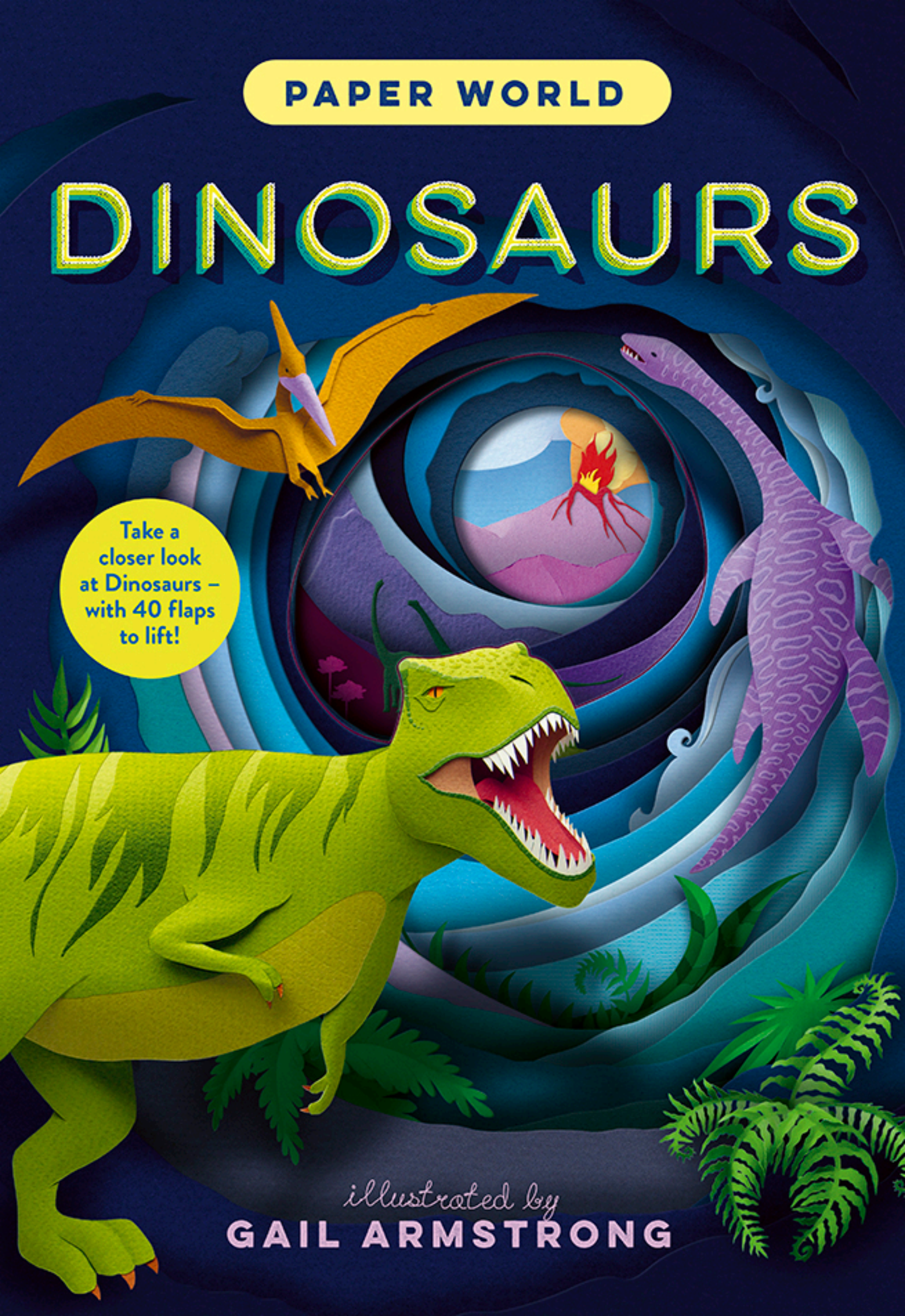
PAPER WORLD

DINOSAURS



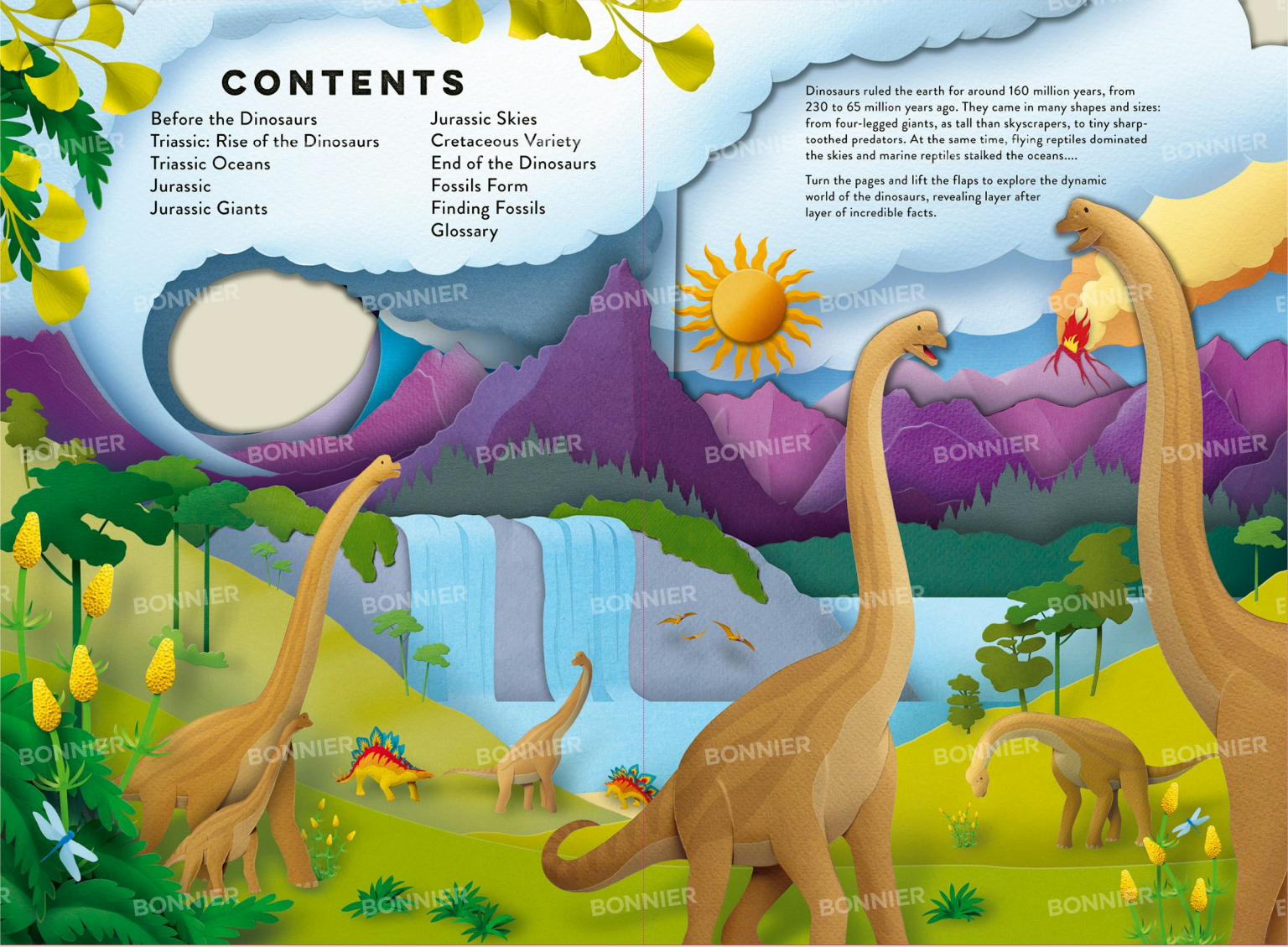
illustrated by

GAIL ARMSTRONG

CONTENTS

Dinosaurs ruled the earth for around 160 million years, from 230 to 65 million years ago. They came in many shapes and sizes: from four-legged giants, as tall than skyscrapers, to tiny sharp-toothed predators. At the same time, flying reptiles dominated the skies and marine reptiles stalked the oceans....

Turn the pages and lift the flaps to explore the dynamic world of the dinosaurs, revealing layer after layer of incredible facts.



BEFORE THE DINOSAURS:

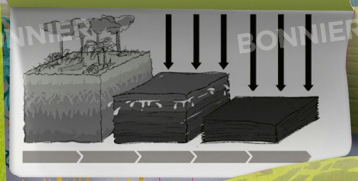
THE CARBONIFEROUS FOREST

The very first life appeared in the oceans: simple life-forms which evolved over millions of years. Eventually some fish developed limb-like fins and made the move onto land – they were the first amphibians. Their homes were the Carboniferous Forests: hot, swampy regions that stretched across the continents, from 358 million years ago until the Permian Period, 298 million years ago.

Like frogs and toads today, the amphibians of the Carboniferous Period had to keep close to the water, and lay their eggs beneath its surface. But another kind of creature was evolving around this time: the first reptiles. Unlike amphibians, reptiles could venture further from the water as they could lay [illegible] had become hotter counterparts.

Formation of coal in the carboniferous forests

When plants in the carboniferous forest died, their remains sank, making a dense material called peat. As the peat got squashed and sank deeper and deeper it heated up until it 'cooked' turning into hard coal.



Giant dragonflies

Meganeuropsis was the biggest insect ever, with a wingspan of up to 75cm, and a fierce predator.It is thought that insects grew so large at this time because of a surplus of oxygen in the air.

Giant millipede

Arthropleura was the longest invertebrate ever, reaching lengths of around 2.6m – as long as a car.

Diplocaulus

Diplocaulus had a boomerang-shaped head, which gave it a streamlined shape for swimming, and made it hard for predators to swallow.

Eryops

The first amphibians had short limbs, evolved from the fins of fish. Eryops had a long flat skull, and hunted like a crocodile today.

Eggs

Like amphibians today, prehistoric amphibians had to go back to the water to lay eggs.

Journey on to land

The first life appeared in the sea at least [illegible] years ago, evolved into simple, soft-bodied creatures. Eventually, animals with skeletons appeared during the Cambrian period, and fish pulled themselves from the water to prey on insects. They were the first amphibians.

Tetrapods

Roughly 380 million years ago, a type of fish with leg-like fins crawled out of the water to find food. It became the first tetrapod – the ancestor of all land vertebrates (animals with backbones).

Early reptiles

Hylonomus was one of the earliest reptiles. Around 20cm long, it spent most of its time in trees and probably ate insects.

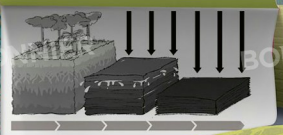
BEFORE THE DINOSAURS:

THE CARBONIFEROUS FOREST

The very first life appeared in the oceans: simple life-forms which evolved over millions of years. Eventually some fish developed limb-like fins and made the move onto land – they were the first amphibians. Their homes were the Carboniferous Forests: hot, swampy regions that stretched across the continents, from 358 million years ago until the Permian Period, 298 million years ago.

Like frogs and toads today, the amphibians of the Carboniferous Period had to keep close to the water, and lay their eggs beneath its surface. But another kind of creature was evolving around this time: the first reptiles. Unlike amphibians, reptiles could venture further from the water as they could lay [illegible] become hotter counterparts.

Formation of coal in the carboniferous forests
When plants in the carboniferous forest died, their remains sank, making a dense material called peat. As the peat got squashed and sank deeper and deeper it heated up until it 'cooked' turning into hard coal.



Giant dragonflies
Meganeuropsis was the biggest insect ever, with a wingspan of up to 75cm, and a fierce predator.It is thought that insects grew so large at this time because of a surplus of oxygen in the air.

Diplocaulus
Diplocaulus had a boomerang-shaped head, which gave it a streamlined shape for swimming, and made it hard for predators to swallow.

Eryops
The first amphibians had short limbs, evolved from the fins of fish. Eryops had a long flat skull, and hunted like a crocodile today.

Journey on to land
The first life appeared in the seas at least 3.7 billion years ago, but it was simple, single-celled organisms. Eventually, animals with skeletons appeared during the Cambrian Period, and some developed fins to help them prey on insects. They were the first amphibians.

Tetrapods
Roughly 380 million years ago, a type of fish with leg-like fins crawled out of the water to find food. It became the first tetrapod – the ancestor of all land vertebrates (animals with backbones).

Early reptiles
Hylonomus was one of the earliest reptiles. Around 20cm long, it spent most of its time in trees and probably ate insects.

Coelurosauravus
This little reptile could glide between trees using wing-like sails supported by bony rods down its sides.

Pareiasaurus
Pareiasaurus was an armoured reptile, its skin covered in bony plates called osteoderms. It walked on thick legs, like an elephant's, which splayed out to its sides, much like reptiles today.

Dimetrodon
Dimetrodon was over 3.5m long with a huge sail on its back, held up by spines. The sail may have helped maintain its body temperature, working like a solar panel to soak up sun.

BEFORE THE DINOSAURS:

THE CARBONIFEROUS FOREST

The very first life appeared in the oceans: simple life-forms which evolved over millions of years. Eventually some fish developed limb-like fins and made the move onto land – they were the first amphibians. Their homes were the Carboniferous Forests: hot, swampy regions that stretched across the continents, from 358 million years ago until the Permian Period, 298 million years ago.

Like frogs and toads today, the amphibians of the Carboniferous Period had to keep close to the water, and lay their eggs beneath its surface. But another kind of creature was evolving around this time: the first reptiles. Unlike amphibians, reptiles could venture further from the water as they could lay their eggs on land. By the Permian Period, conditions had become hotter and drier, and reptiles fared better than their amphibian counterparts.

Eryops
The first amphibians had short limbs, evolved from the fins of fish. Eryops had a long flat skull, and hunted like a crocodile today.

Early reptiles
Hylonomus was one of the earliest reptiles. Around 20cm long, it spent most of its time in trees and probably ate insects.

PERMIAN PERIOD

By the Permian Period, conditions had become hotter and drier, and reptiles fared better than amphibians. Then, around 251.9 million years ago, volcanic activity wiped out more than 90 percent of species in the oceans, and 70 per cent of species on land. It was the most extreme extinction event ever in Earth's history and the end of the Permian.

Archosaurs
This animal family includes dinosaurs, marine reptiles, pterosaurs, birds and modern crocodiles.

Archeria
Like a crocodile today, *Archeria* could walk on land or swim in the water.

Gorgonops
Gorgonops was a sabre-toothed Permian reptile and one of the top predators of its day.

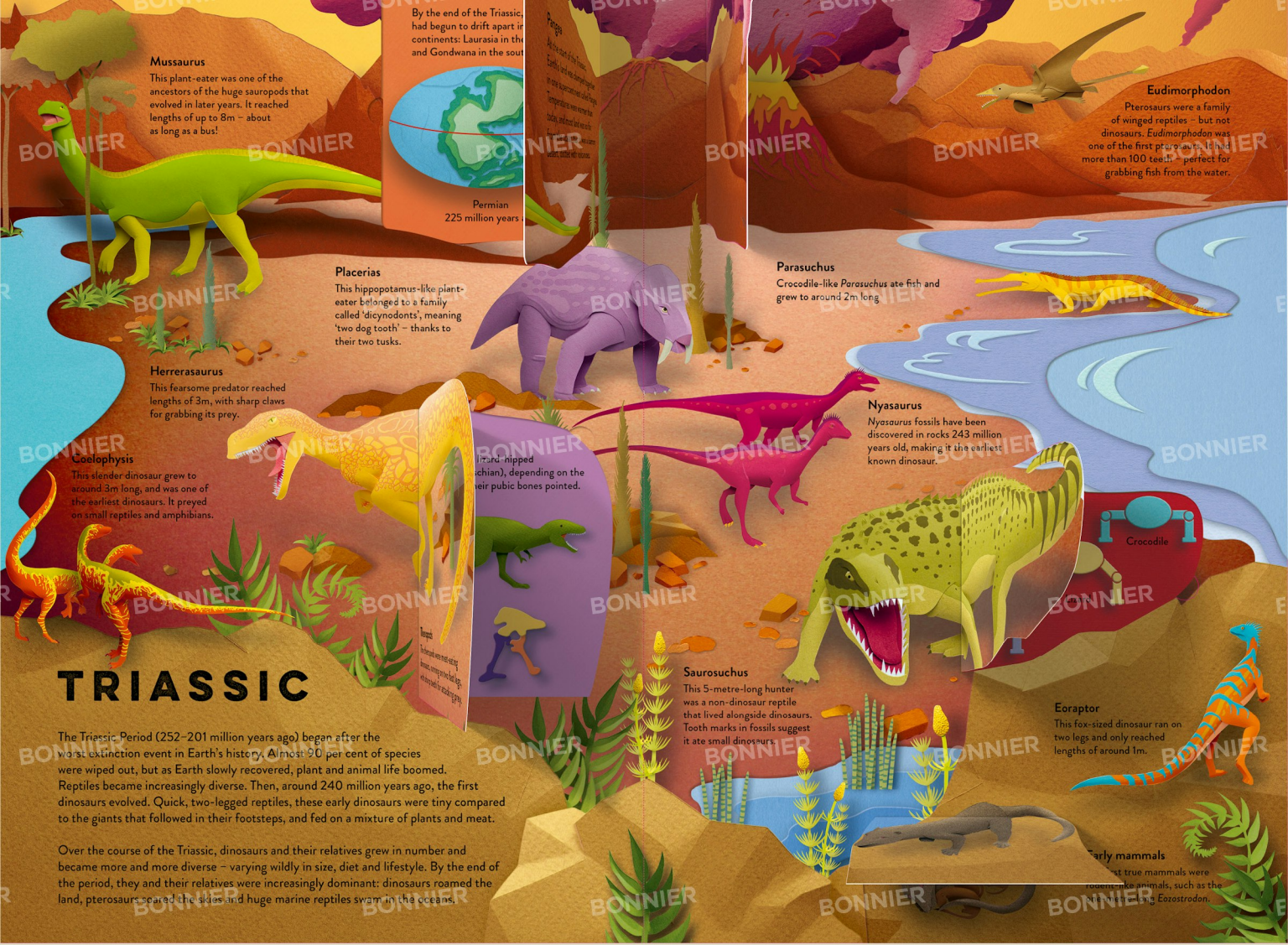
Coelurosauravus
This little reptile could glide between trees using wing-like sails supported by bony rods down its sides.

Pareiasaurus
Pareiasaurus was an armoured reptile, its skin covered in bony plates called osteoderms. It walked on thick legs, like an elephant's, which splayed out to its sides, much like reptiles today.

Dimetrodon
Dimetrodon was over 3m long with a huge sail on its back, held up by spines. Its sail may have helped maintain its body temperature, working like a solar panel to soak up sun.

Diadectes
Most early animals couldn't breathe and eat at the same time. The first exception to this was *Diadectes*! This ability enabled it to grow up to 3m long – making it the first large animal to live only on land.

Coelurosauravus
This little reptile could glide between trees using wing-like sails supported by bony rods down its sides.



TRIASSIC

The Triassic Period (252–201 million years ago) began after the worst extinction event in Earth's history. Almost 90 per cent of species were wiped out, but as Earth slowly recovered, plant and animal life boomed. Reptiles became increasingly diverse. Then, around 240 million years ago, the first dinosaurs evolved. Quick, two-legged reptiles, these early dinosaurs were tiny compared to the giants that followed in their footsteps, and fed on a mixture of plants and meat.

Over the course of the Triassic, dinosaurs and their relatives grew in number and became more and more diverse – varying wildly in size, diet and lifestyle. By the end of the period, they and their relatives were increasingly dominant: dinosaurs roamed the land, pterosaurs soared the skies and huge marine reptiles swam in the oceans.

TRIASSIC SEA

While dinosaurs roamed the earth, the oceans were teeming with life, too. Colourful corals stretched along the warm, shallow coastlines of Pangea. Like today's corals, they were the perfect home for thousands of species: from microscopic algae to enormous marine reptiles bigger than a blue whale.

Marine reptiles were only distantly related to dinosaurs. They could reach enormous sizes, because their body weight was supported by the water – just like whales today. The Triassic saw more diversity of marine reptiles than any other point in history. They came in many shapes and sizes, from dolphin-like ichthyosaurs to turtle-like Hedonus. They moved in different ways, too: plesiosaurs and sea turtles used their limbs like paddles; while other groups used their tail and long snake-like body to move. All were predators, feeding on fish, squid, shelled invertebrates and each other!

Temnodontosaurus
This ichthyosaur had a dolphin-like body and long, toothed beak. Reaching lengths of around 10m, it had huge eyes to help it find prey in dark water.

Shonisaurus
This huge ichthyosaur may have been the largest animal ever alive. As long as a bowling lane, it grew up to 21 m long.

Helicoprion
This shark-like fish had a spiral-shaped jaw, containing more than 100 teeth. It probably fed on squid and ammonites.

Its skull alone was around 2.75m long – that's longer than the height of an adult human.

Hanodus
This metre-long reptile looked like a turtle with its wide, flat shell. It would have crushed shellfish with its beaklike mouth.

Nothosaurus
This marine reptile had a long, flexible neck, webbed feet and sharp teeth. It may have spent some of its time on shore, like a seal today.

Cyamodus
This small placodont had two separate shells and a long tail. It would have dived to the seafloor to feed then swum to the surface for air.

Atopodentatus
This hammer-headed herbivore lived like marine iguanas today, scraping algae off the seafloor to eat.

First corals
During the mid-Triassic, corals became wide-spread. Like modern coral reefs, they were made colourful by the algae living within them.

JURASSIC SKIES

The skies of the Jurassic Period were not populated by birds, but by huge flying reptiles with tooth-lined beaks! They were the pterosaurs. These reptiles were not dinosaurs, but were part of the same wider family known as the archosaurs, to which all dinosaurs, pterosaurs and crocodiles belong. They first appeared in the Late Triassic, and ruled the skies for more than 160 million years until the end of the Cretaceous.

Pterosaurs had wings made of skin and muscle, stretched from their long fourth finger to their body. Hollow bones reduced their weight, so they were light enough to fly, despite their huge size. And many had tails, which would have been used like a rudder on an aeroplane to help them steer in mid-air. On land, pterosaurs could have folded their wings and walked on their forelimbs like legs. Like many birds today, they probably roosted on cliff edges or trees, and could have used the height to help them take off.

Feathers
Many dinosaurs had basic proto-feathers on their bodies – not like the scaly reptiles we know today!

Rhamphorhynchus
This pterosaur used its needle-like teeth to catch fish as it flew over rivers and lakes.

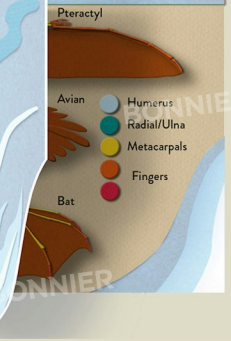
Pterodactylus
This pterosaur is thought to have fed on smaller land animals, crushing them with its powerful beak.

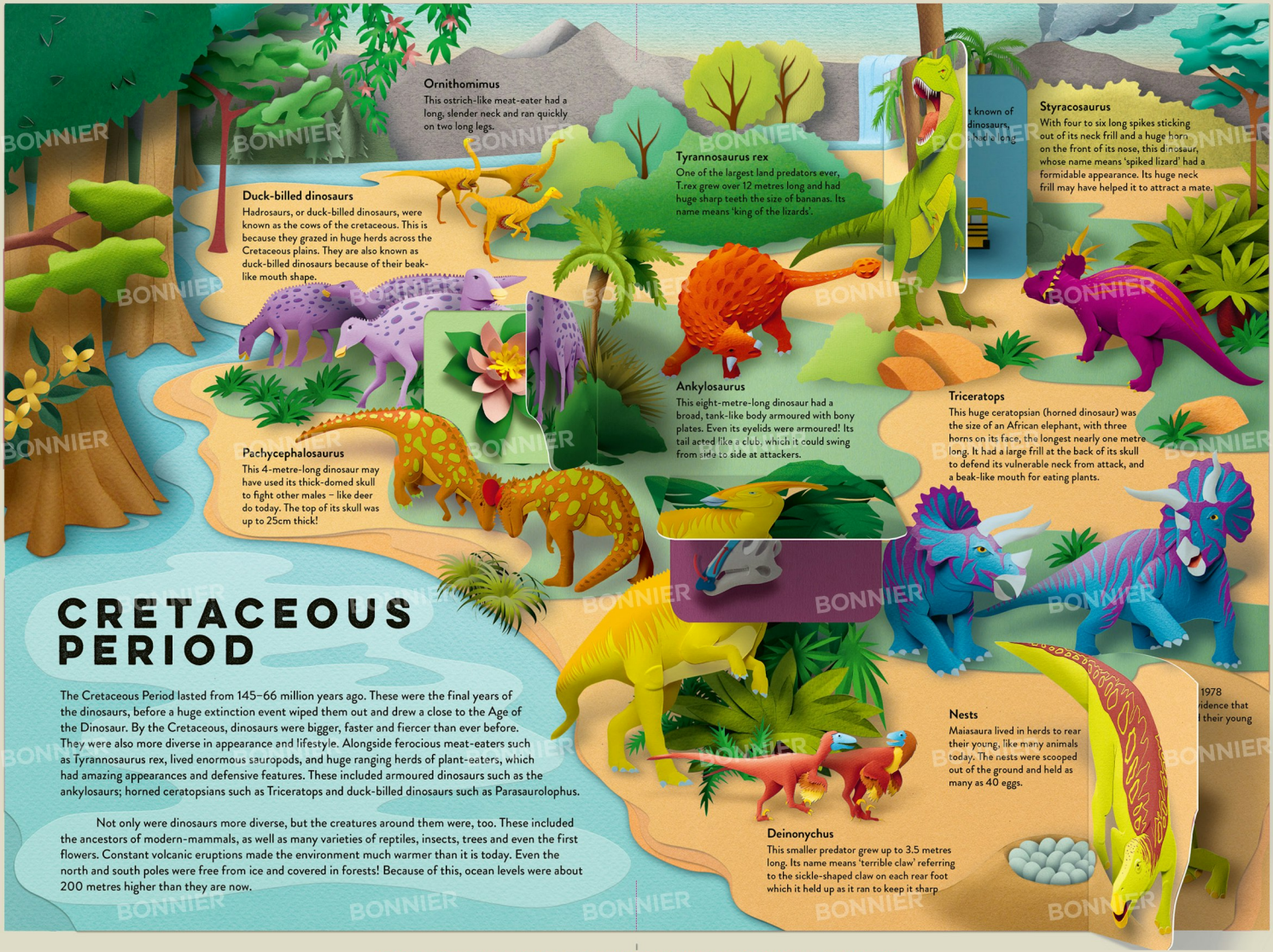
Dimorphodon
This small-sized pterosaur may have been an insect-eater. Its relatively short wings mean it probably only flew short distances.

Flying insects
Dragonflies and other insects also buzzed in the Jurassic skies.

Anurognathus
This tiny pterosaur had a wingspan of just 35cm – and weighed just 40g. That's about the same weight as a chocolate bar!

Eggs
Like dinosaurs, pterosaurs' young hatched from eggs.





CRETACEOUS PERIOD

The Cretaceous Period lasted from 145–66 million years ago. These were the final years of the dinosaurs, before a huge extinction event wiped them out and drew a close to the Age of the Dinosaur. By the Cretaceous, dinosaurs were bigger, faster and fiercer than ever before. They were also more diverse in appearance and lifestyle. Alongside ferocious meat-eaters such as Tyrannosaurus rex, lived enormous sauropods, and huge ranging herds of plant-eaters, which had amazing appearances and defensive features. These included armoured dinosaurs such as the ankylosaurs; horned ceratopsians such as Triceratops and duck-billed dinosaurs such as Parasaurolophus.

Not only were dinosaurs more diverse, but the creatures around them were, too. These included the ancestors of modern-mammals, as well as many varieties of reptiles, insects, trees and even the first flowers. Constant volcanic eruptions made the environment much warmer than it is today. Even the north and south poles were free from ice and covered in forests! Because of this, ocean levels were about 200 metres higher than they are now.

CRETACEOUS GIANTS

Sauropods were large, long-necked plant-eaters that first emerged in the Jurassic. They walked on four pillar-like legs to support their enormous weight, and spent all day grazing on leaves, ferns and horsetails, in order to take in enough nutrients. However, their long necks enabled them to reach even the highest trees, like giraffes today, so they could reach shoots and leaves inaccessible to smaller animals.

By the Cretaceous, some well-known species, such as Diplodocus had died out. But in their wake came the largest sauropods ever: the titanosaurs. Named after the mythological Titans of Ancient Greece, they grew to lengths of up to 30 metres: longer than three buses. They were the last great group of sauropods before the dinosaurs all went extinct.

Sauropod teeth
Most sauropods had pencil-shaped teeth, which scraped leaves or pine needles of trees but were little use for chewing.

Dreadnoughtus
This 26m long giant was only discovered in 2005, from fossil remains in Patagonia, Argentina. It stood about as tall as a two-storey building.

Saltasaurus
This huge dinosaur was covered in bony osteoderms to defend it from predators.

Amargasaurus
This was a comparatively small sauropod, reaching lengths of just 13m. It had two rows of spines down its neck and back, which could have been used for display or defence

Abelisaurus
Few predators could have taken on the sheer size of a sauropod as prey, but one of those that could was Abelisaurus, a 7.5-metre-long hunter from what is now South America.

CRETACEOUS GIANTS

Sauropods were large, long-necked plant-eaters that first emerged in the Jurassic. They walked on four pillar-like legs to support their enormous weight, and spent all day grazing on leaves, ferns and horsetails, in order to take in enough nutrients. However, their long necks enabled them to reach even the highest trees, like giraffes today, so they could reach shoots and leaves inaccessible to smaller animals.

By the Cretaceous, some well-known species, such as Diplodocus had died out. But in their wake came the largest sauropods ever: the titanosaurs. Named after the mythological Titans of Ancient Greece, they grew to lengths of up to 30 metres: longer than three buses. They were the last great group of sauropods before the dinosaurs all went extinct.

Patagotitan
Possibly the largest land animal ever, scientists estimate Patagotitan may have reached lengths of over 30m.

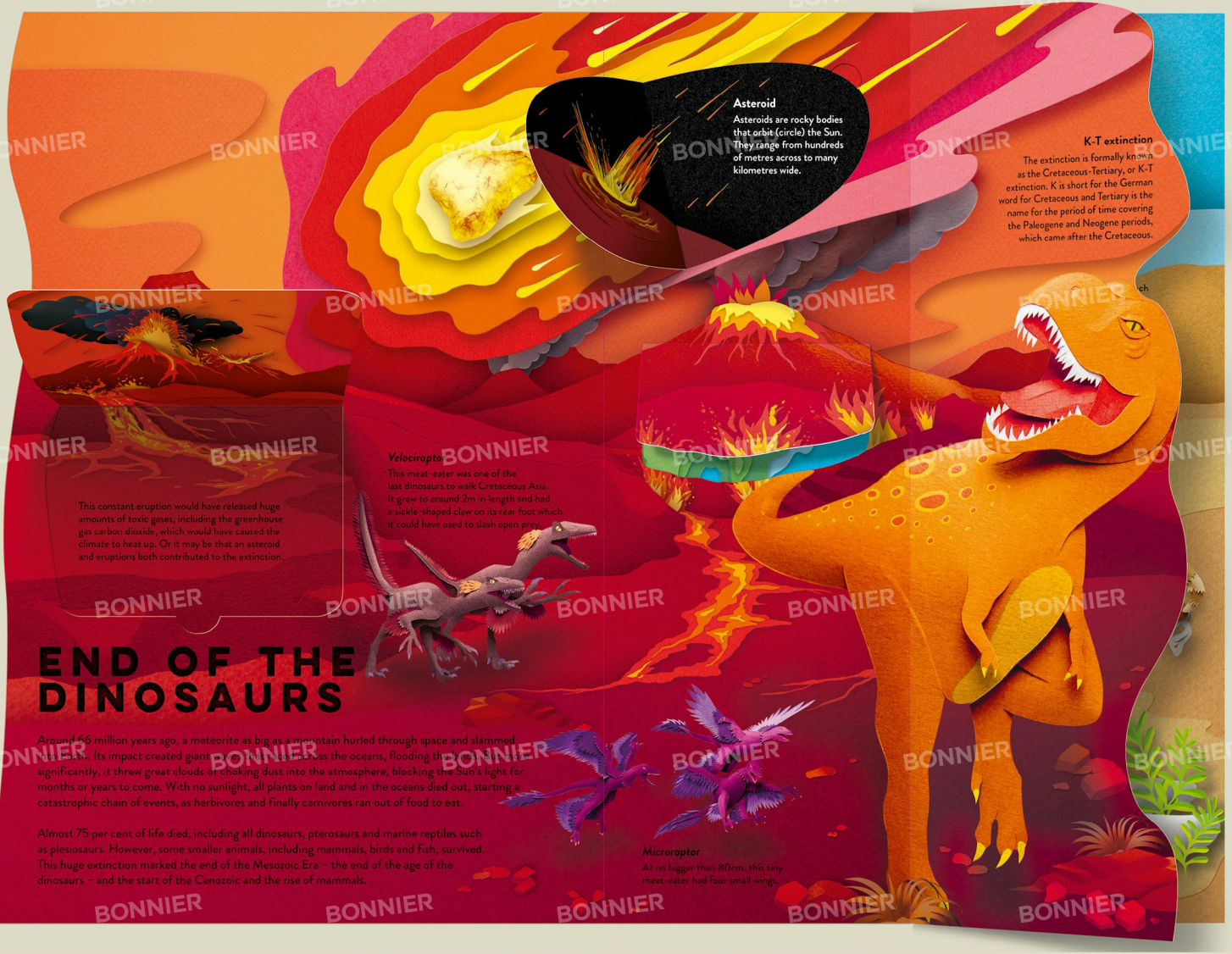
What's in a name?
The huge Dreadnoughtus was named after the mighty Dreadnought battleships of the earliest 20th century. The name means 'fears nothing' in Latin.

Dreadnoughtus
This 26m long giant was only discovered in 2005, from fossil remains in Patagonia, Argentina. It stood about as tall as a two-storey building.

Saltasaurus
This huge dinosaur was covered in bony osteoderms to defend it from predators.

Amargasaurus
This was a comparatively small sauropod, reaching lengths of just 13m. It had two rows of spines down its neck and back, which could have been used for display or defence

Abelisaurus
Few predators could have taken on the sheer size of a sauropod as prey, but one of those that could was Abelisaurus, a 7.5-metre-long hunter from what is now South America.



This constant eruption would have released huge amounts of toxic gases, including the greenhouse gas carbon dioxide, which would have caused the climate to heat up. Or it may be that an asteroid and eruptions both contributed to the extinction.

END OF THE DINOSAURS

Around 66 million years ago, a meteorite as big as a mountain hurled through space and slammed into Earth. Its impact created giant tsunamis that raced across the oceans, flooding the coastal lands. Significantly, it threw great clouds of choking dust into the atmosphere, blocking the Sun's light for months or years to come. With no sunlight, all plants on land and in the oceans died out, starting a catastrophic chain of events, as herbivores and finally carnivores ran out of food to eat.

Almost 75 per cent of life died, including all dinosaurs, pterosaurs and marine reptiles such as plesiosaurs. However, some smaller animals, including mammals, birds and fish, survived. This huge extinction marked the end of the Mesozoic Era – the end of the age of the dinosaurs – and the start of the Cenozoic and the rise of mammals.

Velociraptor

This meat-eater was one of the last dinosaurs to walk Cretaceous Asia. It grew to around 2m in length and had a sickle-shaped claw on its rear foot which it could have used to slash open prey.

Mic

Al
ma

Palaeogene

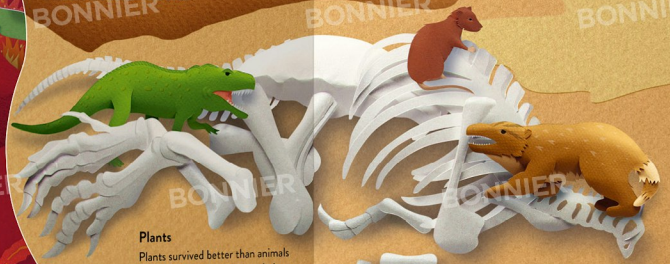
The period after the K-T extinction was called the Palaeogene. Mammals, who had previously lived in the shadow of the dinosaurs, multiplied, diversified and thrived in this period.

Mammals

Many of the surviving animals, such as *Alphadon* and *Repenomamus*, were mammals – small animals covered in fur, who gave birth to live young. It helped that mammals at the time were small, especially compared to dinosaurs, and could eat anything, which helped them to survive.

Archosaurs

All dinosaurs and pterosaurs died out during the K-T extinction but some archosaurs survived, including the ancestors of crocodiles and birds.



Plants

Plants survived better than animals in the wake of the event, as their seeds and pollen could endure harsh conditions for longer, even if their leaves died.

A fossil is made

Here we can see the long process of a fossil forming over millions of years and eventually being discovered.

1. A dinosaur dies

For an animal to turn to a fossil after death, it needs to be buried in sediment (mud or silt). Many land dinosaurs are known from marine sediments as their bodies were washed down rivers and into the sea.

2. The body decays

The soft body parts, such as muscles and skin, rot away. The hard parts, such as bones, teeth and claws, are left.

3. Sediment builds up

Over time, layers of sediment build up. The pressure bearing down turns the lower layers to rock.

Permineralisation

Pores in the buried bones are filled with minerals that filter down through the ground in rainwater. Sometimes these minerals replace the bone altogether. This is how most fossil bones form.

Pores in the bone fill with minerals from seeped rainwater.

4. Turned to stone

Most or all of the bone has been replaced by preserving minerals such as silica and calcium carbonate. A fossil has formed.

Coprolites

Fossilised dinosaur faeces (poo) can reveal what dinosaurs ate.

Wind

5. Changing landscape

Mountains rise up, oceans flood the land, and eventually the dinosaur remains are nearer the surface again.

6. A fossil is discovered

Eventually, the process of erosion wears away the rock to reveal the fossil. Once it is sighted, a team of experts may come in to help uncover all of it.

HOW FOSSILS FORM

Fossils form when an animal's body is preserved after death. Most animals' bodies decompose – but if they are quickly buried in silt or mud, hard parts like bones and teeth can be preserved and eventually turn into stone.

Fossilisation takes millions of years. Groundwater seeps into the bones and the minerals harden to fill the spaces left by the dead cells. Over time, these turn into rock. When we find them, we can learn all about the creatures that walked the Earth before us just by digging them up. In fact, the word fossil comes from the Latin *fossilis* meaning 'dug up'. There are many other types of fossils too – from fossil footprints to fossilised poos!

Trace fossils

A trace fossil is a fossil of a footprint, trail, burrow or other evidence of animal behaviour and movement. For instance, fossil footprints can tell us lots about how dinosaurs lived – whether they lived in herds, whether they walked slowly or ran quickly, and we can even use them to estimate a dinosaur's approximate weight!

Dragons

Hundreds of years ago, before modern science, people discovered fossils and thought they were the bones of dragons or giants.

Early fossil hunters

Around 200 years ago, it was popular for tourists visiting seaside locations to buy fossils as souvenirs. Mary Anning's family sold fossils this way in Lyme Regis, England.

When Mary was 12, in 1811, she found a complete ichthyosaur fossil on the Jurassic Coast, on England's south coast. It was one of the very first fossils to be studied by scientists. Mary Anning went on to become one of the most prolific and admired fossil finders of her age.

Bone Wars

In the eighteenth century, two Americans, Edward Drinker Cope and O.C. Marsh, began competing to find dinosaur bones in North America. In 1860, just six types of dinosaur were known. By 1892, this fierce competition had led to the discovery of 120 new dinosaurs.

Where to find fossils

Anybody can find fossils – even children! But if you do find one, be sure to contact an expert and don't try to dig it up. Most fossils are found by the coast, and the most commonly found fossils are ancient sea creatures such as ammonites and trilobites.

Digging up fossils

A dig or excavation is the site where a fossil is found. Palaeontologists work carefully to reveal fossils using hammers, picks, files, scrapers and brushes. Small fossils can be removed easily from the rock. Large fossils are covered for protection and dug out in a large block, which is taken back to a laboratory for further excavation.

DISCOVERING FOSSILS

The only way we know about dinosaurs is from their fossils. Earth's crust is always moving – so eventually a fossil that was on the seabed can rise to be at the top of a mountain. Together with the erosive power of water and wind, this means that in time, fossils will come to our attention and we can unearth and study them.

Scientists who study fossils are called palaeontologists. It can take months of careful work to reveal a fossil in its location. Details about its location, size, and even colour, can help scientists piece together details about a dinosaur's life. After it has been removed from the site, the fossil will be further studied in a laboratory under a microscope before being removed to be placed in storage – or, in some cases, displayed in museums!

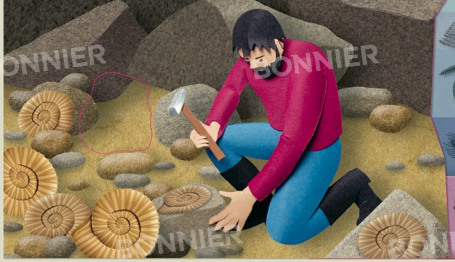
Early fossil hunters

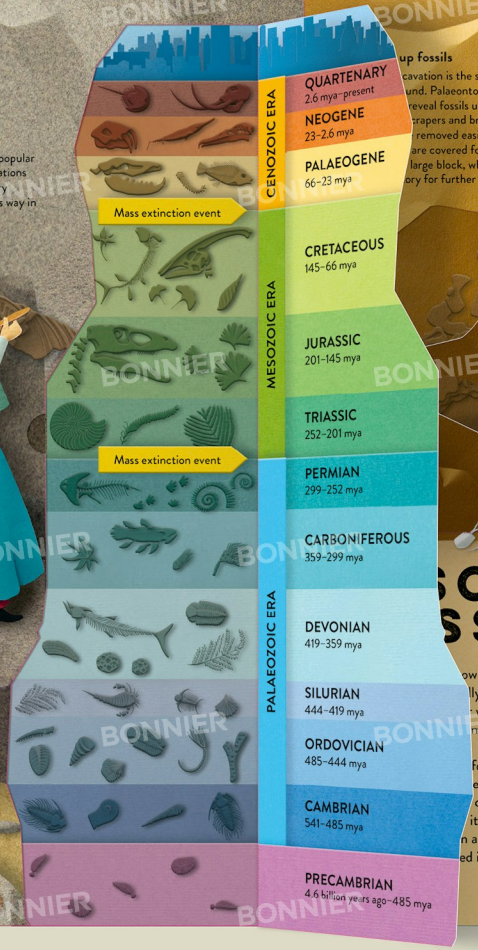
Around 200 years ago, it was popular for tourists visiting seaside locations to buy fossils as souvenirs. Mary Anning's family sold fossils this way in Lyme Regis, England.

Dragons

Hundreds of years ago, before modern science, people discovered fossils and thought they were the bones of dragons or giants.

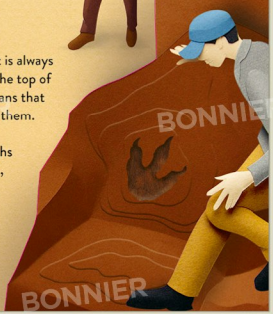
When Mary was 12, in 1811, she found a complete ichthyosaur fossil on the Jurassic Coast, on England's south coast. It was one of the very first fossils to be studied by scientists. Mary Anning went on to become one of the most prolific and admired fossil finders of her age.





up fossils

cavation is the site where und. Palaeontologists work reveal fossils using hammers, trapers and brushes. Small removed easily from the rock. are covered for protection and large block, which is taken back ory for further excavation.



SCOVERING SSILS

ow about dinosaurs is from their fossils. Earth's crust is always lly a fossil that was on the seabed can rise to be at the top of with the erosive power of water and wind, this means that me to our attention and we can unearth and study them.

fossils are called palaeontologists. It can take months eal a fossil in its location. Details about its location, can help scientists piece together details about a it has been removed from the site, the fossil will n a laboratory under a microscope before being ed in storage – or, in some cases, displayed in

GLOSSARY

Amphibians
The group of cold-blooded vertebrates that have soft bodies and live their lives both in water and on land.

Cambrian Period
From 541 to 485 million years ago. This period saw a huge explosion of marine life, including the first animals with backbones, molluscs and trilobites.

Carboniferous Period
From 358 to 299 million years ago. During this period Earth was covered with plants. Animals spread on land and grew in size, including super-sized insects.

Cretaceous Period
From 145 to 66 million years ago. The last period of the Mesozoic Era, which ended with a mass extinction event that wiped out the dinosaurs.

Dinosaurs
Lizard-like reptiles that dominated the planet during the Cretaceous, Triassic and Jurassic periods.

Evolution
The process of how living things gradually change over time because of characteristics passed down to them from earlier generations.

Extinction
When living things die out and are gone forever.

Fossil
The preserved remains of a prehistoric animal or plant in rock. It's not just remains – evidence such as footprints can be preserved too.

Ichthyosaur
A type of marine reptile that lived during the Mesozoic Era, when the dinosaurs roamed the Earth.

Jurassic Period
From 201 to 145 million years ago. Dinosaurs dominated the land during the Jurassic, and ocean and flying animals flourished too.

Mammals
This large group of animals includes humans. Mammals breathe air, have a backbone and hair, and feed their babies with milk.

Mesozoic Era
This huge division of time includes the Triassic, Jurassic and Cretaceous periods.

Meteorite
A space rock that has fallen to Earth.

Palaeontologist
A scientist who studies life that lived millions of years ago by looking at fossilised remains.

Pangaea
Around 300 million years ago, all the Earth's continents were joined together in one huge landmass called Pangaea.

Permian Period
From 299 to 252 million years ago. The climate warmed and many new animals evolved on land and in the oceans. It ended with the greatest extinction of all time, 'the Great Dying', when most species on Earth suddenly became extinct.

Pterosaur
An extinct flying reptile that lived at the same time as the dinosaurs. Pterosaurs were the first vertebrates to fly, long before birds and bats.

Reptiles
Cold-blooded vertebrates that are covered in scaly skin or bony plates. Dinosaurs were reptiles.

Sauropods
Huge, long-necked, long-tailed, four-legged dinosaurs. Sauropods are the largest animals that have ever walked on land.

Triassic Period
From 252 to 201 million years ago. Reptiles diversified and the first dinosaurs appeared.

A TEMPLAR BOOK

First published in the UK in 2023 by Templar Books,
an imprint of Bonnier Books UK
4th Floor, Victoria House,
Bloomsbury Square, London WC1B 4DA
Owned by Bonnier Books
Sveavägen 56, Stockholm, Sweden
www.bonnierbooks.co.uk

1 3 5 7 9 10 8 6 4 2
XXXX XXX

ISBN 978-1-80078-331-7

Written and edited by Ruth Symons
Designed and paper engineered by Richard Ferguson
Production by Ché Creasey
Consultant Dr Helen Scales, Marine Biologist

Printed in China