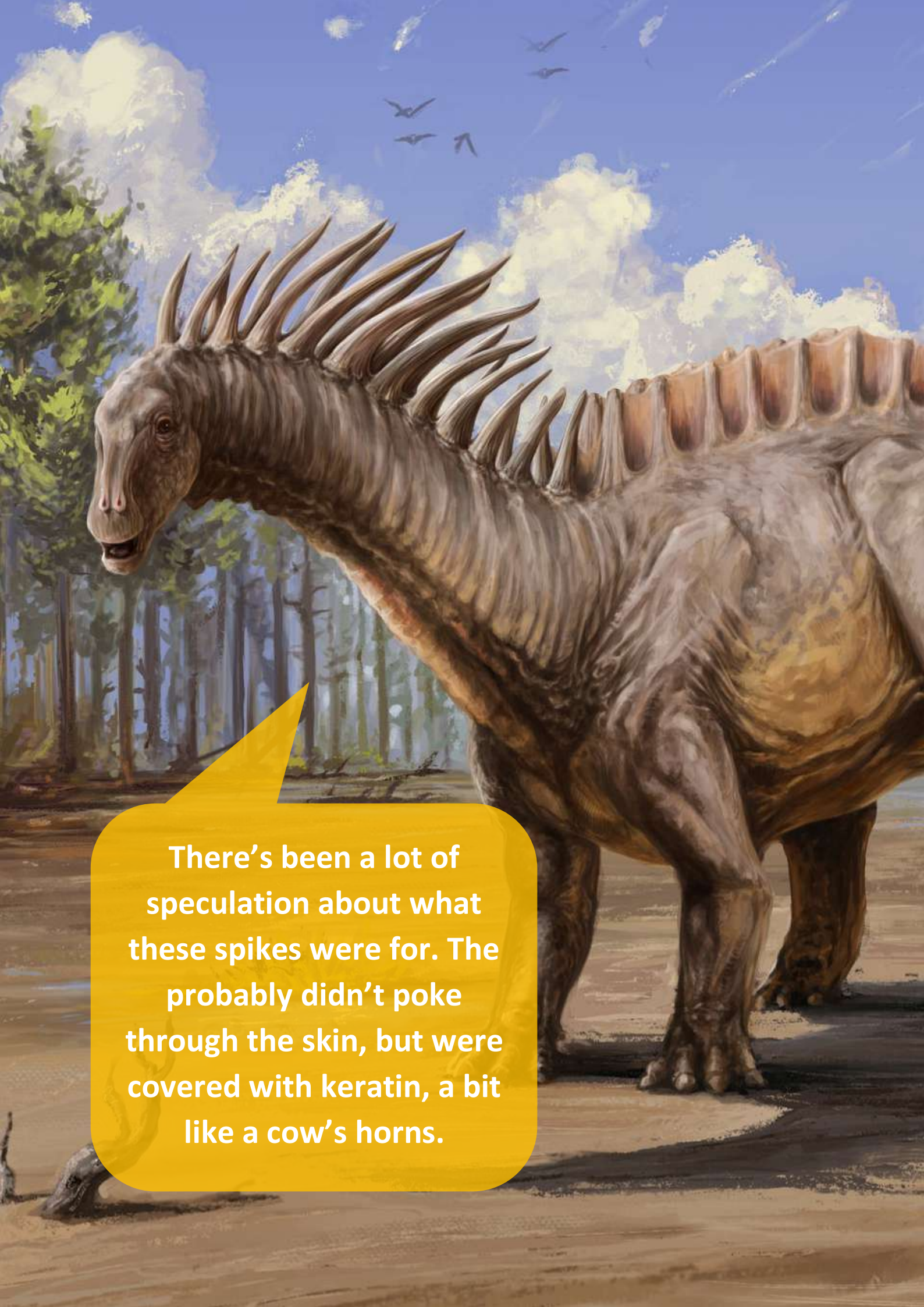

Adventures
From the Land
of Dinosaurs
The Spiny
Sauropod
THINK
DIGITAL ACADEMY

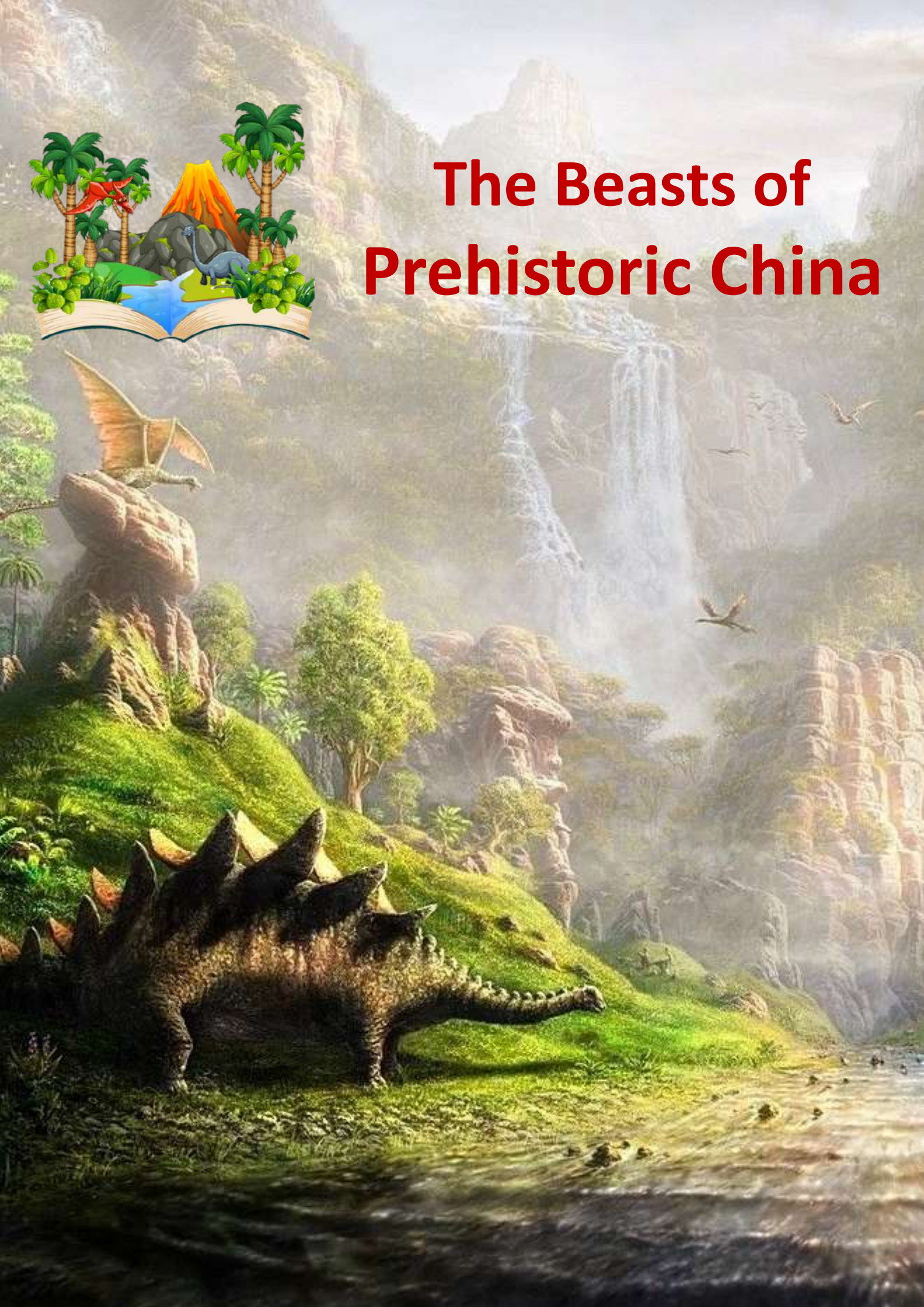
While some of the largest sauropods weighed almost as much as a space shuttle and stretched more than 40 m (130 ft) long, not all of them were that big. One group of sauropods had smaller bodies and shorter necks. And instead of bulk, a couple of members of this group relied on something unusual for protection.

A single, nearly complete Amargasaurus specimen was discovered in 1984.

For a sauropod, it was quite small – a mere 9 m (30 ft) long. But there was something more striking about it. Sticking out of its neck bones were gigantic spikes! These terrifying bony spines were lined in two rows down the back of the dinosaur's neck.

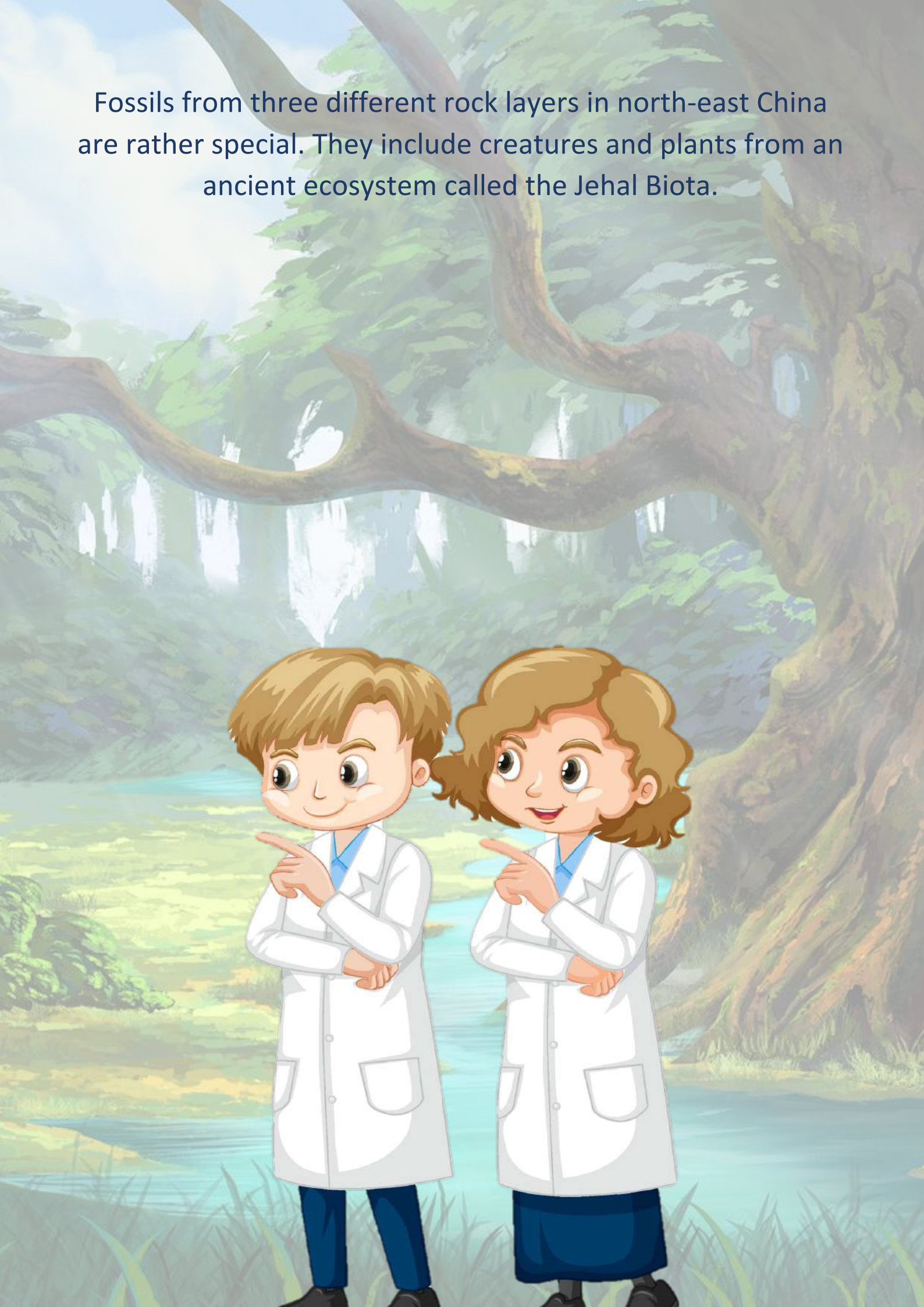

There’s been a lot of speculation about what these spikes were for. The probably didn’t poke through the skin, but were covered with keratin, a bit like a cow’s horns.

Some scientists have suggested they were draped in skin, forming a ginormous sail. Or maybe Amargasaurus had a hump, like a bison, behind the spikes? Some researchers even think that if Amargasaurus shook its neck, it could make sounds with the spines. The most common theory is that they were used for defence, possibly against meat-eating dinosaurs called Abelisauroids. What do you reckon the spikes were used for?



The Beasts of Prehistoric China

Fossils from three different rock layers in north-east China are rather special. They include creatures and plants from an ancient ecosystem called the Jehal Biota.




About 130-120 million years ago, there was a lot of volcanic activity in the religion.

Some scientists think these creatures were buried in a lake by ash from the eruptions, a bit like what happened to the Roman town of Pompeii. As a result, the remains of the animals were perfectly preserved. Here are a few we've found so far.

Reptiles

Twenty-one species of pterosaur have been found in the Jehal Biota, including eggs containing babies!

Scientists also discovered Xianglong – the only known fossilized gliding lizard. It used its ribs to soar between trees.

Mammals

Repenomamus was found with chunks of baby dinosaurs in its .


The giant flea Tyrannopsylla may have lived in its fur.

Dinosaurs

Yutyrannus was the largest dinosaur with feathers.

Tianyulong had long feather-like filaments.

Sinosauropteryx had a stripy tail.

Microraptor was a dinosaur with feathers on its arms and legs used for gliding.

Birds

Thousands of birds have been found in the Jehol Biota with preserved skin and feathers. Confuciusornis is the oldest known bird with a toothless beak. Males of the species had impressively long tail feathers.

In 2021, Archaeorhynchus youngsters were discovered with wing feathers ready for flight.

Plants

Leeftructus is one of the earliest known species of flowering plant. Researchers think it was similar to today's buttercups and lived in wet, marshy areas.

The COLOURFUL Psittacosaurus

In 1923 palaeontologists announced a dinosaur called Psittacosaurus. It was a type of ceratopsian, with horns on the side of its face and a parrot-like beak that it used to eat plants. Unlike its relative Triceratops it was small, measuring only about 1.5 m (5 ft) long. Since its discovery, more than 400 individuals have been found across Asia – ranging from China to Mongolia and Siberia. But one specimen from the Jehol Biota of China was particularly special.

Not only was it almost complete, but it also had, and extraordinary amount of soft tissue preserved. Soft tissue means the bits of an animal that don't usually survive the fossilization process. The palaeontologists were delighted and stunned to find skin, scales and even colour pigment! As a result, they were able to create an extremely complete reconstruction of what this Psittacosaurus looked like.

Form the bones, the scientists could tell that the individual was between six and seven years old, so not yet fully grown. It had around 100 spectacular bristles towards the end of its tail.

Psittacosaurus Fossil

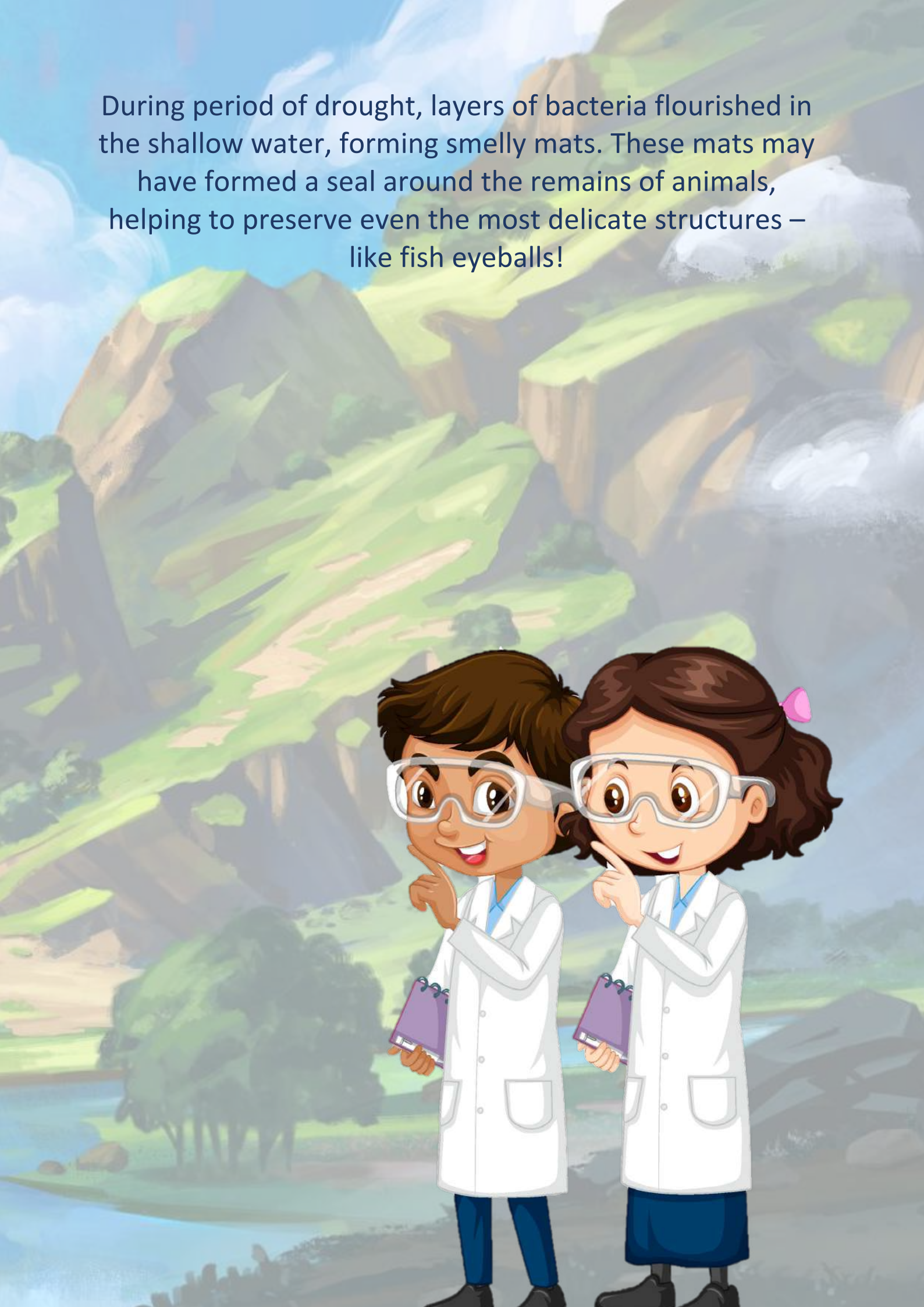
Psittacosaurus also had large eyes, so it probably lived in a low-light environment, perhaps under a forest canopy. It had three different kinds of scales: large flat scales, smaller angular scales and round pebble-like scales. Black and amber brown were the dominant colours, and the pattern of the colours showed Psittacosaurus used countershading. This is a type of camouflage usually used by prey animals, where they're darker on the back and lighter on the belly (like a penguin).


This would have helped it hide from predators such as Dilong as it snuck through the forest.

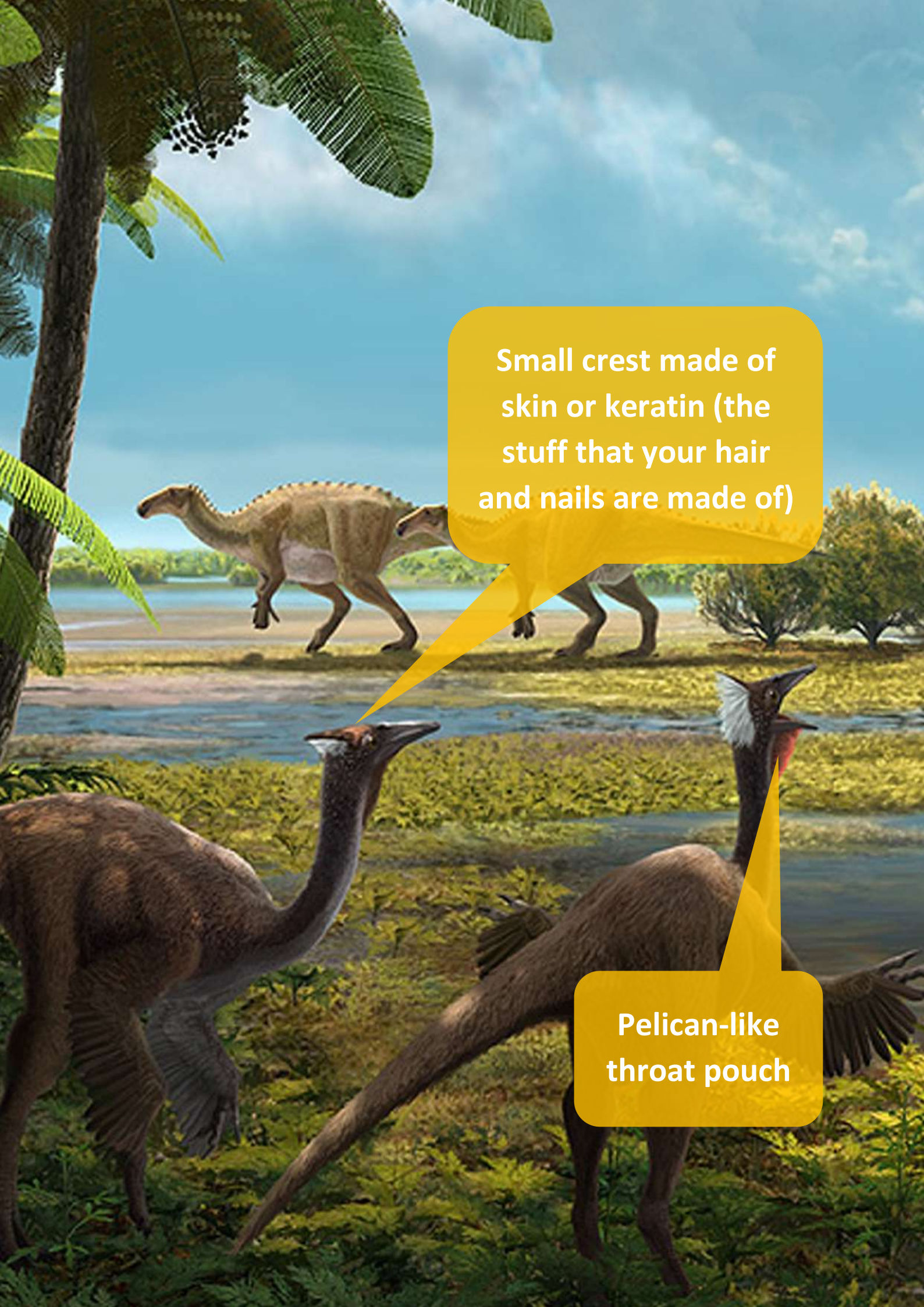
The Wonders of
LAS HOYAS

The Las Hoyas Lagerstatte in Spain is famous for its well-preserved early Cretaceous life, dating from around 128 million years ago. Back then it was a vast subtropical wetland with a seasonal climate.

During period of drought, layers of bacteria flourished in the shallow water, forming smelly mats. These mats may have formed a seal around the remains of animals, helping to preserve even the most delicate structures – like fish eyeballs!



One of the unusual dinosaurs that roamed these wetlands was Pelecanimimus, a type of ornithomimosaur (an ostrich dinosaur). As its name suggests, it had skin pouch under its lower jaw, a bit like a pelican.


Small crest made of skin or keratin (the stuff that your hair and nails are made of)
Pelican-like throat pouch

Pelecanimimus also had a soft crest on the back of its head, and fossils suggest it might have had feathers. Most ornithomimosaurs don’t have teeth, but Pelecanimimus had around 220! And the teeth stopped about a third of the way back on the top jaw, making a long, flat area that might have been sued for ripping up small prey.

Now, Pelecanimimus wasn’t the only unique dinosaur from Las Hoyas. The nearly complete skeleton of Concavenator – a 6 m (20 ft) long, shark-toothed predator with feathers on its forearms – was found in 2003

. It took palaeontologists seven years to prepare the specimen. When they were finished, they discovered that they were finished, they discovered that there were elongated spines on some of the back bones just before its hips. Concavenator had a humpback!

To this day the scientists are unsure what the hump was for. Some have suggested it stored fat, like a camel's hump, while others think it was used for display. You never know, maybe Concavenators impressed each other with their spectacular back humps!

The Block of RAPTORS


Utahraptor was announced to the world in 1993.

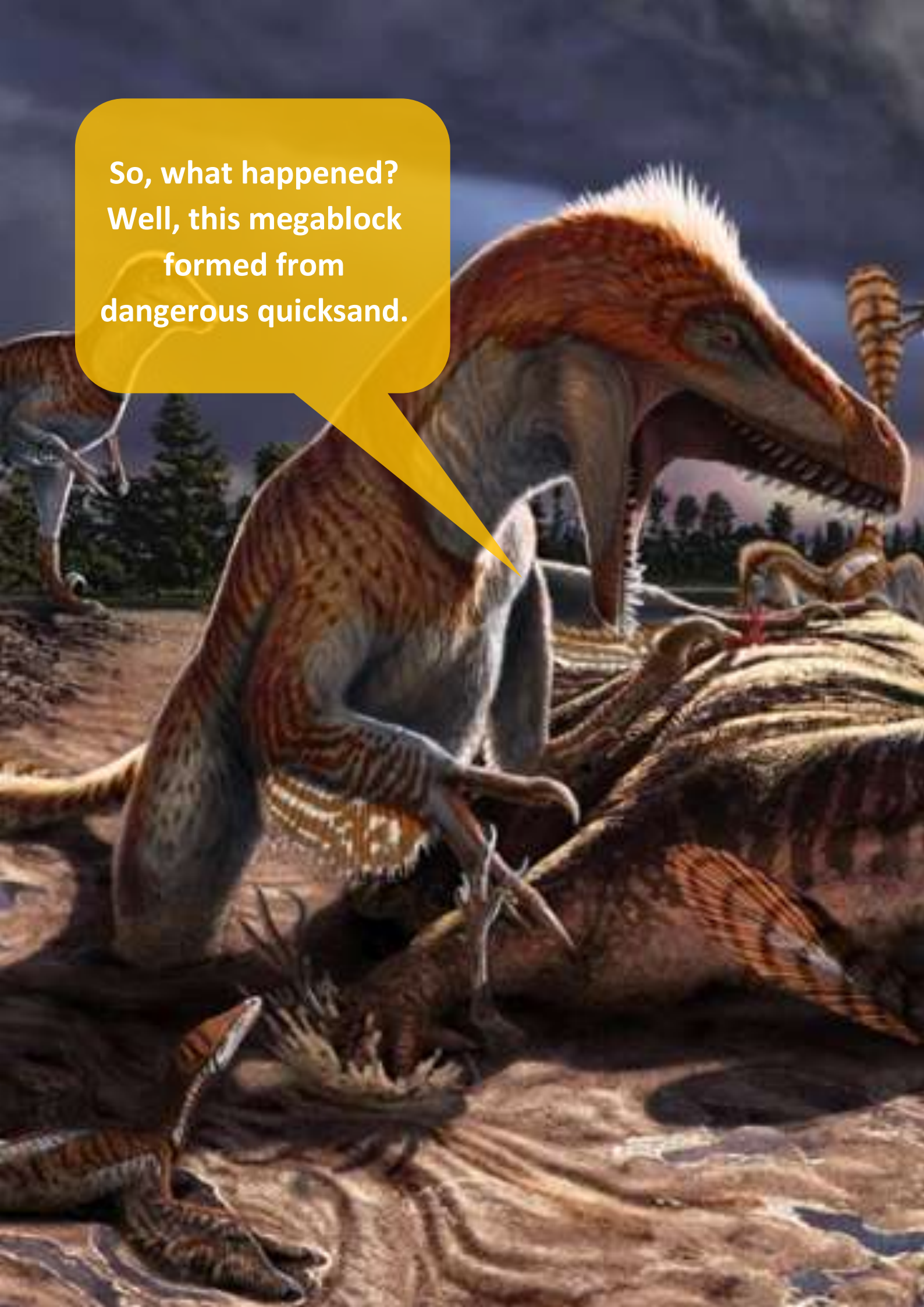
It is the largest dromaeosaur (or raptor to you and me) ever found, but it was only known from a few bones and a giant sickle-shaped claw.

Utahraptor

Then, in 2001, university student Matthew Stikes was doing research north of Arches National Park in Utah when he made a grisly discovery. He stumbled across what looked like a human arm bone! He quickly reported his discovery, and it turned out he had found part of a dinosaur foot. Palaeontologists headed to the site in 2005. And this time they discovered several skeletons.

However, it didn’t prove to be an easy excavation. The block that contained the bones weighed several tonnes and was located way up near the top of a ridge. It took almost ten years to get the megablock ready to move. Finally, in 2014, it was slowly dragged off the ridge with an excavator and loaded onto a truck that took it to a museum.

Already over 3500 hours have been spent preparing this megablock – and there's still more to be done. So far, the palaeontologists have found two plant-eating iguanodont dinosaurs and multiple Utahraptors, including one large adult, ten juveniles and three that are probably less than a year old. These babies are tiny – the front part of their snouts is only about the size of a penny!


So, what happened?
Well, this megablock formed from dangerous quicksand.

The iguanodonts may have become stuck first. Their calls, or the smell of their carcasses, attracted to Utahraptors, probably thinking they were going to get an easy meal. But they rapidly became stuck in the quicksand when their feathers were weighed down with mud. What palaeontologists don't know is whether the Utahraptors were part of a family group or if they got stuck separately. Maybe the megablock will reveal more secrets in the future…


SHAPESHIFTING
Dinosaurs

The first dinosaur reconstructions are from the 1850s, and our understanding of them has changed a lot since! Dinosaurs have gone from slow-moving, tail-dragging lizards to agile creatures with complex lives.


Dinosaur science
is constantly
evolving ...

1850s

Megalosaurus

The first dinosaur to be scientifically named, in 1824. Originally it was thought it walked on four legs and was 12 m (39 ft) long. Today we think it walked on two legs and was 6-9 m (20-30 ft) long.

1850s

Iguanodon

First thought to be a giant iguana with a spike on its nose. Palaeontologists now know the spikes were on its “thumbs” and were probably used to defend itself against predators.

1960s

Deinonychus

This discovery made scientists think dinosaurs were warm blooded, due to their body shape. We still think this is true, but we also now believed Deinonychus was covered in feathers.

1850s

Hylaeosaurus

The first depictions showed a single row of spikes down the back. Palaeontologists now understand that this armoured dinosaur had spikes lined in two rows along its sides.

1900s

Diplodocus

Scientists thought Diplodocus had a sprawling posture and was so heavy it spent most of its time in the water. Today we think it walked with its legs under its body and lived on land.

1880s

Stegosaurus

The classic idea of Stegosaurus gave off major Godzilla vibes by walking on two legs with spikes on its back and plates on its tail. This is the opposite of what we know today.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DIGITAL ACADEMY