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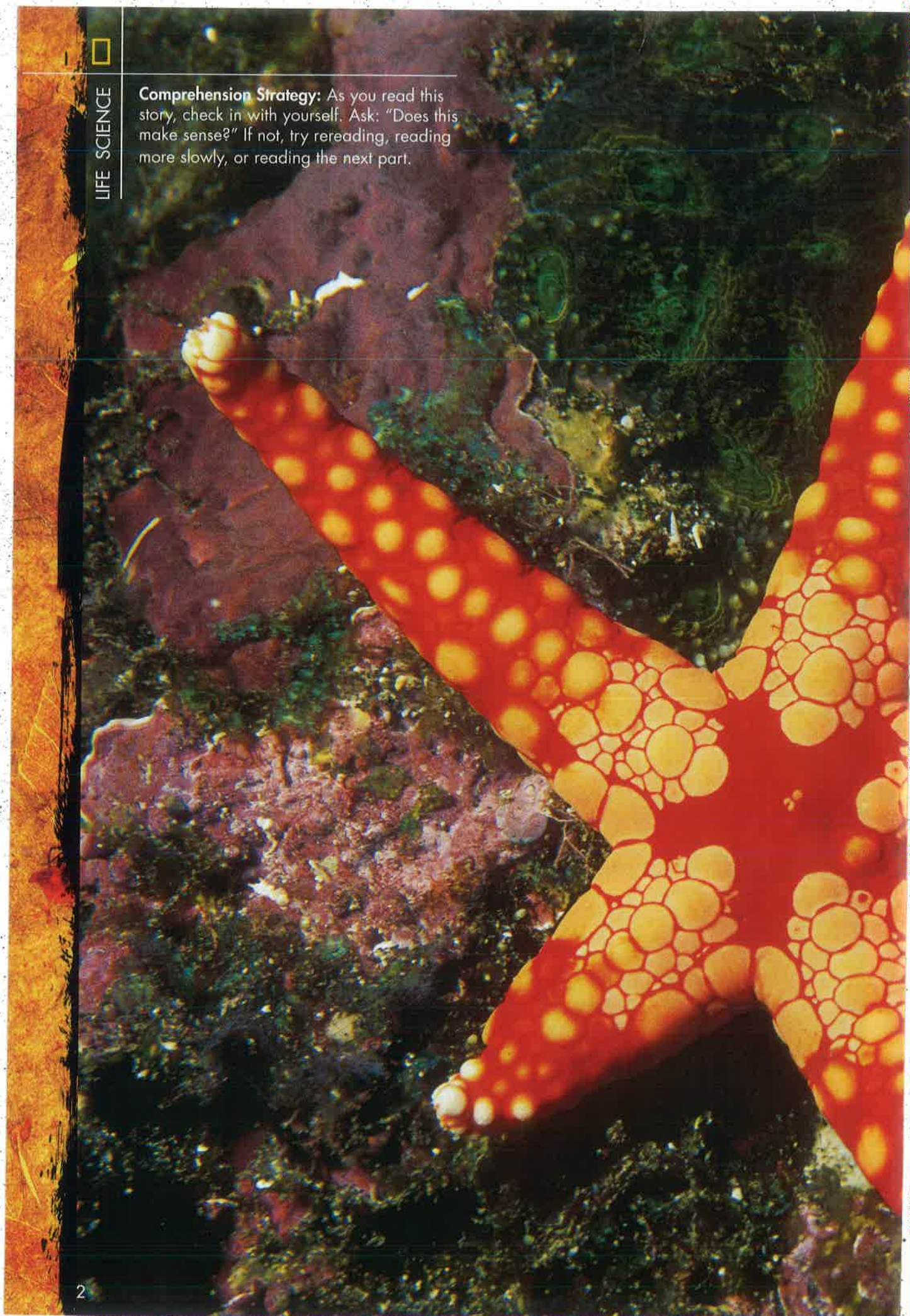
NATIONAL GEOGRAPHIC Explorer!

ARCTIC ALERT! 8

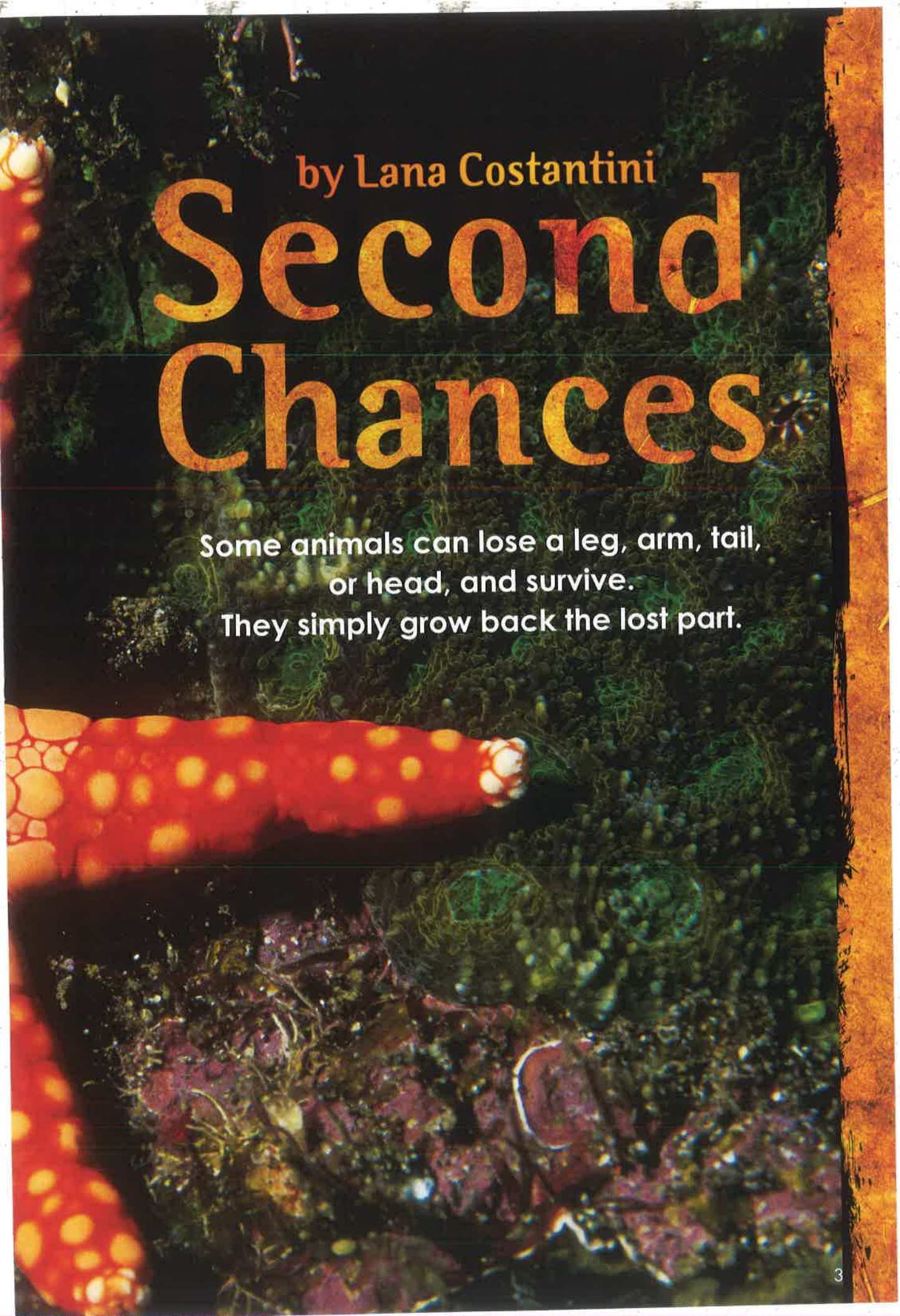
Comprehension Strategy: As you read this story, check in with yourself. Ask: "Does this make sense?" If not, try rereading, reading more slowly, or reading the next part.



by Lana Costantini

Second Chances

Some animals can lose a leg, arm, tail, or head, and survive. They simply grow back the lost part.



Hercules stood by the opening of a cave in a dark swamp. A terrible monster lived inside. Her name was Hydra. Hydra had a body like a huge snake with nine heads. Hercules had been sent to kill her.

As Hydra sprang from the cave, he raised his sword. He cut off one of her heads. Yet Hydra had a powerful trick. For every head he cut off, Hydra grew two more in its place! After a long fight, Hercules killed Hydra.

A sea star regrows part of its arm.

Smart Parts

The story of Hercules is an ancient myth. Yet this myth may be based on real life. Some animals really can grow back lost body parts. This is called **regeneration.**

Regeneration can repair wounds that might be deadly. It can help some animals defend themselves. It can help others find a mate. Regeneration can help an animal survive.

Repair Kit

Take a salamander, for example. It crawls out from under a leaf. *Wham!* A garter snake strikes it, biting off one of its legs. The salamander runs away on only three legs.

Don't worry. A new leg has already started to grow. It will take about a month. Skin, muscle, bone, and nerves grow. Salamanders also can regrow legs, tails, jaws, and even eyes.

A salamander regrows the tip of its tail.

Extreme Makeover

Other animals can regrow parts, too. If a sea star loses an arm, a new one sprouts. The flatworm can regrow its whole body—even its head!

Invertebrates like these can regrow parts better than other animals. They are animals without backbones. The boneless sea squirt is another good example. It can regrow its entire body from a single blood vessel.

Just Dropping Off

Some animals lose body parts on purpose. This is called **autonomy.** They do it to escape predators. To protect itself, a lizard can drop its tail. An octopus can break off its wriggly arms. A sea cucumber can spray its own guts at an attacker. Losing their insides would kill most creatures. The sea cucumber doesn't have that problem. It just grows new ones.

Colorful sea squirts can regenerate their entire bodies from just one blood vessel.

Bigger, Better

Some animals grow new body parts every year. It's part of their natural cycle. Male deer shed their antlers in winter. In spring, new bone, nerves, and blood vessels grow into bigger antlers. Large antlers help deer compete for mates.

In the fall, male puffins shed the outside of their brightly-colored beaks. Their beaks underneath are small and dull-looking. The next year, the colorful part grows back. A brighter beak attracts mates.

Life's Building Blocks

It's easy to see why being able to grow new body parts can help animals. Learning how animals do this has puzzled scientists.

Scientists are trying to solve that puzzle. They study these animals' **cells.** Every living thing is made up of one or more cells. They grow into all the body's parts. Each cell gets a job. A cell can form skin, or muscle, or nerves, or bones. A cell keeps its job forever. A skin cell is always a skin cell. Or so scientists once thought.

Each fall, the male puffin sheds the outer layer of its beak. Within a year, the beak will grow back.

Going Back in Time

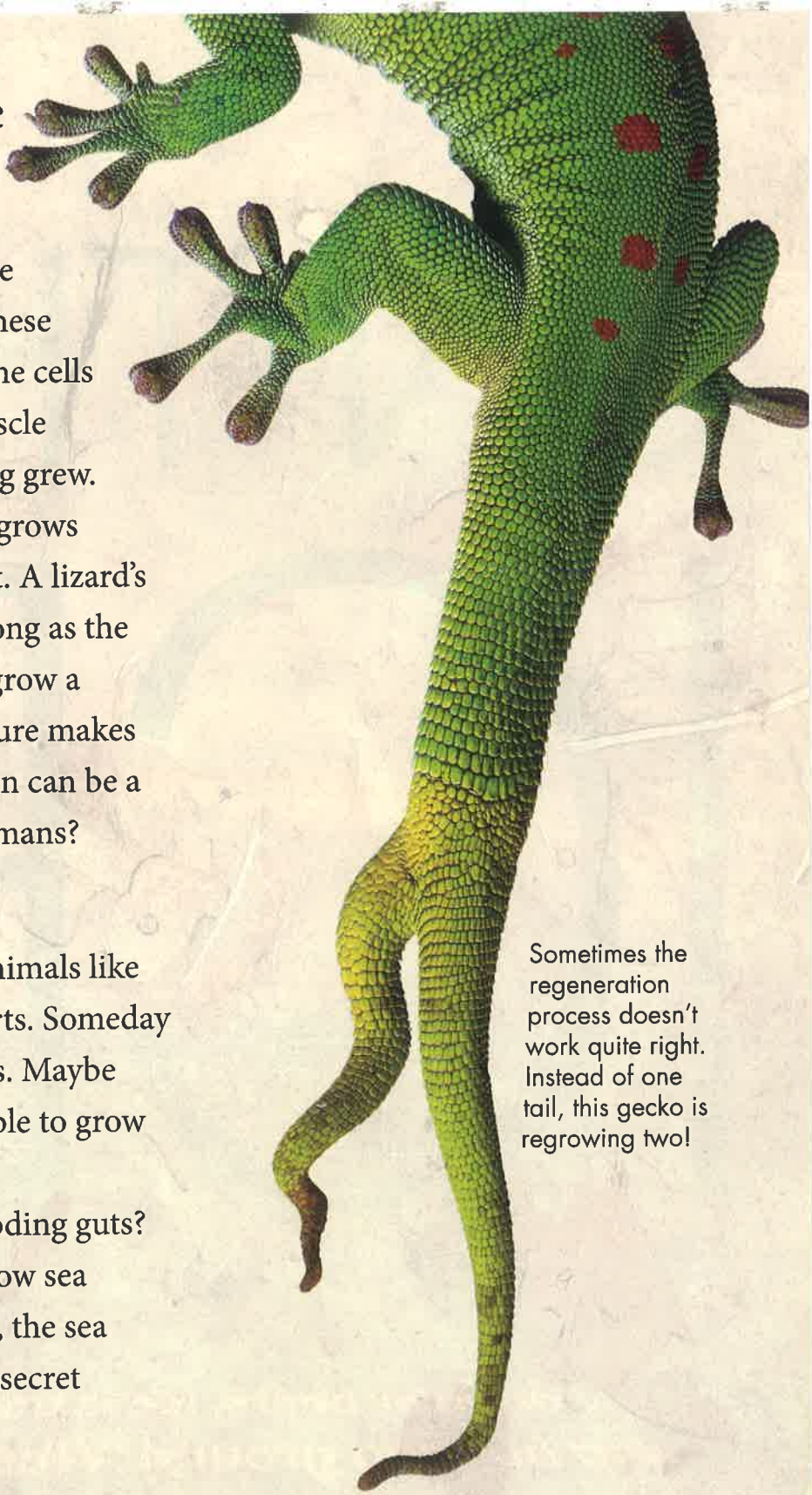
Then scientists studied an injured salamander. They watched cells near the animal's wound change. These cells could do any job. Some cells built bone. Some built muscle and so on. A whole new leg grew.

Even when a body part grows back, it isn't always perfect. A lizard's new tail may not be as strong as the old one. An insect might grow a new leg—on its head! Nature makes mistakes. Still, regeneration can be a lifesaver. Could it help humans?

Life Lessons

We can learn a lot from animals like salamanders and sea squirts. Someday we may know their secrets. Maybe one day humans will be able to grow new arms and legs, too.

What about those exploding guts? Scientists want to know how sea cucumbers do that. So far, the sea cucumber is keeping that secret to itself.



Sometimes the regeneration process doesn't work quite right. Instead of one tail, this gecko is regrowing two!

Wordwise

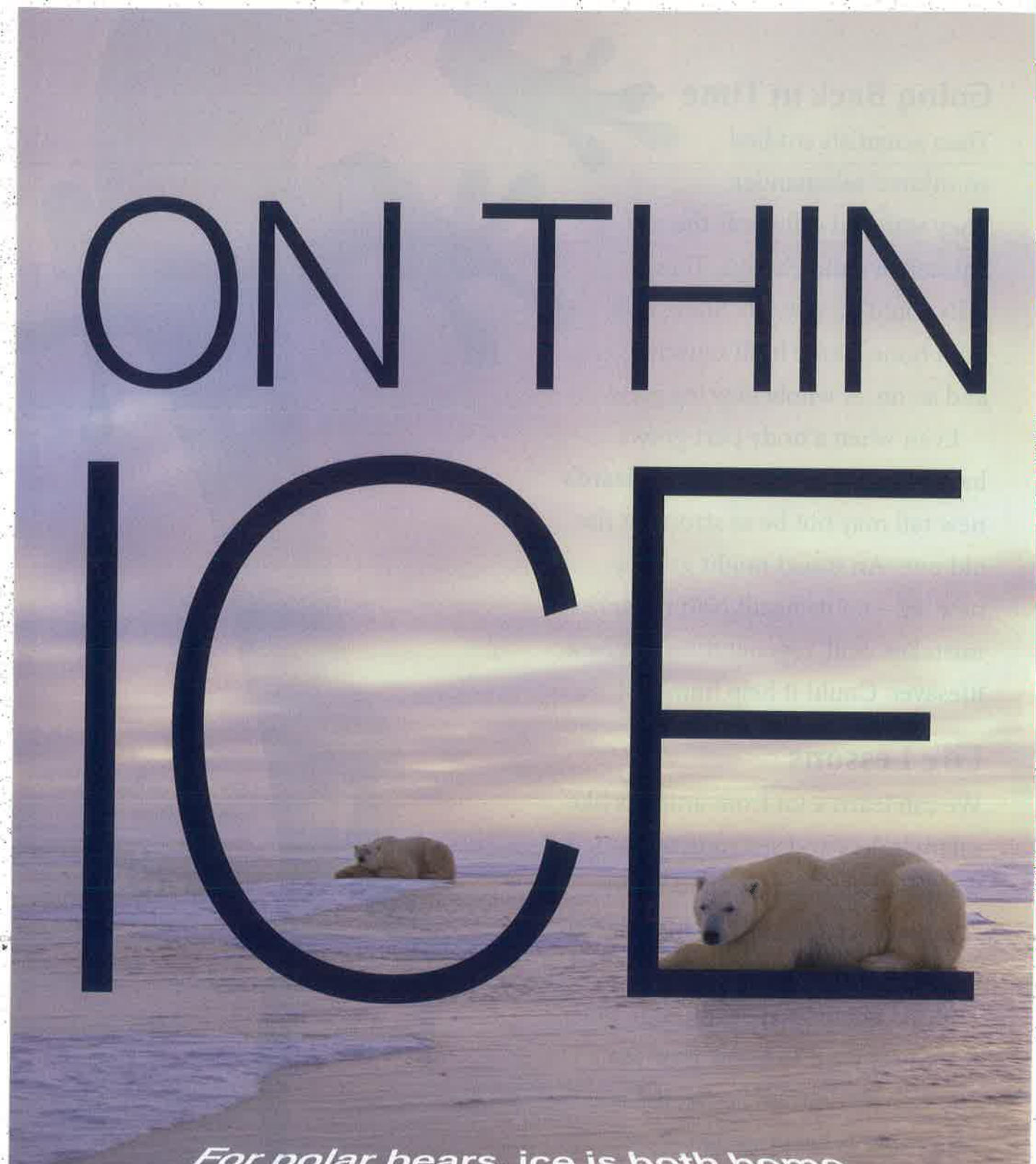
autonomy: ability to let go of a body part on purpose

cell: smallest living part of a plant or animal

invertebrate: animal without a backbone

regeneration: ability to repair or regrow injured or lost body parts

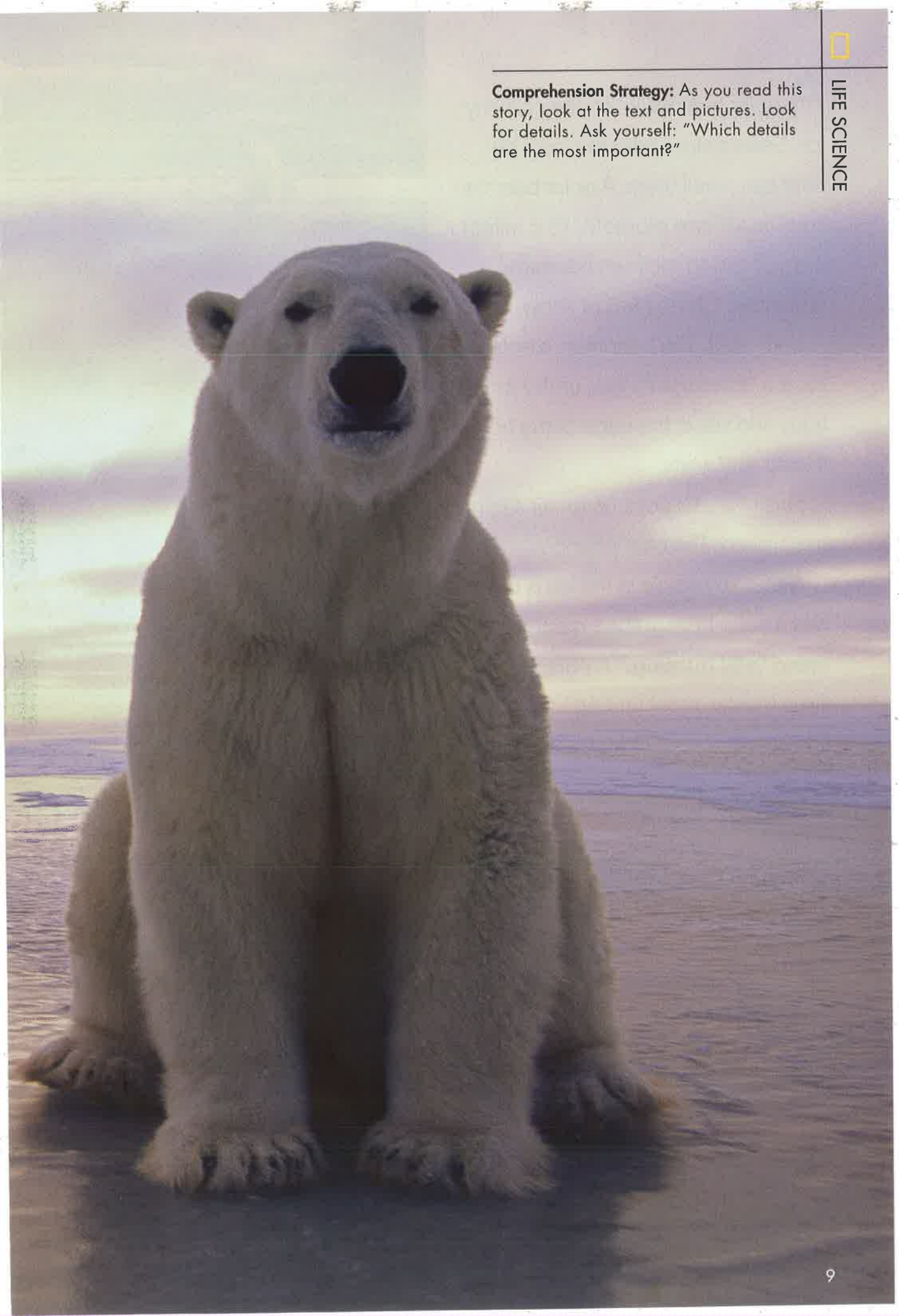
ON THIN ICE



For polar bears, ice is both home *and hunting* ground. What happens *when that* ice begins to melt?

by Johnna Rizzo

Comprehension Strategy: As you read this story, look at the text and pictures. Look for details. Ask yourself: "Which details are the most important?"



A polar bear walks on the crunchy ice. Seals swim under the ice. The bear can smell them. A polar bear can smell seals one kilometer (0.6 miles) away. It can smell them beneath one meter (three feet) of snow.

Sniff, sniff. The bear finds a hole in the ice. It tucks in its legs under its big body and sits at the edge of the hole. It waits and waits.

Finally, a seal pops up for air. Dinner has arrived. The bear pounces.

Waiting by a hole in the ice is one way a polar bear grabs a meal. It's called **"still hunting."** A polar bear's life is mostly about finding food and eating.

A polar bear pokes through ice in the Arctic.

This polar bear is "still hunting."

Putting on the Pounds

For a polar bear, fat is where it's at. A polar bear usually eats every four or five days. Bears need to build up layers of **blubber,** or fat.

Blubber helps bears stay warm and survive when it is hard to find food. Polar bears can get pretty big. Female bears can weigh up to 300 kilograms (660 pounds). Males usually weigh twice that.

Waiting for the Ice

When ice first forms over the sea, it is very thin. As the weather gets colder, the ice gets thicker. Ice chunks join together to make larger blocks.

As winter comes, the blocks freeze together. This forms **pack ice.** Pack ice is thick and strong. It can support a lot of weight. Heavy polar bears can safely walk on it.

Many polar bears live in the southern part of the Arctic. Here, the pack ice melts in the summer. So the bears must move onto land. Land is not the best **habitat** for polar bears. Food is harder to find. It's also easier for the bears to hunt on the ice.

Bear Territory

Polar Bear Range

The Ice Kingdom

Lots of blubber helps polar bears survive. They live in the Arctic. The Arctic is the area around Earth's North Pole. Winter temperatures can fall to −40° Celsius (−40° Fahrenheit).

It is so cold there, the ocean water freezes. It turns to ice. Bears and other animals can walk on it. To understand polar bears, you need to understand ice.

Too Hot to Handle?

Ice is key to a polar bear's survival. Polar bears must move from ice to land, then back to ice. They can travel up to 4,800 kilometers (3,000 miles) a year. Yet what happens to the bears if the ice changes?

The Arctic is changing. It is heating up. Pack ice is melting earlier. Early melting is not good for bears. It means bears must go onto land sooner. Bears use more energy when they hunt on land. Just 12 seconds of running can use more energy than the bear would get from eating a seal.

Dangerous Ice

Polar bears are built to swim. Their powerful, webbed paws pull them through the water. They can swim up to ten kilometers (6.2 miles) per hour. They can dive up to six meters (20 feet).

Swimming long distances comes naturally for polar bears. They can swim 100 kilometers (60 miles) at a time to get to their hunting ground.

Melting ice is making it harder for bears to swim. When the pack ice melts, the gap between ice and land grows. This makes rougher waves. Rough waves can tire bears.

A leaping polar bear barely makes it across the gap in the ice in these photos.

A polar bear uses its large, webbed paws to swim.

Watching and Waiting

These are difficult times for polar bears. The Arctic is getting warmer. Pack ice is breaking up earlier. The bears' season on land is lasting longer. Finding food is getting harder.

Polar bears need to eat a lot. They need to store extra energy. Without it, they could starve during the lean months on land. To survive, the bears are moving into areas closer to humans. There, they find a new source of food—trash. Eating trash is not healthy for bears. It doesn't give them the fat they need to survive.

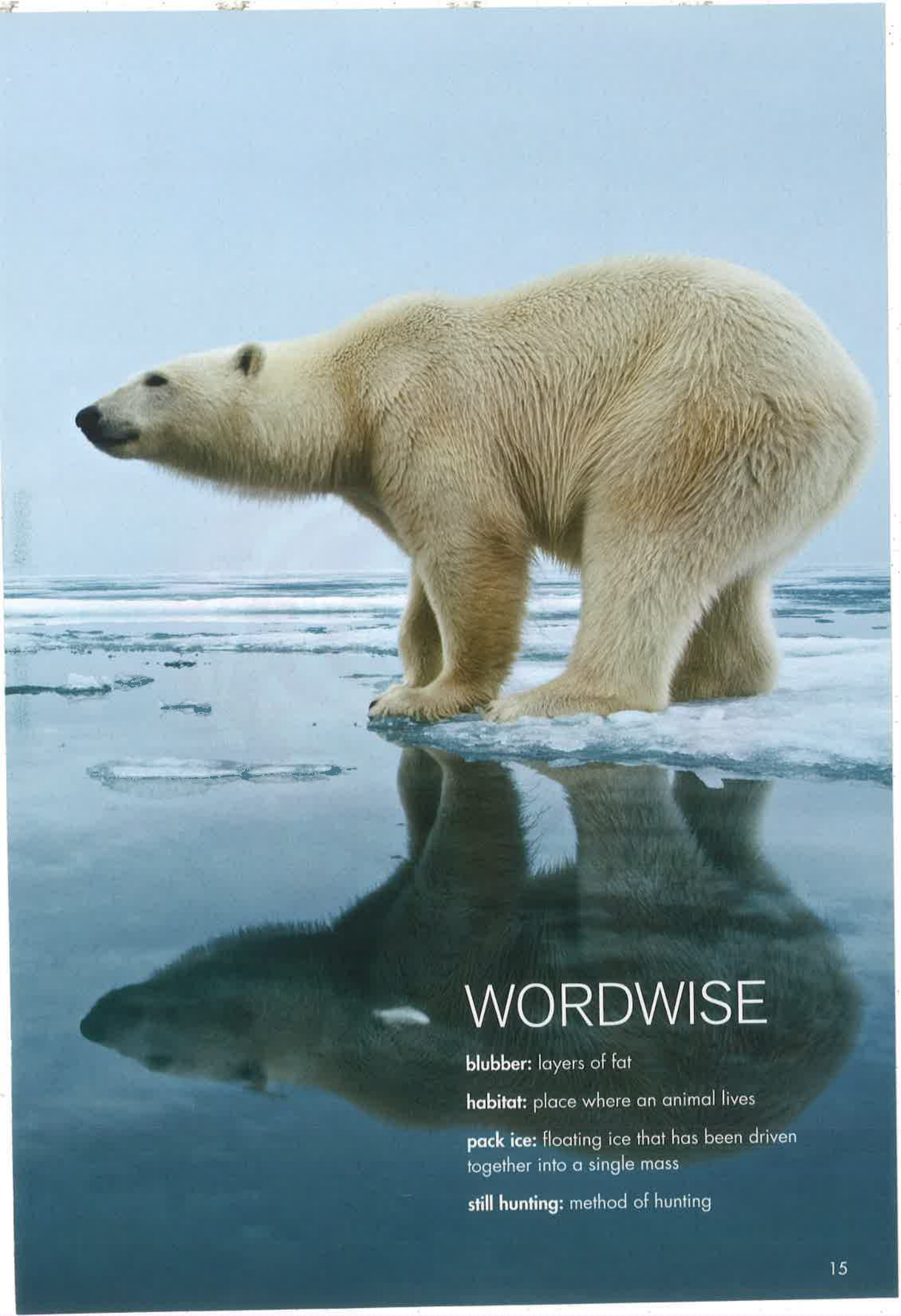
Searching for Survival

Getting closer to people also is not good for polar bears. Humans are the only predators bears need to fear.

What will happen to polar bears? We don't know. Polar bears have adapted before. Long ago, they probably lived in warmer regions. Gradually, they moved north. They adapted. Their eating habits changed. They survived.

Scientists continue to study polar bears. Maybe the polar bears will adapt again. Maybe they will be able to live in a warmer world.

A polar bear cub clings to its mother.



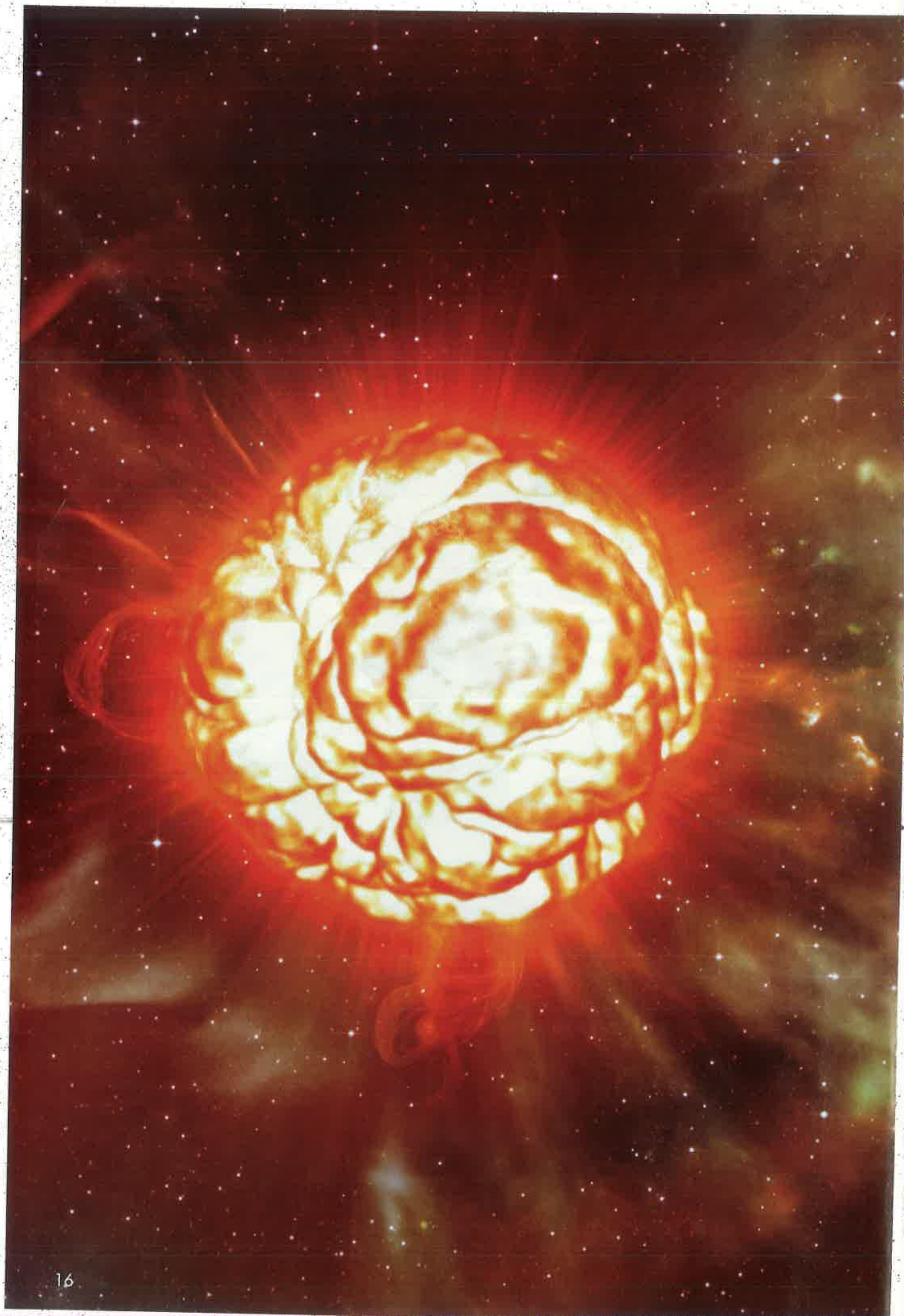
WORDWISE

blubber: layers of fat

habitat: place where an animal lives

pack ice: floating ice that has been driven together into a single mass

still hunting: method of hunting



Comprehension Strategy: As you read, look for words that describe how things look and feel. Use the words to create pictures in your mind.

SPACE QUEST

Follow an astronaut on his journey through the solar system.

by Don Thomas
NASA Astronaut

I had been waiting for this moment since I was six years old. I was strapped in my seat on the space shuttle *Columbia*. It was minutes before takeoff. Suddenly, the rocket engines roared to life.

We lifted off. *Columbia* shot upward. "Yahoo!" I yelled. "Let's go!" My first trip into space had begun.

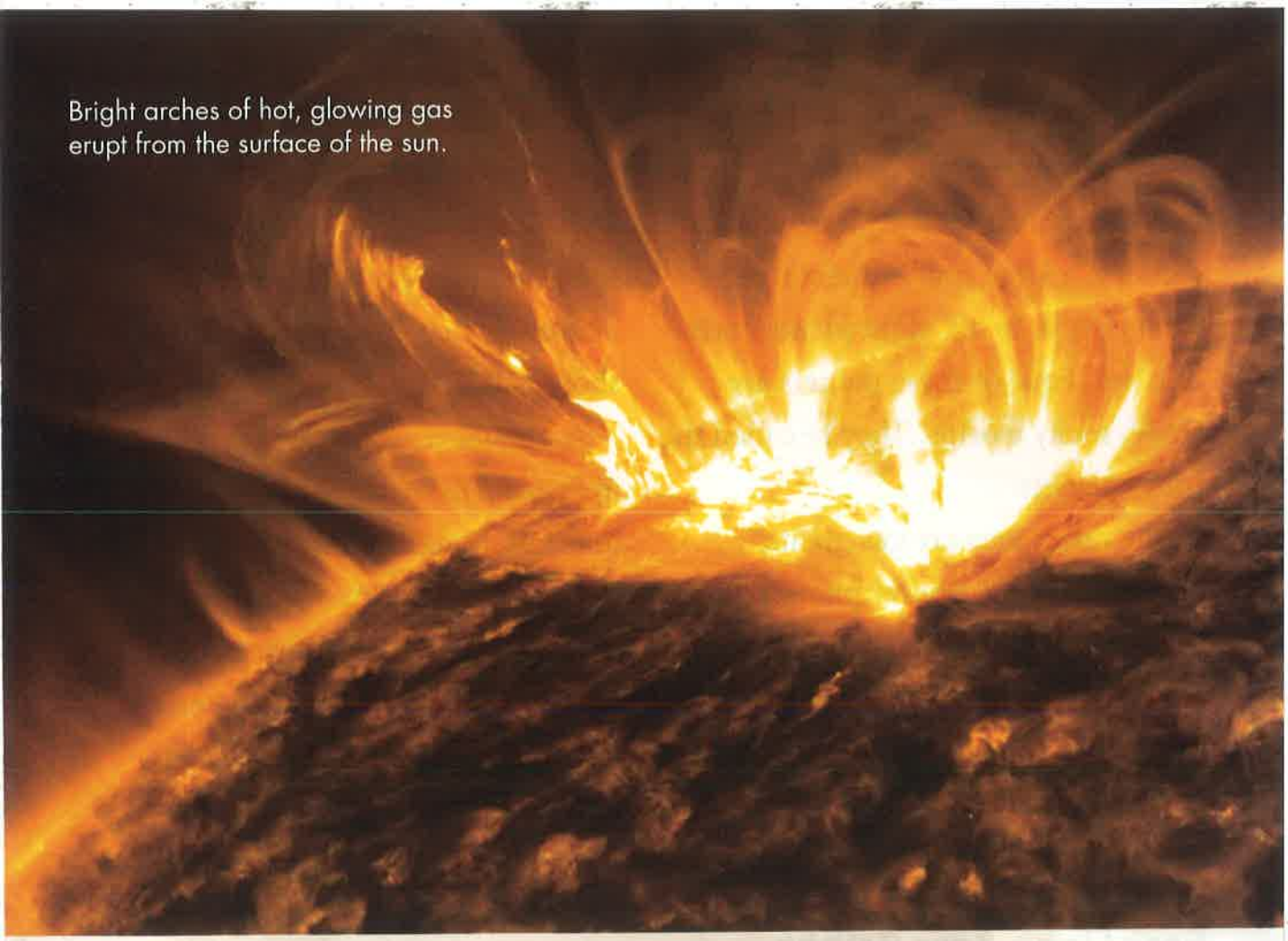
Minutes later, everything went silent. The main engines cut off. Another wave of excitement hit me. I realized we'd made it. I was in space. What would I see there?

Sunrise, Sunset

I unstrapped my seat belt and floated to a window. The view took my breath away. Space was darker than any other color I had ever seen. In the distance, a thin blue crescent glowed. It was Earth's atmosphere.

Soon, I saw my first sunset in space. As Earth spins on its **axis,** it makes one **rotation** every 24 hours. On Earth, we see one sunrise and one sunset each day. *Columbia* orbited Earth once every 90 minutes. So I could have seen 16 sunrises and sunsets each 24 hours I was in space.

Earth's atmosphere changes color as the sun sets.



Bright arches of hot, glowing gas erupt from the surface of the sun.

Our Star, the Sun

From Earth, the sun is the brightest object in the sky. It is also the largest object in our solar system. Yet the sun is just an average-size **star.** Stars are giant, glowing balls of hot gases. These gases are a star's fuel. Most stars' fuel lasts for billions of years.

Stars like our sun change these gases into energy. We see and feel this energy as heat and light. It takes a little more than eight minutes for the sun's light to reach Earth. That means the sunlight you are seeing now left the sun about eight minutes ago.

Spots and Flares

The sun might look like it is calm and quiet. Think again! When we use a **telescope,** we can see the sun up close. Now the sun looks alive with activity. Gases boil and bubble. Fiery storms rage.

One kind of storm, called sunspots, looks like dark blotches. A sunspot looks dark because it's cooler than the areas around it. The number of spots follows an 11-year cycle. At times, like right now, many sunspots speckle the sun. At other times, we can't see any.

Our Solar System

Energy from the sun not only warms Earth. It warms all the planets. A planet is a large space object that orbits a star. In all, eight planets orbit our sun. Four of these planets are small, rocky worlds. They're called the inner planets.

The other four are gas giants. They're called the outer planets. Jupiter is the largest of these worlds. It is also almost completely made of gases. Its Great Red Spot is one the largest storms on any planet in the solar system.

Star Light, Star Bright

From space, I had a good view of the planets, the sun, and many stars. From Earth, stars seem to twinkle. That's because gases in Earth's atmosphere are always moving.

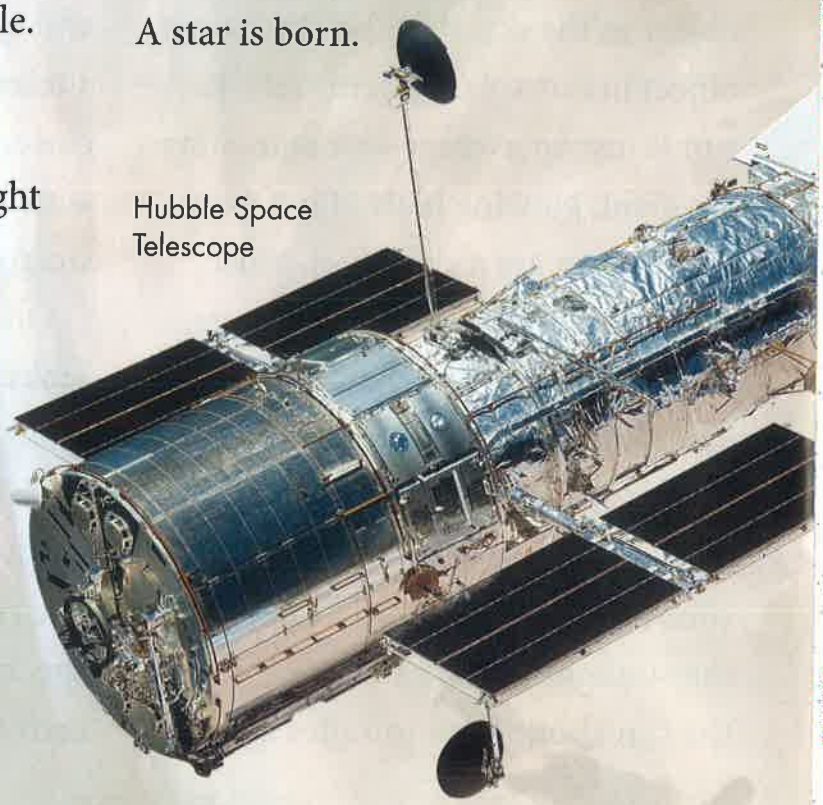
In space, every star shines bright and steady. They also shine with different colors. A star's color tells how hot it is. Cooler stars are reddish. Warmer stars are yellow. Hotter stars are blue.

A Star Is Born

Space is the best place to study stars. The Hubble Space Telescope orbits in space. It takes photos of stars. Some of Hubble's most beautiful photos show nebulae.

A nebula is a cloud of gas and dust in space. Stars form within some nebulae. It takes millions of years to make a star. It starts with **gravity.**

Gravity is a pulling force. All objects have it. Inside the nebula, gravity pulls bits of gas and dust together. The pull of gravity gets stronger. The mass attracts more space stuff. It grows larger. Gravity pulls harder. It begins to press everything into a tight ball. The ball grows blazing hot. It starts to shine. A star is born.



Hubble Space Telescope