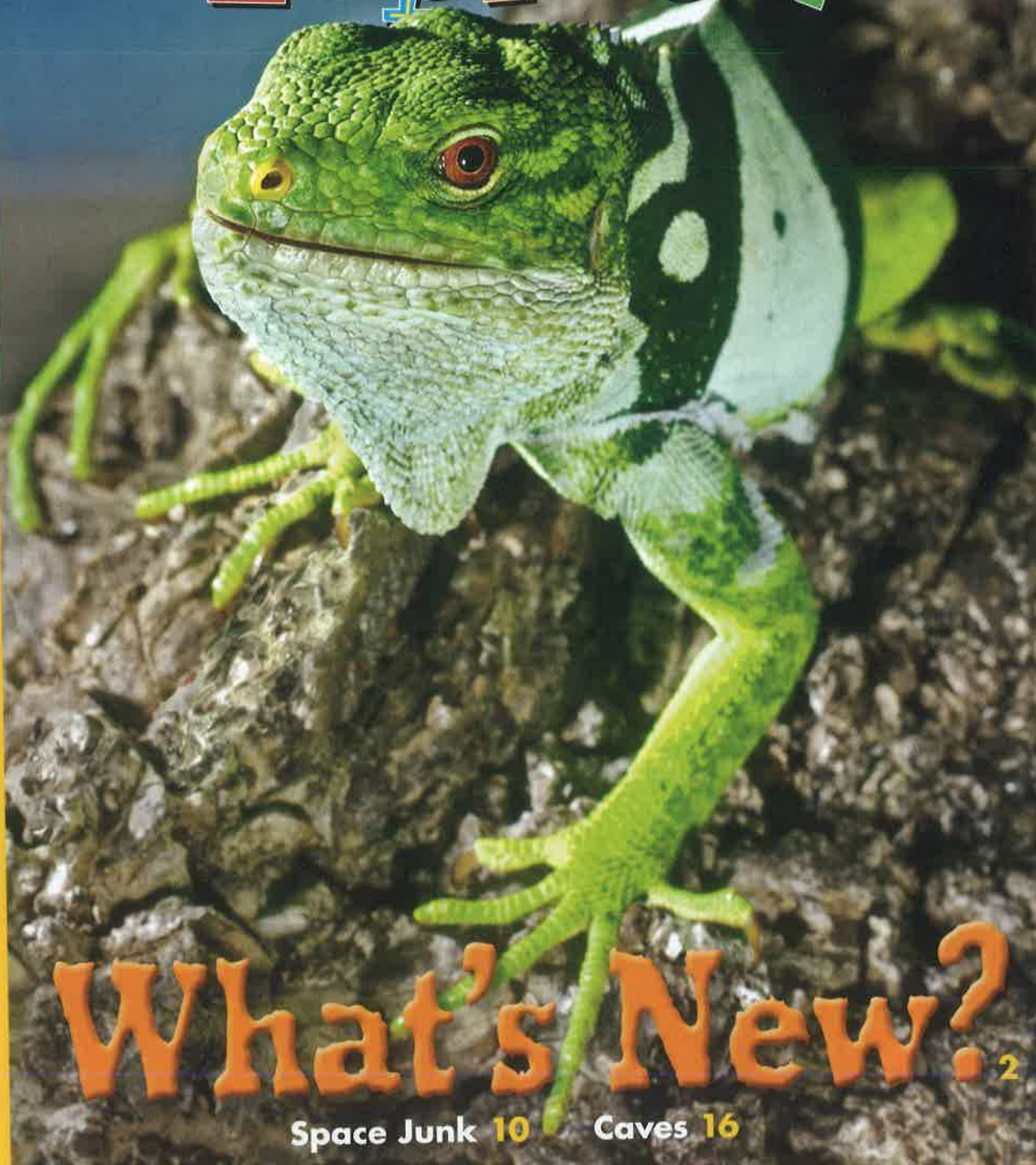


PIONEER EDITION

NGPIONEER.ORG

MAY 2010

# NATIONAL GEOGRAPHIC Explorer!



## What's New?

Space Junk 10 Caves 16

2





*This clouded leopard is a newly discovered species.*





**Reading Strategy:** After you read each part of the story, stop to think about it. Ask yourself: "What is the most important information I just read?"



# What's New?

By Marylou Tousignant

That's a question scientists ask as they crisscross our planet searching for "new" species.





Bosavi woolly rat

**T**he helicopter landed in a jungle in Papua New Guinea. It's near Australia. A team of explorers jumped out. They had come to find new animals.

For five weeks, they searched day and night. They set traps. One night, the team found a tripped trap. Inside, there was an animal with silver and gray fur. It was the size of a small dog. It wasn't a dog. It may be the largest rat ever discovered. Scientists had never seen one like it.

## Far-off Places

Scientists know of two million living species. If you think that's a lot, think again. They think there could be eight million more! So scientists search rain forests. They climb mountains. They hike in deserts. They dive into oceans. They even look in backyards.

Each year, scientists discover about 15,000 new species. The explorers who found the giant rat found nearly 40 new species. One was a grunting fish. Another was a fanged frog. Yikes!





*Pygmy chameleon*

© ALAN BAYLIS, RIGREW, JOARVIN, INITIATVE

© SHUTTERSTOCK (BACKGROUND)

## **Far-fetched Tales**

Sometimes villagers in far-away places find an animal before scientists do. So scientists listen to their stories. Some of these stories are hard to believe.

Villagers on one island told an amazing story about a “flying fox.” It had bright orange fur. The scientists didn’t believe it. Then one day, they caught a strange bat. It had orange fur with white stripes. It had a head like a fox. The “flying fox” was real after all. It was a new species.

## **A Hidden Forest**

Another team of explorers went to a country in Africa. The local people told them about Mount Mabu, a hidden forest. It wasn’t on any map. Yet satellite photos showed a patch of green. The team began a search.

No trails led there. Still, the explorers found it. They took 500 samples of plants and animals. They found birds, butterflies, and a small chameleon that looks like a branch. Are any of these species new? Scientists are still studying them.



## A Hostile Habitat

Scientists don't always get help from villagers. Often they search on their own. They even go to places where it seems like nothing could live.

In 2005, explorers discovered an odd animal. It lives near deep-sea vents in the Pacific Ocean. These vents squirt hot water and chemicals. Few animals can survive in this **habitat**.

This animal has a yellow-white shell. Fine "hairs" sprout from its claws. Scientists named it the Yeti crab. Bacteria live in its "fur." The bacteria may protect the crab from the chemicals. Scientists are trying to learn more.

## New or Not?

Looking for new species can be disappointing. One scientist thought he found a new kind of caterpillar. Then the cocoons hatched. He had seen these moths before. No. Not a new species.

In Costa Rica, scientists studied an odd spider. It didn't eat insects. It ate plants. This wasn't a new species. Yet its behavior was new to science.

Scientists can use DNA to help them see if an animal is "new." DNA is a tiny molecule inside each living thing. It holds a code that guides how a species looks and grows. Each species' DNA is unique.

PREMER/A. FRIED © 2004, COURTESY OF THE CENSUS OF MARINE LIFE

*Yeti crab*





## Naming Names

Scientists **classify** all living things into groups. The biggest groups are plant and animal. The smallest group is species.

Every species is given a **common name**. This name can be fun. For example, a new species of iguana in Fiji is called *bulabula*. That's Fijian for "hello, hello."

Each species also gets a **scientific name**. This name helps describe it. The Yeti crab's scientific name is *Kiwa hirsuta*. *Kiwa* is the name of an ancient sea god. *Hirsuta* means "hairy." So *Kiwa hirsuta* means hairy god of the sea!

## Mistaken Identity

Sometimes, species are put in the wrong group. This happened to the clouded leopard. It lives on Borneo.

This leopard's spots are shaped like clouds. But its spots are smaller than other clouded leopards'. Its spots are darker, too. Its teeth are longer. Its legs are shorter. Its paws are wider. Scientist began to wonder. Was this leopard a separate species?

They tested the animal's DNA. The tests showed 40 differences between the Bornean clouded leopard and other clouded leopards. It was a different species! Each year, scientists find about 30 new species on Borneo.

*Bulabula iguana*







*Green pit viper*

## What's Happening?

Borneo is one place rich in new species. The Mekong River area in Asia is another.

Many interesting animals live there. You can see spiders as big as dinner plates. Look for hot-pink millipedes. Watch out for long green pit vipers that slither through the jungle vines. Find birds that eat frogs. E-e-ew!

Between 1997 and 2007, scientists found more than 1,000 new plants and animals in this area. Now that's what we call **biodiversity!**

## Fitting In

Biodiversity is all the plants and animals in an ecosystem. Each living thing in an ecosystem has a purpose. For example, a millipede eats dead plants and animals. It recycles them back into the soil. That makes the soil rich for plants.

What happens after scientists find a new species? They study how it fits into its ecosystem. Is it predator or prey? Maybe it's both. What does the species need to survive? Scientists want to know these facts.





"Strawberry" crab

## Protecting New Species

Scientists worry about new and unknown species. Some, like the strawberry crab, may die out shortly after being found. Others may die out even before they are found.

So scientists want to protect them. That's why many countries are setting up preserves. These are safe places where animals can live.

New species like the giant rat remind us how much of the world is left to explore—even in our own backyards and neighborhoods.

## WORDWISE

**biodiversity:** number and variety of organisms found within a specific area

**classify:** to group organisms

**common name:** informal name for a species

**DNA:** molecule that has a unique code that guides how a living thing lives and grows

**habitat:** place where a plant or animal normally lives and grows

**scientific name:** formal name for a species



**Reading Strategy:** As you read, imagine you are an astronaut. What would you think or do about space junk?

*This drawing shows what one artist thinks a collision in space looks like.*



ESA





# SPACE JUNK

Space around Earth is becoming a garbage dump. Will a lost tool or smashed satellite crash into the next space mission?

**By Jonathan McDowell**  
Astrophysicist, Harvard-Smithsonian Center for Astrophysics



**E**verything seemed normal in space. Astronauts were working on a space station. Suddenly, Mission Control ordered them to leave the station. They rushed to the escape pod. Inside the pod, they waited for further orders. What was the big emergency?

A small piece of space junk was speeding toward the space station at 28,000 kilometers (17,500 miles) per hour. The crew could be in danger! Ten minutes later, Mission Control sent an all-clear order. The station and crew were safe.

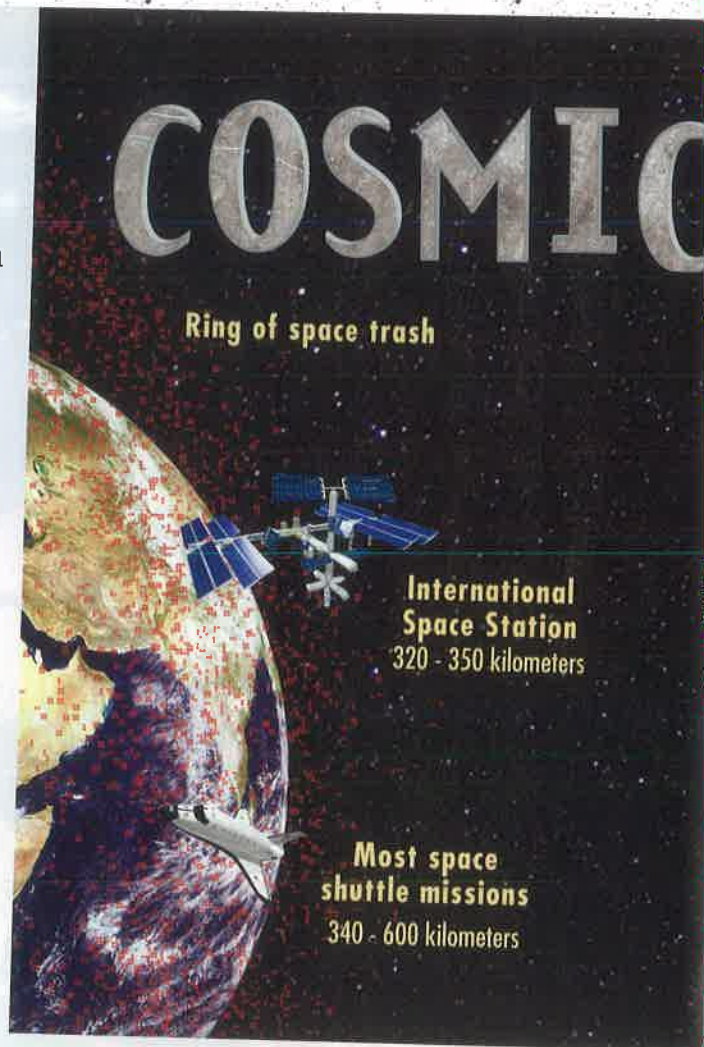
## Space Scraps

This close call happened on March 12, 2009. It wasn't the first time it happened. It won't be the last.

There is a lot of trash in space. Each year more is added. This junk can cause a big problem.

It began when the first **artificial satellite** was launched in 1957. Since then, we have launched thousands of satellites. Many are still there. One in five still work. The rest are junk.

Some satellites are as big as a school bus. That's big enough to track. We know where they are.



## Space Waste

Burned-out satellites are dangerous. So are the rockets that took them into space. Parts of these rockets stay in space. Many still hold rocket fuel. That can explode, splintering the rocket into small pieces. That just makes more space junk.

The United States and the former Soviet Union tested weapons by shooting at old satellites. China did, too. One of China's missiles shattered a weather satellite. More than 2,800 pieces of new trash were created—the single worst case of space littering.



# CLUTTER

Most space junk forms a ring around our planet. Working satellites and explorers on manned missions have a tough time staying clear of it.

## Global Positioning System (GPS) satellites

20,200 kilometers



## Communication and television broadcast satellites

36,000 kilometers



Note: The objects shown in this diagram are not drawn to scale.

© CLARA/SHUTTERSTOCK (EARTH); © MICHAEL PANEBURO/SHUTTERSTOCK (INTERNATIONAL SPACE STATION); © SHAPFENDER/SHUTTERSTOCK (SPACE SHUTTLE); © FINCHUK ALEXY/SHUTTERSTOCK (GPS AND BROADCAST SATELLITES); © EKATERINA STARSHAYA/SHUTTERSTOCK (BACKGROUND)

## Leftover Litter

Space junk can make more space junk. Last year, two satellites collided. More than 1,600 pieces, large and small, became space junk.

There are other kinds of space trash, too. Astronauts drop tools. They lose screws and drop gloves. Even chipped paint can become space junk. So can regular trash that's tossed from space stations. About 300,000 pieces larger than a corn flake now litter space. All this trash threatens new missions. It makes space more dangerous for explorers.



Butterflies dance around part of a Russian rocket that crashed back to Earth.



## Small Scraps, Big Damage

All this trash can cause problems.

Litter that's **orbiting** Earth can travel at 7.7 kilometers (about 5 miles) per second. That's fast! No wonder space junk can crack windows, chip heat shields, and rip solar panels.

Sometimes space junk falls to Earth. **Friction** with particles in Earth's **atmosphere** causes most junk to burn up. Really big pieces slam into the ground. Some splash into oceans.

That's why scientists track space junk. They use radar and telescopes. These tools can track objects larger than a grapefruit. Millions of pieces are much smaller than this. These small pieces can do big damage. Yet there is no way to track them.

## Shields Up

How can we make less space trash? First, we make tools harder to lose. For example, lens caps attached to cameras stay put. We use up leftover rocket fuel. A rocket that uses all its fuel can't blow up.

Finally, we protect astronauts and spacecraft with shields. The layers of an astronaut's spacesuit can prevent damage from small pieces of trash.

## Collecting Trash in Space

Scientists are thinking of other ways to clean up space. One way is to shoot lasers at space trash. The lasers would push the litter farther away. The only problem is Earth's **gravity** would eventually pull it back. It would become a problem again later.

Here's another way. Make spacecrafts with giant nets. The nets would catch the litter. Then the litter could be dumped into Earth's atmosphere. The litter would burn up.

Scientists still need to find other solutions. No doubt they will. They already know how to explore space. Let's hope they can clean it up, too. Space must be kept safe!

## WORDWISE

**artificial satellite:** spacecraft launched by a rocket that then goes around a planet or moon

**friction:** force that creates heat when two objects move against each other

**gravity:** force that causes objects to move toward the center of Earth

**orbit:** to move around a star, planet, or other object in space

**atmosphere:** layers of air surrounding Earth



# LOST IN SPACE

Astronaut **Edward White's lost glove** sped around Earth at **28,000** kilometers per hour before **burning up**.



A \$100,000 **tool bag** was **lost** during repairs to the **International Space Station**. People could see it from the ground using a **telescope**.



The 1958 **Vanguard I** satellite remains in orbit as the **oldest** piece of **space trash**.







# RAW

## Deep Into Darkness

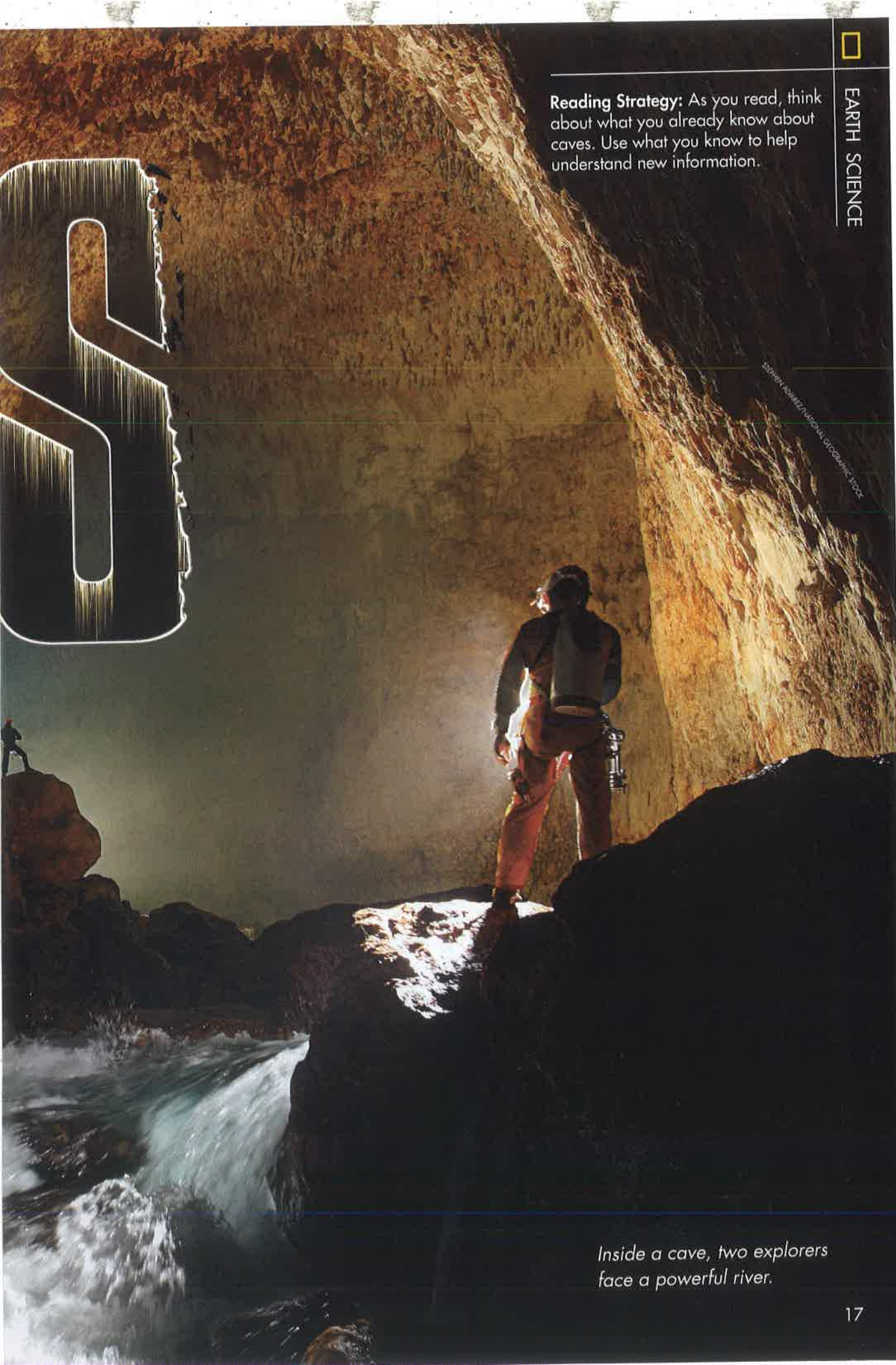
By Beth Geiger

Journey below Earth's surface  
into a world of shadows, twisting  
tunnels, and raging rivers.





**Reading Strategy:** As you read, think about what you already know about caves. Use what you know to help understand new information.



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*Inside a cave, two explorers face a powerful river.*