

PIONEER EDITION

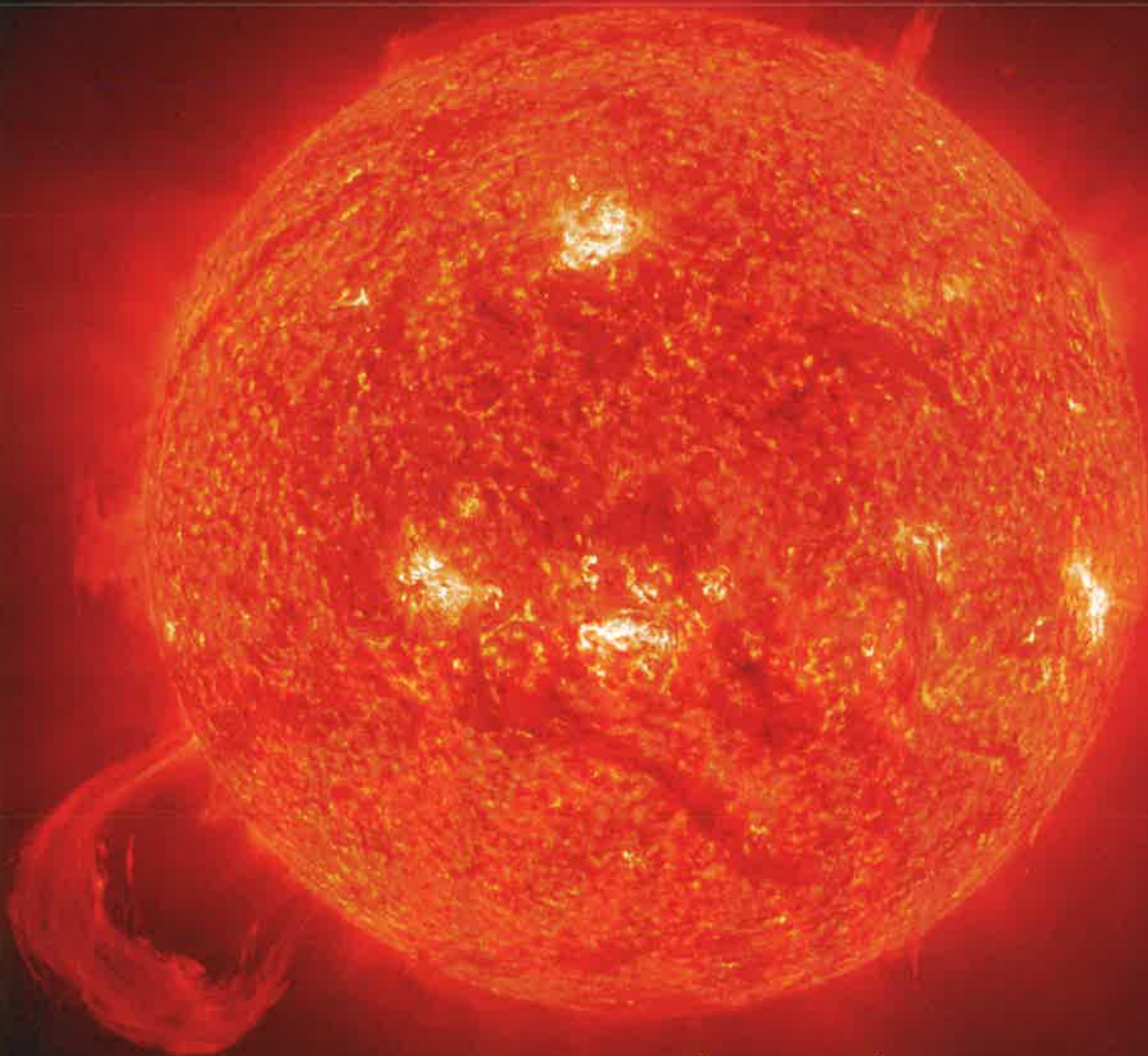
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NATIONAL GEOGRAPHIC

# Explorer



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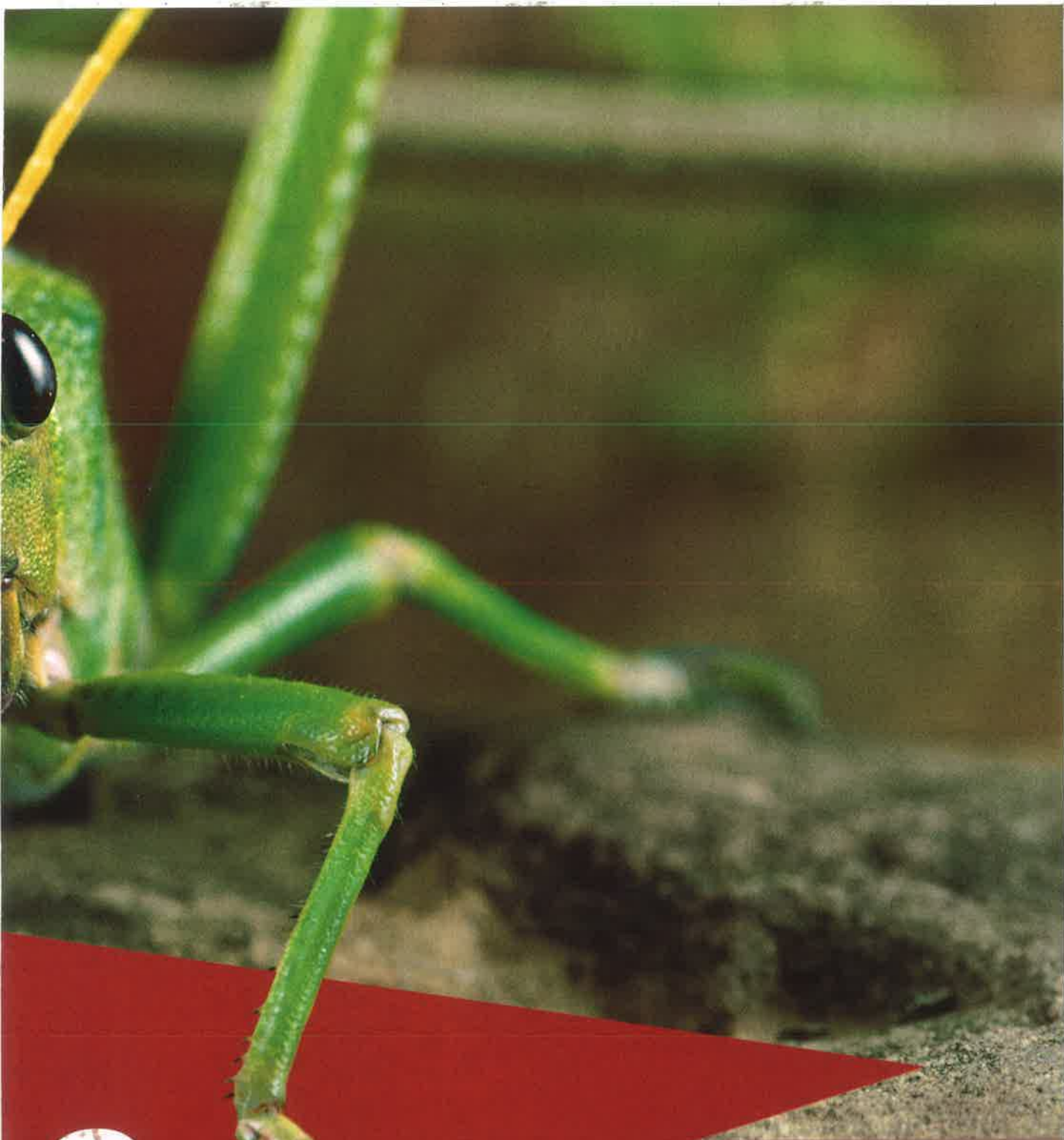
## Life Science

### COMPREHENSION STRATEGY:

Before you read, predict what each section is about.



# INSECT OLYMPIC



es

*On your mark. Get set. Go!*

*The Insect Olympics are about to begin.*

***By Marylou Tousignant***





That's the motto of this summer's Olympic Games. It's also a goal for insects. Predators chase insects. To survive, insects must hop higher than their predators. Or they must fly faster or be stronger.

Let's find out just how tough insects are. We'll have a contest. The contest will be between insects and other animals. We'll put each pair to the test. Welcome to the Insect Olympics. Let the games begin!





# Fastest

A cheetah is fast. It can run about 20 times the length of its body in a second. That'd be hard to beat in a race. Yet imagine that the cheetah is the same size as a tiger beetle. A tiger beetle is fast, too. Which one is faster?

Both animals are at the starting line. Ready. Set. Go! They're off!

Look at that beetle go. Incredible! It moves 170 times the length of its body in one second. *Zoom.* The beetle passes the cheetah and wins the race.



tiger beetle

cheetah





peregrine falcon



## ***Zippiest***

What's up next? It's a dragonfly and a falcon. Which one do you think is the fastest flier?

The peregrine falcon is known for its speed. Yet the green darner dragonfly is one of the fastest flying insects on the planet. This could be a tough matchup.

And there they go! The falcon dives. *Whoosh!* The dragonfly dives. Wait! It stops. It flies forward. It flies backward. It hovers. The falcon keeps diving. It's four times faster than the insect. In this race, the bird wins.

green darner





# Strongest

Next let's see what's stronger, a gorilla or a dung beetle. The gorilla can lift 10 times its weight. Its strong arms can uproot trees. It can break thick branches. The gorilla must be stronger than the beetle, right? The beetle is so small.

Don't be too sure. The mighty dung beetle is strong, too. It can lift 1,141 times its weight. It uses this super strength to fight other beetles.

The gorilla may be bigger, but it's not stronger. In this matchup, the beetle wins.



horned dung beetle



western lowland gorilla

# Loudest

That sound you hear is a howler monkey. Its howl can be heard 5 kilometers (3 miles) through the rain forest. It may be loud, but so is the male cicada.

The cicada makes a loud clicking sound. This sound is so loud, it could hurt your ears.

The monkey's sound travels farther than the cicada's. Yet its sound isn't as intense. So this contest is a tie. The cicada wins on volume. The monkey wins on distance.

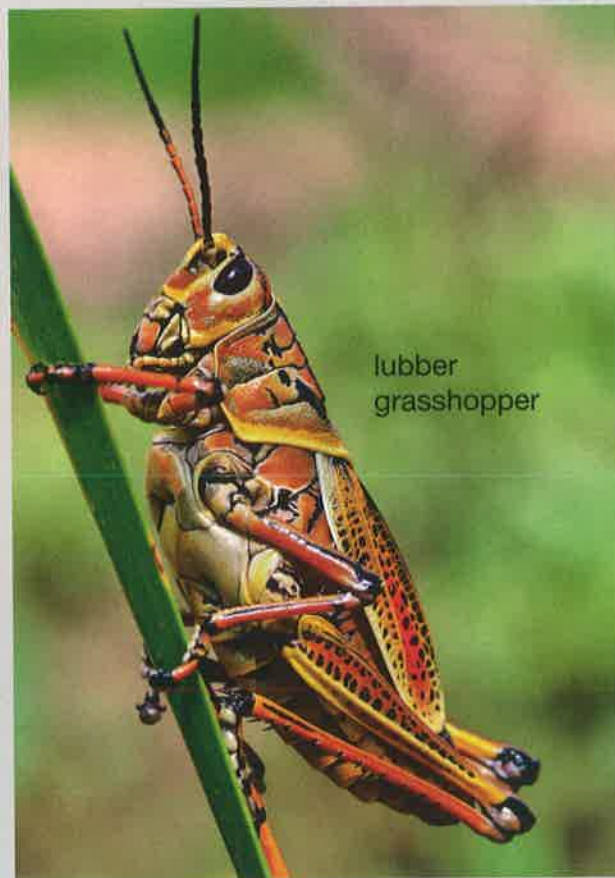
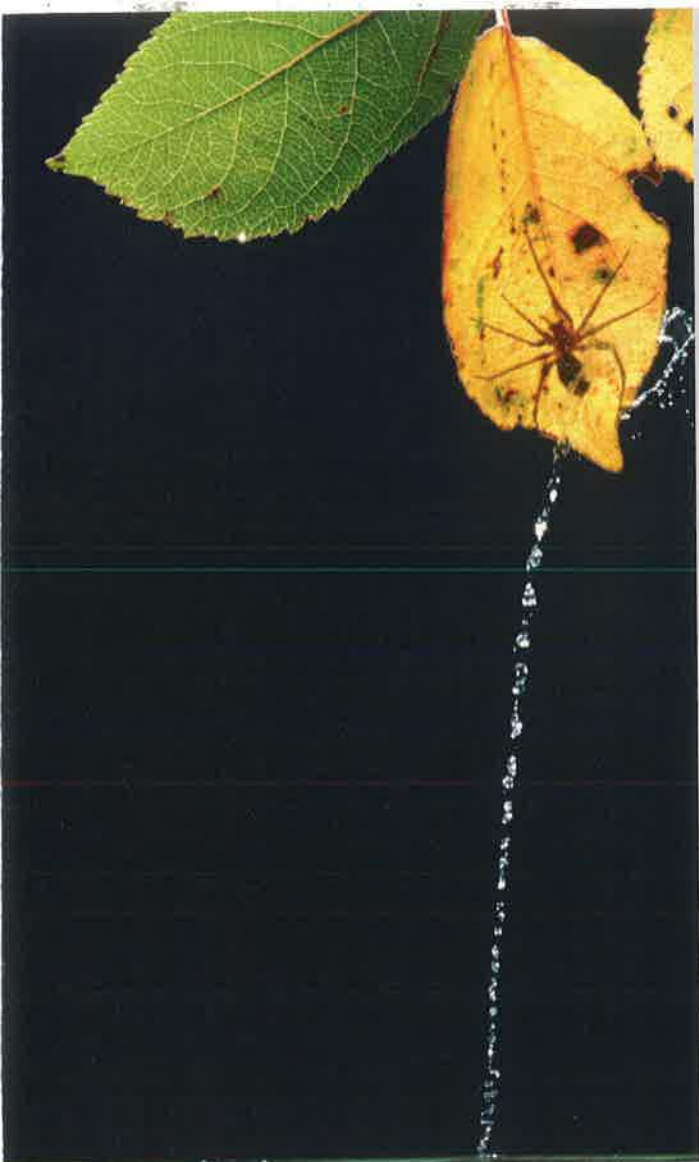
golden drummer cicada



red howler monkey







lubber  
grasshopper

## ***Wettest?***

The next contest is between two champion spitters. The grasshopper is one. It spits a brown liquid at predators. The archerfish is the other. It shoots a spray of water at its prey. The spray knocks insects out of the air. It even zaps grasshoppers.

The contest begins. Predator and prey spit at each other. Spit. Spit. Spit. Stop! This matchup is going nowhere!

That was a messy contest, but the Insect Olympics were great. They showed us that insects are among the strongest, fastest, and loudest critters on Earth.



archerfish

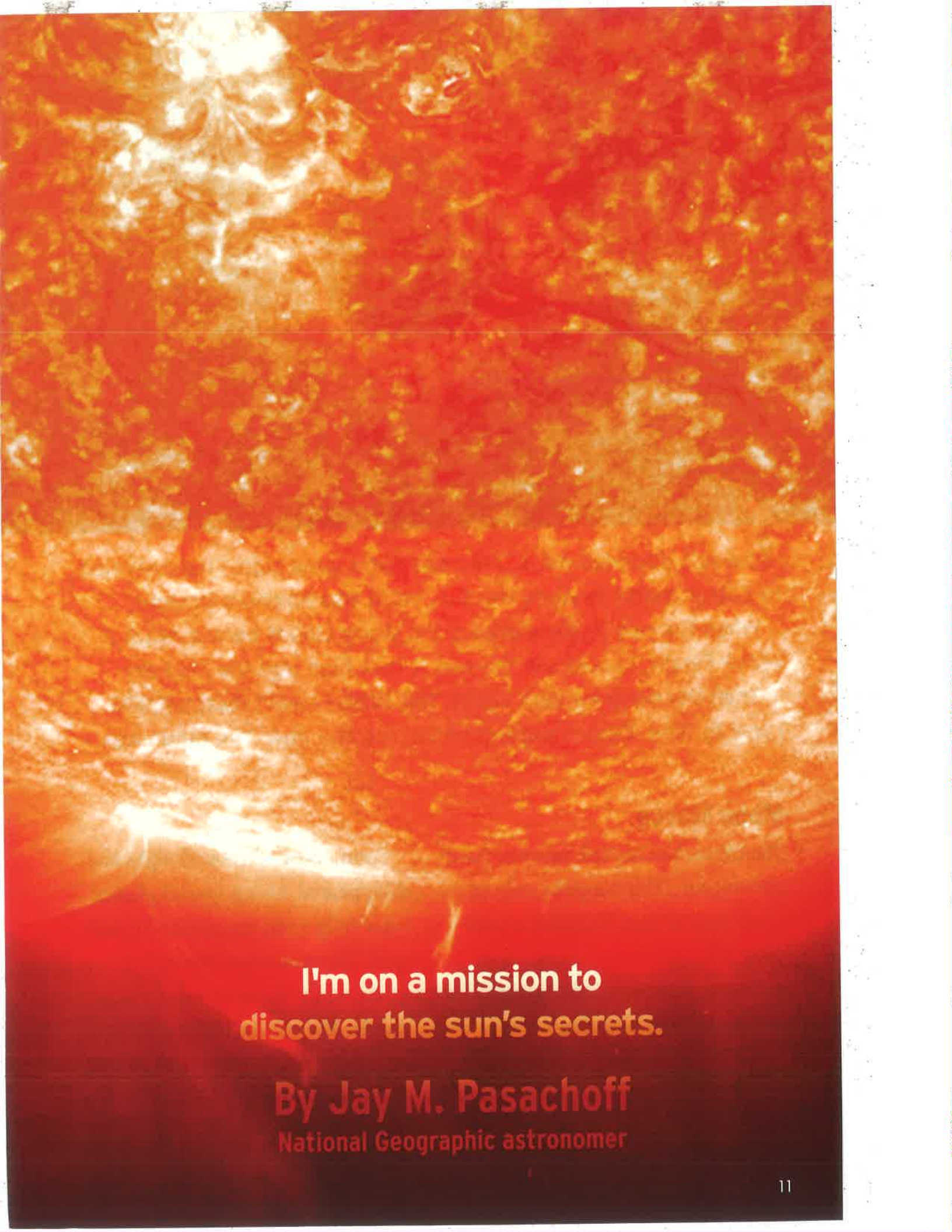
## Space Science

### COMPREHENSION STRATEGY:

As you read, look for causes and their effects.

# Sun Catcher





**I'm on a mission to  
discover the sun's secrets.**

**By Jay M. Pasachoff**  
National Geographic astronomer



a total solar eclipse

**T**he rain pounded down. This was not a good sign. I had traveled to Easter Island to study the sun. Yet it was nowhere in sight.

When the rain finally stopped, the storm clouds parted. What a relief! Finally, I could see the sun. It rose high into the blue sky.

Then the sky grew dark again. This time, I wasn't disappointed. I was thrilled. Clouds weren't hiding the sun now. The moon was.

## **Moon Moves**

The moon had moved between Earth and the sun. This happens only once every year or two. It's called a total solar eclipse.

During an eclipse, the moon crosses in front of the sun. The moon's shadow falls on a tiny bit of Earth. You have to be in that tiny bit to see the eclipse.

Soon, most of the sun's light had disappeared. Using special glasses, I saw only a red ring around a dark spot. The moon had covered the sun.

Now only the sun's corona was visible. The corona is the sun's outer atmosphere. We usually can't see it. Yet with the moon blocking the sun, I could see its silvery threads of light.



## Solar System

What an amazing sight! Moments like this are important to astronomers. They give us information. They bring us closer to solving the sun's secrets.

We already know a lot about the sun. We know that it is the center of our solar system. Our **planet** and seven others go around it.

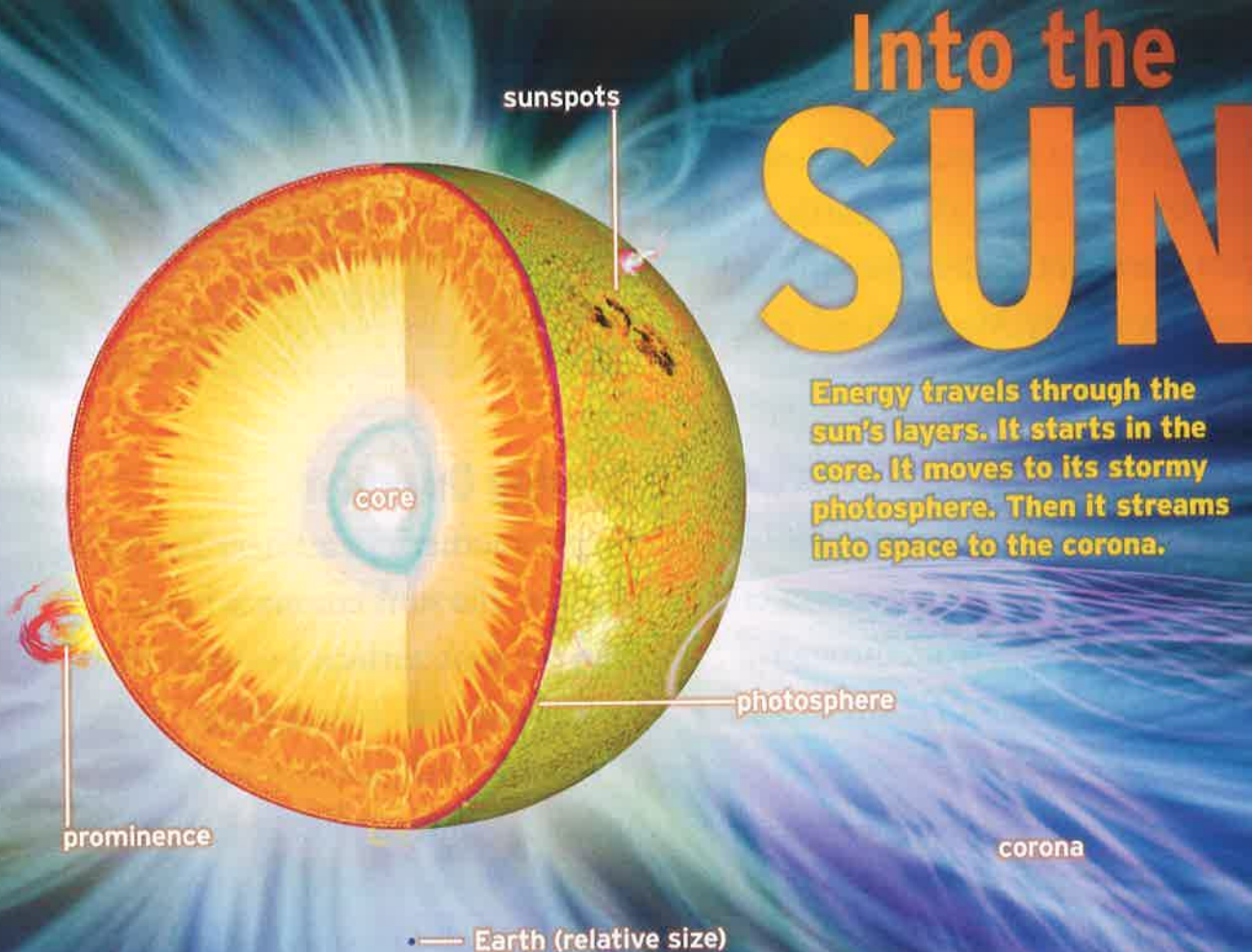
The sun is Earth's closest **star**. It's 150 million kilometers (93 million miles) away. It gives off lots of energy.

## Boil and Pop

The sun's energy comes from its core. The core is mostly made up of gases. These gases are a star's fuel.

Stars like our sun change this fuel into energy. We see and feel this energy as heat and light.

The gases on the sun boil and pop. Jets of gas explode. At times, dark blotches dot the sun. These **sunspots** look calm. Yet under them, hurricanes of gases swirl.



## Seeing Spots

Sunspots can be several times the size of Earth. Some may last for hours. Others may last for months. They all follow a pattern called a **solar cycle**.

Most solar cycles last about 11 years. Sometimes the sun has no spots. At the peak of the cycle, dozens of sunspots may appear. The current cycle should reach its highest point in 2013. Then a new cycle will begin.

We should be seeing early signs of that next cycle. We aren't, though. It could mean the sun will be less stormy. That could affect Earth. In the past, Earth got colder when the sun was less stormy. Maybe there's a link between these events.

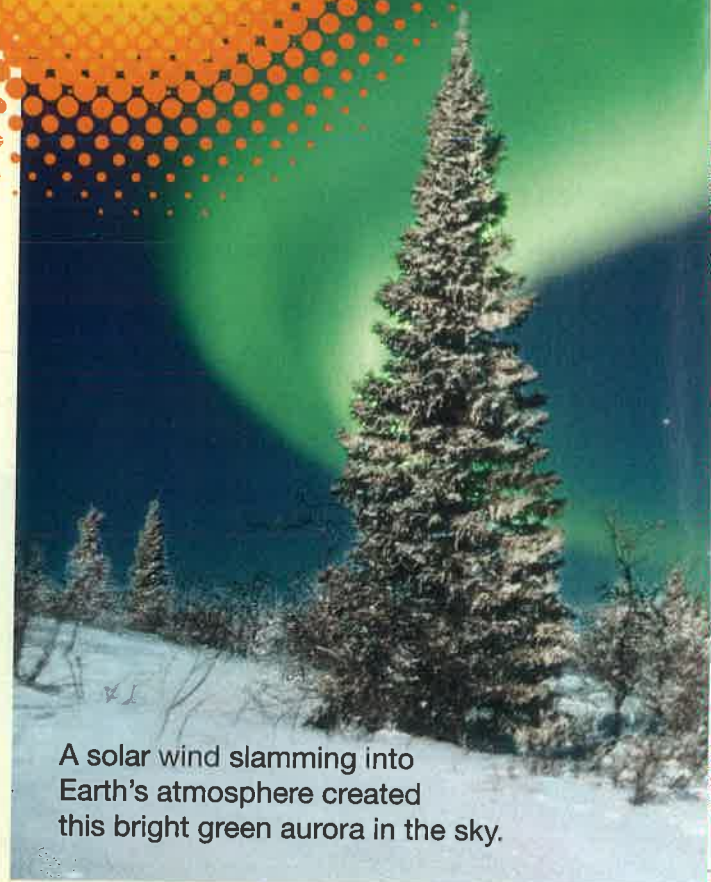
## Zapping Earth

Lots of sunspots also cause problems. If they bunch together, they can erupt. Then gas particles whip through space. These form **solar winds**. These solar winds can cause power outages. They can damage satellites, too.

Sometimes they mix with our atmosphere. Then the sky glows with colors. This is called an aurora.

## Hot Fact

Light from the sun's surface reaches Earth in just over **8 minutes**.



A solar wind slamming into Earth's atmosphere created this bright green aurora in the sky.

## Burning Question

There's another sun mystery I'm trying to solve. The sun's corona is hotter than the sun's surface. I wonder where the corona's heat comes from.

Watching eclipses may help me find out. While the sun is dark, I can see the corona. I can watch the loops of gas flying into space. Perhaps the loops create the extra energy.





## Chasing the Sun

I'll keep chasing eclipses until I find out. I've seen 54 solar eclipses so far. I've gathered lots of data. I need more. Maybe an eclipse will happen in the skies near you. If so, take a look.

Be careful, though. Looking at the sun can harm your eyes. The moon must cover it completely. Then you will safely see the power of our sun.

## Wordwise

**planet:** a large, nearly round space object that orbits a star and does not make its own light

**solar cycle:** the sun's 11-year weather cycle

**solar wind:** a stream of gas particles that flows out from the sun

**star:** a body of hot gases that makes its own energy, including heat and light

**sunspot:** a dark spot on the sun's surface that is cooler than other parts of the sun's surface



## Life Science

### COMPREHENSION STRATEGY:

As you read, think about what you already know about ocean habitats.

# Tide Pools







# of Tales

By Joe Levit



**Pounding waves** slam the rocky shore. Water splashes over the rocks and washes away. The waves are fueled by a giant storm.

A fat, orange sea star clings to one of the rocks. As each wave comes in, it wallops the sea star. As the wave goes out, it tugs on the sea star. Pushed then pulled, the sea star holds on. The waves can't rip it out to sea—this time.

As the day passes, the storm weakens. Slowly, the waves return to normal. They flow over the rocks and then back to the sea. Now the sea star lets go of the rock to follow the water. It can't survive out of the water for long.


## A Pocket of Pebbles

Staying alive in a **tide pool** can be tough. A tide pool is a small pocket of pebbles near the shore. Often the pool is filled with water.

Thousands of creatures live in tide pools. Some animals live in just one tide pool. Others move in and out. That's what the sea star does.

The sea star follows the **tides** to find food. Tides happen when sea levels rise or fall. Twice a day, the tide changes. When the sea rises, it is high tide. Waves cover the shore.

When sea levels drop, it is low tide. The waves pull back. Some water stays trapped in tide pools.



A sun star clings to the rocks of a tide pool.





Seaweed covers the rocks of this tide pool.