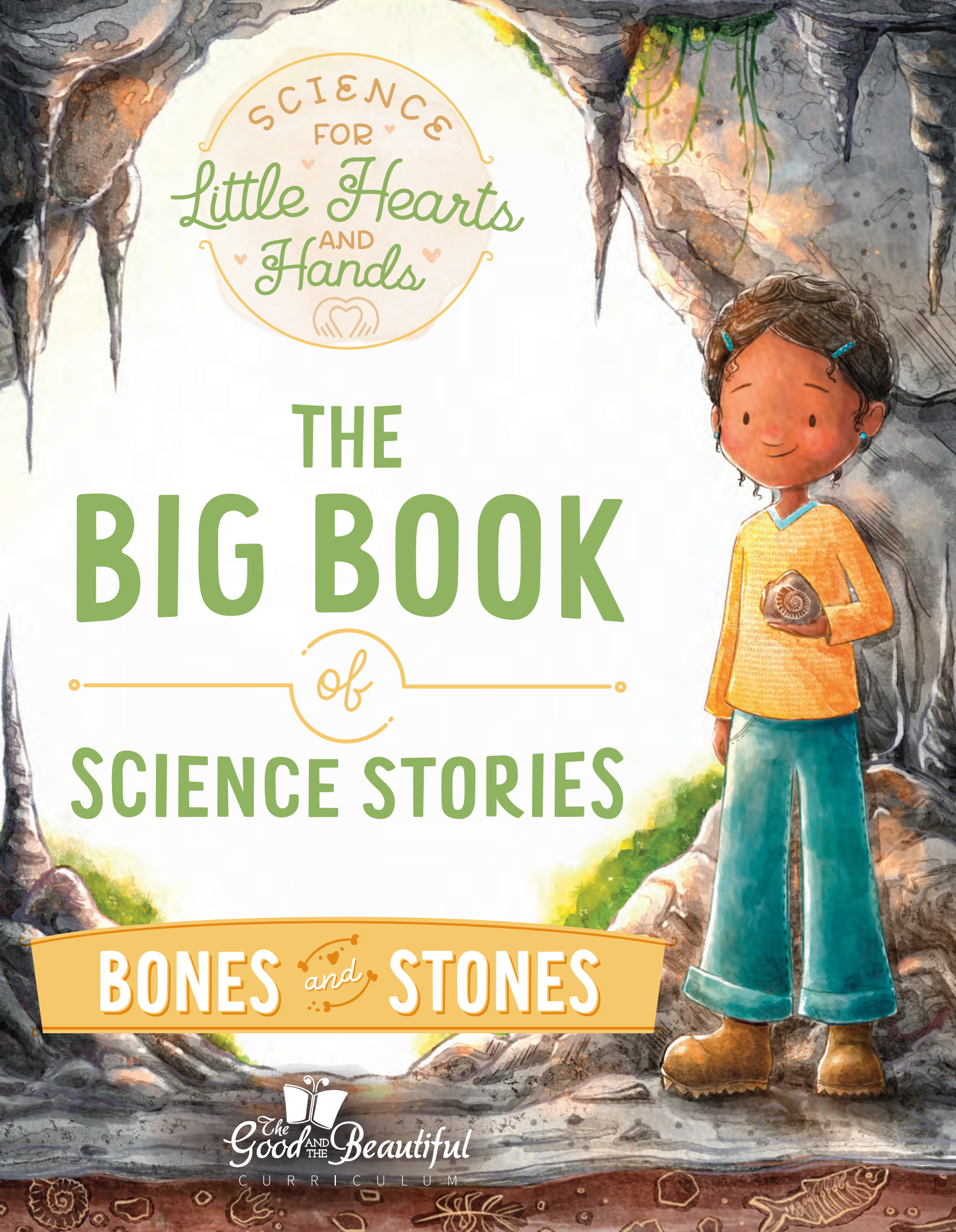

SCIENCE FOR
Little Hearts AND Hands
THE
BIG BOOK
of
SCIENCE STORIES
BONES and STONES
The Good AND THE Beautiful
CURRICULUM

TABLE OF CONTENTS

The Missing Piece

Illustrated by Vanessa Toye

Waves lapped at the sandy beach as the hot summer sun beat down. Trina and her younger sisters, Tabby and Veda, sat in shallow water, scooping up handfuls of sand and letting the water wash the tiny grains away again.

"Girls!" Grandpa called. "Come get some melon!" Trina's mouth watered. She was so hungry. The girls jumped up and ran to the picnic table, where their grandpa handed them each a slice of juicy watermelon. They ate the sweet fruit, wiping juice from their mouths after every bite.

When Trina was finished, she jumped from the table, ready to head back to the water. As she landed, one of her feet bumped into something poking out of the sand. Trina brushed the sand away with her fingers.

"Grandpa!" she cried. "Tabby! Veda! Come look at this!"

"Well, I never . . ." Grandpa's voice trailed off.

"What?" the girls asked together.

"That looks like a fossil!" he exclaimed.

"Wait—a *real* fossil?" Trina asked, amazed.

A few weeks later, Trina, Tabby, and Veda sat on Grandpa's back porch, sipping lemonade. Grandpa's footsteps sounded at the back door.

"Girls," he said, grabbing their attention. "I have a surprise for you."

"What is it?" Trina asked, jumping up.

"What are we doing?" Veda and Tabby inquired at the same time.

"Grab your shoes and get in the jeep. We've got somewhere to go!" Grandpa instructed. The girls squealed and ran to the jeep.

Fifteen minutes later, Grandpa pulled the jeep into the parking lot of the local museum. “This way,” Grandpa directed them, leading them into the building and down a long hallway. They soon entered a room with a large mammoth statue. Paintings of ancient animals covered the walls.

Also on display in the center of the room was a large skeleton of what looked like some kind of horse. Mr. Dom was waiting in the room, and he waved and motioned for them to come over to the display.

"Thanks for coming!" he told the group. "I wanted to show you this." He pointed to the display. "These are the fossils of a horse that lived many years ago. We've been putting together this display for a long time, and we were missing a few of the fossils. Can you guess what you found?"

"One of the missing pieces?" Trina guessed excitedly.

"Correct!" Mr. Dom answered. "You found the missing fossil, and we wanted to thank you."

Reaching into his pocket, he pulled out a string of deep yellow-orange beads. "This is an amber necklace," he said, handing the necklace to Trina. She took it in her hands and felt the smooth beads. "Amber is actually a type of fossil," he explained. "Some trees keep out germs and bugs by making gooey stuff called resin. When resin hardens over time, it turns into amber." He went on, "When people discovered amber, some thought it was so beautiful they decided to make jewelry with it."

Trina pulled the necklace around her neck and clasped it safely on. Tabby and Veda leaned over to look at Trina's special gift. "You're wearing a fossil!" Veda exclaimed, and the girls giggled.

"Thank you, Mr. Dom," Trina told him.

"Thank *you*," he replied.

FUN FACTS ABOUT

FOSSILS

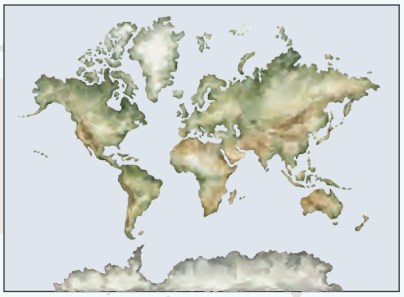
If you ever find what might be a fossil, leave it there, record the exact location, and report it to a local organization that deals with fossils. They will let you know whether or not you can keep it!

The process by which a bone or other material becomes a fossil is called **fossilization**.

Some fossils are so tiny that we can't even see them! They can only be seen through a scientific tool called a **microscope**.

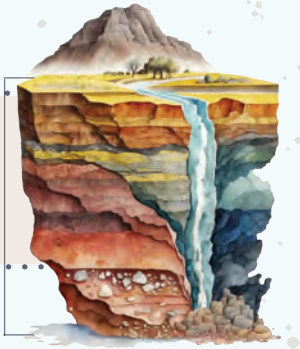
MICROSCOPE

Fossils have been found on every continent on Earth!



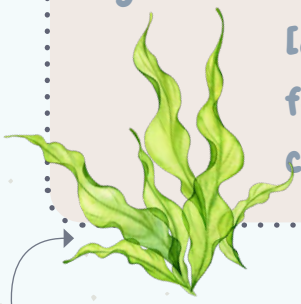
Many of the earth's fossils have been formed underwater. Moving water can quickly cover dead plants or creatures with mud, which turns them into fossils over time.

Most fossils are found in a "soft" type of rock called **sedimentary rock**.



SEDIMENTARY ROCK

One type of fossil can help keep bugs from eating your garden! A powdery substance called **diatomaceous** [die-uh-tuh-MA-shus] **earth** is made up of fossilized algae and, when sprinkled on plants, can help keep bugs under control.



ALGAE

Ancient Aquarium

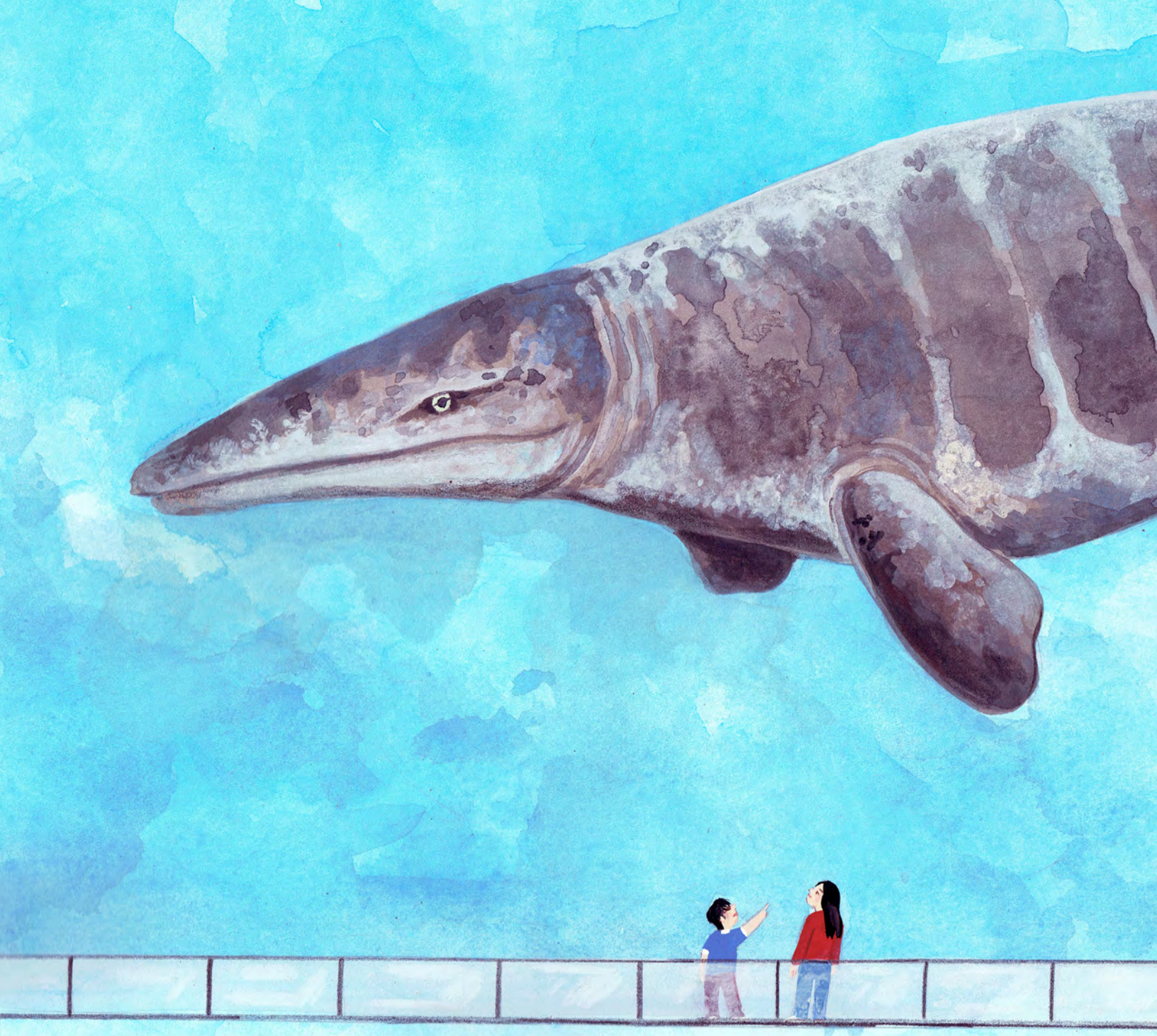
Illustrated by Olga Baumert

It was a rainy Friday afternoon. Nia sat in a big chair by the large window in the family room, watching the rain fall from the dull gray sky. She turned to her older brother, who was sitting on the couch looking at the fish swim round and round in their tank. With a sigh, she said, “I wish it wasn’t raining. I really wanted to play catch with you today, Riku.”

Riku replied, “Me too, but I’m sure we can think of something fun to do inside.”

“I won!” Sora squealed from her place on the soft rug, where she and her twin brother had just finished a board game. “Good game, Koda,” she said to him.

Suddenly, Koda looked up and shared an idea with his three siblings. “I know! Let’s imagine we’re at an aquarium.”



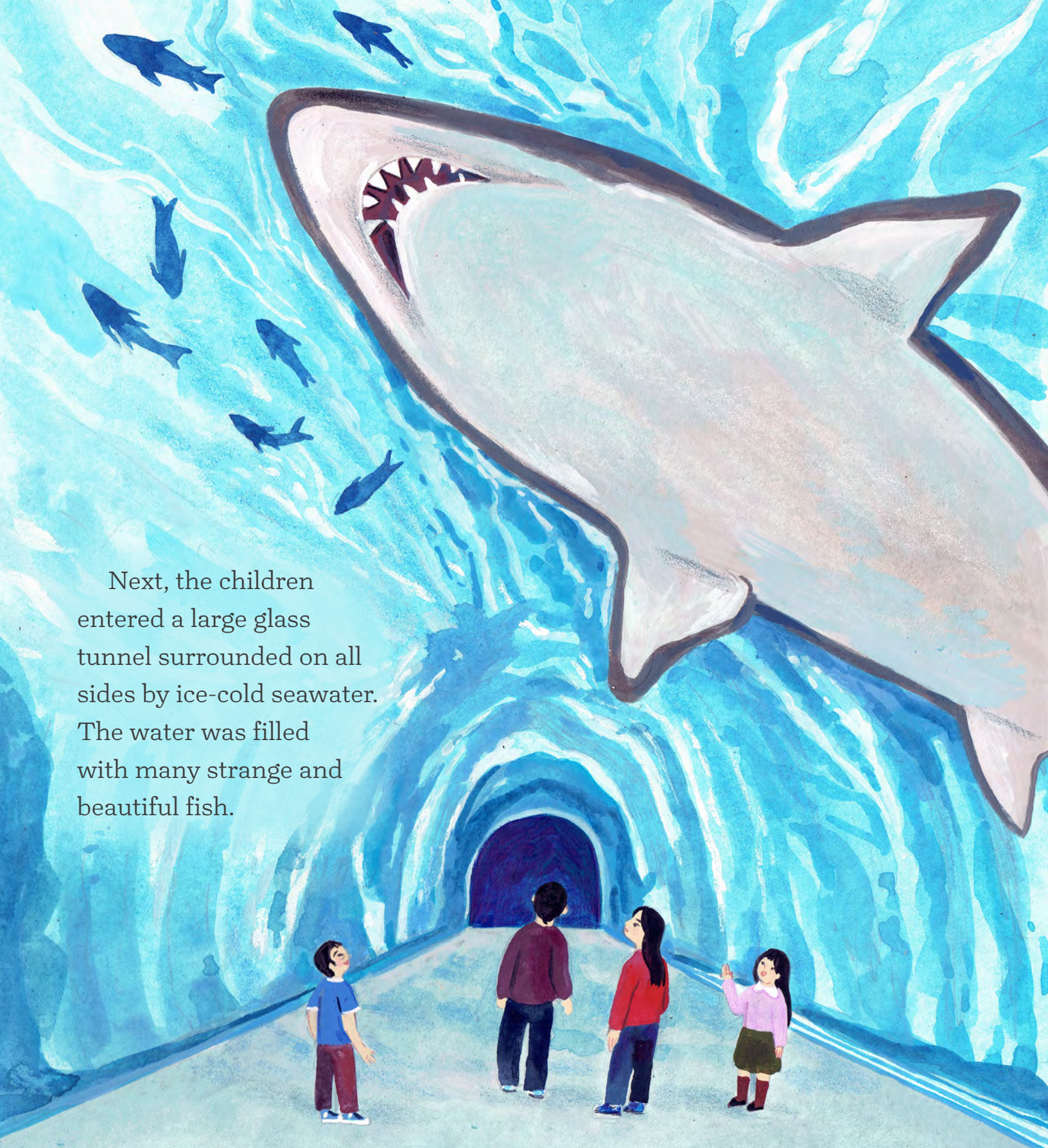
Koda suggested they move on to the next exhibit, where they saw a fierce *Tylosaurus* [tie–luh–SOR–us] paddling his four flippers through the water with his long tail waving out behind him.

"That's a big scary mouth," Koda said, backing away.

Riku nodded. "The *Tylosaurus* is just about the deadliest hunter in the ancient ocean. He can swallow birds, sharks, and dinosaurs without chewing!"

With a splash, followed by oodles of bubbles that rose to the surface, a giant sloth dove deep down to eat the green plants at the bottom.

"Long ago, the place where the giant sloth lived would have been a desert. He would've spent a lot of time in the cool water," Riku recalled.



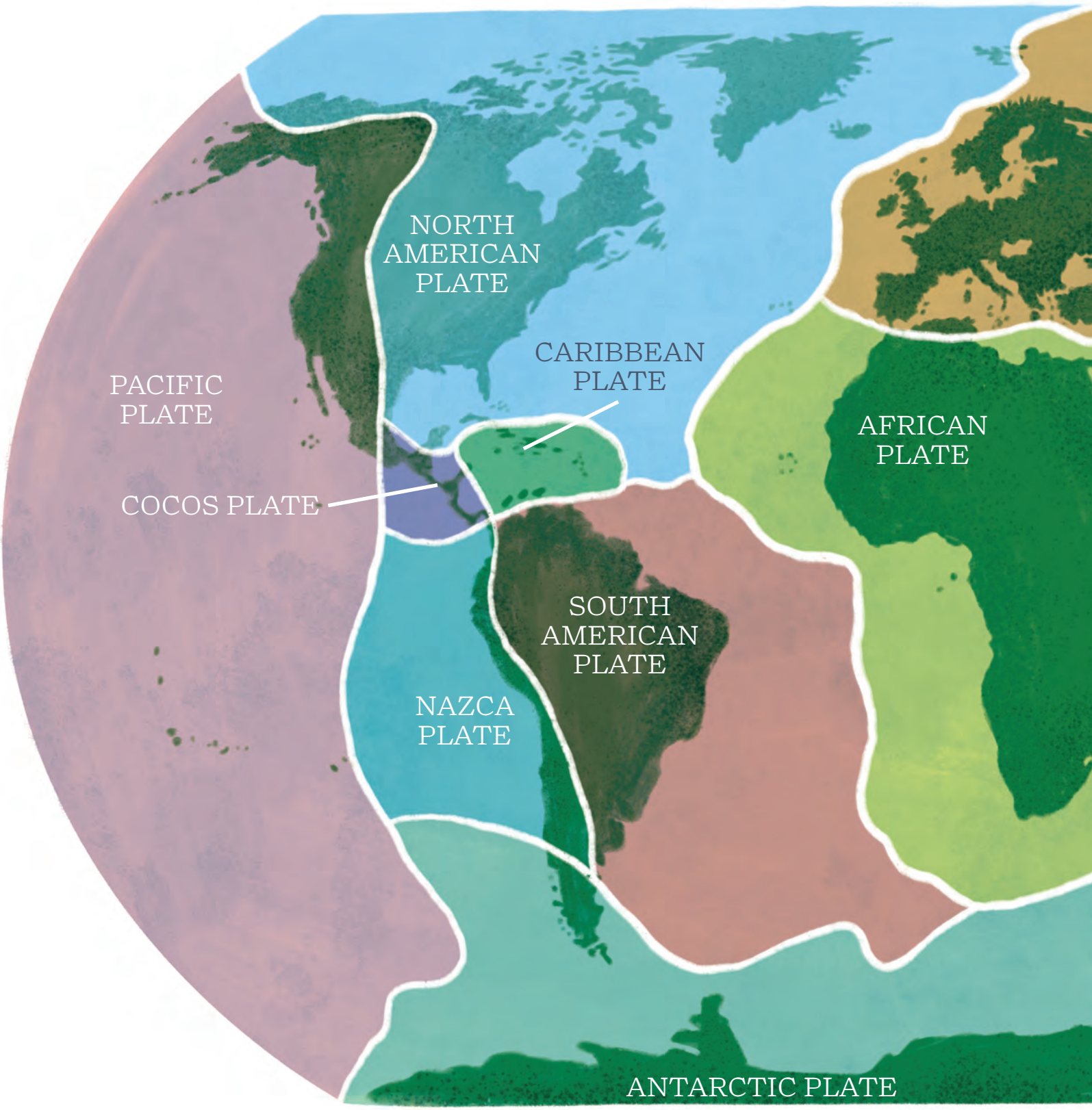
Next, the children entered a large glass tunnel surrounded on all sides by ice-cold seawater. The water was filled with many strange and beautiful fish.

Suddenly, a dark shadow blocked out the light directly above the children's heads. They all looked up to see a huge *Megalodon* [MEG–uh–luh–dahn] gliding silently above them!

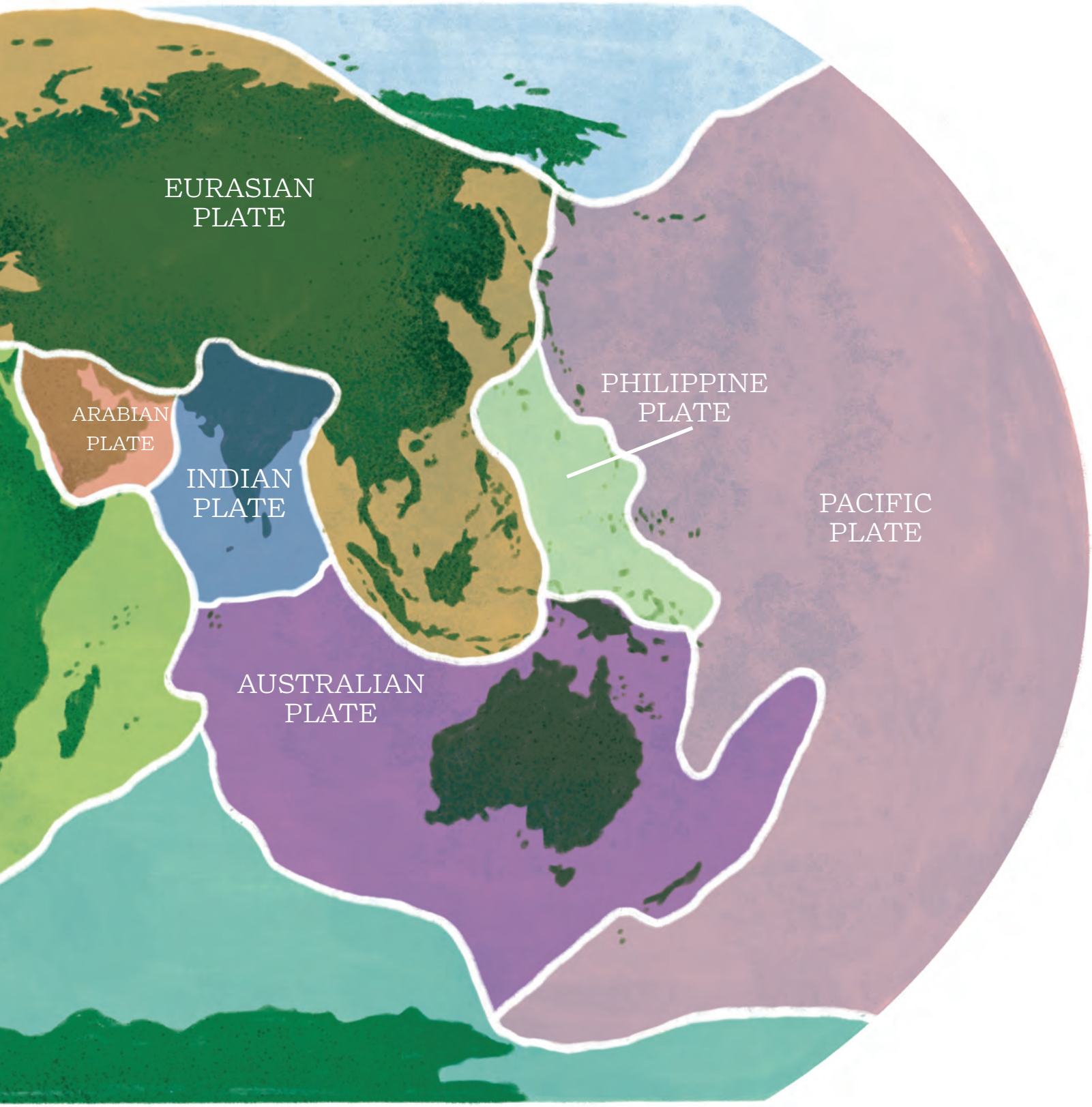

When the Earth "SHAKES"

Illustrated by Natalia Grebtsova

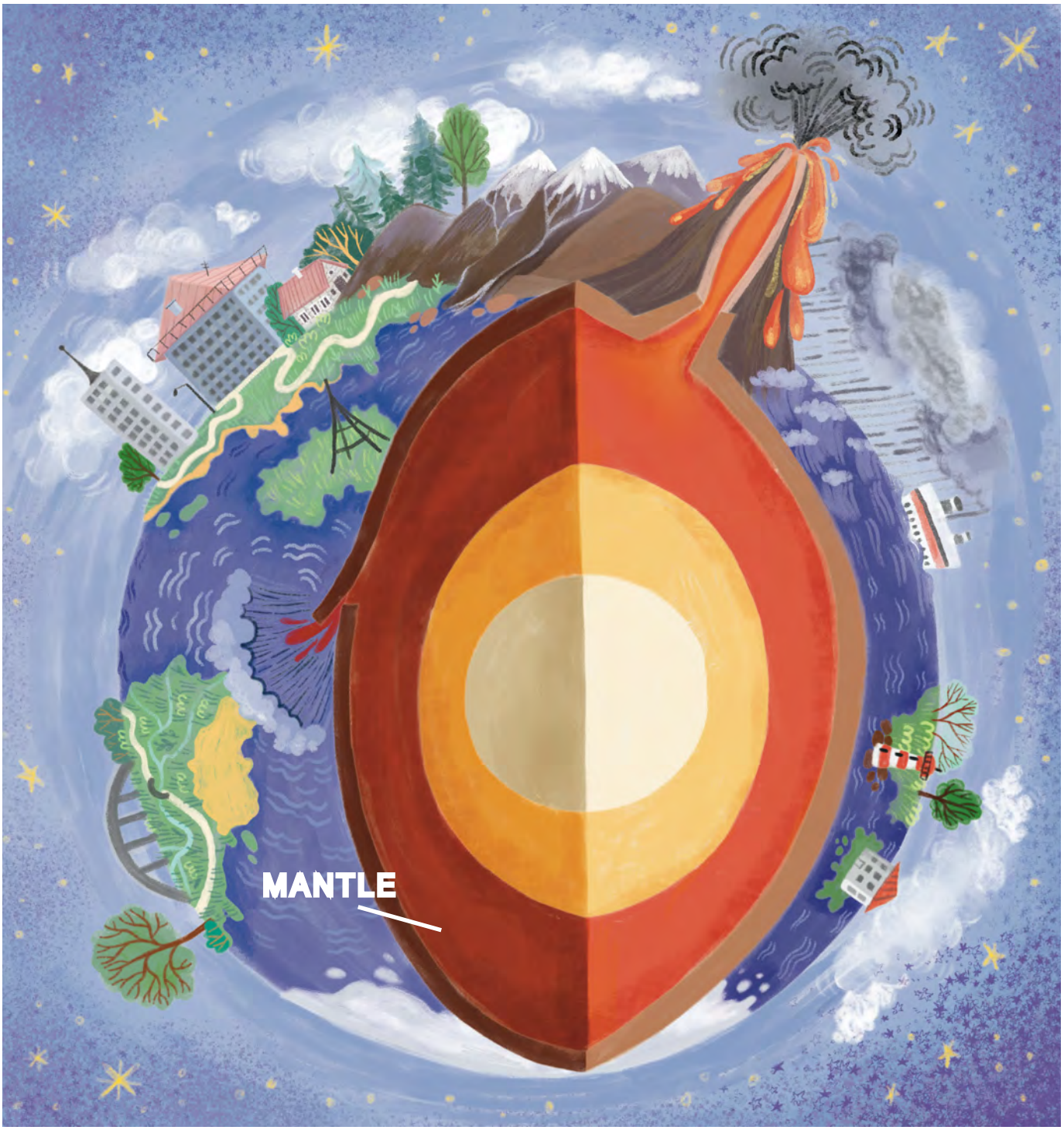
Deep down in the earth, there are many big chunks of rock—chunks bigger than a whole country! These big chunks are called *tectonic plates*, but they aren't like your dinner plates.



These plates are very thick and carry all of our cities, rivers, mountains, and countries on top of them. They make up the outer layer of the earth, also known as the *crust*, and fit together like puzzle pieces.

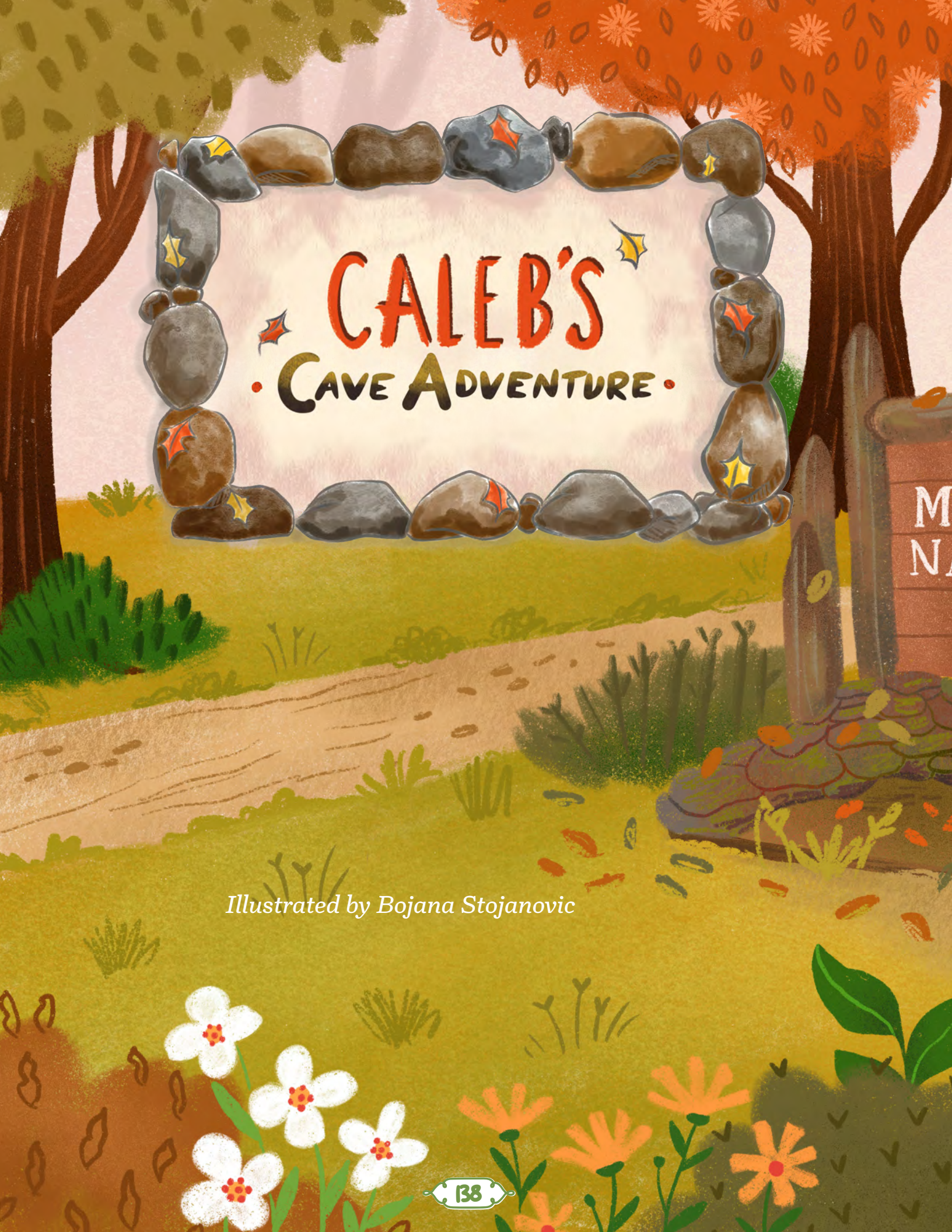


If you were to look beneath the earth's crust, you would see a layer much thicker than the crust, called the *mantle*. This layer is made up of hot, partly melted rock. The crust floats on top of the mantle, giving tectonic plates the ability to move.



Imagine a boat sitting on the water. Since there is liquid beneath the boat, it can't hold totally still—even when the wind or a motor isn't taking it anywhere.

Just like a boat on the water, tectonic plates are moving all the time, but the movement is small and slow enough that we usually don't even feel it.



Illustrated by Bojana Stojanovic


AMMOTH CAVE
ATIONAL PARK
A World Her
and International Biosphe

The leaves were turning red and orange as Caleb walked with his family down the path that led to Mammoth Cave. Glancing ahead, Caleb could see the entrance to the cave. “Water!” shouted Caleb’s little sister, Bella.

Trickling from the top of the cave down into the entrance was a waterfall surrounded by dark green ferns. The gentle breeze carried misty beads of water toward Caleb, who sighed with delight. The weather was warm and muggy, so he wasn’t quite sure why he needed to bring a jacket.

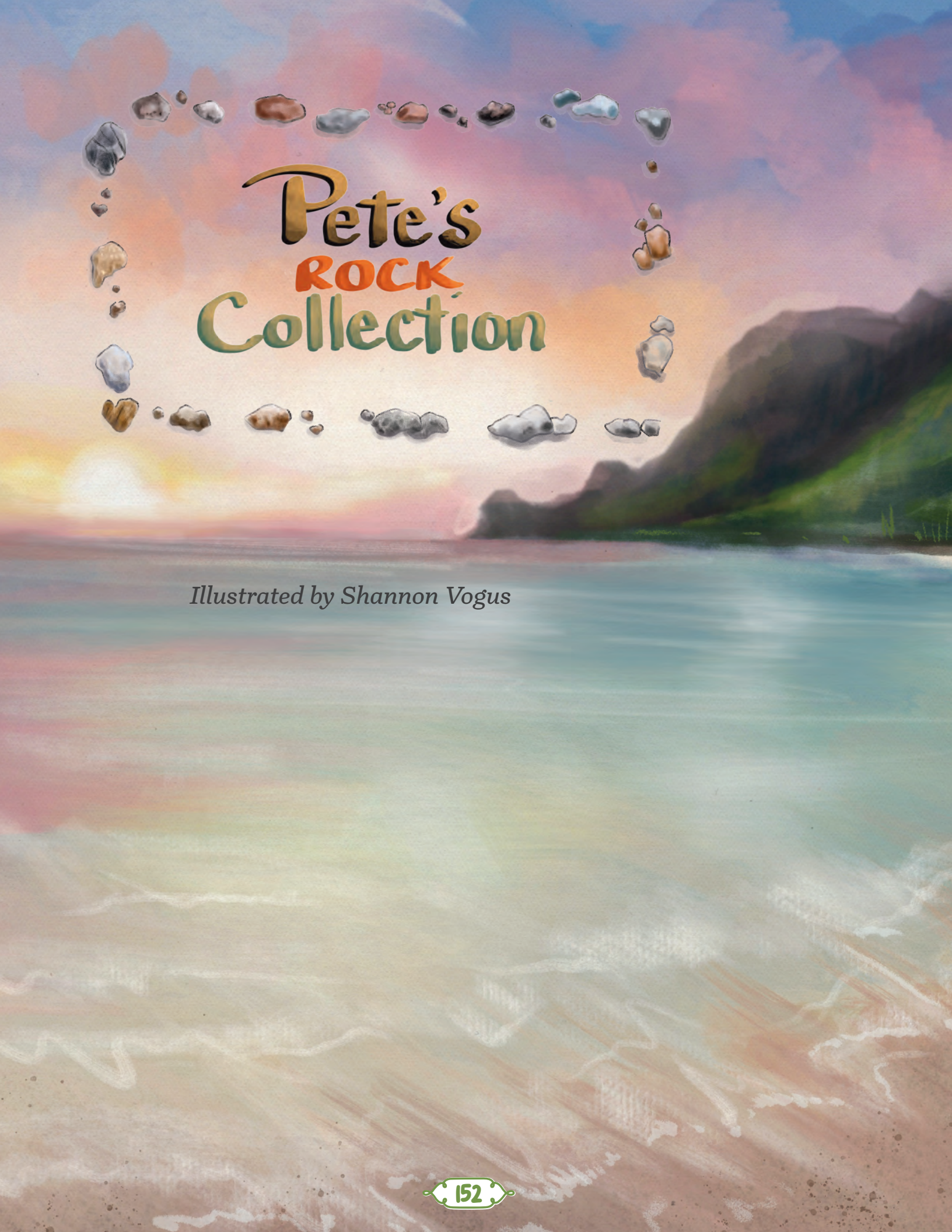
As they went through the cave opening made of gray limestone rock, Caleb felt the temperature drop—it was no longer warm like it had been when he had walked down the colorful autumn path just a few minutes ago. With a 40-degree drop in temperature and a windy breeze blowing through the entrance of the cave, Caleb was suddenly grateful he had brought his jacket. Caleb and his sister held on to the railing as they took the 68 stairs down into the cave.

At the bottom of the stairs, a tour guide was waiting for them. Everyone introduced themselves, and then he said, "Welcome to Mammoth Cave! I am Ranger Dave, and I am excited to have you join me today to experience the wonders that can only be found in the dark depths of our rocky earth. We are blessed to have the gift of electricity as we enjoy our tour today. When Native Americans and early settlers found this cave, they didn't have light switches or strong flashlights."

The lights went out, and Bella gave a surprised squeal. Caleb tried to adjust his eyes to the darkness, but everything around him was completely black. "Without light from a fire or electricity, this is what your tour would feel like today," continued Ranger Dave.

“Down here, the light from the sun cannot reach us, so no plants and only a few animals can survive in this darkness. Luckily, with the help of some light . . .” continued Ranger Dave as the lights suddenly switched back on, “you will be able to discover ‘deep’ beauty today. Be sure to pay attention to any sounds you hear.”

Caleb’s family walked along the railed pathway until they came to the end of a narrow corridor.



Illustrated by Shannon Vogus

Pete picked up a dark rock covered in holes. As he turned it in the palm of his hand, he noticed how rough it felt against his skin.

"Pete, are you about ready to go?" he heard his dad call.

"Yes, Dad," responded Pete as he carefully put the dark rock into his shirt pocket, closed the lid of his rock box, grabbed his notebook, and hurried to meet his father.

Today, Pete had the special opportunity to join Dad on a work assignment. Pete's dad was a geologist; he studied the rocks that formed the Hawaiian Islands.

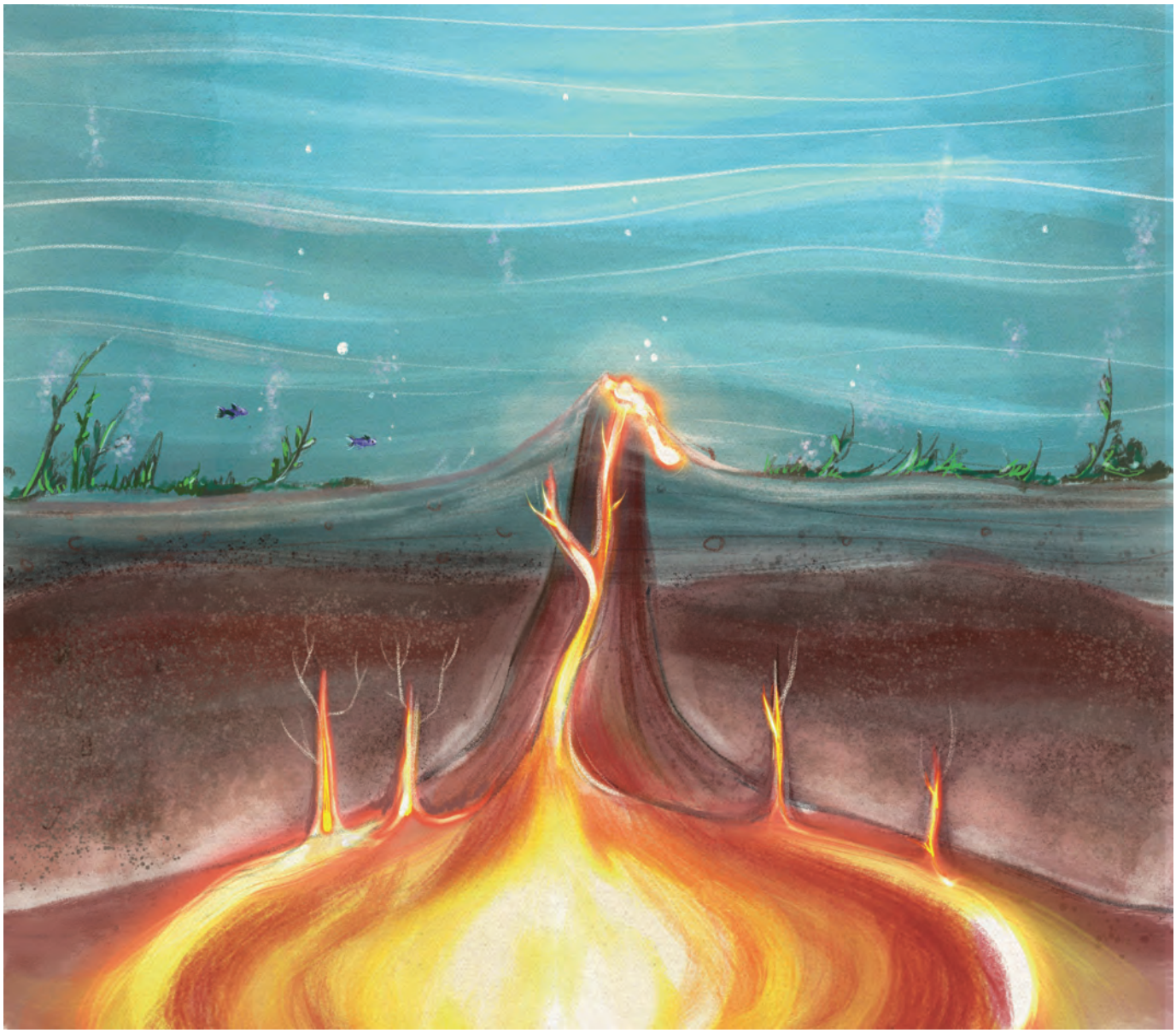
After buckling his seatbelt, Pete pulled the rock back out of his pocket. "Dad, are these the rocks we are trying to find today?" he asked.

"No, today we will be looking for something a little different," responded Dad. "I'll tell you about it when we get to the beach."

"While we drive, could you tell me the story of this rock again? It's my favorite story!"

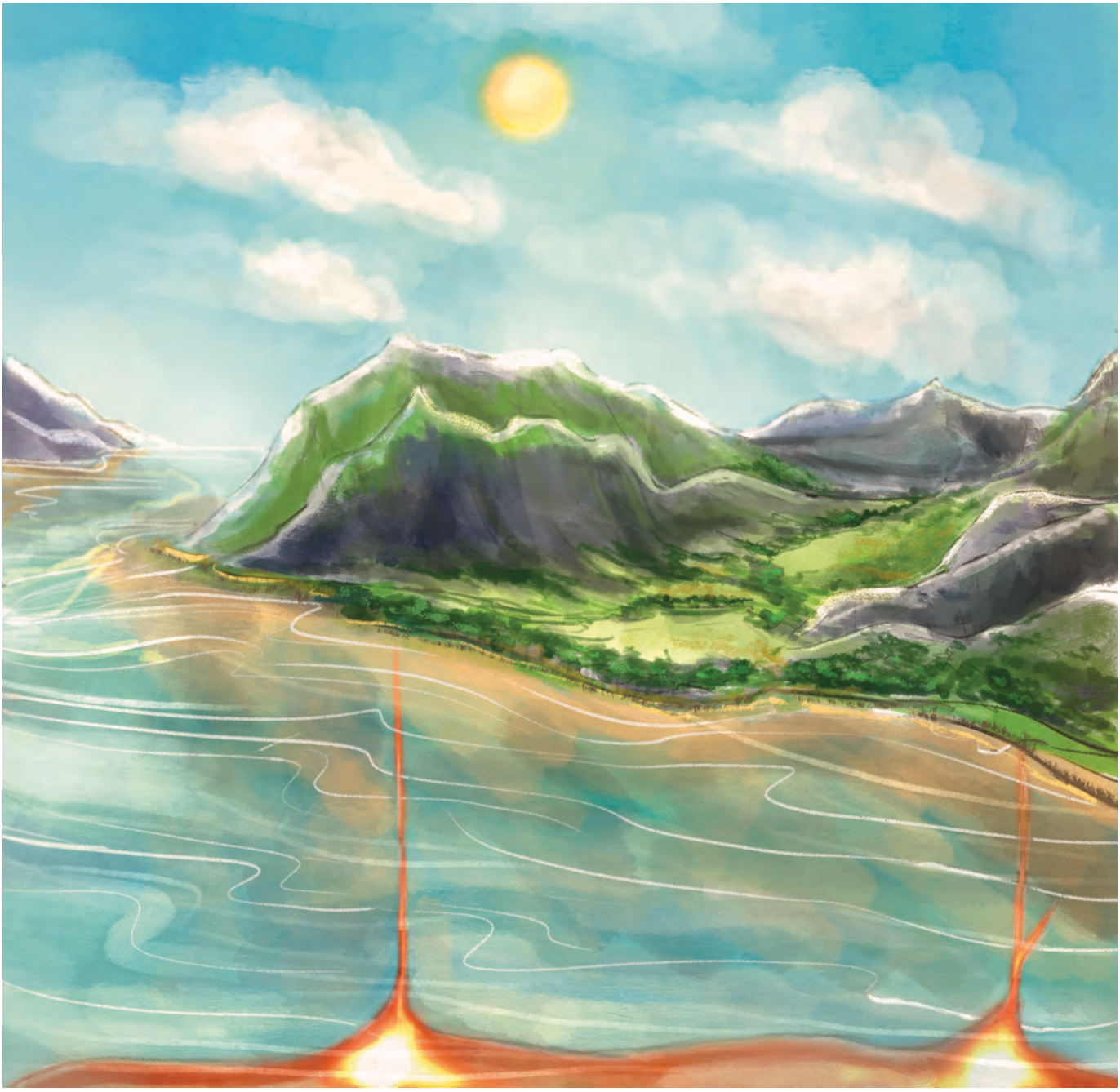
"Yes," chuckled Dad. "We should have just enough time."

Pete closed his eyes and tried to picture what his father described. “Deep down beneath the hard ocean floor is a rock that is so hot it flows like honey,” started Dad. “This liquid rock flows into cracks that are found in the hard outer layer of the earth.



“One day there was so much of this hot liquid rock trying to push into the cracks that it broke through the ocean floor! The melted rock cooled and created a small mountain at the bottom of the sea. More liquid rock pushed up through the new mountain, and it continued to burst up from below and cool again and again.

"Each time this tiny underwater volcano erupted, more layers cooled on top of it, and the little mountain grew until it wasn't very little anymore. In fact, it grew so big that it became taller than the surface of the ocean. It's now our beautiful island of Hawaii," finished Dad.



"So, that's how lava rock is born?" asked Pete.

Dad smiled. "Yes, and these types of rocks are called *igneous* rocks. However, rocks aren't really born, and they never die; they just change."


Polar to Tropic
EXPLORING CLIMATE
-ZONES-
ZOO

Illustrated by Shannon Vogus

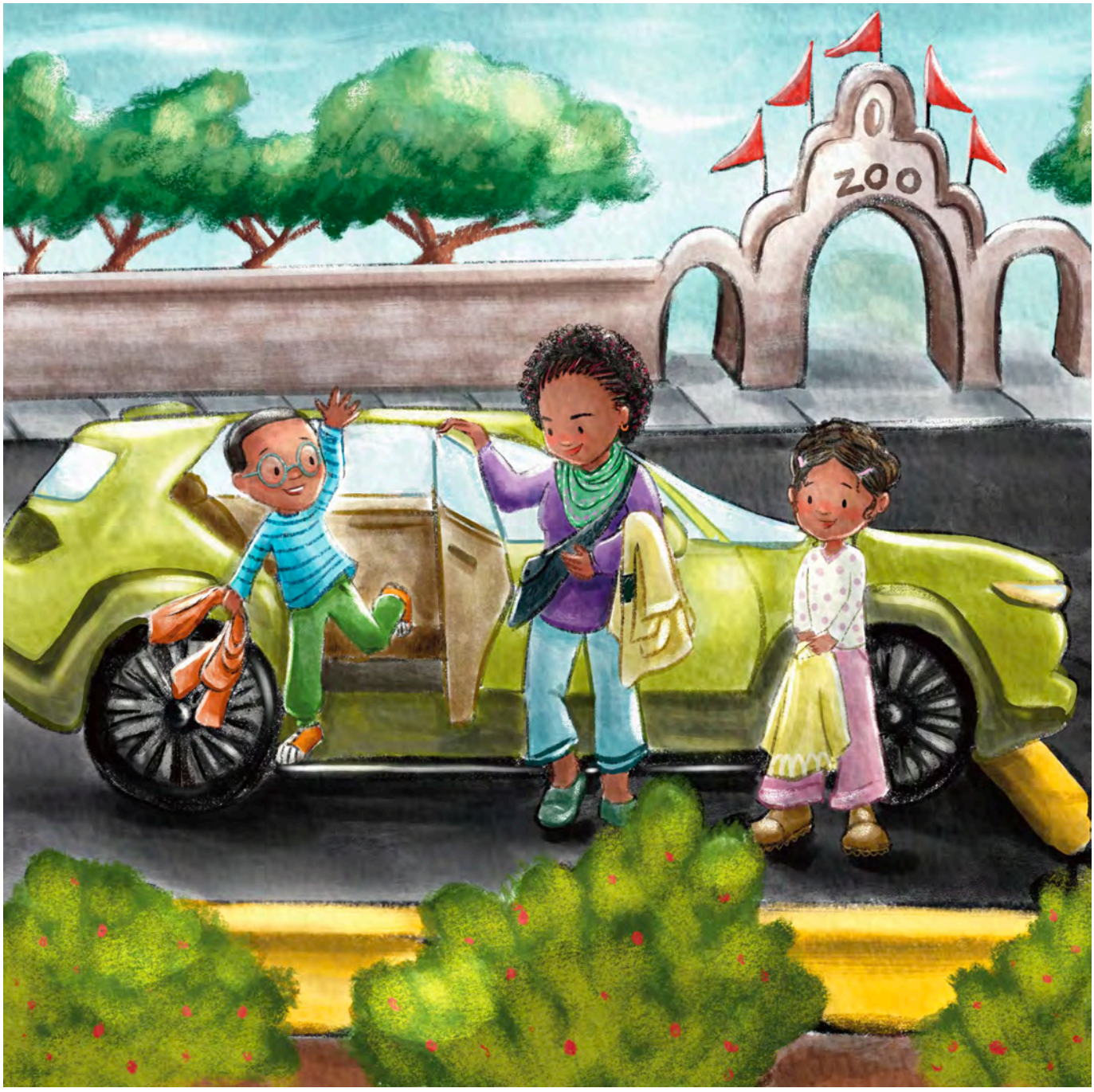
Carter squirmed in his seat in the car. Only a few more minutes and they would be there. His excitement for this long-awaited field trip was bubbling up inside of him and coming out in sporadic wiggles. His older sister Zion took one look at him and giggled. "Mom, I'm not sure Carter is going to make it to the zoo. He looks like he might fall out of his seat at any moment," she said with a kind smile.

"I'm sure he can wait two more minutes. I can see the zoo parking lot now," Mom replied, shooting a quick glance back at the bobbling Carter.

"I know. I know. I'm too excited to sit still! But will we really get to experience all three climate zones? I've loved learning about them at home, and I just want to see them come to life! Let's go!" Carter trilled.

"Yes, Carter," began Mom. "That's why we are going to the zoo today. I love letting you see science come to life, too."

Mom parked the car and unlocked the doors, and Carter sprang out of his seat, ready for adventure.



The family hurried through the ticket lines and into the zoo. They could just see the first building; it had a big sign above it that said "Into the Cold." Mom had picked this zoo specifically because it had a set of buildings to teach about each climate zone so the kids could learn about them in an active way.

"Anyone have any guesses which climate zone this building will be about?" Mom asked the kids.

"Polar!" they chimed together. Carter continued, "There are two polar zones—one at the North Pole and one at the South Pole. The sun doesn't shine straight at these areas of the earth, so the temperature is below freezing most of the time there."

As they walked into the building, the summer warmth faded away, and a blast of cold air whooshed over them. They all shivered and put their sweatshirts on.

Inside, walls were painted white to look like the snowdrifts of one of the coldest places in the polar zone—the Arctic. Carter scurried over to the glass enclosure of an arctic hare, while Zion turned to admire a beautiful snowy owl.

"What else do you two remember about this zone?" Mom asked as she watched them delightedly.

"In the polar zone, the winters are long, and the summers wouldn't even feel like summer to us," Zion recited. "Plants don't grow as well there, but there are lots of amazing animals, such as polar bears and this fluffy white snowy owl." Just as she finished explaining, the owl she was watching took off from its perch with a great flapping of its wings and flew across the enclosure.

"Yes! And I love that most of the animals there are white so they can blend in with the snow! Check out this cool hare!" Carter squealed, jumping up and down in time with the hare. Zion and Mom laughed.

Carter continued, "I love that when He made them, God thought of every detail these animals would need to survive—even their fur color!"

After watching the hare hop around its enclosure, the family explored more of the building. They were able to see . . .

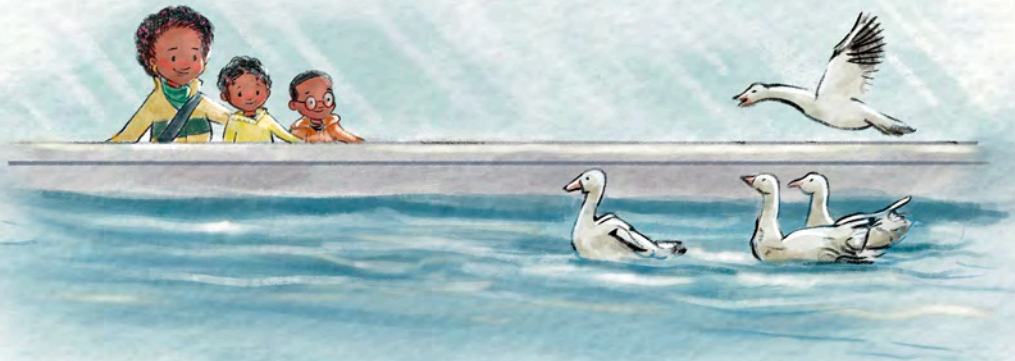
an arctic fox,

lemmings,

penguins,

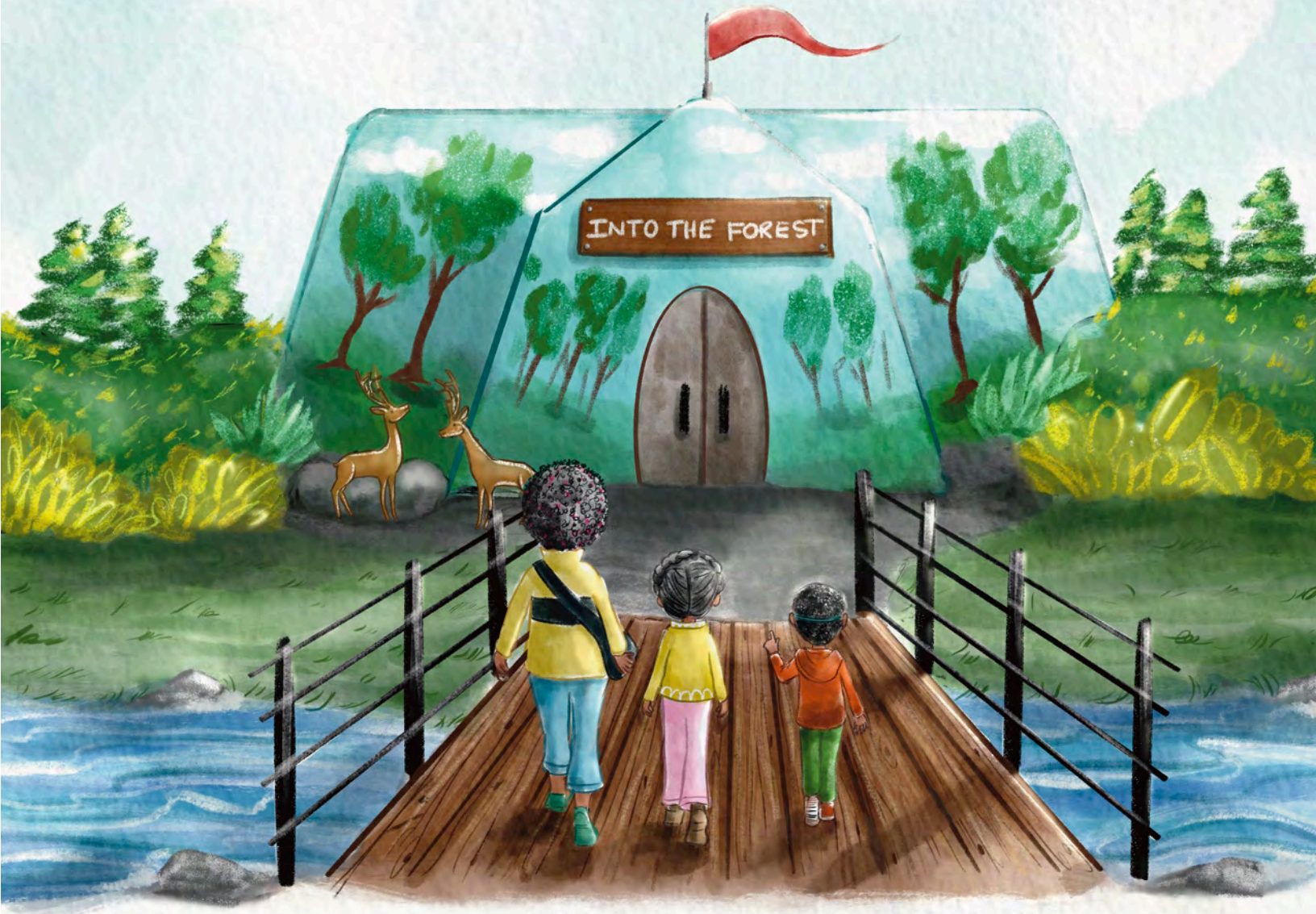
seals,

and a small flock of snow geese.



As they left the building, they crossed over a small bridge that led to the next building with a sign saying "Into the Forest" above the entrance.

Carter held the door for his mom as they walked inside. "What a gentleman, Carter. Thank you!" Mom exclaimed, then asked both kids, "What zones come next on our planet? They're the ones that are not too hot and not too cold."



Zion took a look around, noticing the beautiful forest-themed paintings on the walls. She noticed that the air temperature felt warmer, similar to the way it felt outside today. "Oh, I know! You're talking about the temperate zones, where we live!" She pulled the sleeves up on her sweatshirt.

"Good job, Zion!" Carter gave her a thumbs-up. "The sun shines more directly on these zones because they're closer to the middle part of the earth that sticks out the most. My favorite thing about living in the temperate zone is having four different seasons every year: winter, spring, summer, and fall," Carter remarked.

"I'm glad you two remember all that," Mom praised. "Most of the people on the planet live in temperate zones, and many kinds of plants and animals can live in these zones because the temperatures don't get extremely high or low. Oh, wow! Check out that raccoon!" Mom quickly pointed to a raccoon just as it jumped into its water bowl and splashed drops everywhere.

The temperate zone building was larger than the first building, and they visited all kinds of animals, such as deer, foxes, wolves, hedgehogs, skunks, turtles, and even a majestic-looking moose.

They went out the door and crossed a second bridge. There were even more animals outside that lived in the temperate zone.

Carter was very excited when a squirrel skittered along the path right past them.

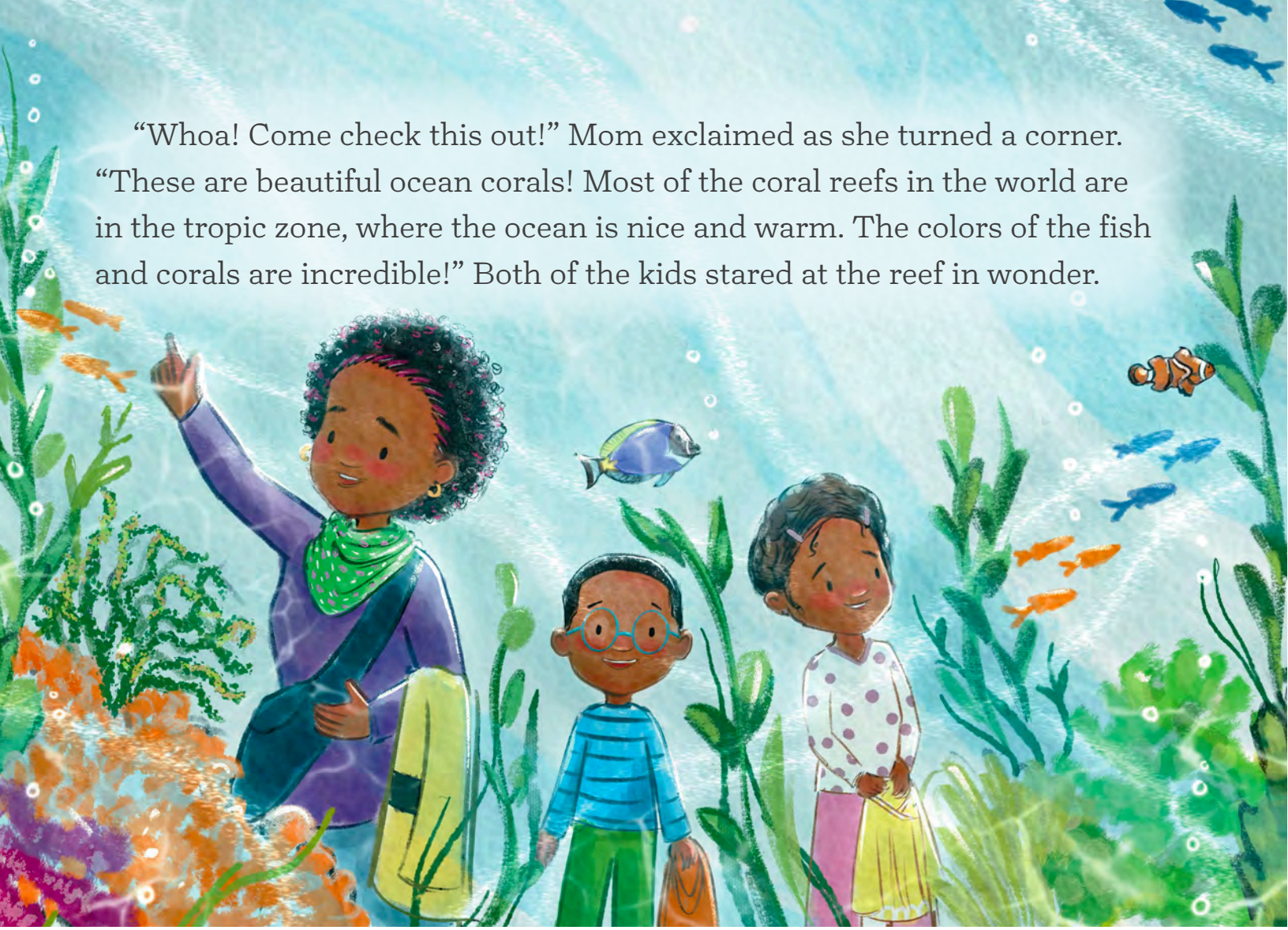
The last building was called “Into the Rainforest.” As they went in, the air became warm and heavy, like a blanket wrapping around them. The walls were mostly hidden behind leaves and vines from the plants growing everywhere. Before Mom could ask the kids what zone this could represent, Zion asked, pulling her sweatshirt over her head, “Isn’t this the tropic zone?” She was already starting to sweat!

Fanning herself, Mom took off her sweatshirt too. “That’s right, Zion. Why do you think the zoo made it so hot in here, Carter?” Mom asked as they followed Carter over to a huge tank with a giant anaconda.

"Because the tropic zone is right at the equator—the part of the earth that gets the most sunlight. This zone has forests where it rains a lot. Get it? Rain. Forest. Rainforest," Carter answered, grinning. "Can you help me take my sweatshirt off?" he said as they walked. It wasn't raining, but the hot air felt wet anyway.

"Of course, buddy," Zion said as she helped Carter remove his sweatshirt. "I remember learning that it rains a lot in the tropic zone, and it doesn't get very cold. And that the amazing tropical fruits, such as bananas, pineapples, and mangoes that I love to eat, come from this climate zone." She rubbed her stomach, thinking of lunch.

"Whoa! Come check this out!" Mom exclaimed as she turned a corner. "These are beautiful ocean corals! Most of the coral reefs in the world are in the tropic zone, where the ocean is nice and warm. The colors of the fish and corals are incredible!" Both of the kids stared at the reef in wonder.



They couldn't stay too long, though, because they wanted to check out the animals that live in the tropic zone—monkeys, jaguars, toucans, poison dart frogs, anteaters, and sloths.

Near the exit of the building was a colorful model of the earth—a globe. It was taller than Mom and showed where all the climate zones were. A small plaque next to it explained about each zone and said that they could be broken down into even more specific climate zones with longer names, such as tropical rainforest, desert, temperate oceanic, and polar tundra.

Looking at the globe, Zion realized how much more there was to learn about climate zones! She turned to Mom, ready with questions. This trip had been perfect. She and her brother had experienced what it might be like to be in each of the planet's major climate zones. Zion hoped they would go visit them all one day.

FUN FACTS ABOUT

ZONES OF THE WORLD

Birds can be found in most zones of the world, but some birds that live in temperate zones take a "vacation" during the colder months of the year. These birds will travel to warmer areas, such as near the tropic zones, to be able to find food.

Many well-loved foods, such as chocolate, sugar, and coffee, grow in tropic zones.

COCOA BEANS

There are over 200 species of monkeys, and they live in tropical forests in Asia, Africa, and the Americas.

Fungi, such as mushrooms, are an important part of life in the forests of temperate zones. One such mushroom is called the giant puffball mushroom. As its name suggests, this large white mushroom is shaped like a sphere and can be as small as a golf ball or even bigger than a soccer ball!

Polar bears live in polar climates and have fur that appears white for camouflage in their snowy environment. Surprise! The skin underneath their warm coat of fur is actually black!

Ever wonder where the temperate zone gets its name? It makes perfect sense because the word temperate actually means "mild" or "pleasant!"

Rainforests usually make us think of tropic zones, but a temperate rainforest is a special type of rainforest with mild climates and temperatures that are found in temperate zones.

The snowy owl has tiny rough hairs, called **bristles**, around its hooked beak that help it feel when it is close to something. This same beak helps it catch and grip its food, which it can swallow in one gulp!