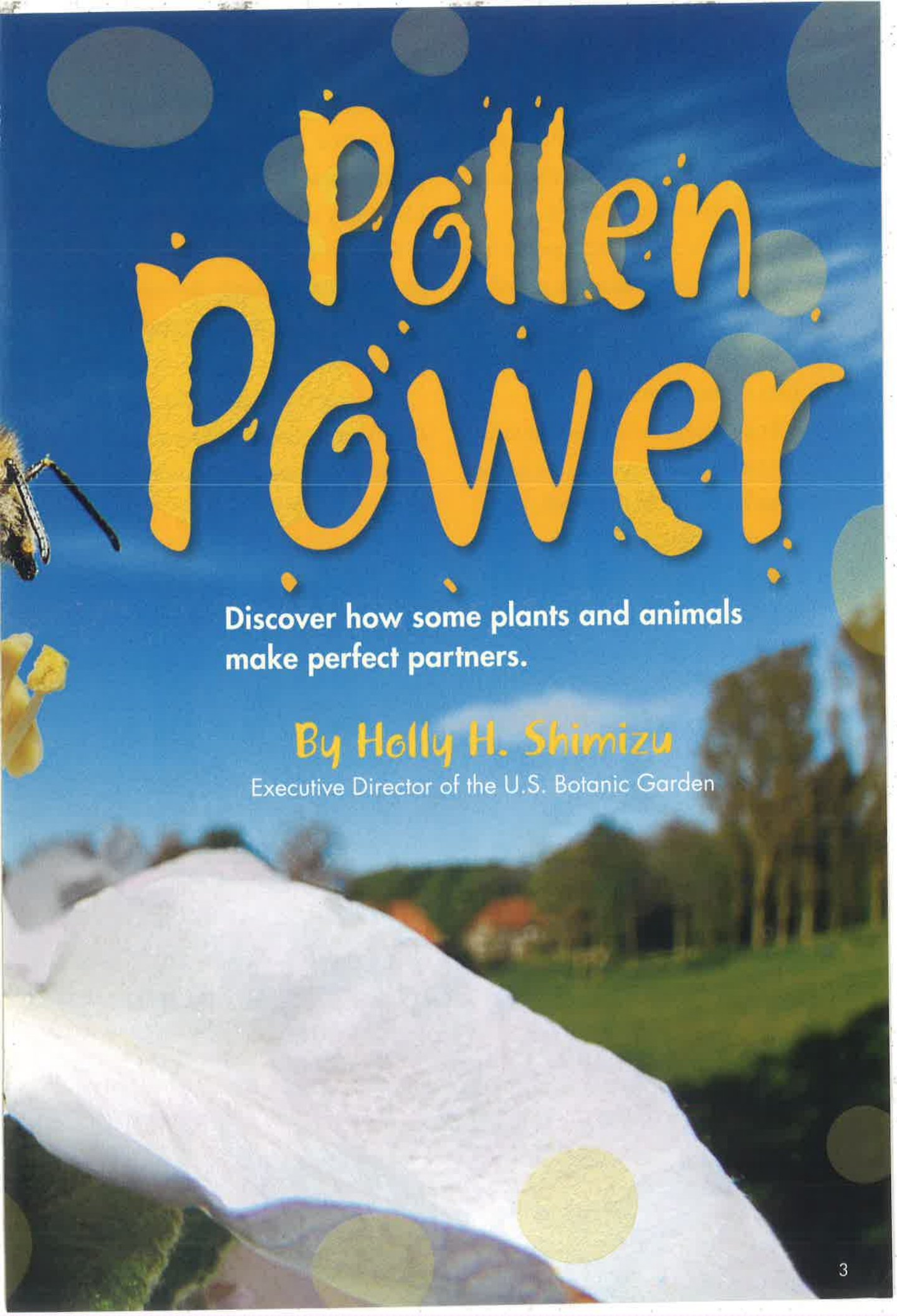
Pollen Power 2

Comprehension Strategy: Before reading, scan the title, photos, and captions to determine your purpose for reading.

Pollen Power

Discover how some plants and animals make perfect partners.

By Holly H. Shimizu
Executive Director of the U.S. Botanic Garden



A sphinx moth darts out of the darkness. It heads for my garden. There, a moon vine opens its white flowers. A sweet smell fills the air. The moth follows that smell.

Deep inside the flower's petals is a juice, or nectar. The moth unrolls a long tube from under its head. The moth uses the tube like a straw to suck up the nectar.

A fine powder called **pollen** is in the flower, too. The pollen sticks to the moth's body. To the moth, the pollen means nothing. To the flower, it is everything. For most flowers to make seeds, pollen must move from plant to plant. The moth moves it.

A Plant and Its Pollen

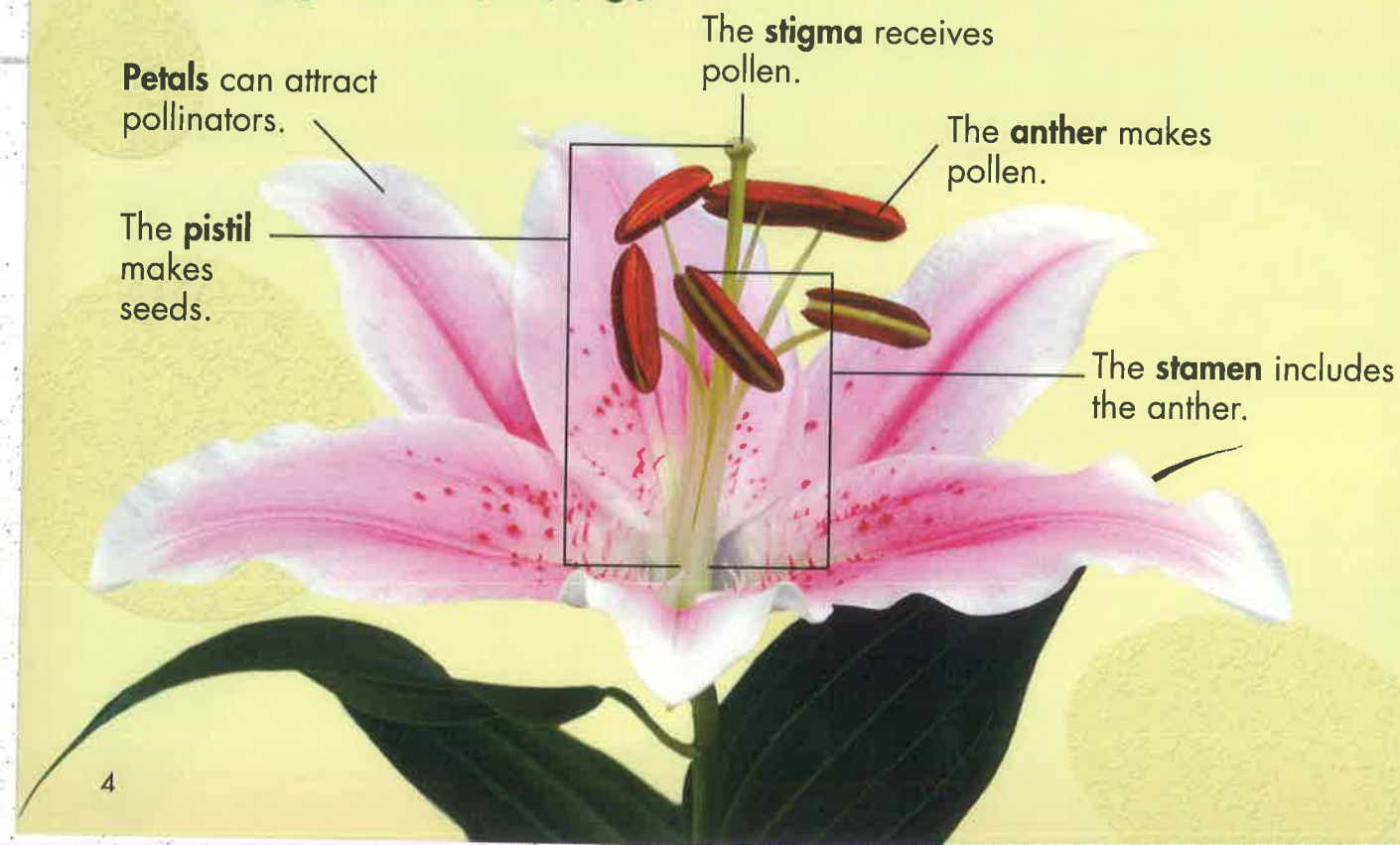
The moth is the reason I plant moon vine. I want to bring more **pollinators** like moths to my garden. I begin by thinking about flowers.

Flowers can make the seeds that grow into new plants. Before the seeds can grow, flowers must be **pollinated.**

A flower has many parts. A part called the anther makes pollen. **Pollination** can happen when pollen enters a flower's stigma.

Yet most plants are rooted in the soil. They cannot move pollen from one flower to another themselves. So they get pollinators to do it for them.

Inside a Flower



A sphinx moth slurps nectar from this orchid.

Yellow pollen coats the anthers on this flower. A pink pistil curves beneath the stamens.

Sending a Message

Plants "call" to pollinators in a number of ways. Some plants send a message with their color or shape. Think of the moon vine. Its white flowers bloom only at night. Night moths can see it in the dark.

Try planting some bee balm if you want to get a hummingbird's attention. The bee balm's red flower "tells" the hummingbird to come close for nectar. When it drinks, its feathers get dusted with pollen.

Following a Guide

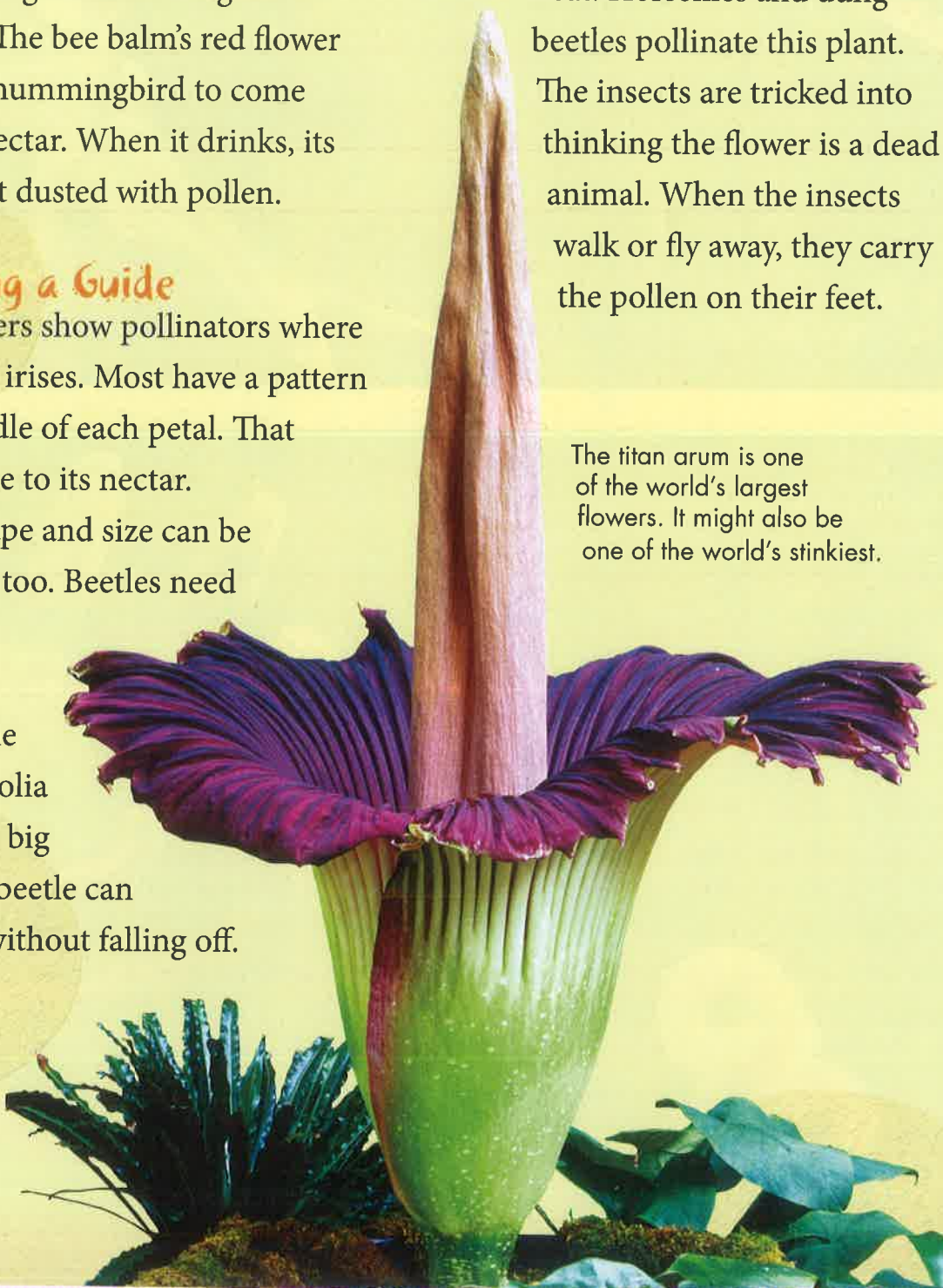
Some flowers show pollinators where to go. Take irises. Most have a pattern in the middle of each petal. That guides a bee to its nectar.

Petal shape and size can be important, too. Beetles need large, wide petals to land on. The large magnolia petal is just big enough. A beetle can land on it without falling off.

The Nose Knows

A flower's smell can also attract pollinators. Fresh, light smells bring butterflies and bees. Other smells bring bats.

Some plants give off a stinky smell. Where I work, there is a plant called the titan arum. It smells like rotting meat. Horseflies and dung beetles pollinate this plant. The insects are tricked into thinking the flower is a dead animal. When the insects walk or fly away, they carry the pollen on their feet.



The titan arum is one of the world's largest flowers. It might also be one of the world's stinkiest.

Patterns in this iris's petals tell insects where to go for nectar.

White nectar guides lead this bumblebee to the heart of this flower.

This hummingbird zooms in to drink nectar from a bright red flower.

Perfect Pollinators

Bees are some of the best pollinators. Pollen easily sticks to their fuzzy bodies and legs. They are also strong enough to push deep into the flowers. That helps them reach nectar.

A butterfly is also good at moving pollen. It uses its tube-like mouth to reach nectar in long, narrow flowers. As it sips nectar, it gathers pollen on its legs.

Lesser long-nosed bats pollinate, too. This bat has a hairy head. When it sticks its nose into the flower, well, you can guess what happens.

Odd Couples

There are other pollinators, too, but not ones I'd see in my garden. Some geckos climb inside flowers to drink their nectar. As the gecko drinks, pollen sticks to its scales. Then it moves the pollen to another flower.

The honey possum pollinates some flowers. Pollen coats its pointed nose when it laps up nectar. It carries the pollen to the next flower.

Plants and their pollinators help one another. The animals drink nectar to live. The plants need help making new plants. Sometimes these pairs can't survive without each other.

Plant and Pollinator

The yucca plant cannot live without the female yucca moth. She cannot live without the yucca plant. She scrapes pollen from anthers inside the yucca flower.

She shapes the pollen into a lump and tucks it under her mouth. She then flies to another yucca plant. There, she lays her eggs. She puts some of the lump on that flower's stigma. Now the flower can grow seeds. The seeds will be food for the moth's babies when they hatch.

When I see an insect buzzing in my garden, I stay out of its way. It might be busy pollinating. That is an important job for both plants and their pollinators. It is how they survive.

Read more about pollinators in the March 2011 issue of National Geographic.

Wordwise:

pollen: tiny grains a plant makes to reproduce

pollinate: to transfer pollen from one flower to another

pollination: to pollinate

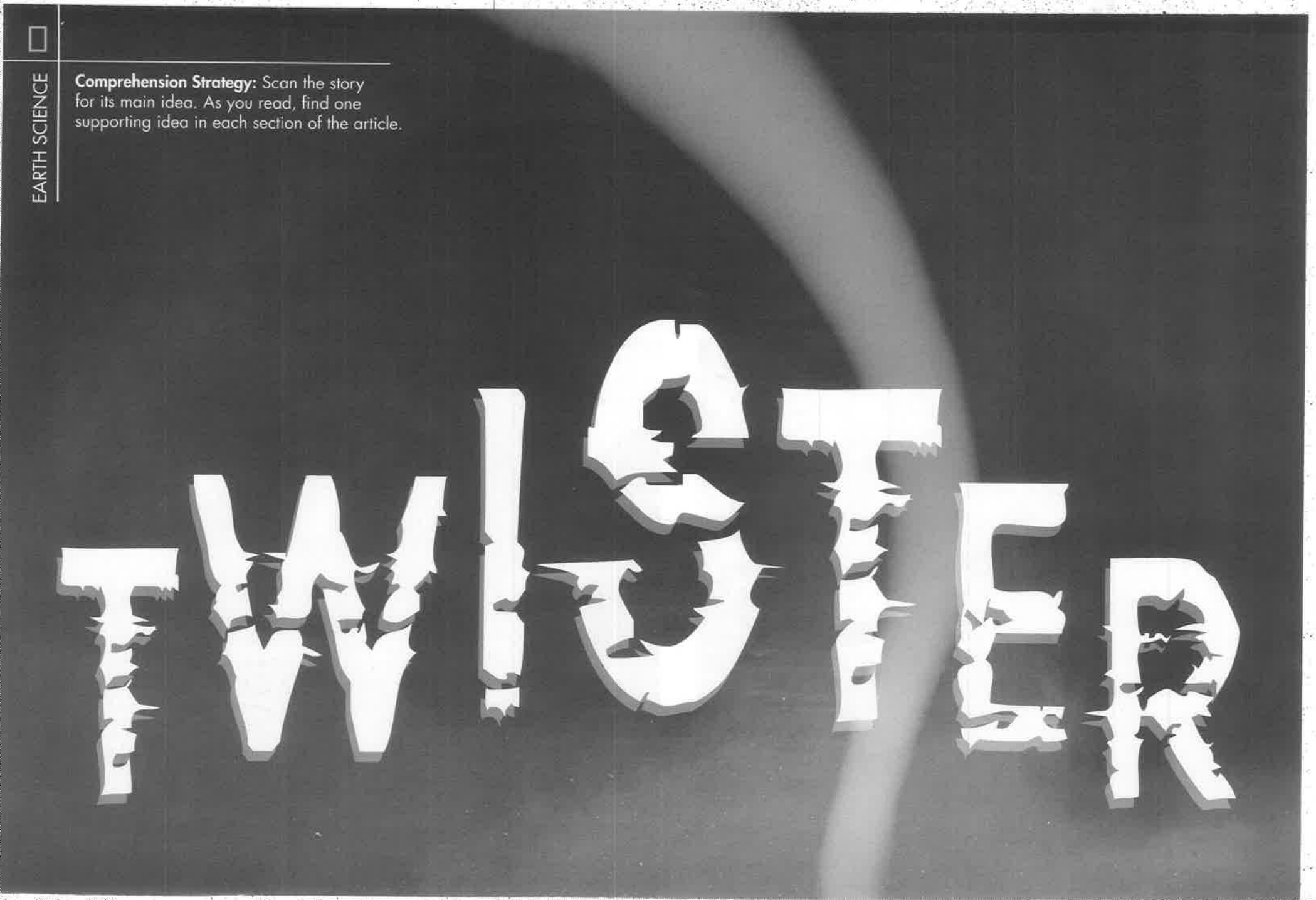
pollinator: insect or other animal that transfers pollen from plant to plant

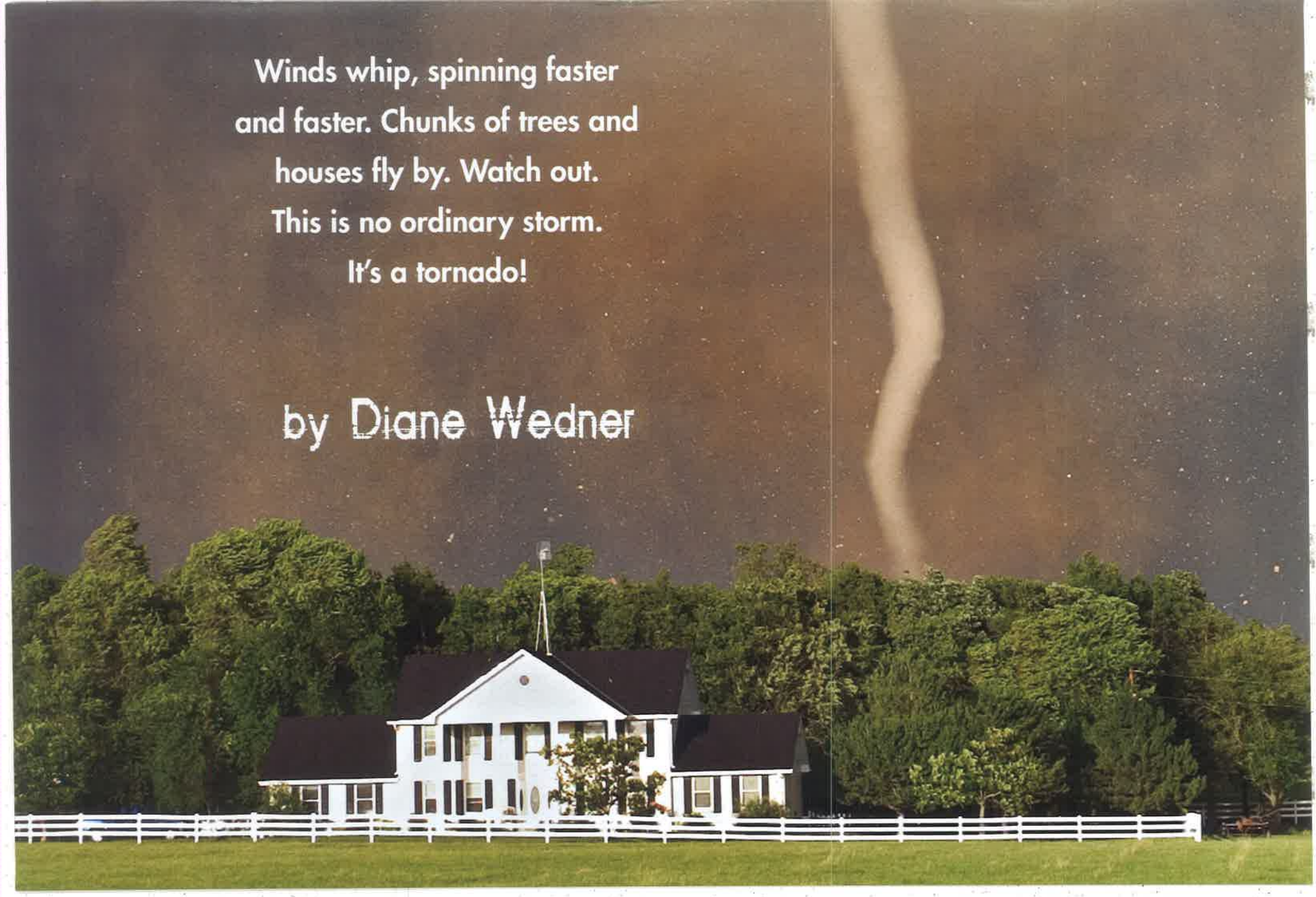
Pink pollen covers this honey bee.

These honey possums are pollinators, too.

EARTH SCIENCE

Comprehension Strategy: Scan the story for its main idea. As you read, find one supporting idea in each section of the article.




Winds whip, spinning faster
and faster. Chunks of trees and
houses fly by. Watch out.
This is no ordinary storm.
It's a tornado!
by Diane Wedner

Josh Wurman's heart raced as he sped through town. Behind him, a monster **tornado** roared. If it caught him, it could toss his truck like a toy.

Normally, Wurman does the chasing. He is a meteorologist. He studies storms. A tornado is one of the most dangerous kinds of storms.

A tornado's winds can spin up to 483 kilometers (300 miles) per hour. They can be deadly. Power lines break. Roofs fly off buildings. Tornadoes can rip up everything in their path.

Wurman was lucky. He got away. He wasn't near the tornado for a thrill. He wanted to learn about it.

Scientists like Wurman already know a lot about tornadoes. Yet they don't know exactly how these storms form. That information is important. It could help them predict when tornadoes will strike. Then they could do a better job warning people that a tornado is coming. They could save lives. That's why Wurman studies these killer storms.

Tornadoes can spin out of a giant thunderstorm like this one.

A tornado's powerful winds tossed this van into a motel.

Tornado Trouble

Tornadoes are hard to study. Getting close to one can be deadly. It's hard to find them, too. They don't last long. They can happen all over the world. They can happen during the day or at night, and any time of year.

There are some tornado hot spots, though. One is called Tornado Alley. It's in the United States. The wind patterns there cause big thunderstorms called **supercells.** These storms can mean tornado trouble. Hundreds of tornadoes rip through Tornado Alley every spring.

The Search

Wurman knows about Tornado Alley. That's why he went there to hunt tornadoes in the spring of 2009. He joined a team of weather scientists. It was the biggest tornado study ever.

First, the scientists had to find tornadoes. Each day, they checked weather reports. They looked for supercells. When they spotted one, they raced to reach it. Often, they got to it too late. Sometimes, a tornado never formed.

Week after week, they failed to find a twister. They didn't give up, though.

Mapping the Storm

Finally, the team got lucky. A big storm formed in Wyoming. The sky turned black. Winds whipped. This time, the team got there in time.

Inside his truck, Wurman watched his **radar** screens. He saw lots of colors. He "read" the colors. They showed him where rain fell and winds spun. They made a map of the storm.

First, warm, moist air rushed up into the cloud. That rising air is called an **updraft.** At the same time, a cooler **downdraft** pushed rain and hail to the ground.

Up in the cloud, the rising and falling winds began to spin faster and faster. They made a funnel. It touched the ground. It was a tornado!

On the Ground

The tornado looked like an elephant's trunk. Its tip wiggled across the ground. Wurman's team dropped weather tools in its path. The tools measured the tornado's wind speed and direction. They also measured air **temperature.** They even measured the size of raindrops and hail.

After 30 minutes, the funnel started to wobble. Then it was gone.

Puzzle Pieces

That tornado gave Wurman and his team lots of data. It told them more about tornados than ever before. Of course, there is still a lot to learn.

They have to figure out what it all means. For example, why do some supercells spin out tornadoes and others don't? It's like putting a puzzle together. This puzzle could take 10 years to solve.

The answers could lead to better tornado **forecasts.** People would have more time to get to safety when a tornado is coming. For Wurman, that would be an even bigger thrill than seeing another tornado up close.

WORDWISE

downdraft: downward current of air

forecast: prediction about the weather

radar: device that uses waves of energy to detect and map objects

supercell: big thunderstorm that can spin out tornadoes

temperature: degree of hotness or coldness

tornado: spinning funnel of air that touches the ground

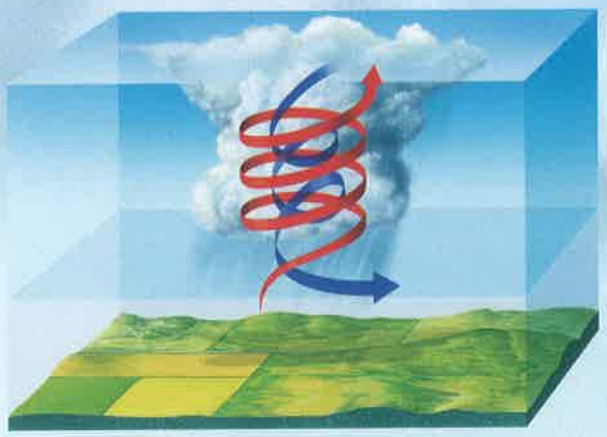
updraft: upward current of air

How a Tornado Forms

Winds spin. Faster and faster, they twist. Watch out. It's a tornado! Follow the steps to see how a tornado forms.

1. Warm air and cold air collide. They form a spinning tube of air.

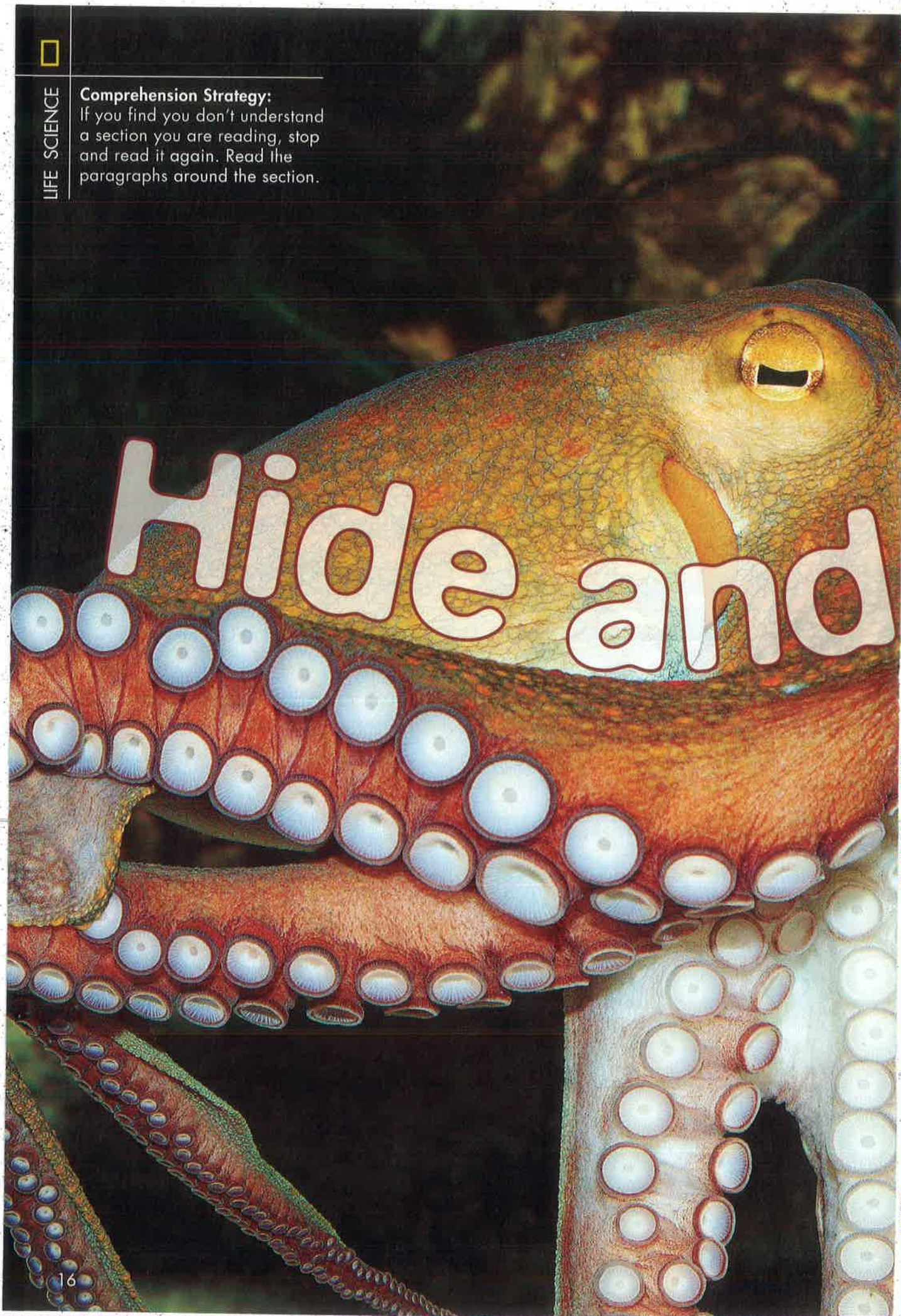
2. The rotating air tilts upright. Warm, moist air spirals upward in an updraft. Cooler air flows down. It pushes rain and hail to the ground.



3. Warm and cold air currents spiral. They squeeze the rotating winds into a funnel. When the funnel touches the ground, it's a tornado.

Red arrow: warm air
Blue arrow: cold air

Comprehension Strategy:
If you find you don't understand a section you are reading, stop and read it again. Read the paragraphs around the section.



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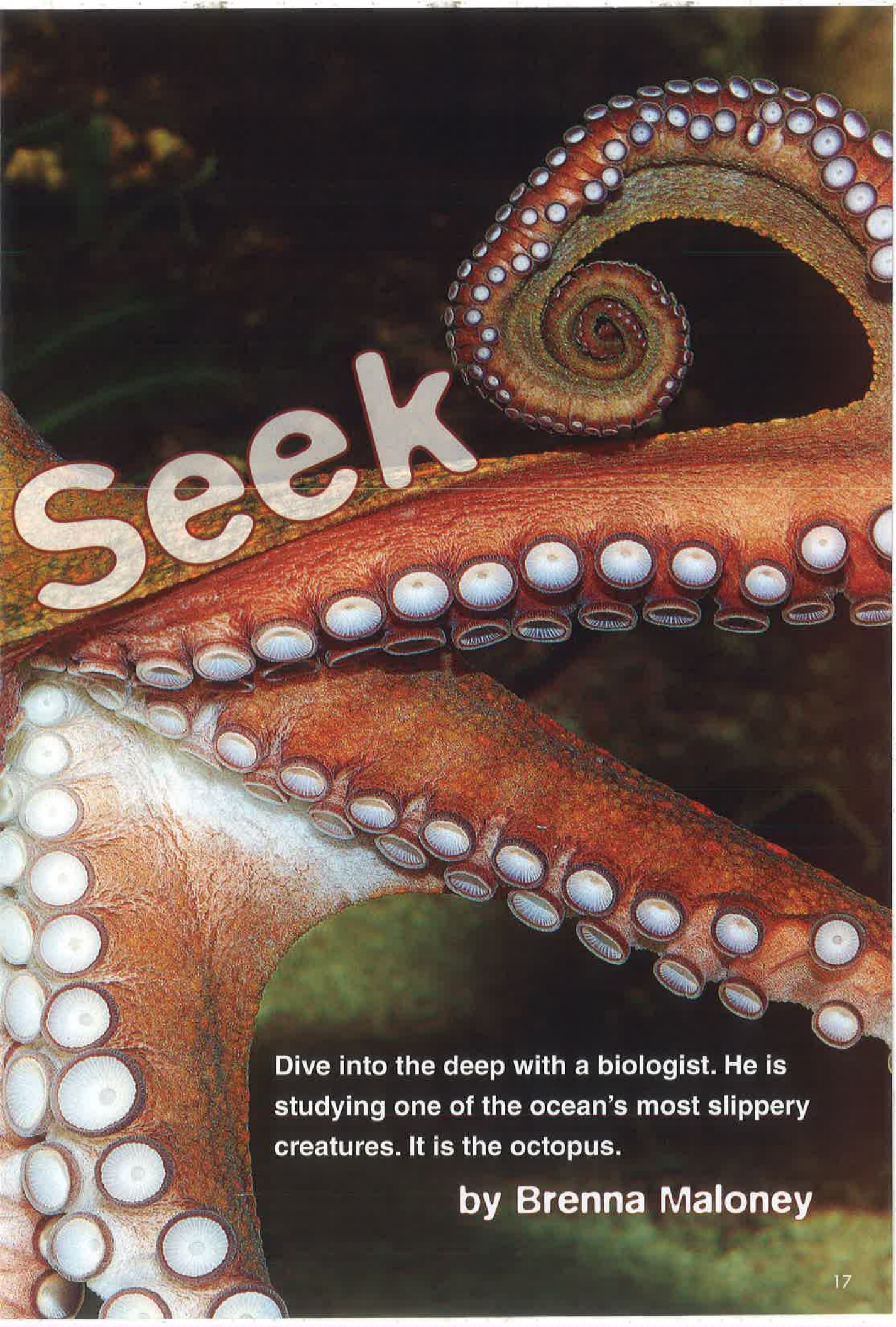
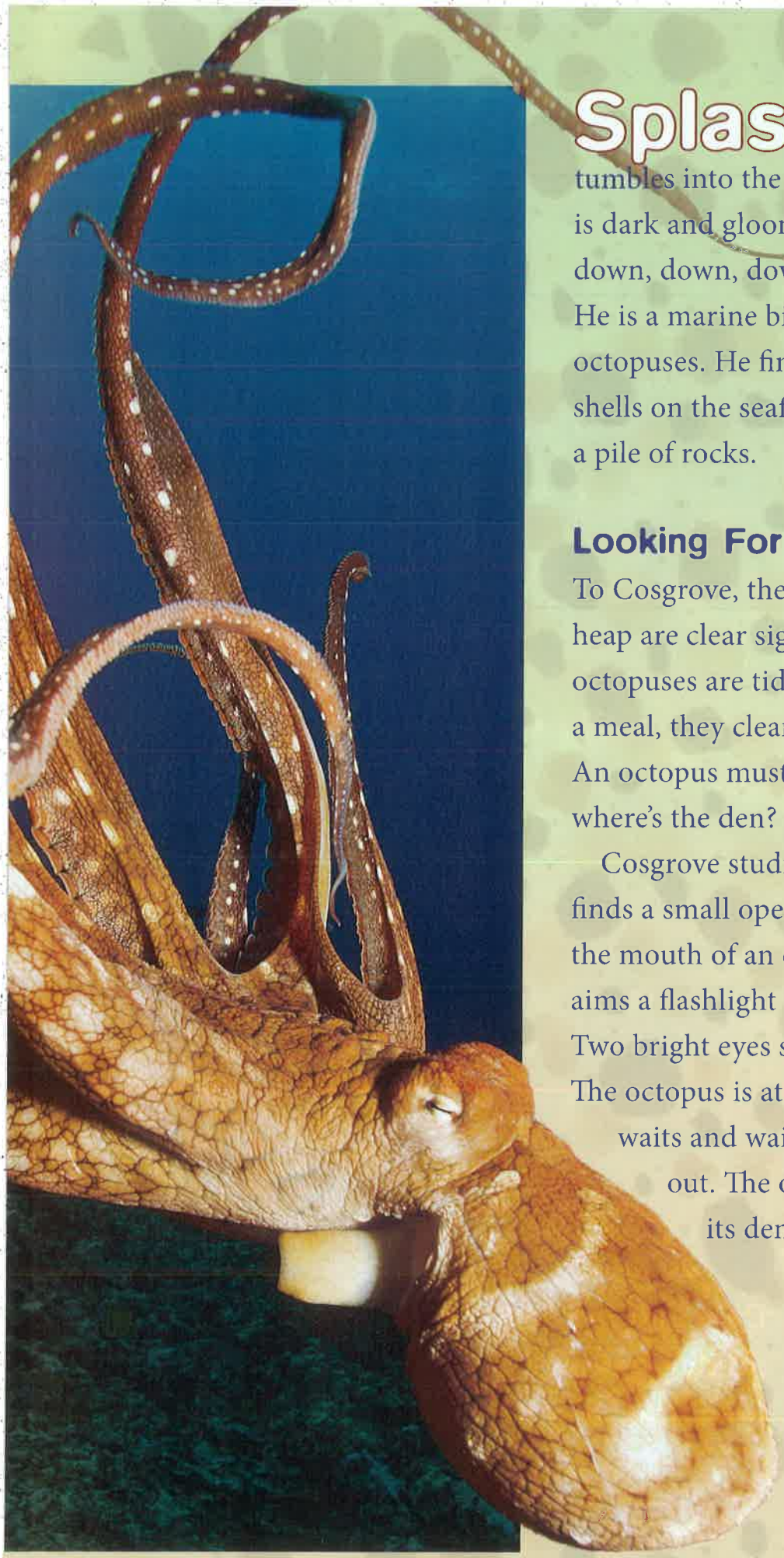


Dive into the deep with a biologist. He is studying one of the ocean's most slippery creatures. It is the octopus.

by Brenna Maloney



Splash! Jim Cosgrove tumbles into the icy sea. The water is dark and gloomy. Cosgrove swims down, down, down to the seafloor. He is a marine biologist looking for octopuses. He finds a heap of scallop shells on the seafloor. It's next to a pile of rocks.

Looking For Clues

To Cosgrove, the rock pile and shell heap are clear signs. He knows that octopuses are tidy creatures. After a meal, they clean out their dens. An octopus must be nearby. Now, where's the den?

Cosgrove studies the rock pile. He finds a small opening. It looks like the mouth of an octopus den. He aims a flashlight into the opening. Two bright eyes shine in the light. The octopus is at home. Cosgrove waits and waits for it to come out. The octopus stays inside its den.

This day octopus dives deep to avoid a diver.

A Head Above the Rest

Hiding in its den helps the octopus feel safe. An octopus wants to be a predator, never prey.

Octopuses belong to a group of animals called **cephalopods.** Cephalopod means "head-foot." An octopus looks like a big head with eight feet. The "feet" are really arms.

Rows of round suckers cover each arm. The suckers have a strong grip. They also help the octopus feel, smell, and taste.

Held Captive

Many octopuses have tasted Cosgrove. Once while exploring, he slipped on a pile of rocks. He looked down. A small octopus had wrapped its arms around his legs.

The octopus tugged and tugged. It pulled him toward its den. When it saw the size of Cosgrove, it let go. Cosgrove didn't panic when the octopus pulled on him. "I know an octopus will give up long before I do!" he says.