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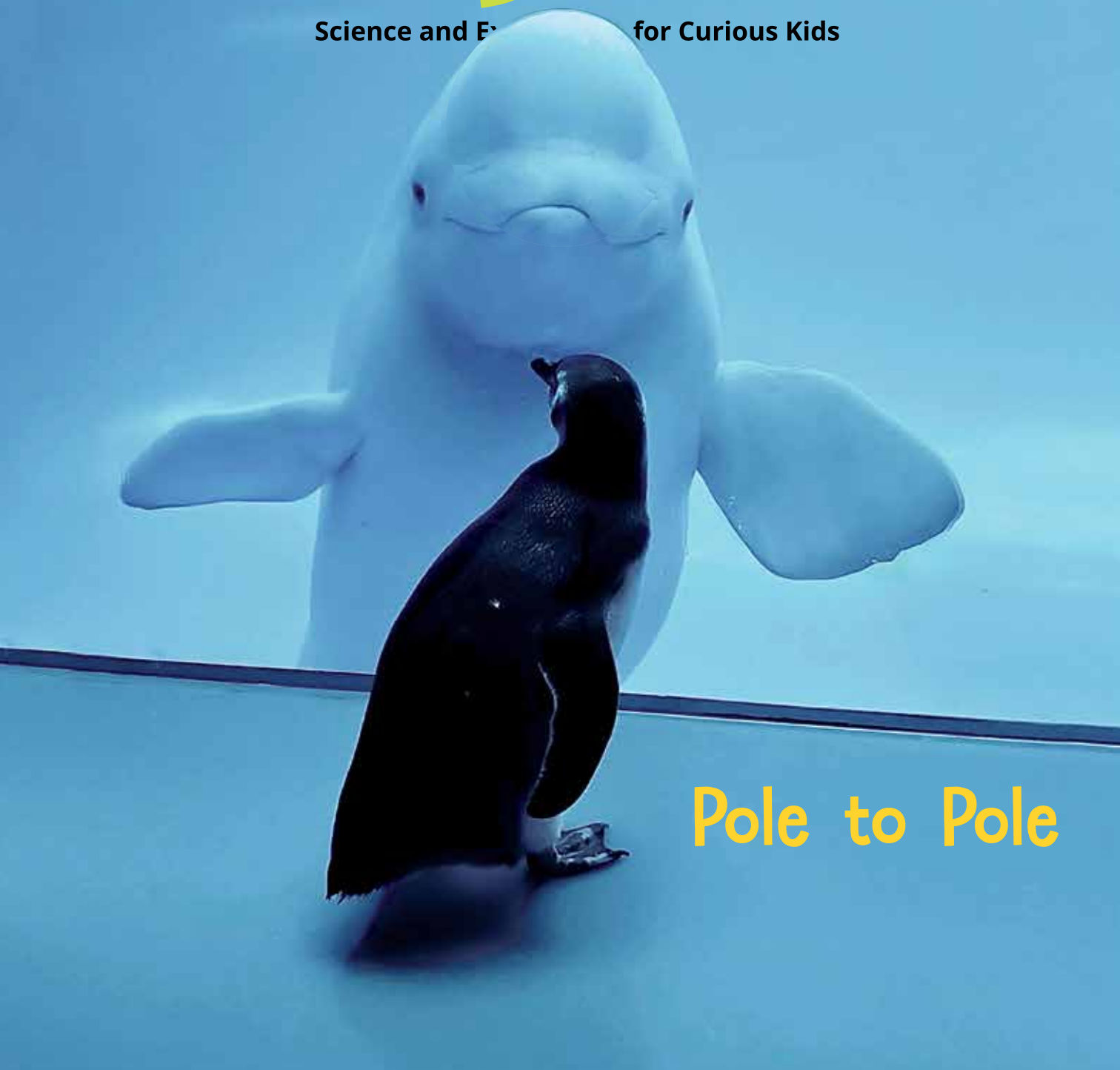
Ask®

Science and F[illegible] for Curious Kids



Pole to Pole

Ask®

Science and Exploration for Curious Kids

Volume 20, Number 3 March 2021

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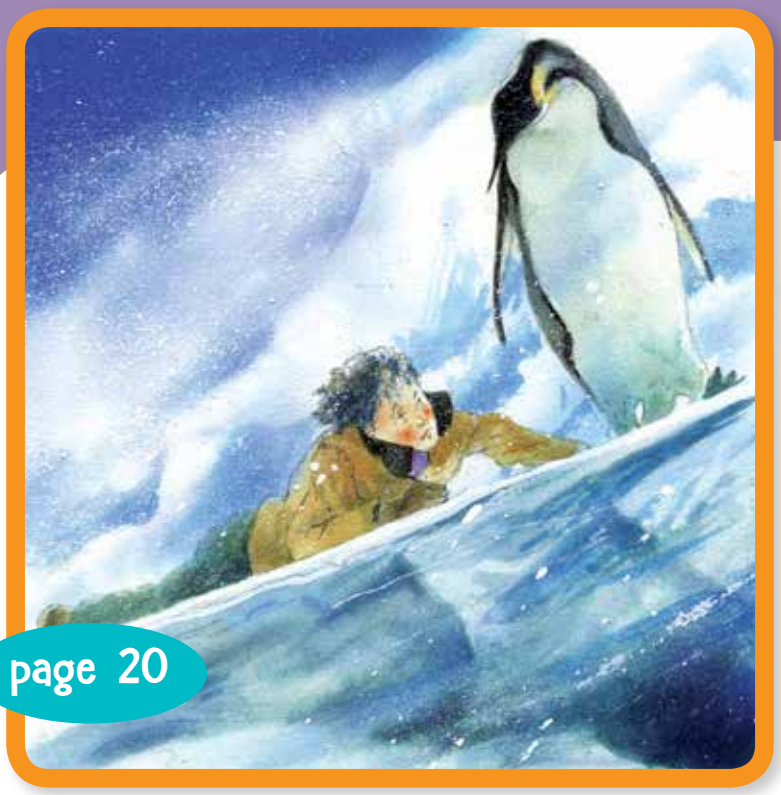


What do penguins know?

page 20

Departments

On the Cover
Carmen the Magellanic penguin meets Kayavak the beluga whale at the Shedd Aquarium in Chicago. Penguins live only in the southern hemisphere and belugas live in the Arctic, so these two animals would normally never meet. But while the aquarium was closed during the pandemic, the penguin keepers let their curious charges go exploring.

Contents

Features

Is all ice square?

page 15

How far will you go for fish?

page 12

Do polar bears need night lights?

page 9

Got space rocks?

page 23

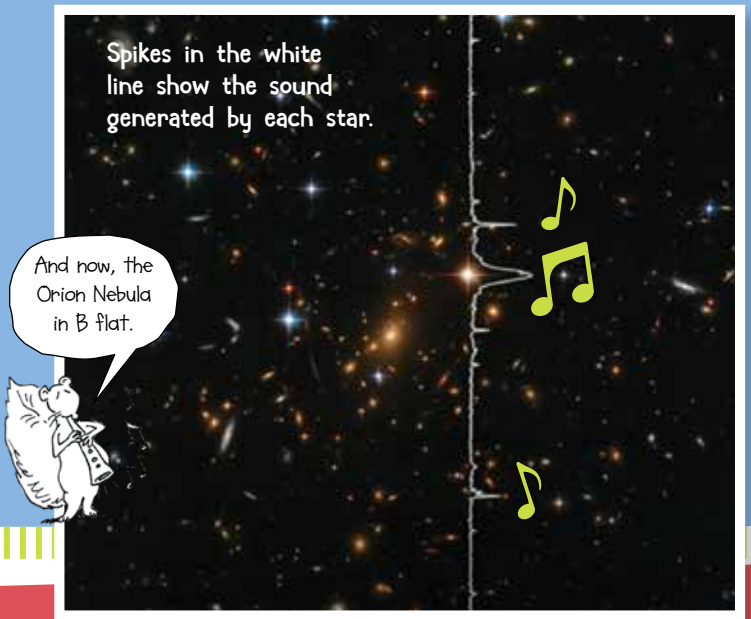
by Elizabeth Preston

The Sounds of Space

Pictures of stars and galaxies can be breathtaking. But looking at pictures isn't the only way to appreciate outer space. Scientists have turned some telescope images into music.

They call these musical pieces *sonifications*. How do you listen to a picture? Imagine a line moving across a picture of stars and galaxies. Whenever the line hits a star, there's a "ping." Stars at the top of the picture make high notes, stars near the bottom low notes. A steady hum represents a glowing cloud. Where the stars are brighter, the notes are louder.

Scientists combine data from several telescopes to make sonifications. Each telescope "plays" one instrument. Together, they make a harmonious song. The sonifications can help people who are blind experience the beauty of space, too.



A Real Copycat

It's possible to train dogs to copy people. Researchers have taught dogs to imitate their actions with the command, "Do it!" But is it possible to train cats to follow our lead? A new experiment shows that for at least one cat, the answer is yes.

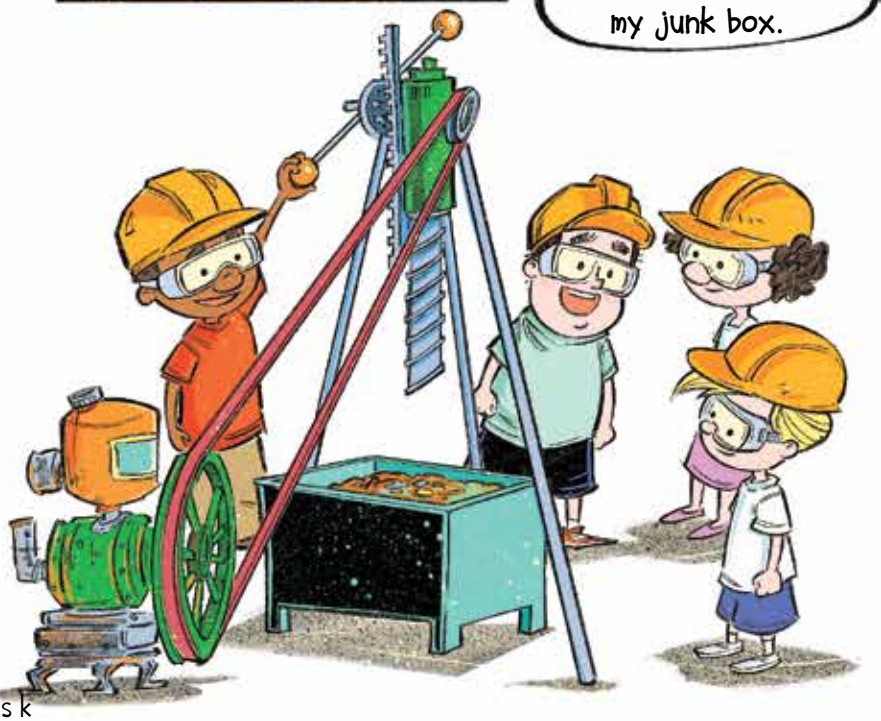
The cat was named Ebisu. Her owner, a dog trainer in Japan, taught her the "Do it!" command. Then researchers tested Ebisu by giving her new actions to copy. Ebisu's owner touched her hand to a cardboard box, or rubbed her face on the box. Then she told the cat "Do it!" Most of the time, Ebisu copied her owner by rubbing the box with her own face or paw. It's the first time scientists have shown a cat can learn to imitate a person.

HOW TO BE UN-SQUISHABLE

This bug is called the diabolical ironclad beetle. It isn't really made of iron. But it is very, very tough. It can even survive being run over by a car.

To figure out what makes the beetle so sturdy, researchers studied its shell up close. They used powerful microscopes and other tools. They discovered that the shell is made of two pieces that lock together like a jigsaw puzzle. Inside, the pieces have many layers. These features help the shell resist pressure.

NESTOR'S DOCK




At the top are things you like now, like video games.
Then action figures.
Wood blocks.
And a rattle at the bottom.
What is this wet layer?
I forgot to close the window during a storm.
And this black slimy layer?
I used to throw apple cores in there.
You've made crude oil.
What is this?
Mr. Hippo!
I thought I'd never see him again!
RUN!
AVALANCHE!
I'm glad that's all cleaned out.

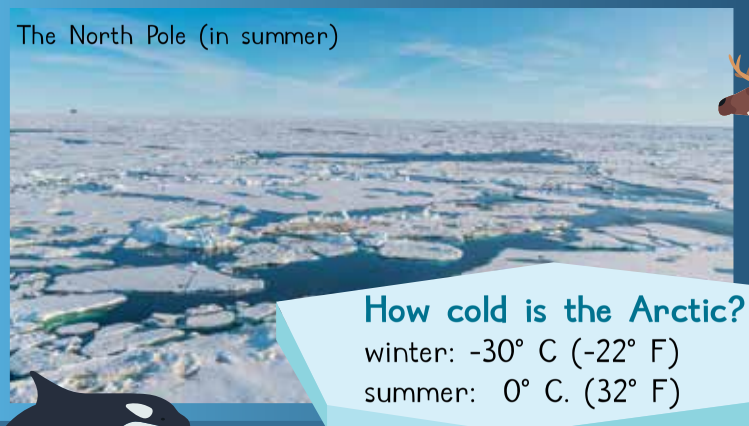
Poles Apart

Arctic (North)

Summer: April to September **Winter:** October to March

At the top and bottom of the Earth are two icy regions. In the north is the Arctic. In the south is the Antarctic.

The ice around the North Pole is frozen ocean, not solid land. The ice is thick. But it moves with the ocean currents. So no pole marks the North Pole. A stick in the ice would drift somewhere else in a few months.



How cold is the Arctic?

winter: -30° C (-22° F)
summer: 0° C. (32° F)

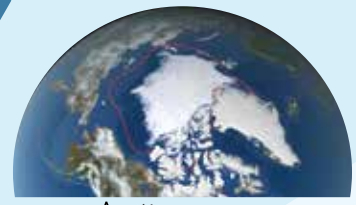

Arctic fox


caribou


snow goose

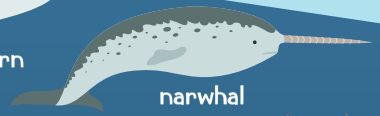
The ice at both poles freezes over a larger area in winter and shrinks in summer. As the climate warms, the ice melts more every year.


Arctic winter


Arctic summer


polar bear


northern orca


narwhal


fur seal


lemming


beluga whale


snowy owl

The Arctic is water surrounded by land.


many whales

The Arctic includes the frozen polar sea and a ring of land around it. Parts of Asia, Europe, Greenland, and North America are in the Arctic.


walrus

First explorers to reach North Pole

Robert Peary, Matthew Henson, Ootah, Seeglo, Egingwah, and Ooqueah, 1909

Antarctica (South)

Summer: October to March **Winter**: April to September

penguin

Antarctica is a rocky continent with mountains, dry deserts, and even an active volcano, Mount Erebus. Most of Antarctica is covered by an immense ice sheet, the size of the U.S. and Mexico combined.

albatross

Weddell seal

Mount Erebus, Antarctica's active volcano

No people live in Antarctica, and no country owns it. Nations share it for scientific research.

The South Pole

many whales

First explorers to reach South Pole

Roald Amundsen and his team, 1911

How cold is Antarctica?

winter: -60° C (-74° F)
summer: -10° C (14° F)

Antarctica is much colder than the Arctic. It's also very windy. Hurricane-force winds that last for weeks are not uncommon.

skua

southern orca

Antarctica is circled by strong ocean currents and fierce winds. These help keep it very cold.

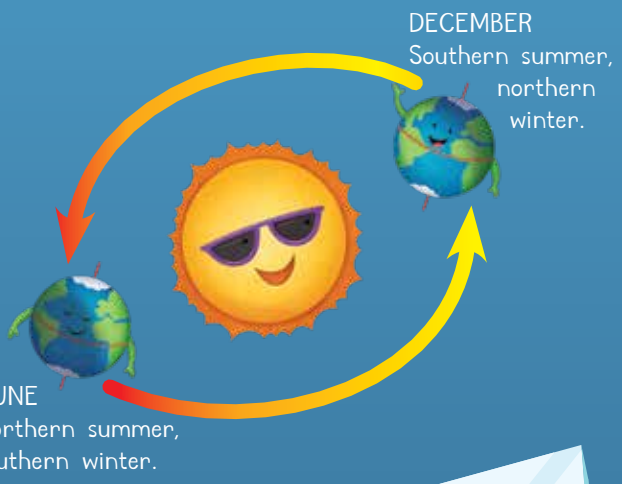
Antarctica has 90% of the world's ice and 70% of the world's fresh water. In places, the ice is 3 miles (5 km) thick.

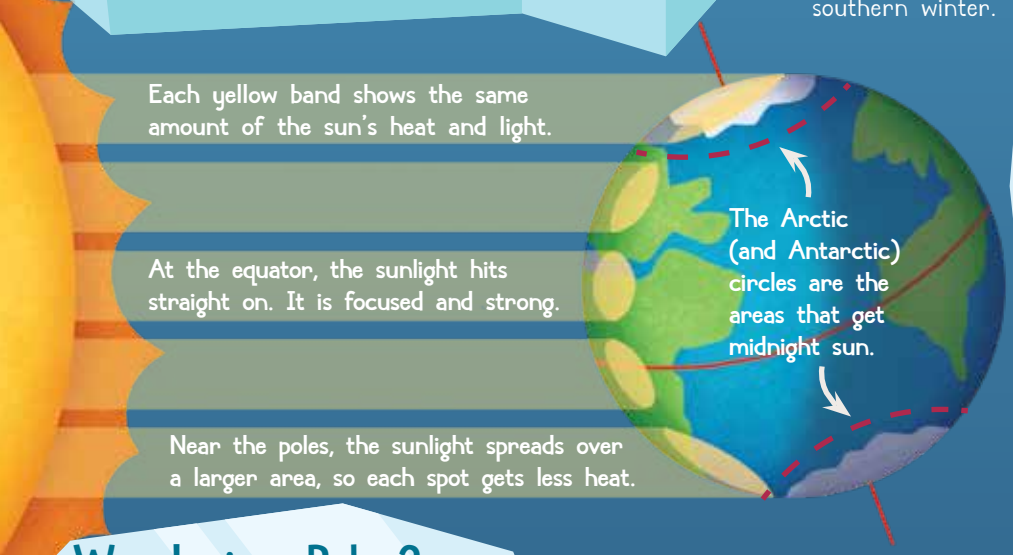
Antarctica is land surrounded by water.

The Midnight Sun

At the poles, the sun never sets in summer. In winter, it's dark all the time. Why?

Earth's axis is tilted a bit. This tilt means that in June the North Pole leans toward the sun. As the Earth spins around each day, that top bit is never out of the sunlight. Six months later, the Earth is on the other side of the sun and the pole points away from it. Then the top bit is always dark. The South Pole is the same, but reversed (summer when North is winter).



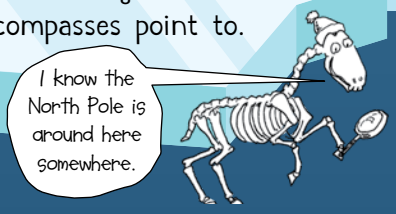


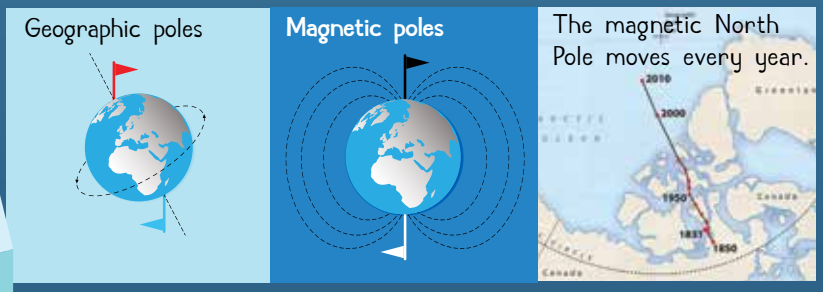
Why Are the Poles Cold?

Sunlight shines on the top and bottom of the planet at an angle. It also has to travel through more air. So the sunlight is weaker and not as warm near the poles.

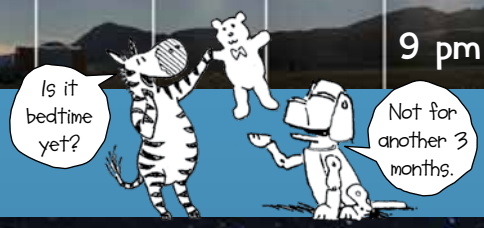
Wandering Poles?

Earth actually has two sets of poles. The *geographic* poles are an imaginary center pin that the earth spins around once every day. The *magnetic* poles are the positive and negative of Earth's magnetic field. This is what compasses point to.





The geographic poles don't change. But Earth's magnetic poles drift a bit as Earth's molten iron inside sloshes. Sometimes they even flip! When that happens, everyone's compass will point south instead.



This sequence of photos shows the sun moving through the sky in the Antarctic summer. It never sets, just goes around and around.

Night Light Show

The aurora borealis and aurora australis, or northern and southern lights, appear in the sky in the far north and south. These eerie, shifting curtains of light happen year round, but are easier to see in the long winter nights.

Aurorae appear when streams of tiny (harmless) charged particles from the sun hit gases in our atmosphere. Earth's magnetic field steers the particles around and down at the poles. The aurorae are brightest when the sun is most active, with lots of sunspots.

Flying with Arctic

The journey is about to begin. Hundreds of white seabirds fill the air. As the Arctic sun dips low over the ocean, they depart. Like many birds, they are migrating, moving south to escape the coming winter. But this is no ordinary migration. These tiny birds, Arctic terns, will fly across the world, all the way from the Arctic to Antarctica.

Arctic terns look like small seagulls. They have long, swept-back wings and tails, with black caps and bright red beaks. Every year they complete the longest migration of any animal on earth. Not bad for a bird that weighs no more than a lime!

The Nesting Grounds

For an Arctic tern, life begins as a speckled egg, laid in a nest on the bare ground. The mother and father

by Rebecca Hirsch

Terns

take turns sitting on the egg. Nearby, other terns tend their own eggs.

It is June in the Arctic tundra, on an island off the coast of Greenland. The long winter has passed. The snow and ice are melting fast. The sun shines day and night. Soon a gray chick hatches. His parents bring him food: insects, fish, and small ocean plants and animals called plankton. He hides in the tall grass while his parents fish. Some chicks around him have nowhere to hide, for not much grass grows on the nesting grounds. Instead, the chicks lie very still on the bare ground to avoid predators.

Terns scoop up small fish and krill as they fly low over the ocean.

One day, an Arctic fox sneaks into the colony. The adults work together to keep the chicks safe. One bird sends up an alarm, squawking loudly with a shrill call that sounds like *kee-kee*. Soon everyone is squawking. The birds band together and swoop down upon the fox. They dive and peck and scream at it. They even poop on it! The fox does not like all this attention and noise. Finally, he leaves. The chicks are safe once more.

Eggs and chicks are speckled brown, to blend in with the scrubby ground.

Parents bring fish and bugs to feed their hungry chicks.

As the weeks pass, the little chick grows bigger. He is no longer gray but white. Soon he is flying. He plucks fish and plankton from the surface of the ocean and snaps insects from the air.

The Long Journey

In September, cold winds start to blow. The Arctic summer is ending. Soon the snow and ice will return, and there will be little food to eat.

The terns leave their Arctic nesting grounds, departing at sunset. Under the stars, they fly over the dark sea.

The terns swoop low over the waves and dive for fish. In some places, the ocean is filled with food. In others, there is little to eat, so they keep flying south. Their light bodies, mostly feathers, allow them to travel without much need for rest. On and on they fly, across the wide, wide Atlantic Ocean.

One day the terns encounter a flock of gulls. The larger gulls chase young terns and steal their food. Later a storm blows the terns off course. But when the weather is calm, the wind helps the colony travel fast and far.

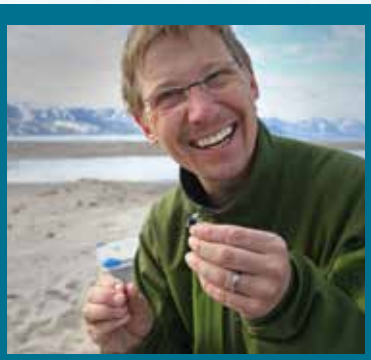
In October and November the Arctic terns arrive in Antarctica, just in time for the southern summer. The sun shines day and night.

Now the birds molt. Their worn feathers fall out. The young tern rests on a chunk

Arctic All-You-Can-Eat Buffet

Many kinds of birds fly to the Arctic in spring. Why do they come? First, there are few predators, so it's a great place to lay eggs and raise chicks. But most important, in spring the polar oceans are filled with food. Green algae grows on the underside of the ice. As the days grow longer, it blooms. Small shrimp called krill eat the algae. Soon they fill the sea. Small fish (and big whales) eat the krill. Big fish come to eat the smaller fish. All this krill and fish make a feast for hungry birds, whales, dolphins, and seals. Terns eat all the fish they can in the short northern summer. Then they're off to catch the southern summer buffet.

A single krill is tiny. But there are vast numbers of them. Schools of billions of krill make pink patches that are visible from space.

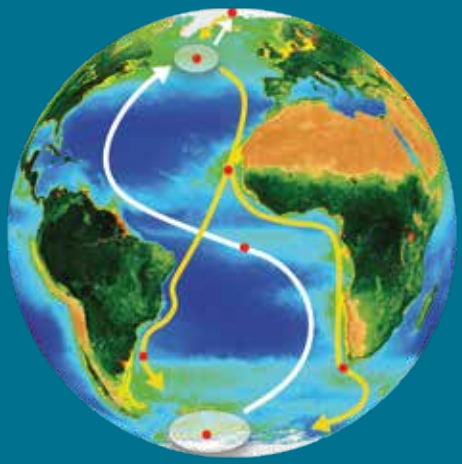


Bird scientist Carsten Egevang of the Greenland Institute of Natural Resources shows a tiny tracker worn by the terns.

Tracking Terns

Every year, Arctic terns migrate from one end of the Earth to the other, and back again. But what path do they take? To find out, bird scientists caught terns in Greenland and Iceland. They strapped small trackers on the birds' legs. These trackers recorded the GPS position of the bird each day. When they caught the birds again a year later, the scientists were able to see a record of the terns' journey.

They learned that the birds flew an average of 44,000 miles (70,900 km) in a year. Terns can live 30 years. "If you add that up over the course of their lifetime, that's like flying to the moon and back three times," says Iain Stenhouse, a marine bird expert with the Biodiversity Research Institute in Maine.



An Arctic tern's epic journey. Red dots show rest stops.

of floating ice and waits for his new feathers to grow.

In May, most of the colony will return north for the Arctic summer. But the young tern will stay behind. He is not yet ready to return to the nesting grounds to have chicks of his own. Antarctic winters are brutal, so he will wander the southern seas to survive. In two years, he will fly north with the rest of his colony. He will soar over the waves, making his way to the other end of the world, to the very place he was born. There he will choose a mate and have chicks of his own under the Arctic sun.

Arctic terns become less gray as they get older—the opposite of most people!

Iceberg!

In 1912, an iceberg sank the ship *Titanic*. But where did it come from?

Icebergs are big pieces of ice that drift around in the ocean. Thousands of icebergs fill the Arctic and Antarctic seas. But icebergs come from the land. Land ice is always on the move, sliding slowly downhill. Where ice sheets or glaciers meet the sea, huge chunks break off and float away. The iceberg that sank the *Titanic* broke off the Jakobshavn glacier in Greenland.

Icebergs come in all sizes and shapes. The top part you see is less than half of it. Most of an iceberg is under the water.

Icebergs are not frozen sea. They are pieces of land ice that break off and float away into the ocean. This is called "calving."

Green algae grows on the undersides of icebergs. Tiny **ice fish** and **krill** live in cracks in the ice.

Some icebergs have lovely blue or green ice, colored by tiny algae.

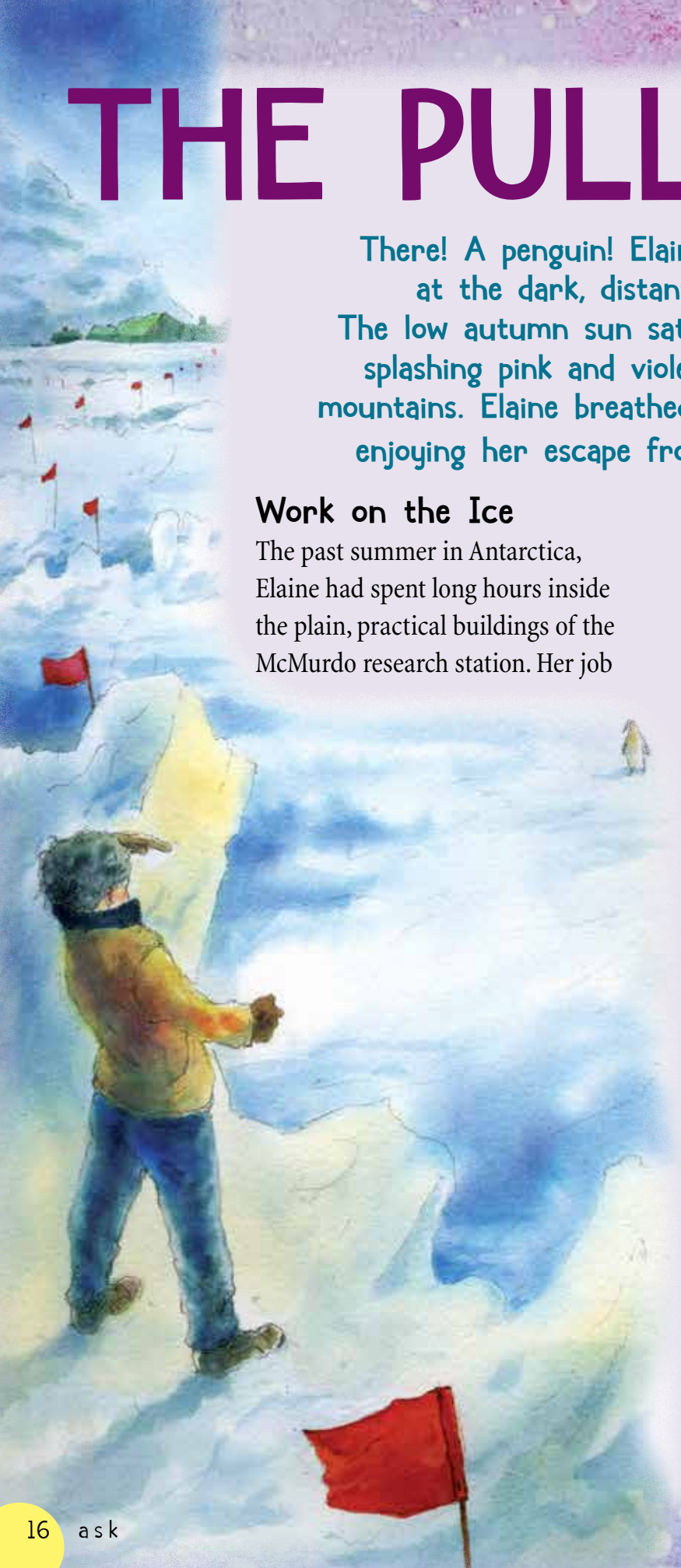
The floating part you see is only the very top of an iceberg. 70% of it is underwater.

Fierce wind and waves can sculpt icebergs into surprising shapes.

Small icebergs and bits of ice that fall off icebergs are called **bergy bits** and **growlers.**

THE PULL of the

There! A penguin! Elaine Parker stared out at the dark, distant dot on the ice. The low autumn sun sat between sea and sky, splashing pink and violet across the craggy mountains. Elaine breathed in the pure, crisp air, enjoying her escape from McMurdo Station.



Work on the Ice

The past summer in Antarctica, Elaine had spent long hours inside the plain, practical buildings of the McMurdo research station. Her job was to look after the fire extinguishers and fire alarms in the machine shops, sheds, boiler rooms, dorms, and warehouses of this remote outpost. But on her days off, Elaine loved to strap on skis and explore the sparkling ice and crystal caves beyond the station. Sometimes she was so filled with the wild beauty of Antarctica that she started to sing—or yodel!

With winter coming, she'd be heading home soon. But before she left there was one more thing Elaine wanted to do. She was determined to see a penguin—up close. She'd heard tantalizing tales from the biologists, about how penguins played and took care of one another, how they were curious and often approached people. She had spotted a few, but only from far away. But that night after dinner, someone said there was a lone penguin on the ice on the far side of the station. Elaine rushed out, hoping to get a closer look.

PENGUIN

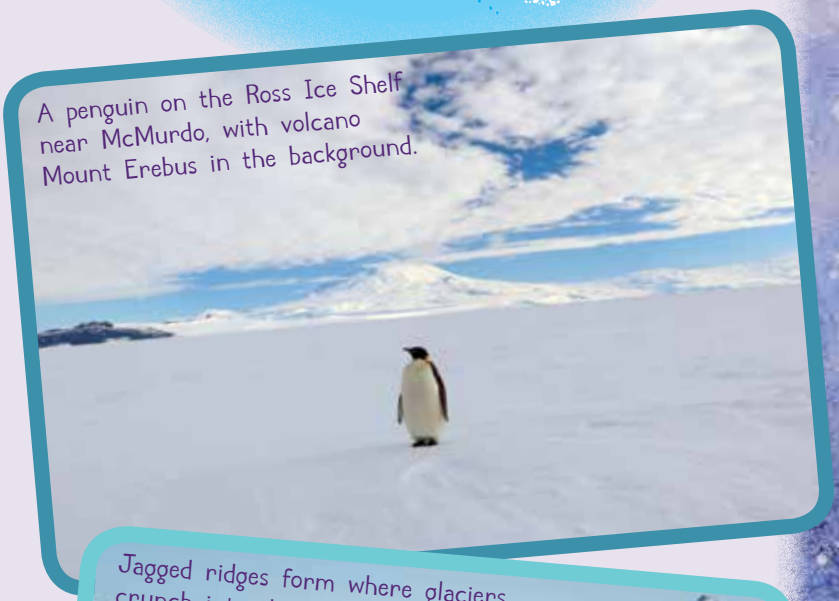
by Christy Mihaly
art by Alan Marks

On the Ice

Now her neck tingled with excitement . . . and cold. The day had been sunny and warm (for Antarctica, meaning around 20˚F or –6˚C, still below freezing). But a frosty wind circled, a warning. Elaine knew the weather could change in a heartbeat. A sudden storm could drop the temperature by 50˚ in just a few minutes.

She gazed across the icy plain. Although it looked solid, this ice sheet was in constant motion, squeezed and warped by the glacier—the vast river of ice sliding slowly down the mountains toward the ocean. The glacier's tremendous pressure created jagged cracks and zig-zagging ridges of ice. Crevasses—deep blue cracks in the ice—lurked beneath the snowy surface. Rows of blue and red flags marked a safe path through this hazardous zone.

A frosty gust of wind blasted, and she reached up to cover her bare earlobe. Oh no, where was her hat? Elaine had left her backpack—with her warm parka, hat, and emergency radio—back at McMurdo! Normally, she carried that orange pack everywhere. But hearing about the penguin, she'd dashed out without it.


A penguin on the Ross Ice Shelf near McMurdo, with volcano Mount Erebus in the background.


Jagged ridges form where glaciers crunch into the frozen sea.

Her stinging ears were in danger of frostbite. This was trouble. She was out on the ice alone, without her gear.

Maybe the cold had slowed down her brain, but Elaine didn't consider the danger. All she could think of was the penguin. Watching the swaying bird shape coming closer, she spied a flash of yellow. It was an emperor penguin!

Elaine tried to ignore her ears and lowered herself to sit on the snow. It was against the rules to approach a penguin, she knew. So she had to wait and see if the bird would come to her. The bitter wind blew through her clothes. Elaine held her breath, concentrated on the penguin waddling toward her, and willed it to keep coming. Soon the bird stood right in front of her. Its eyes were level with hers, its beak almost touching her nose.

She admired the golden-orange stripes edging the bird's beak. She tried not to blink as the penguin eyed her closely. Then it reached out its beak, leaned in, and tapped her cheek.

Elaine's heart leapt with the thrill. The penguin bent forward, then dipped

its beak inside her collar. It tickled! Elaine couldn't help it—she giggled.

Her laugh startled the penguin. Flipping onto its belly, the bird tobogganed away. It slid across the ice into a billowing cloud of snowflakes.

Elaine stood and stomped her feet, trying to warm her toes. Well, that was that. She'd lost her penguin, a storm was brewing, and it was past time to head back to McMurdo.

Just then the screen of snow parted. Elaine got a glimpse of her bird friend, and felt the pull of the penguin. Surely she'd be safe out here just a little longer! She leaned into the blowing snow and followed the bird farther out on the ice, away from the base.

A Friend in Need

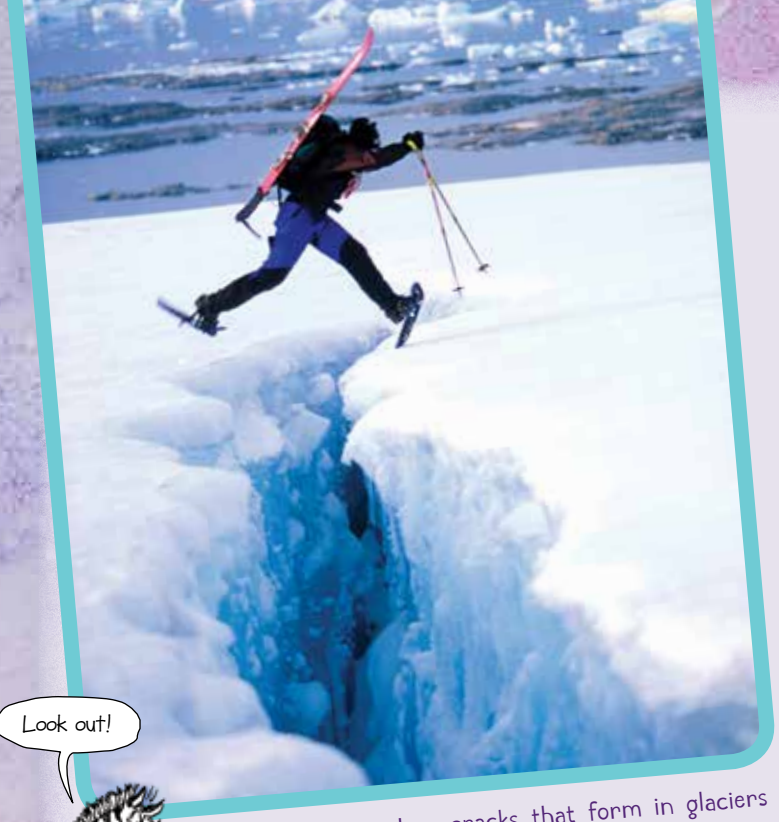
Suddenly . . . *Whoosh!* A strong gust knocked her off her feet. She tumbled over and over, sliding like a hockey puck across the slippery plain and into the whirling snow. Then the wind picked her up and slammed her face-down onto the ice.

Elaine was pinned down by the wind and scared to move. She squinted through icy eyelashes, straight down into a neon-bright blue glow. Oh no! That beautiful blue was the color of danger. It came from a deep hole below her. She was lying on a thin skin of ice above a blue crevasse.

Emperor Penguins

Of the many penguin species, only emperor and Adelie penguins live on Antarctica itself. Emperors are the largest of the penguins. Adults stand 3 or 4 feet (1 m) tall. Their shiny yellow and orange neck feathers stand out against the black and white of their bodies. They sometimes flop on their bellies and push with their wings to slide rapidly across the ice. This "tobogganing" is faster than walking.

Emperor penguins usually live in big groups and catch fish in the ocean. But once a year, penguins molt: they grow new feathers and shed all the old ones. When molting, penguins stay on land and go off by themselves. This is what the penguin that saved Elaine Parker was doing on the day of the sudden storm.



Crevasses are deep cracks that form in glaciers and ice sheets. When covered with snow, they can be invisible to unwary travelers.

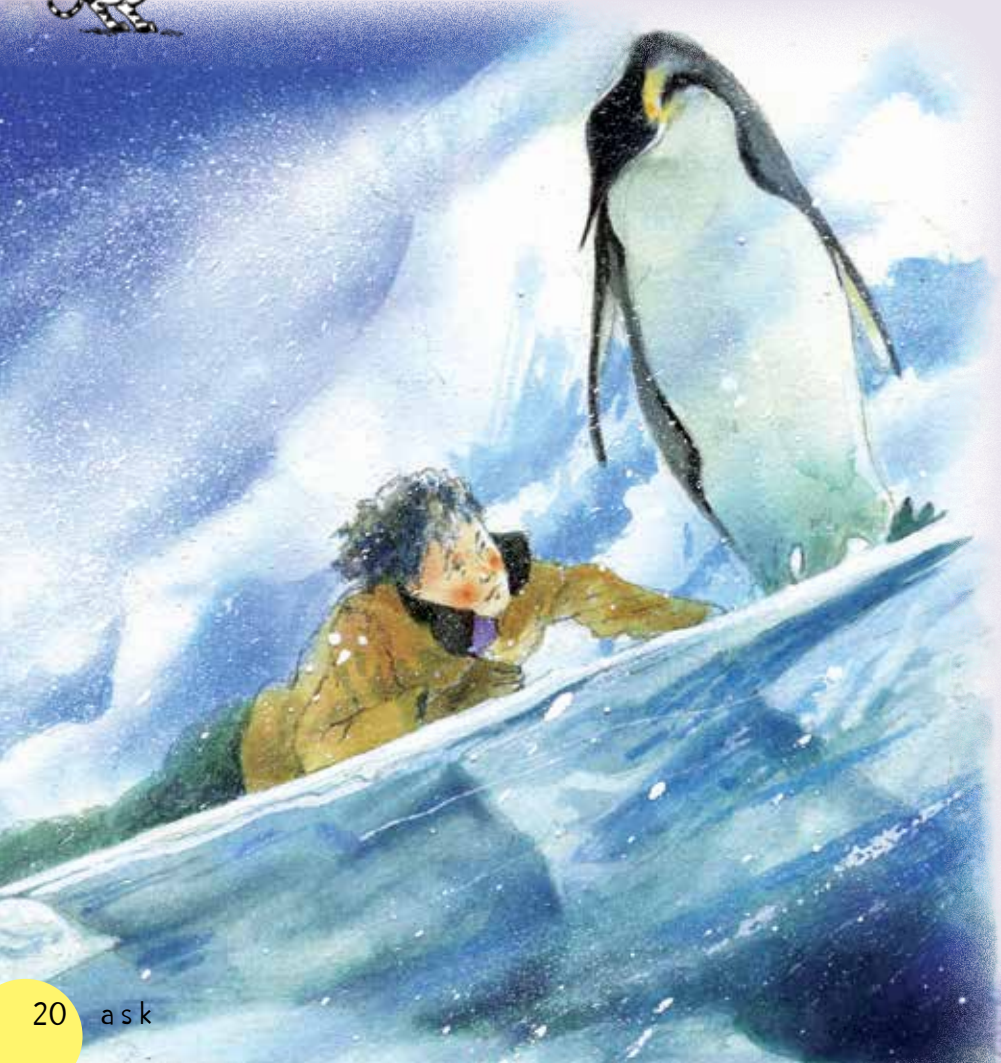
Elaine heard a *tink* as tiny cracks shot through the ice. Icy cold seeped into her belly. Crunch! The crust gave way slightly, and she dropped a little lower. If she broke through, she'd drop into the crevasse, where nobody would ever find her. The storm swirled and Elaine's thoughts spun.

Then, as quickly as it began, the wind died. In the sudden quiet, Elaine felt someone near. She peeked up.

Her penguin stood peering down at her. Seeing Elaine move, the bird walked away, then stopped and looked back. It seemed to be inviting her to follow.

As Elaine tried to decide on her next move, she heard a snap. Cracks spiderwebbed around her. She made up her mind. She would trust this bird.

She spread her arms on the ice like wings, keeping her body flat and spreading her weight across the fragile surface. She breathed out a steamy cloud and pushed forward on her belly, inching along. Ahead, the penguin wove a trail between the cracks. Elaine scraped along behind, slow-motion tobogganing. Icy shards collected along her arms and scratched her nose and cheeks. She lost track of



time as she focused on following the penguin's path.

Finally, with one last pull of her arms, Elaine crawled after her penguin onto solid, white ice. Safety! Standing on quivery legs, she turned to look back. In the distance, an Elaine-shaped imprint marked the spot where she'd landed, right over a giant crack.

Phew. Elaine bent over, her hands on her knees. Once her heartbeat had slowed to normal, she turned toward the penguin. How could she thank her friend?

But the bird was already gone, retracing its steps across the maze of cracks. As Elaine watched, the penguin paused atop a ridge. It stood up on its toes, stretched its wings wide and pointed its beak skyward.

"*EHEHEH-UHUHUH-EHEH!*" it trumpeted. The ecstatic cry sent shivers up Elaine's spine.

She threw back her head and yodeled her reply: "*Oh yoyodelayeeoheoheeoheeoh!*"

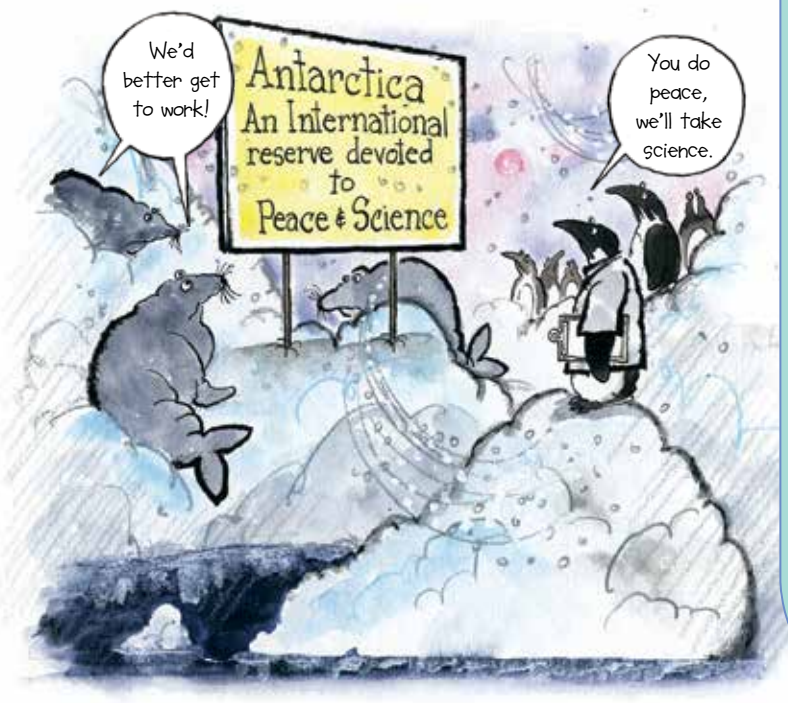
The penguin waited until the last echo faded. It looked back at Elaine across the terrible, beautiful ice. Then it was gone.

Elaine pulled out her knife and cut a strip of fleece from the bottom of her jacket. Wrapping the fabric around her head, she sighed with relief, and turned at last toward McMurdo Station. She knew her way back from here.

Her penguin guide would rejoin its colony for the long winter ahead. Elaine, thanks to that bird, would head home with a story that she'd never forget.

Cold Scientists

art by Mark Brewer



Climatologists: Ice Cores

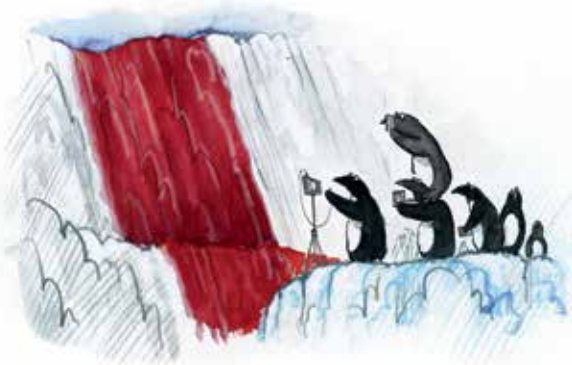
As snow falls, it snags gases and dust from the air. Thousands of years of snowfalls lie in layers on Antarctica. Using hollow drills like big straws, climatologists pull out long tubes of layered, smooshed snow, called ice cores. Then they look at the trapped gases, dust, and pollen in each layer to learn what the air was like long ago and how Earth's climate has changed.

Zoologists: Antifreeze Fish

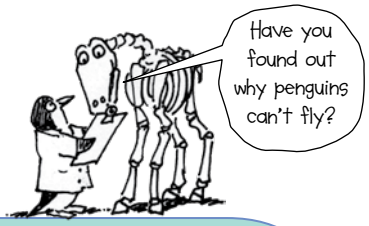
Why isn't this fish frozen? Both the north and south polar oceans are home to fish that live in water so cold it would freeze a normal fish solid in minutes. What's their secret? These fish make a natural antifreeze, a special sugary protein in their blood that keeps ice crystals from forming. Scientists are studying the fish antifreeze for possible uses in medicines and making better ice cream.

Microbiologists: Blood Falls

Blood Falls is a strange Antarctic glacier that has turned rusty red with iron seeping from an underground lake. The lake is home to weird microbes, similar to ones that live in the deep ocean and maybe on other planets. These microbes, trapped under the ice for 1.5 million years, have evolved to live without oxygen. Instead, they eat sulfur and iron.



Lots of scientists visit Antarctica every year. What are they all doing down there?



Astronomers: South Pole Telescope

Antarctica is a great place for astronomers, people who study the stars and space. The air is very clear, there are no city lights, and in winter it's dark all the time, so they can get a lot done. The South Pole Telescope is looking at distant galaxies for clues to dark energy, a mysterious force that seems to be making the universe expand.

Physicists: Neutrinos

Physicists have built an unusual telescope to hunt for tiny sub-atomic particles called neutrinos. Their neutrino-detector, called IceCube, is made of long strings of sensors sunk deep into the ice. Neutrinos are so tiny they zip right through ordinary matter. Trillions stream through you every second! But when one hits an ice crystal just right, it makes a faint blue flash. Spotting these flashes and tracing where in space the neutrinos come from can help astronomers find distant black holes and supernovas.

Geologists: Meteorites

Meteorite-hunters love Antarctica. Thousands of meteorites, small space rocks, rain down on Earth every day. Antarctica doesn't get more meteorites than anywhere else, but if you're looking for tiny black space rocks, it's easy to spot them on a big, white sheet.

Paleontologists: Polar Dinos

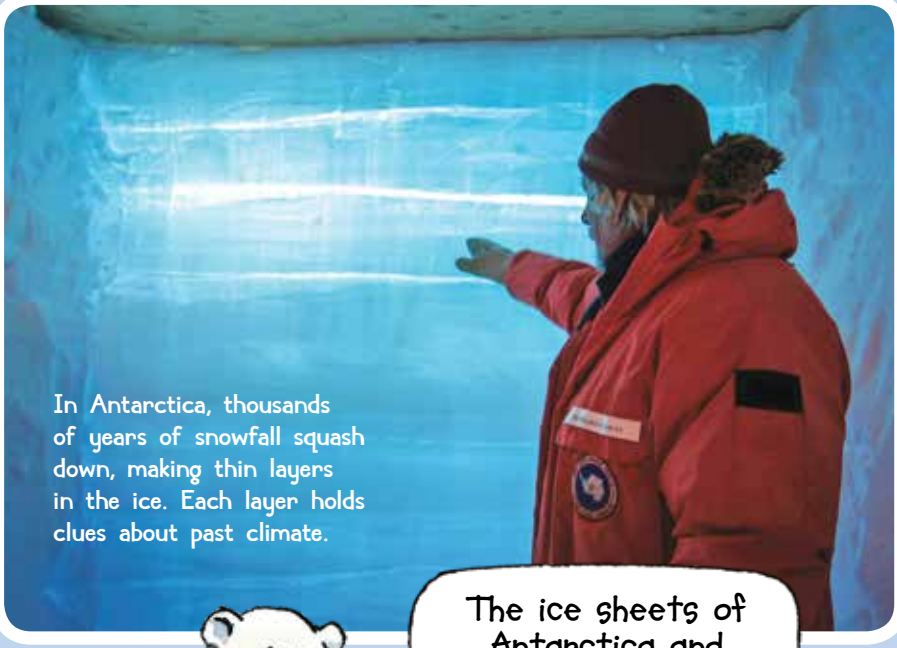
Fossil hunters have discovered that at least eight species of dinosaurs roamed Antarctica during the Cretaceous period, along with tropical ferns and insects. Finding dinosaurs and forests so close to the pole makes scientists think that the planet was much warmer 85 million years ago.

Climate Clues in the Ice

by Tania Therien
art by Thor Wickstrom

In chilly Antarctica and Greenland, snow has piled up over many centuries without melting. All that snow makes an icy blanket that can be miles thick. And by studying the ice, scientists can tell what the weather was like long ago.

How? When snow falls, it traps little air bubbles and bits of dust from the air. These freeze into the ice.



In Antarctica, thousands of years of snowfall squash down, making thin layers in the ice. Each layer holds clues about past climate.

Using special drills, scientists remove long tubes, or cores, of ice. They store the tubes in huge freezers.

Scientists can tell how old each layer is by counting back. If they melt a bit of ice from an old layer, they can get a sample of air from that time. From clues in the air and in the snow itself, they can tell whether the snow fell in a warm or cool year. This gives us a snapshot of Earth's temperatures over many thousands of years.

They can also measure the amount of carbon dioxide (CO_2) gas at different times. The CO_2 levels go up in warmer periods, and down in ice ages. In ice from the last 80 years, the amount of CO_2 in the air has risen faster than it ever has before.

These tubes have been drilled from deep in the ice sheet.

Ice cores are stored in a big freezer, a library of past climate.

The dark band is a layer of volcanic ash that fell on Antarctica 21,000 years ago.

Getting ready to drill a new core.

The Big Melt?

by Tracy Vonder Brink

Ice sheet melting in Svalbard, Norway

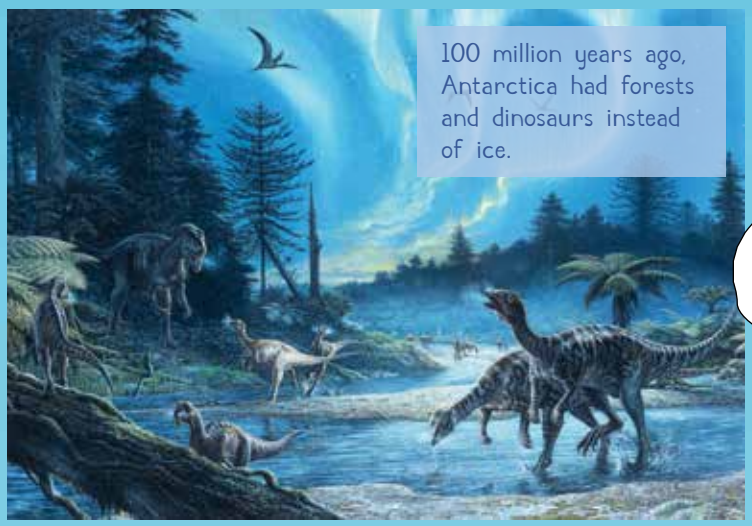
The Arctic and Antarctic might seem far away. But the ice at the top and bottom of the world has a big impact on all of us.

At the edge of Antarctica, a cliff of ice stretches a mile high. Suddenly, with a boom, a huge chunk the size of a city block breaks off and splashes into the sea. A new iceberg is born! In summer, polar ice is always breaking and melting. But now it's happening more, and faster. That worries scientists.

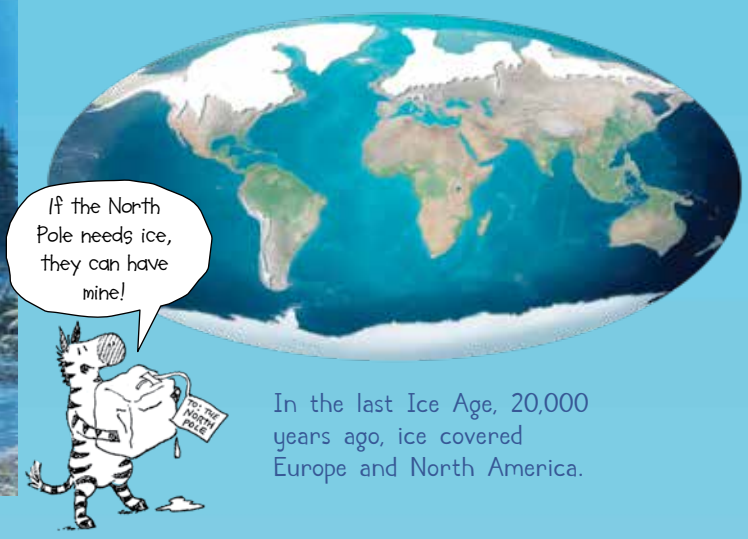
A Warmer World

As far back as 870 CE, Vikings recorded how many days a year the sea near them was covered in ice. In modern times, satellites take daily pictures of the ice caps. Scientists can compare pictures to see how the ice changes year to year. And what they see is less and less ice.

In the distant past, Earth has been both warmer and colder than it is now. A hundred million years ago, Antarctica was ice-free. It was warm enough to have forests full of dinosaurs. But in colder times, ice has covered much of the globe.



100 million years ago, Antarctica had forests and dinosaurs instead of ice.



In the last Ice Age, 20,000 years ago, ice covered Europe and North America.

Usually, Earth's climate changes very slowly, over thousands or millions of years. Plants and animals have time to adapt. But now, human activities like burning fossil fuels are causing Earth to heat up much faster. And the poles are warming more quickly than anywhere else. That's something new.

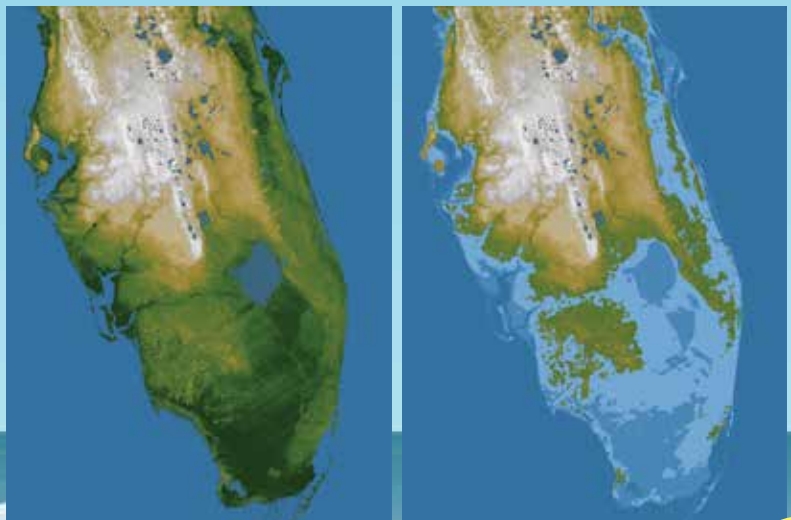
What does that mean for the Arctic and Antarctic?

Less Ice, More Water

A warmer world means less ice, for a start. It used to be impossible to sail a ship from Europe to Alaska over the top of Canada. The way was blocked by ice, even in summer. But over the past 42 years, the Arctic has lost half of its winter ice. Every year, more ice melts in summer and less re-freezes in winter. For the first time in modern memory, there are open stretches of water across the top of the world.

When more ice melts, it also melts faster. Why? Shiny white ice and snow reflect sunlight. That helps keep the poles cool. But dark blue water absorbs the sun's heat and warms up. This melts more ice, which traps more heat, which melts more ice. This is what scientists call a feedback loop.

Warming also dumps more land ice into the sea. In Arctic Greenland, immense ice sheets cover rocky land. Warm weather can melt the top of the ice. The water seeps down to form a slippery layer over the rock. This sends huge slabs of ice sliding downhill, into the ocean. The ice sheets have always shed some ice in summer. But now they are losing more ice than ever before.



If Antarctica completely melted, low places like Florida might be under water.

Polar bears hunt seals on the ice. With less ice, they go hungry.

Rising Seas

When the ice melts, where does all that water go? Back into the oceans.

Earth's oceans are immense. But the ice sheets hold a LOT of water. Antarctica's ice cover is larger than the United States and several miles thick. If all that ice melted, sea levels would rise by around 200 feet (60 m). Antarctica is huge and very cold, so there's no danger of it all melting tomorrow. But even slow melting can dump a lot of extra water into the oceans. If we don't do anything to stop warming, by the end of the century, sea levels around the world could be several feet higher. That would flood many towns built near coasts.

Rising seas could also make wells more salty and cause problems for farmers who need fresh water for crops.

As sea levels rise, we may need to find new ways to build.

Changing Weather

Warmer poles will also change weather all over. Big weather systems are driven by cold air circling around the poles and deep ocean currents that move heat around. These deep currents start at the poles, when cold, salty water sinks and flows toward the equator.

If these ocean currents shift or stop, our weather could change in ways we can't predict. Some areas could become rainier. Some could become drier. Storms could be more frequent and powerful.

What Can We Do?

The best way to save the ice is to reduce heat-trapping gases in the air. Using clean energy, driving less, and recycling can all help. It will take hard work. But if we all pitch in, we can keep the poles icy.

This map shows deep ocean currents that move heat around the world. Blue is cold water, red is warm.

Ask Ask

WITH SAGE AND BRIAR

TEXT BY ellen R. BRAAF
ART BY MARNIE GALLOWAY

Hey, Sage! Rigel wants to know, why do burps make sounds?

Brrrp. They sure do. Excuse me!

Sounds happen when things vibrate. These vibrations vibrate the air in all directions. If the vibrations reach your eardrums, you hear a sound.

PLINK!

PLINK!

If I feel my throat when I talk, I can feel my vocal cords vibrating to make voice sounds. Do vocal cords make burp sounds too?

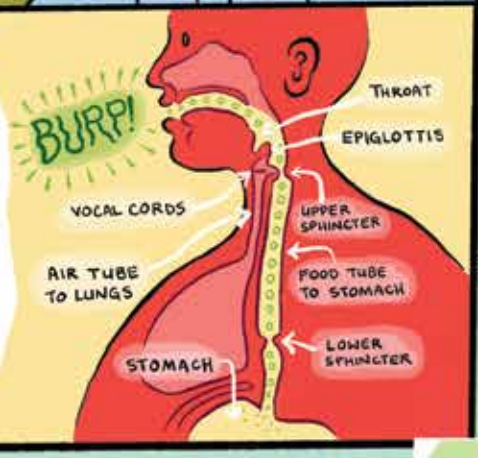
When I burp, air is coming UP from the stomach.

There are two tubes in your throat. Voice sounds are made by air flowing up the air tube from the lungs. Burp sounds come from the other tube, which goes to the stomach.

When your stomach has too much gas, maybe from drinking soda or eating too quickly, gas rises in your food tube and collects at the top. Pressure increases until there's enough to force open a round muscle that keeps the food tube closed, called the sphincter. When that happens...

Brrrrp! Excuse me!

Nice eructation! Or, burp. As the gas rushes out, the sphincter vibrates. So does the epiglottis, a flap at the back of the throat. The vibrations bounce around in the long food tube, which amplifies them like a trumpet. Put these all together, and you get the "burp" sound. The more gas rushing through, the louder the burp.



So what's the loudest burp ever?

BURP

Paul Hunn from England holds the record for loudest burp—109.9 decibels, almost as loud as an ambulance siren (120 decibels).

Better out than in! But always remember to say,

Excuse me!

ASK US ANYTHING!

WRITE TO US AT:
ASK
70 EAST LAKE STREET
SUITE 800
CHICAGO, IL 60601

OR HAVE YOUR PARENT EMAIL
ASK@CRICKETMEDIA.COM

Contest and Letters

Send your letters to Ask Mail, *70 East Lake St., Suite 800, Chicago, IL 60601, or have your parent/guardian email us at ask@cricketmedia.com.*

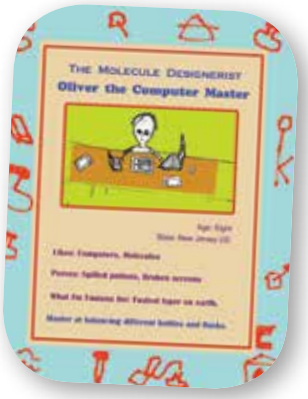
In our October issue we asked you to show us what kind of "..ist" you might like to be. Thanks to all you enthusiasts for sharing what excites you!

Arborist
Julie P., age 6

Puppiologist
Chelsea Y., age 9, California

Logan the Artist
Logan C., age 10, California

Owlist
Ruben P., age 9



The Molecule Designerist
Oliver D., age 8, New Jersey

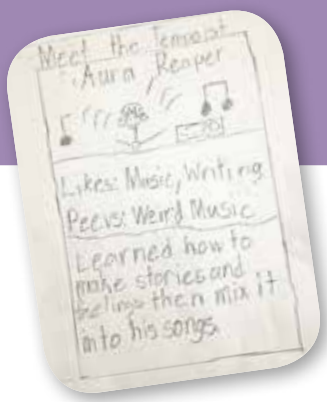
Horseback Ridingist
Amarachi O., age 10, New Jersey

Reptilest
Caylee O., age 10, New Jersey

Dear Marvin,
I want to ask two questions: (1) what was the first type of dog? and (2) what was the first piece of furniture?
Your friend,
Alexandria F., Massachusetts

Dear Alexandria,
The first dogs were a lot like wolves, because, in fact, they were wolves. They liked to hang around early humans and jump on their new invention, the bed. Early humans told them "No! Bad! Down!" And the first wolf who obeyed, became a dog. After that, we just kept evolving.
Obediently,
Bot

Dear Zia,
I really like to do embroidery. Do you? I like creating patterns from a little piece of cloth. I really like doing art. My favorite kind of cupcake is chocolate with sprinkles on top. What's your favorite kind?
Yours,
Vanessa A., age 9, North Carolina



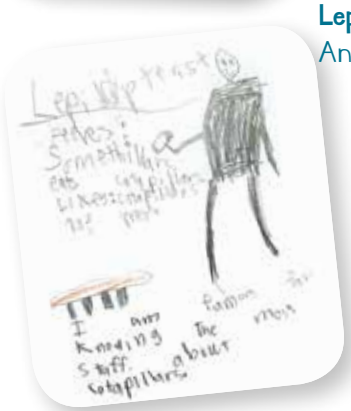
Tempoist
Matthias S.

Sportist
Chase L., age 9

Artist
Marin F., age 8, Florida

Paleontologist
Aubrey M., age 8, Connecticut

Lepidopterist
Andrew F.



Serpentologist
Skyla H., age 11, Washington

Firecrackerist
Aidan P.

Eaterist
Daniel B., age 7, Washington

Catologist
Maria A., age 10, Mississippi

Dear Vanessa,
Chocolate with sprinkles is delicious! Sewing is also very fun. I have a new idea for a project. I'm going to make a cloth cupcake with embroidered sprinkles! That way I will have it forever. Also, no crumbs in the bed!
Sprinkles for ever,
Zia

Dear Marvin,
I have a prank for you! Take a box and label it "The Best Box of Rules." Then write down a list of rules (don't worry, you don't have to follow them!) and put it in the box. After that, half-fill the box with clear glue. When Plush sees it, she'll put her hand into the box to get the list and she'll get stuck in the glue!
Sincerely,
Pranar V., Washington

Dear Pranar,
The first rule will be "Do not take this list!" She won't be able to resist that. Thanks!
Prankmeister Marvin

March Contest

Ice Master

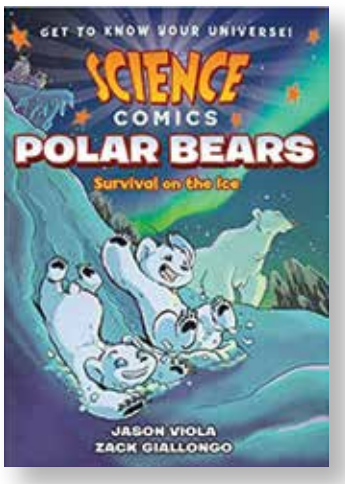
At the Ice Hotel in Sweden, everything is made of ice: walls, chairs, beds, stairs—even the piano! For this month's contest, imagine something you might like to make out of ice. What other uses could there be for the shivery, slippery stuff? Send us a drawing of your idea (or build it and take a picture!) and we'll feature the most frosty in an upcoming issue of *Ask*.

Contest Rules:

1. Your contest entry must be your very own work. Ideas and words should not be copied.
2. Be sure to include your name, age, and state on your entry.
3. Only one entry per person, please.
4. Your entry must be emailed by a parent or legal guardian, saying it's your own work and that no one helped you, and that *Ask* has permission to publish it in print and online.
5. For information on the Children's Online Privacy Protection Act, see the Privacy Policy page at cricketmedia.com.
6. Email a photo or scan of artwork to: ask@cricketmedia.com, or mail to: *Ask*, 70 East Lake St., Suite 800, Chicago, IL 60601. Entries must be postmarked or emailed by March 31, 2021.
7. We will publish the winning entries in an upcoming issue of *Ask*.

Whatson's Book Corner

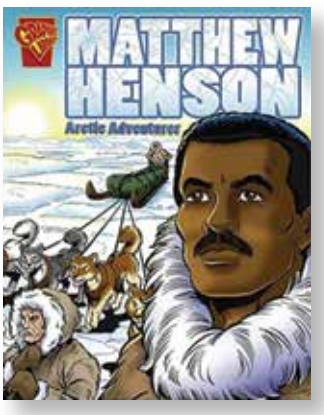
Science Comics: Polar Bears
by Jason Viola and Zack Giallongo



If you want to know about the Arctic, why not ask someone who lives there? In this fun book, two mischievous polar bears learn the art of stalking a seal and other polar bear basics, while exploring the Arctic and its many exciting dangers. Seals, watch out!

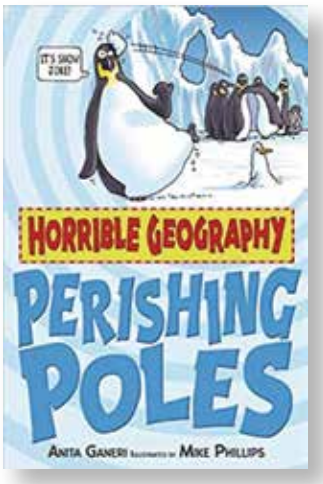
Matthew Henson, Arctic Adventurer
by Phil Miller

In the early 1900s, teams of explorers raced to be the first to reach the North and South Poles. Matthew Henson was a skilled sailor, navigator, and carpenter who was working as a store clerk when he joined a North Pole team in 1906. He built the sleds and found the way, and he may have been the first person to reach the pole! This cartoon book tells the story of his adventurous life.

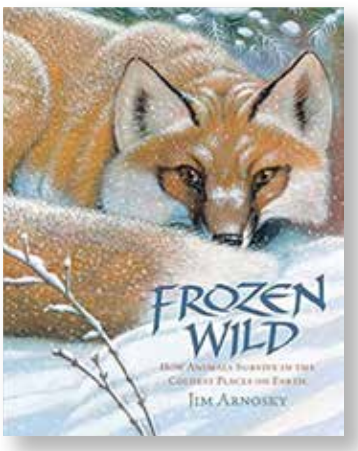


Perishing Poles
by Anita Ganeri

I'm delighted to find that the Horrible History team does geography too. Here they find the funny side of polar science, explore the many kinds of ice, and meet interesting polar animals and people. Liberally sprinkled with terrible penguin puns, bad jokes, and hair-raising stories of explorers in polar peril.



Frozen Wild
by Jim Arnosky



How do animals survive in the coldest places on Earth? This beautiful book reveals the hidden secrets of beavers, otters, polar bears, whales, snowy owls, and other animals of the Arctic and Antarctic. It's comforting to learn they have so many clever ways to stay warm and find snacks. A great book to curl up with on a cold winter night.

text and art by Thor Wickstrom

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