Adventures From the Land of Dinosaurs

A Journey Through Time

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Earth’s life has changed a lot since emerged around 3.5 billion years ago. Those changes have been recorded in rocks. If the conditions are just right when a creature dies, it can turn into a fossil – preserved in the rock.


Younger rocks are deposited on top of older rocks, and each layer represents a chunk of time. To organize these layers, scientists created something called the Geological Time Scale.


The Big Five
Extinctions

More than 95% of all species that have ever lived are now extinct. When more than 50% of life disappears in less than a million years, it is called a mass extinction. Luckily, these events are rare they have only happened five times during the history of our planet. And they all have one thing in common: climate change. At various points Earth has rapidly got really hot or really cold, with devastating consequences.

Permian

This extinction is known as the “Great Dying” because over 95% of life on Earth went extinct. In Siberia, the ground cracked open and lava poured out. These eruptions wreaked havoc and caused extreme global warming.

Ordovician

Life was mainly in the oceans when 85% of species went extinct. Animals like trilobite and graptolites survived but took a hit. This extinction occurred in two parts. There was major cooling followed by a rapid warming. Possible causes include the effects of newly evolved plants and volcanic eruptions.

Devonian

During the Devonian, the first forests spread across the land. This caused the climate to cool. Ice sheets formed, causing sea levels to drop. This devastated marine communities. By the end of the Devonian, 75% of life went extinct, including armoured fish called placoderms.

359 Million Years Ago

Placoderms

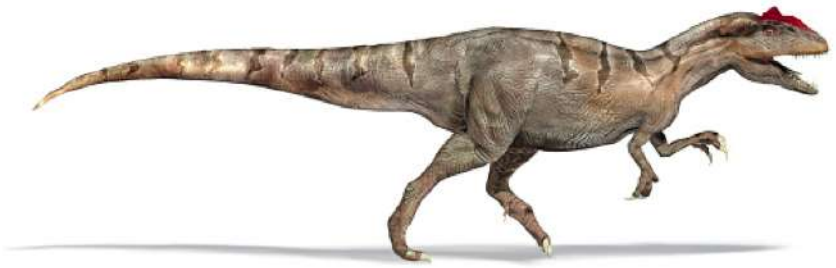
Triassic

As the supercontinent Pangaea began to split, volcanoes started erupting. Lava may have shot up like a fountain over 1 mile (1.5 km) into the sky. On land, most of the dominant croc-like reptiles went textiles, including phytosaurs and aetosaurs. Altogether, around 80% of life went extinct.

Cretaceous

Most scientists agree that an asteroid impact wiped out around 76% of life at the end of the Cretaceous period, including the dinosaurs (but not birds). The impact triggered landslides, earthquakes, and tsunamis. All the dust in the atmosphere blocked out the sun and cooled the climate. Most of the survivors were small scavengers that could hide in burrows.

66 Million Years Ago



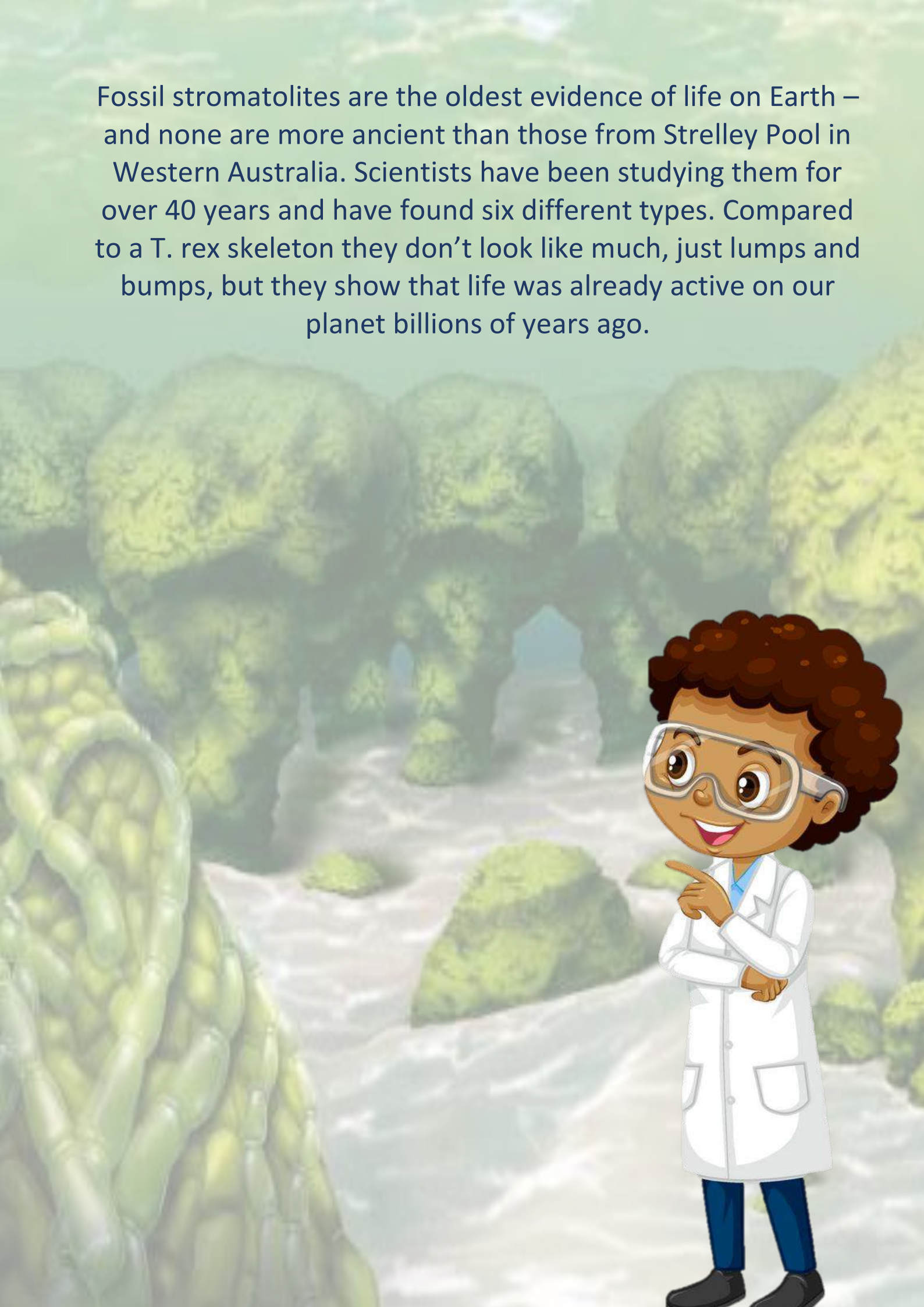
Dinosaurs

Welcome to the Precambrian. While this is the shortest part of this story, this period presents almost 90% of our planet's history. It starts with the formation of Earth, roughly 4.6 billion years ago, and ends 541 million years ago. We'll start 3.5 billion years ago with the oldest confirmed life – the humble stromatolite. Then we'll fast forward through almost two billion years to check out the earliest complex life. Most of it was squishy.

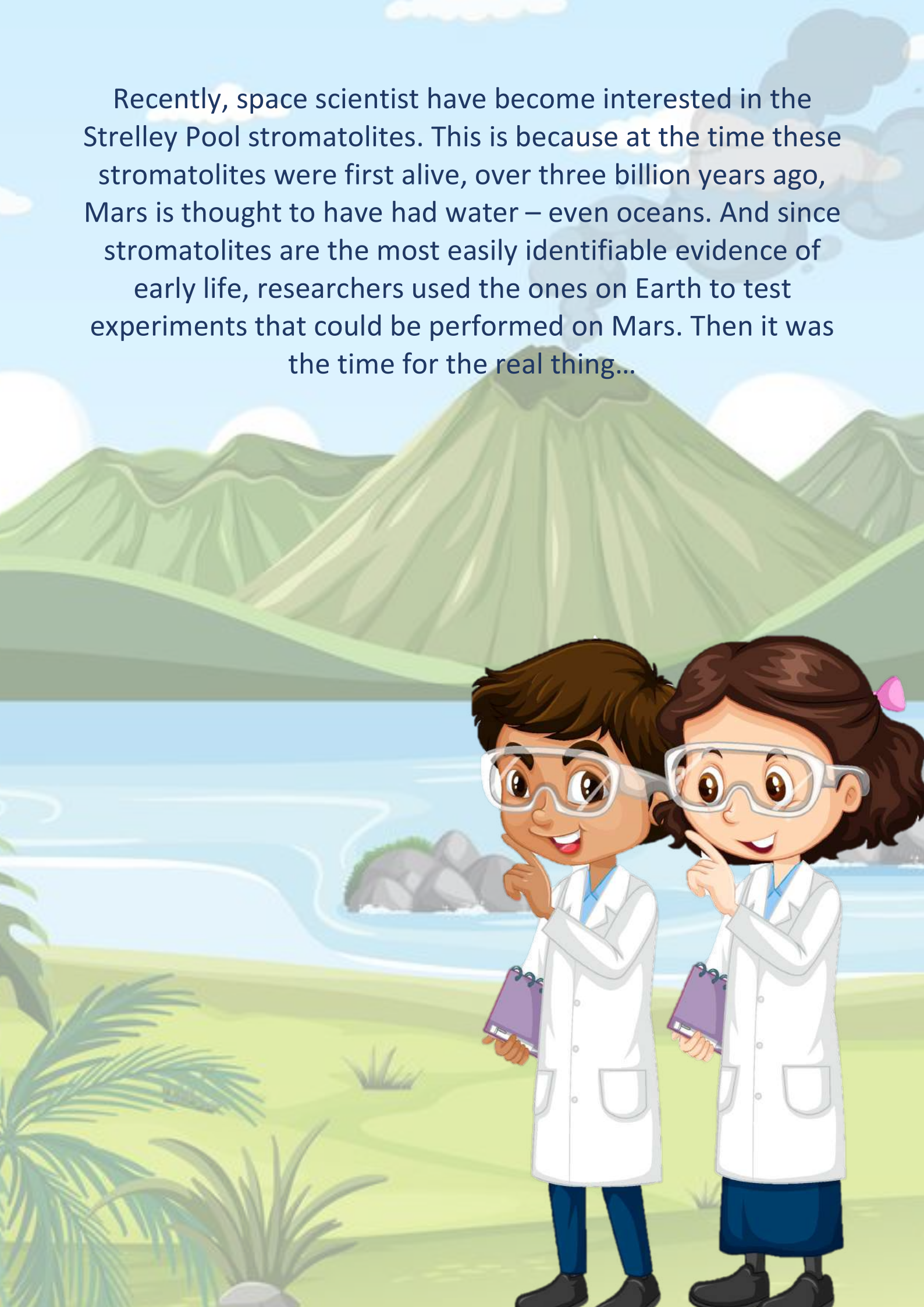
Prehistoric Goo and the Mars Rover

Out first story starts roughly 3.5 billion years ago, in an area that would later become part of Australia. Here, in shallow marine environments, lived a type of bacteria that got its energy from sunlight. The bacteria formed mounds by trapping sediment in their goo, building up layers as they grew towards the light. These structures are called stromatolites. Incredibly, some are still alive today.

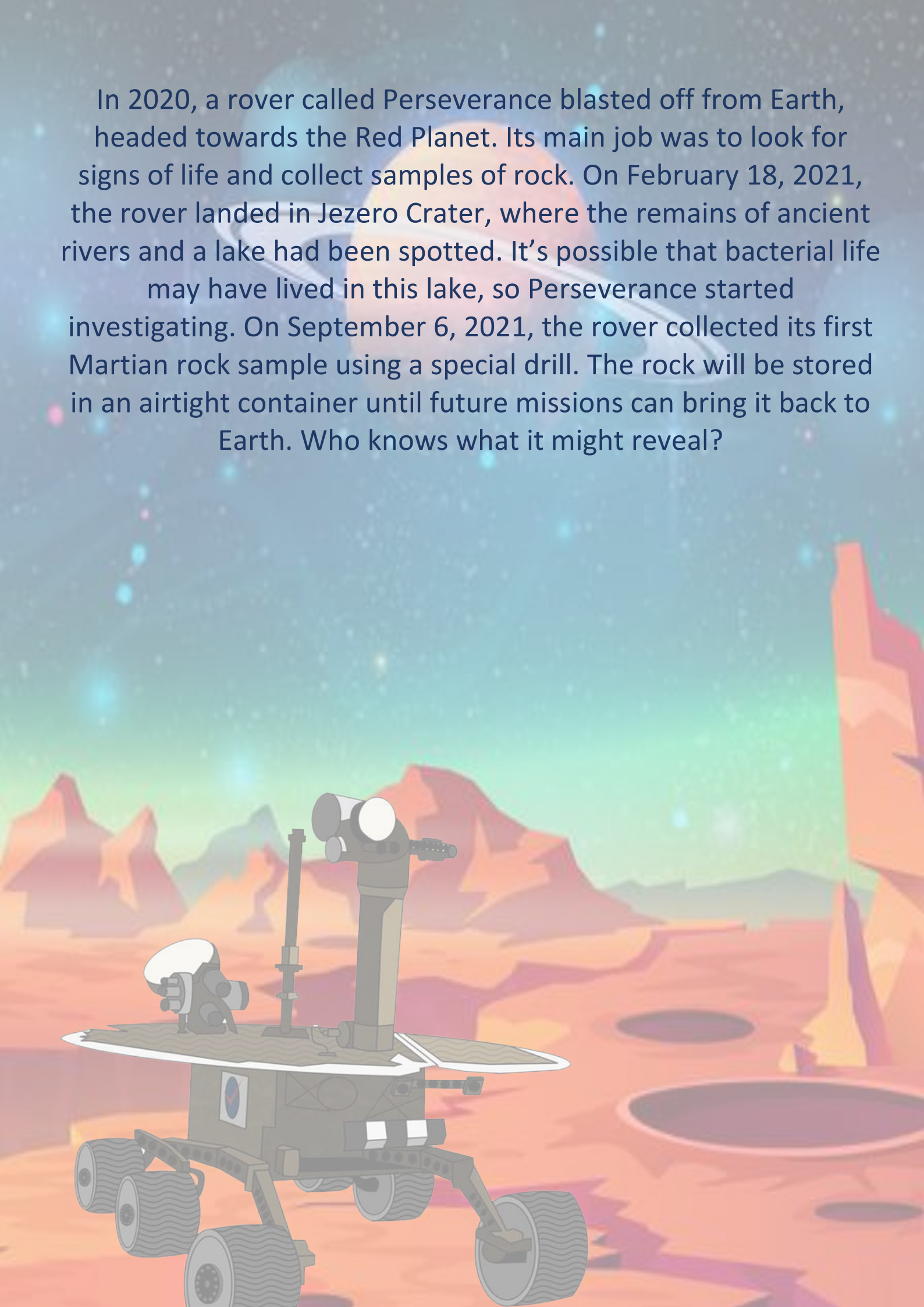
Fossil stromatolites are the oldest evidence of life on Earth – and none are more ancient than those from Strelley Pool in Western Australia. Scientists have been studying them for over 40 years and have found six different types. Compared to a T. rex skeleton they don't look like much, just lumps and bumps, but they show that life was already active on our planet billions of years ago.



Recently, space scientist have become interested in the Strelley Pool stromatolites. This is because at the time these stromatolites were first alive, over three billion years ago, Mars is thought to have had water – even oceans. And since stromatolites are the most easily identifiable evidence of early life, researchers used the ones on Earth to test experiments that could be performed on Mars. Then it was the time for the real thing…



In 2020, a rover called Perseverance blasted off from Earth, headed towards the Red Planet. Its main job was to look for signs of life and collect samples of rock. On February 18, 2021, the rover landed in Jezero Crater, where the remains of ancient rivers and a lake had been spotted. It's possible that bacterial life may have lived in this lake, so Perseverance started investigating. On September 6, 2021, the rover collected its first Martian rock sample using a special drill. The rock will be stored in an airtight container until future missions can bring it back to Earth. Who knows what it might reveal?




The Kids of
Charnwood Forest

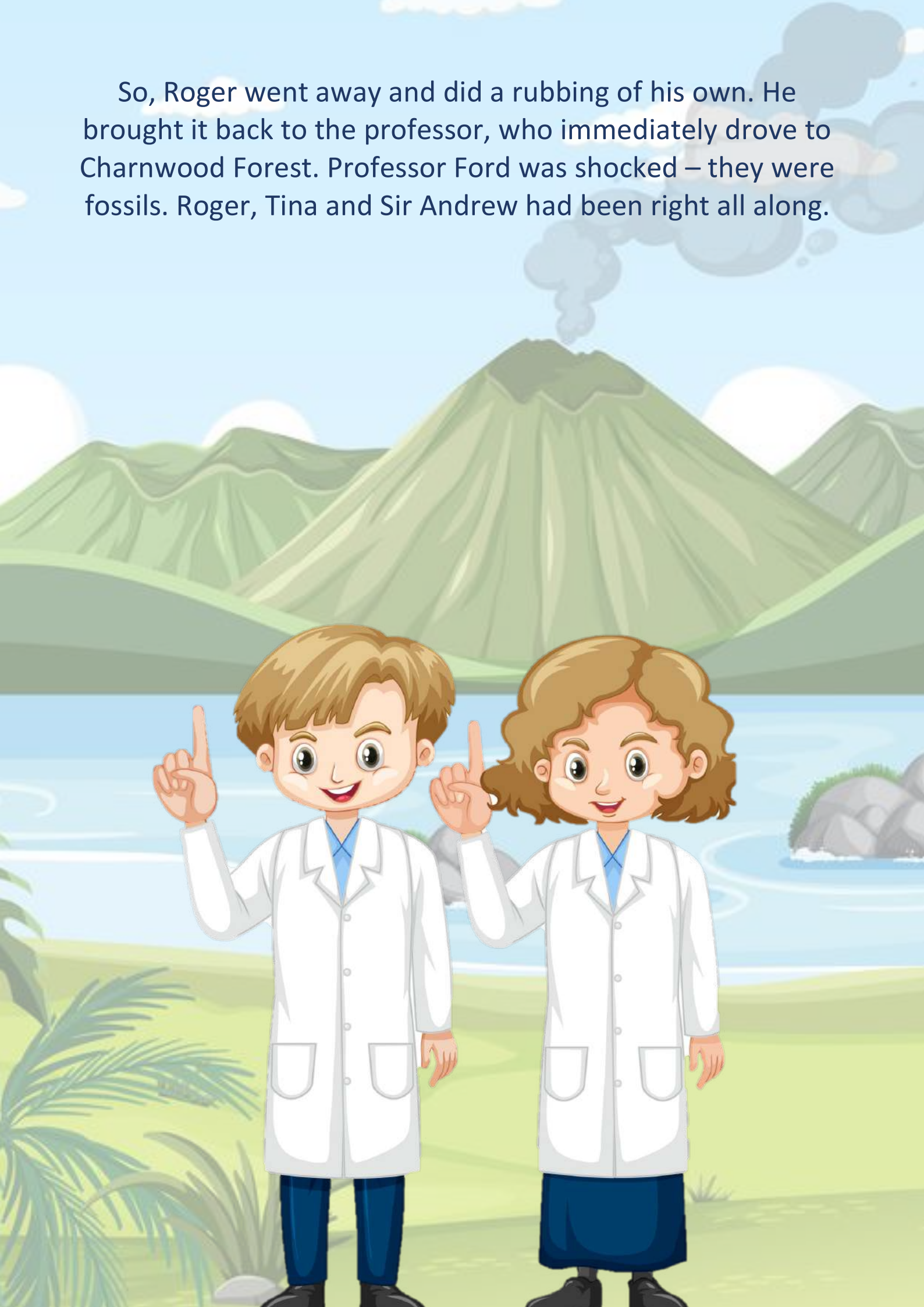
In England in the 1840s, old ring-like structures were found in the rocks of Charnwood Forest by some quarrymen. Locals came to know the quarry as the “ring pit” but didn’t know what the rings were.

A few years later an amateur geologist (someone who studies rocks) names Sir Andrew Crombie Ramsay suggested they might be fossils, but professional scientists told him that it was impossible. They explained that the rocks were too old – from the Precambrian – and that no fossilized life forms had ever been found from that time.

Almost 100 years later a teenager named Tina Negus, was out picking berries in the Charnwood Forest quarry. At the base of a cliff, she spotted some weird leaf-like patterns. She showed her teacher, who also told her they couldn't possibly be fossils. Tina wasn't put off though and returned to the site to make a rubbing of the rock with a piece of paper and a pencil. After visiting museums and looking in books, she was stumped. Her fossil didn't match anything she could find.

The following year, in 1957, three boys – Roger Mason, Richard Blachford and Richard Allen – were climbing in the same old quarry. They found the impressions and Roger, knowing a bit about geology, also thought they could be fossils. He went to a local university and spoke with Professor Trevor Ford, a geologist, who was sceptical. Are you spotting a trend here?

So, Roger went away and did a rubbing of his own. He brought it back to the professor, who immediately drove to Charnwood Forest. Professor Ford was shocked – they were fossils. Roger, Tina and Sir Andrew had been right all along.



Professor Ford used chisels, hammers and crowbars to lever out a giant block containing the specimens. He announces the fossils to the world in 1958, naming the leaf-like impressions, Charnia. They are the first recognized Precambrian fossils and are thought to be between 659 and 556 million years old. The ring-like fossils were named Charniodiscus and were thought to be holdfasts, structures that attached the animals to the seafloor. It was an incredible discovery – and all thanks to the kids of Charnwood Forest.

Life Begins to Get Complicated

The earliest known complex life on Earth appeared around 600 million years ago, during the Precambrian. These early life forms are called the Ediacaran Biota, and they lived until about 542 million years ago. Scientists don't know if they are directly related to later animals or if they represent a separate branch of the family tree.


Claudina had one of the first-hand shells and was possibly a worm. It looked like stacked tubes.


Tribrachidium lived in shallow water. It was a soft-bodied creature unlike anything alive today.

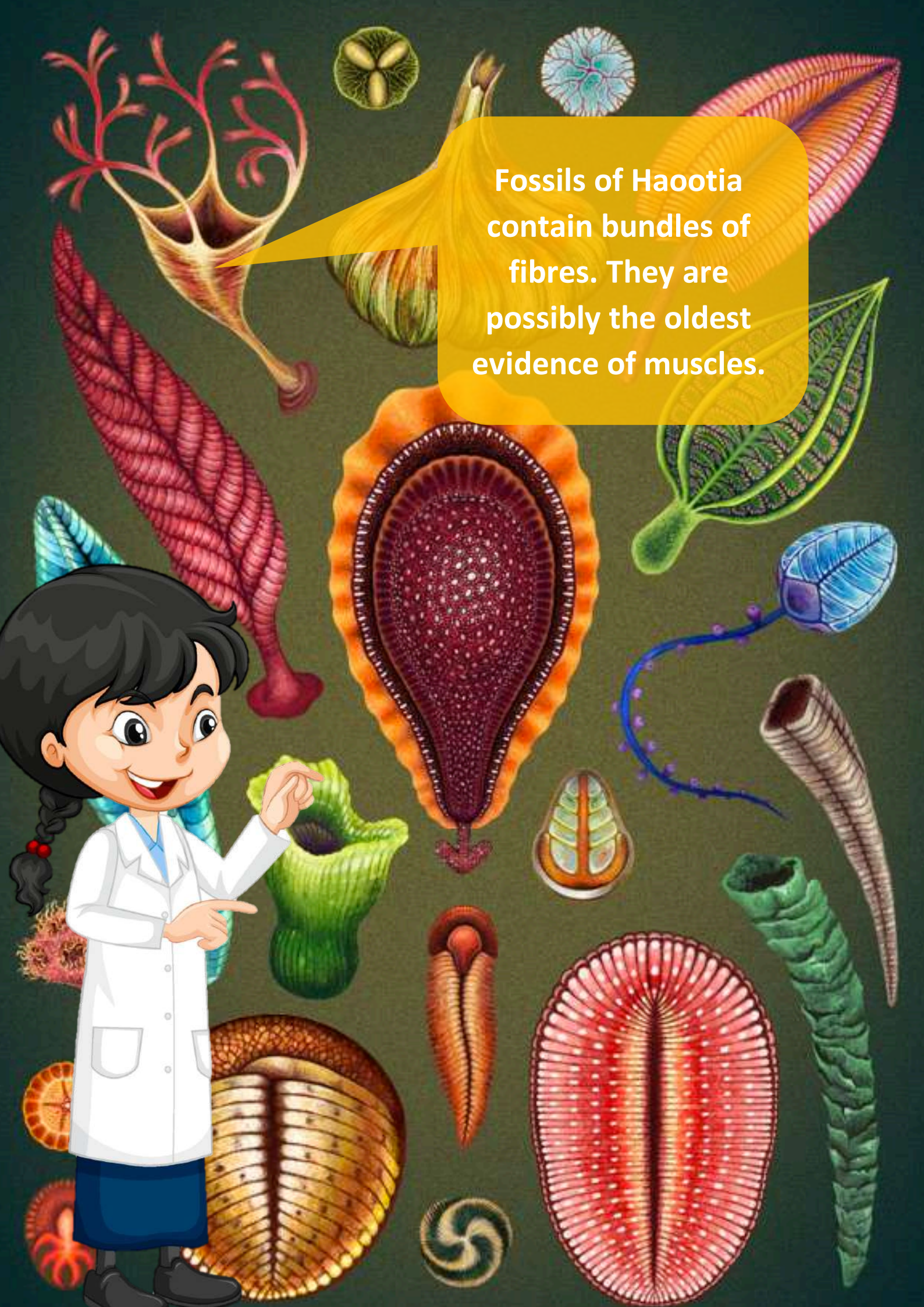

Kimberella was a snail-like creature that scraped food off the seafloor.


Fractofusus may have reproduced by growing its own clothes.

A Different Earth

Using rocks and fossils, scientists can track the ancient position of the oceans and continents as they moved over time – the Earth didn't always look like it does today. During the late Precambrian the land was just exposed rock, with all life living in the oceans. Ediacaran Biota fossils have been found all over the world, from South Australia to Canada.


Spriggina is only found in South Australia. It is the earliest known fossil that has a head.


Fossils of Haootia contain bundles of fibres. They are possibly the oldest evidence of muscles.

Animals

At least one member of the Ediacaran Biota has been identified as an animal – Dickinsonia. When alive, Dickinsonia would have been soft and squishy. In 2016, researchers discovered a mummified specimen in which they were able to detect a tell-tale sign of animal life.


Dickinsonia was one of the first animals that could move on its own to get food.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