1 CHALK, ICE AND BONES

Dmytryk saw his friends from afar – they'd gathered by the secret cliff. There it was: Aliye's black hair, Sashko's tuft of red hair and Yasia's chestnut plaits with purple strands. His three friends were peering at something in the grass.

"You're late," Sashko grumbled.

Dmytryk whipped out his phone:

"Mama called."

His mother fought in the 57th Motorized Infantry Brigade in the east of Ukraine, and you never knew when she would get another chance to call her loved ones.

His friends nodded. Mama was a good enough reason to be late.

"Look what we've found on the lake shore," Yasia said, gesturing toward the grass. "Do you know what that might be?"

Dmytryk looked at two rocks.

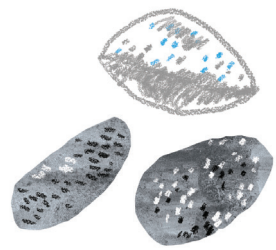
"My grandpa called them devil's fingers," he said, pointing at the longish one.

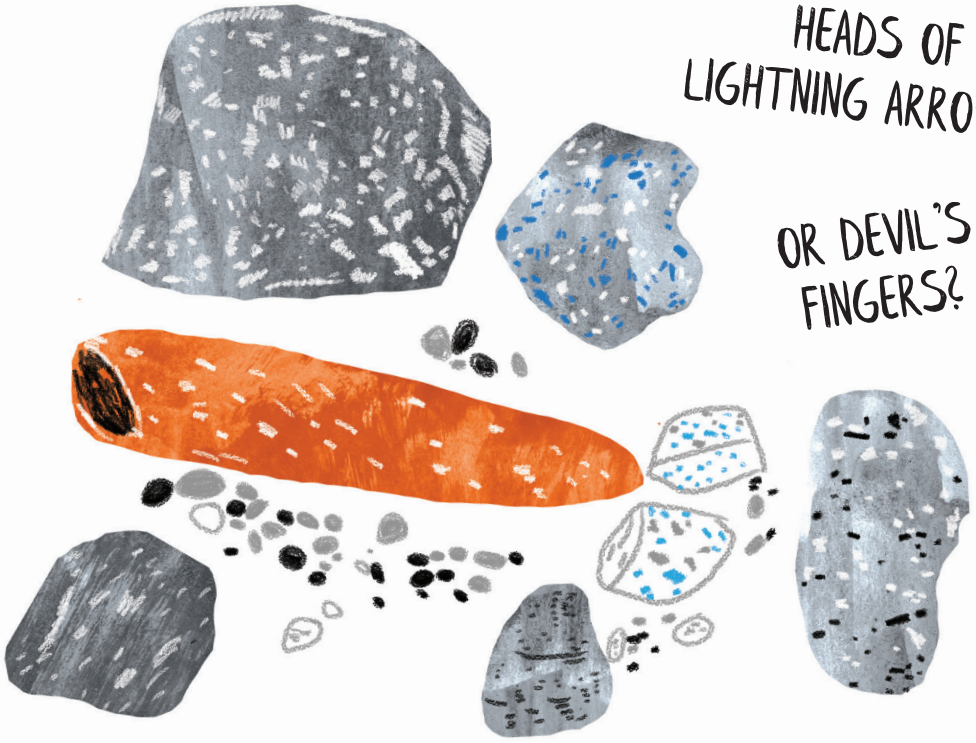
"And my grandma said they were the heads of lightning arrows. But I guess they're neither."

Aliye ran her fingers along their find thoughtfully.

"I think I know who can tell us about them," she said.

Back at the holiday camp, Aliye shouted:





"Da-a-a-dy!"

"What happened, *kızım* (meaning 'my daughter' in Crimean Tatar)?" a man with glasses said, looking out of a pavilion in the park.

"Do you know what these are?" Aliye dashed to the pavilion like an arrow. Her friends tagged along.

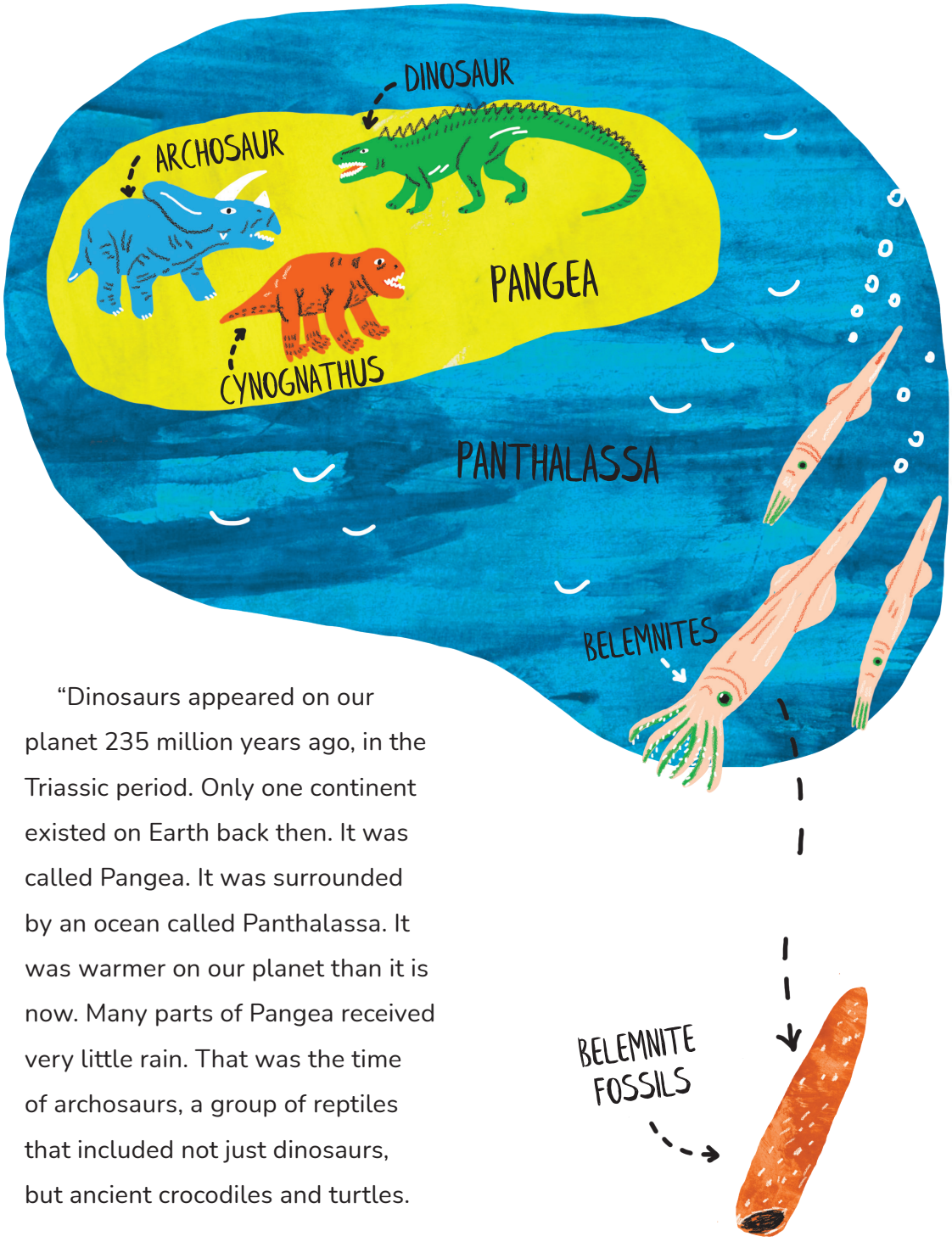
"I do," her father nodded. "These are mollusc fossils."

"Fossils?" Sashko said, perking up. "From the dinosaur era? Perhaps these are fossils of dinosaurs, not molluscs, Mister Rustem?"

"But what kind of dinosaurs lived here?" Yasia cut him short.

"Textbooks don't mention specific species!" Dmytryk said, getting excited.

"Alright," Rustem said, interrupting them. "I'll tell you the whole story. Come on over here, sit down.



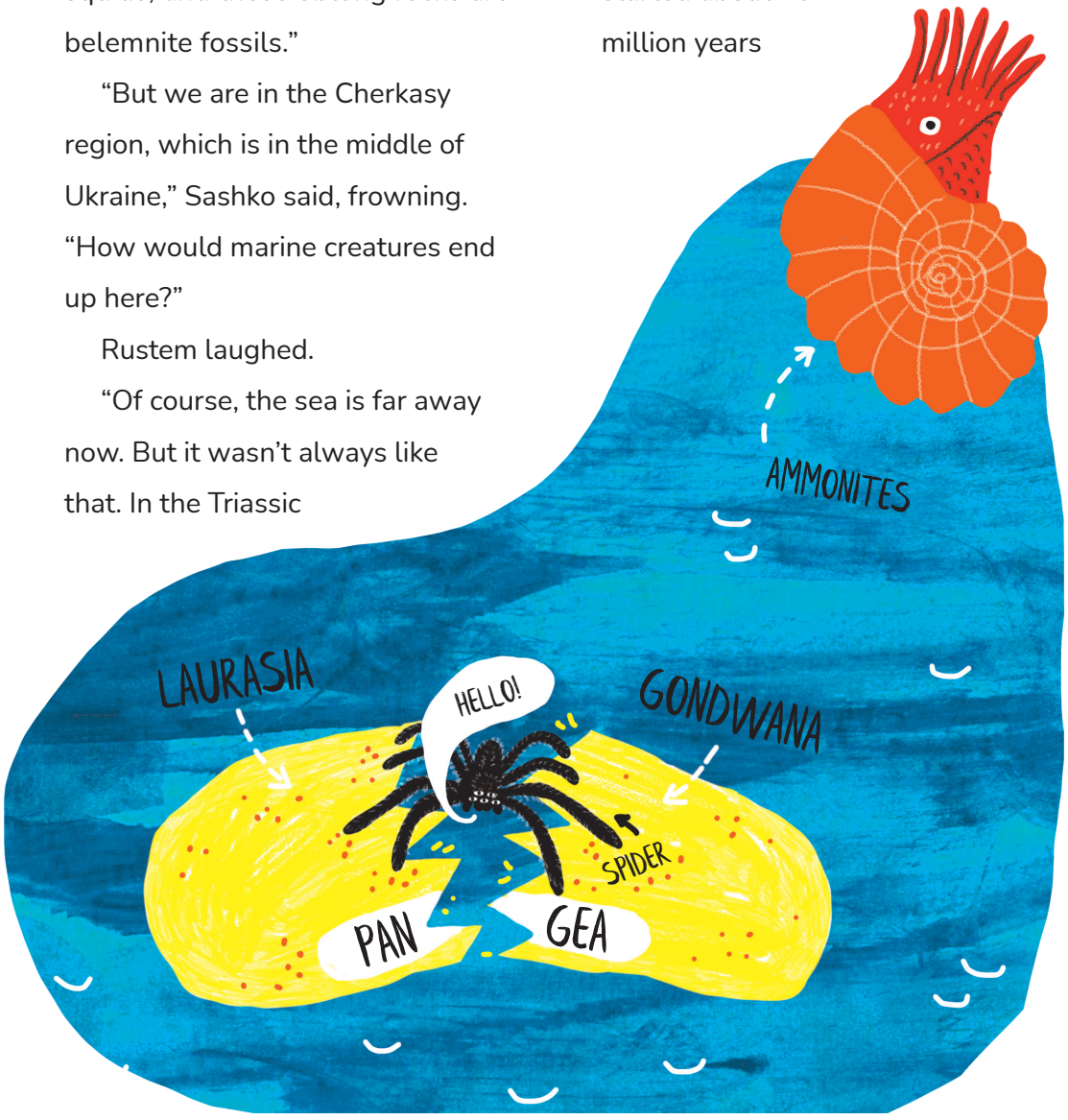
"Dinosaurs appeared on our planet 235 million years ago, in the Triassic period. Only one continent existed on Earth back then. It was called Pangea. It was surrounded by an ocean called Panthalassa. It was warmer on our planet than it is now. Many parts of Pangea received very little rain. That was the time of archosaurs, a group of reptiles that included not just dinosaurs, but ancient crocodiles and turtles.

The first turtles, dinosaurs and mammals appeared. And there were belemnites swimming in the seas. Those molluscs looked like squids, and these oblong rocks are belemnite fossils."

"But we are in the Cherkasy region, which is in the middle of Ukraine," Sashko said, frowning. "How would marine creatures end up here?"

Rustem laughed.

"Of course, the sea is far away now. But it wasn't always like that. In the Triassic period, there was only one continent, so much of what is now land was under the sea. And in the Jurassic era, the next period that started about 201 million years



ago, Pangea split apart to form two continents: Laurasia and Gondwana. New oceans appeared, such as the Atlantic. It was during the Jurassic period that the first birds and early mammals appeared, and **ammonites** lived in the ocean and seas. It was **a kind of squid mixed with a snail**."

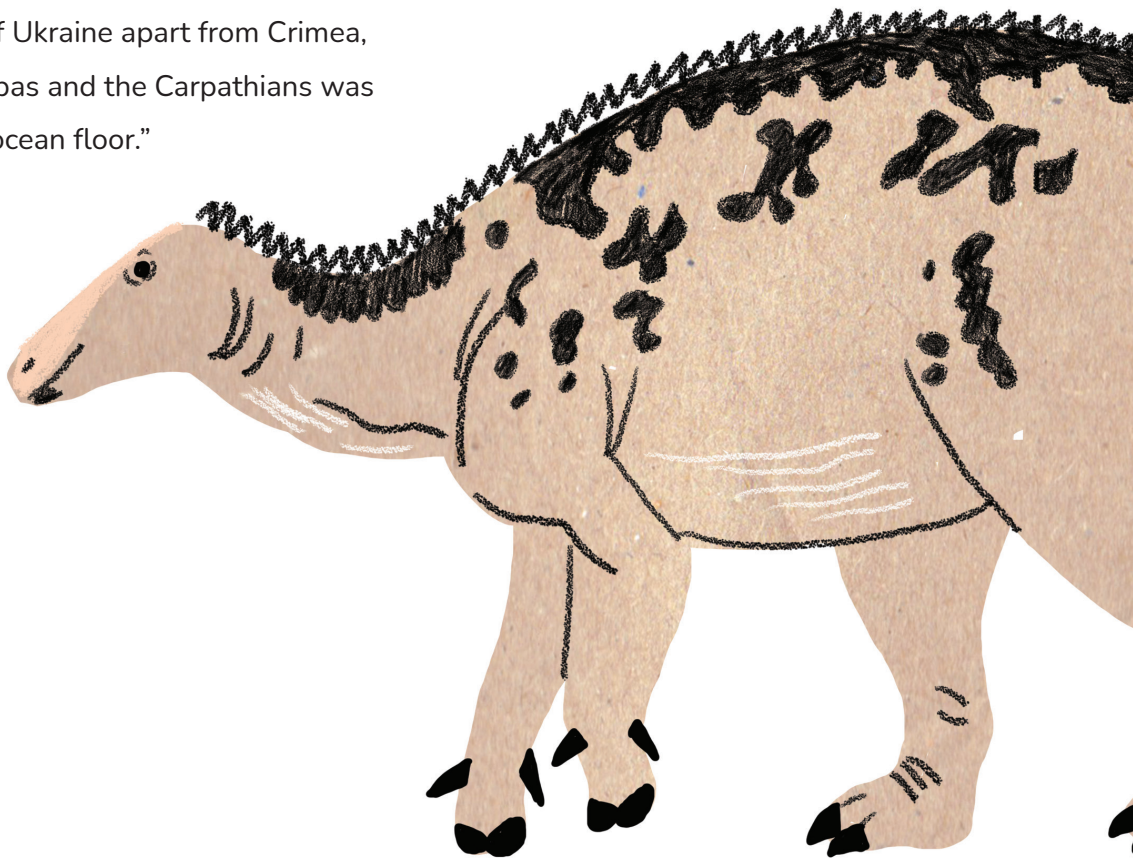
The children giggled.

"The Jurassic period was followed by the Cretaceous period, roughly **145 million years ago**. Back then, all of Ukraine apart from Crimea, Donbas and the Carpathians was the ocean floor."

"And what about dinosaurs?" Dmytryk asked. "The Jurassic period was the dinosaur era, for sure."

"Only two species have been found in Ukraine. Both in Crimea. Only one of them could be identified. It was a herbivore called Riabininohadros."

"Never heard of it," Sashko declared in the sceptical tone of a dinosaur expert.



“It’s a close relative of Iguanodon.”

“Well, if you say so…” Sashko said thoughtfully and pulled up a browser on his smartphone to check out those Iguanodons.

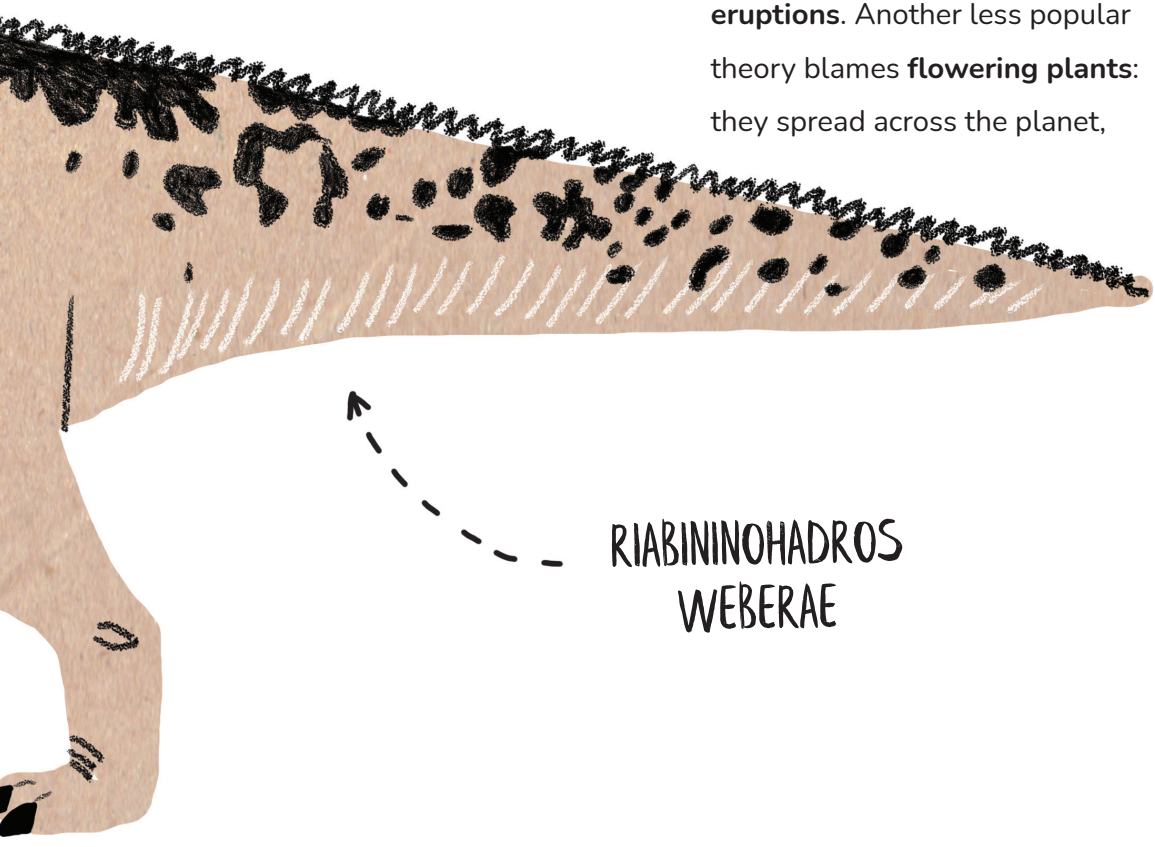
“And who lived in the water? I mean apart from those … belemnites and ammonites?” Aliye spoke up.

“Oh, many different creatures at different times. Huge rays and sharks. Also, plesiosaurs and mosasaurs – giant marine reptiles. Sea crocodiles.”

“Why did they die out?” Yasia wondered.

“Because **a meteorite fell on Earth**,” Sashko explained.

“It’s just one of the hypotheses,” Rustem said. “According to another one, the species died out during the Cretaceous period as a result of **earthquakes and volcanic eruptions**. Another less popular theory blames **flowering plants**: they spread across the planet,




MAMMOTH
KIEVORNIS
BLACK SEA
FISH
TURTLE

displacing conifers and ferns. The herbivorous dinosaurs couldn't eat them and died out. And then the predators that hunted those herbivores died out, too."

"Oh, I see ... and what happened after the dinosaurs died out?" Yasia wondered.

"The Cenozoic era began. The continents started to look similar to the ones we have now. The entire south of Ukraine was the large, shallow Paratethys Sea, home to fish, turtles and salamanders. Ancient sea birds nested on its shores. Their fossils are often found in the Luhansk region. The Paratethys Sea dried up and then filled with water again several times until it vanished six million years ago, leaving behind the **Aral and Caspian Lakes**, as well as the **Black Sea Lake,** which later became the **Black Sea**.





"The planet became much colder. Ice ages occurred from time to time, bringing freezing temperatures. Huge glaciers on the poles spread much further than now – up to the borders of Ukraine. There were five ice ages in total."

"So, that's when mammoths lived in Ukraine?" Aliye asked.

"Exactly. And not only them. Cave bears, lions, hyenas, woolly rhinos, as well as hamsters, hares and various birds lived here, too."

"Why did they all die out? Because it grew warmer?"

"There are many theories. Some say that people hunted them, others

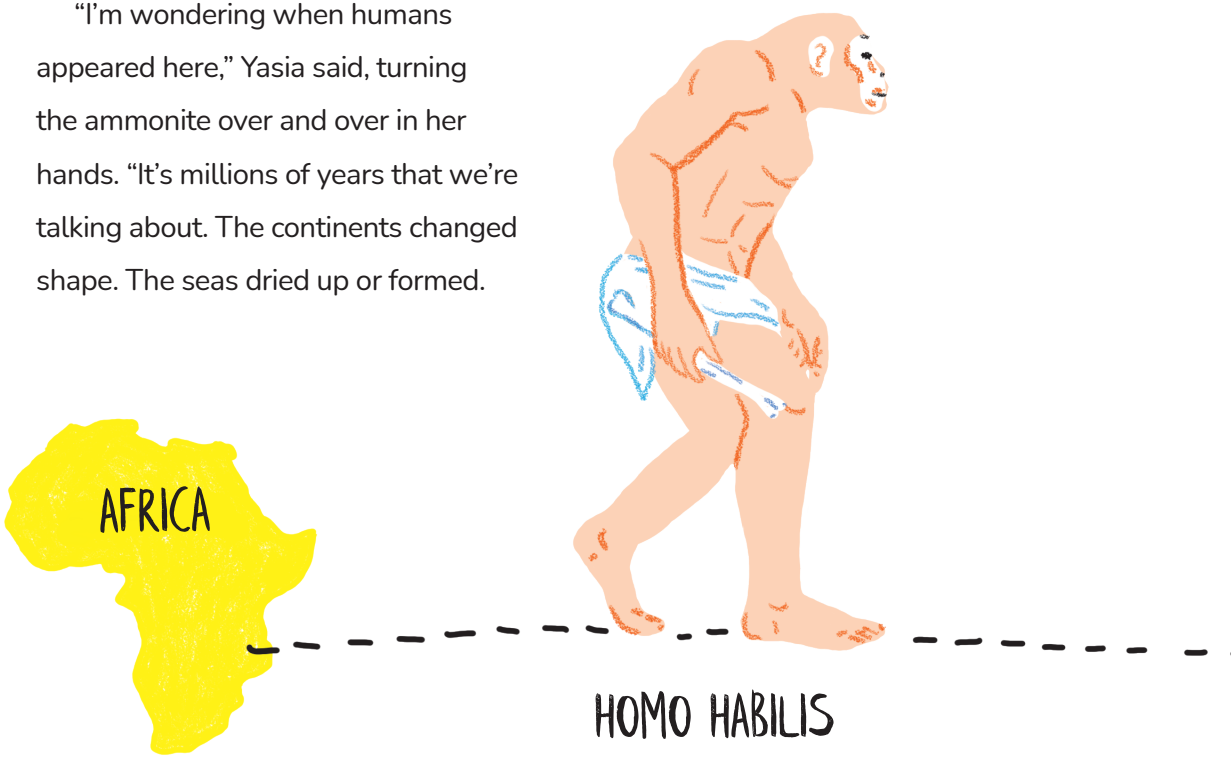
blame the warming. I prefer a new version: **the entire ecosystem was built around the mammoths, so when they vanished, everything else disappeared, too. And the mammoths were wiped out by an epidemic**."

"And what happened afterward?"

"The world became quite similar to the one we know now. Except that saiga antelopes and wild goats lived in the forests." (These were two of numerous extinct species.)

"I'm wondering when humans appeared here," Yasia said, turning the ammonite over and over in her hands. "It's millions of years that we're talking about. The continents changed shape. The seas dried up or formed. Did it all happen without humans?"

"I don't study humans," Rustem said, and shrugged. "But we are a very young species, indeed. As far as I remember, the earliest members of the genus Homo (the earliest human-like creatures) originated in Africa about 2.4 million years ago. Researchers call them Homo habilis. And Homo sapiens, to which all modern humans belong, appeared **around 300,000 years ago**. They reached the Ukrainian lands even



later ... well, I'm sure your history teachers will tell you all about it."

The children looked at one another. Aliye and Dmytryk, who had just finished the fifth grade, mumbled:

"Oh yeah. Teachers will tell us, for sure."

"I have an idea!" Yasia exclaimed. "Let's do some research and write our own history book! A fascinating one, not another boring textbook."

"Let's create a page on social media instead!" Dmytryk said, picking up on her idea. "It's easier, and its followers would be able to add info. We can even make a game. A quest! The page could be called 'A Cool History of Ukraine'!"

"Sounds interesting, guys, but we all go back to our hometowns in a week," Sashko said, sceptical as always. "You won't travel that often from Zaporizhzhia to Kropyvnytskyi, let alone to Ivano-Frankivsk or Chernihiv."

"We can meet online. Our parents will help us." Aliye turned to Rustem. "Won't you?"

"Of course," Rustem said, hugging his daughter.

