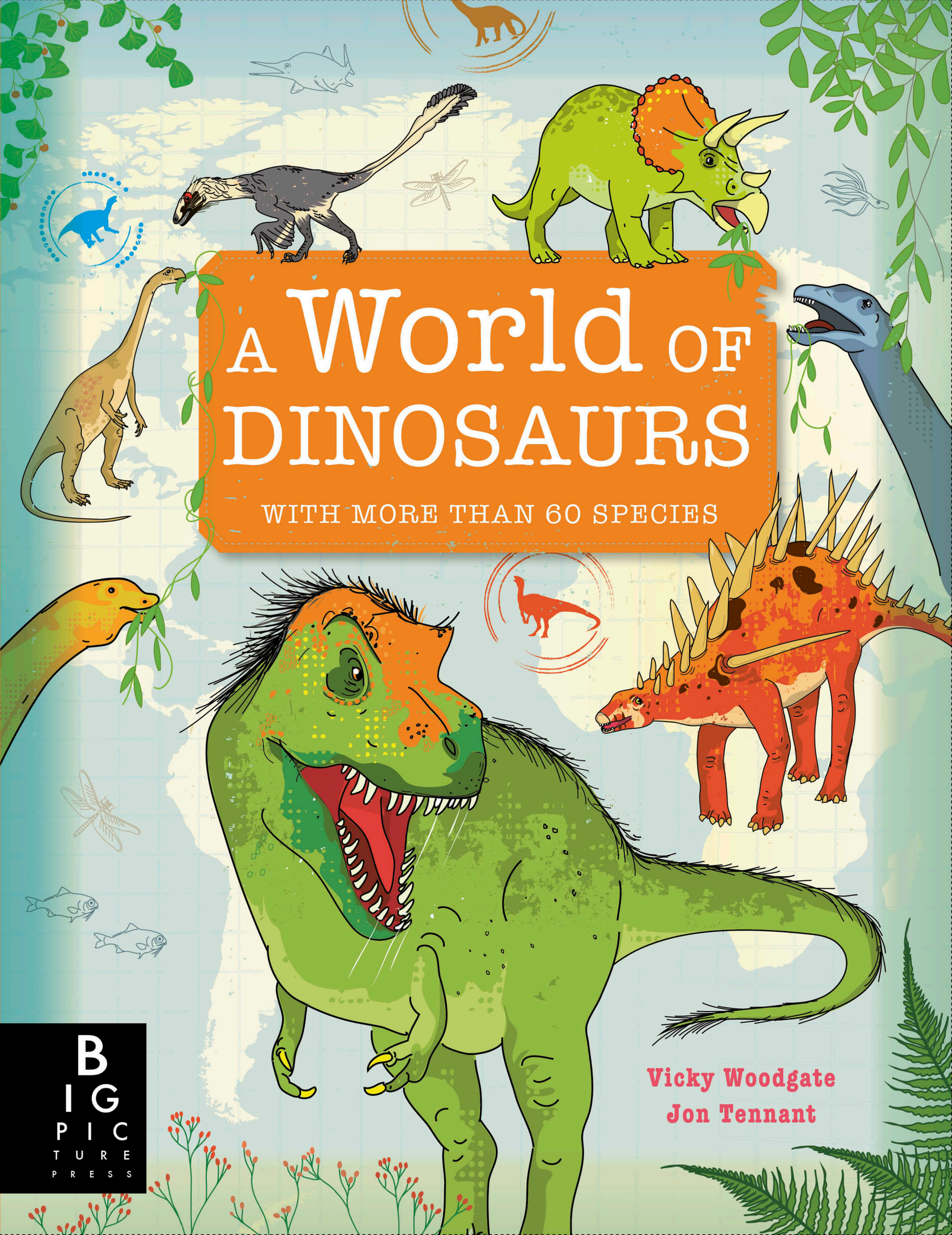
A World of Dinosaurs
WITH MORE THAN 60 SPECIES
Vicky Woodgate
Jon Tennant
BIG PICTURE PRESS

For my nephews and nieces, El, Riley, Eva and Sam,
and for Idaho's finest, Wyatt, Sawyer and Dawson – V.W.

For all adventurers, past, present and future.
Never stop exploring – J.T.

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A World of Dinosaurs

by **Vicky Woodgate** and **Jon Tennant**

B P P

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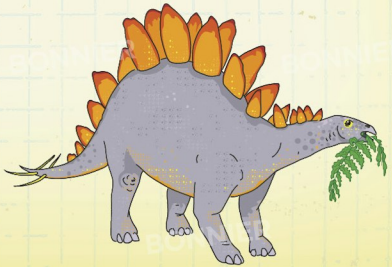
Introduction

Welcome to the world of dinosaurs! This book will take you back in time to an age when reptiles ruled the Earth. Spanning every continent, our journey takes in more than 60 dinosaurs and their relatives – from little to large, including some you may never have heard of!

A World of Dinosaurs reveals the incredible variety of prehistoric life, and shows how dinosaurs once dominated every corner of the Earth. Are you ready to begin your global dinosaur hunt? Then let's get to it . . .

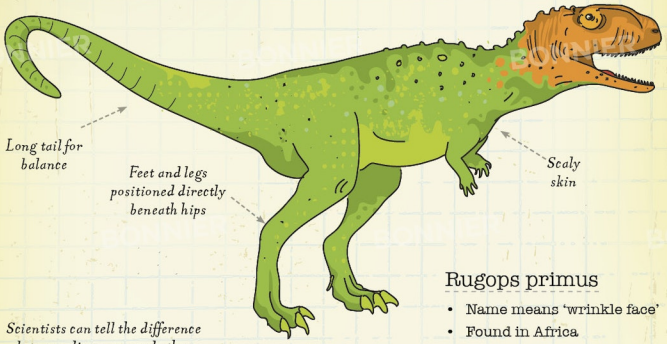


A World of Dinosaurs

Around 230 million years ago, dinosaurs were the dominant life form on our planet. Some were gentle plant eaters, while others were ferocious predators. They ranged from tiny predators hardly bigger than a chicken to huge grazing animals more than 35 metres long. This makes the biggest dinosaurs the largest animals ever to have walked the Earth.

What did dinosaurs look like?

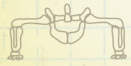
Dinosaurs were a group of reptiles that lived on land, between 245 and 60 million years ago. They all had tails and laid eggs, and walked about on two legs or four. It is thought most dinosaurs had scaly skin, like lizards today.



Scientists can tell the difference between dinosaurs and other reptiles by the complete hole through their hip socket.

Rugops primus

- Name means 'wrinkle face'
- Found in Africa



Modern reptiles hold their legs to the side of their bodies.

Crocodiles walk with their knees bent outwards.

Dinosaurs walked with their legs straight under them.

What is a dinosaur?

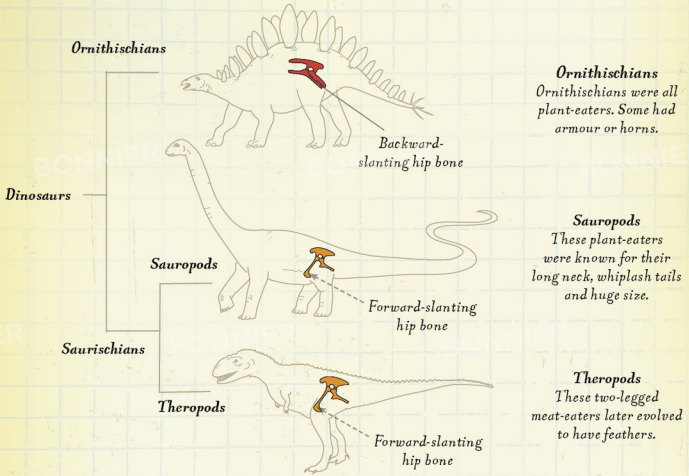
Dinosaurs all walked on the ground. The flying and swimming reptiles that lived alongside them were not dinosaurs at all but distinct groups of their own.

Bird-hipped or lizard-hipped?

Dinosaurs are grouped according to the shape of their hips. Ornithischian or 'bird-hipped' dinosaurs had backward-slanting hips (pubic bones), while the saurischian or 'lizard-hipped' dinosaurs had forward-slanting hips. The saurischians were made up of two further groups: sauropods and theropods.

Surprise surprise

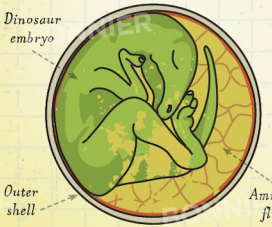
Despite their name, bird-hipped dinosaurs have no relation to modern-day birds. In fact, modern birds are descended from lizard-hipped dinosaurs!



Ornithischians
Ornithischians were all plant-eaters. Some had armour or horns.

Sauropods
These plant-eaters were known for their long neck, whiplash tails and huge size.

Theropods
These two-legged meat-eaters later evolved to have feathers.



Eggs

Dinosaurs, like modern birds, laid eggs. Their fossilised remains have been found all over the world. Many of these have been found clustered together. Some dinosaurs have even been fossilised sitting over or 'brooding' their eggs.

The Age of Dinosaurs

The first dinosaurs appeared around 230 million years ago. They lived over three major periods in the history of Earth: the Triassic, Jurassic and Cretaceous periods. Together, these form the Mesozoic era, often referred to as the Age of Dinosaurs.

TRIASSIC: 251–199 million years ago

The Triassic

At the beginning of the Triassic, there was one huge 'supercontinent' called Pangaea. Gradual movements within the Earth forced this to split into two continents: Laurasia and Gondwana.

JURASSIC: 199– 145 million years ago

The Jurassic

The continents continued to move away from each other, temperatures dropped and plant life became more lush and abundant. Dinosaurs grew bigger and began to diversify.

CRETACEOUS: 145–66 million years ago

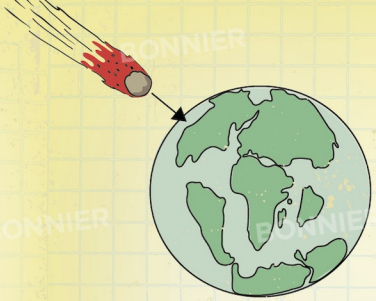
The Cretaceous

The continents began to look more like their current shape. By now, dinosaurs lived right across the globe – even at the north and south pole. They grew bigger and bigger.

Before the dinosaurs

Dinosaurs were not always dominant. Before them, and in their earliest days, a number of predatory dinosaur-like and crocodile-like groups existed, as well as some mammal-like reptiles.

Archosaurs are a group of animals including dinosaurs, crocodiles, birds and pterosaurs. Primitive archosaurs like this one walked more like crocodiles.



The meteor that struck Earth is thought to have been about 15km wide – that's about the size of Manhattan Island in New York.

Extinction

So where did the dinosaurs go? Around 66 million years ago, a meteor struck the Earth, throwing huge clouds of gas into the atmosphere. Combined with large-scale volcanic eruptions, this dramatically changed temperatures around the world. Around three-quarters of all plants and animals went extinct.

Golden eagle

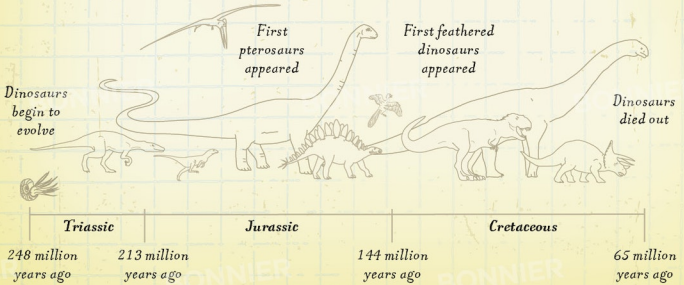
Extinct or evolved?

While many of the dinosaurs went extinct, some survived the chaos. They were a special line of dinosaurs – the birds. Able to adapt to the changing environments, they not only came out of the extinction event, but went on to flourish. Over time they evolved into the huge number of species we see around us today.

Ever seen a dinosaur?

Wait, so dinosaurs are still around today? Yes! Every bird you know, from a pigeon to an emu to a penguin, is technically a living, breathing dinosaur!

Dinosaur timeline



Dinosaurs Today

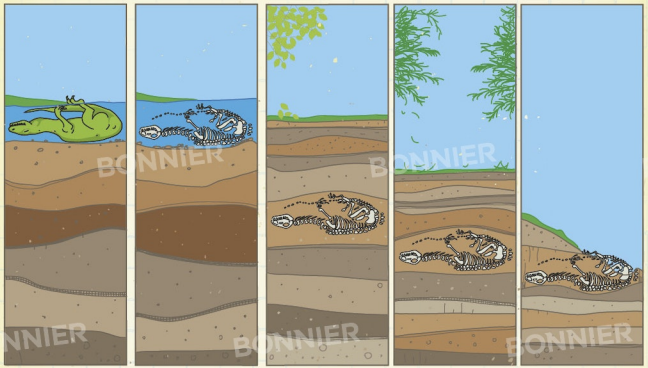
Almost everything we know about dinosaurs comes from studying their remains, known as fossils. Preserved over millions of years, fossils are usually made up of the hard part of an animal's body, such as its bones. The oldest fossils we know of are around 3.5 billion years old! They comprise the earliest forms of simple life, similar to bacteria.

What is a fossil?

The process of fossilisation takes many thousands of years to complete. It is a gradual process where the parts of an organism are slowly replaced with harder minerals, which can survive for millions of years. Scientists who study fossils are called palaeontologists.

Fantastic beasts

Before people understood what dinosaurs were, ancient cultures thought they were mythical creatures like dragons!



Often, when a dinosaur died it was washed into a lake or river. Here, its body was covered with water.

Next, its body decayed and rotted away. Usually just the skeleton remained.

Over very long periods of time, the skeleton was then covered with layers of sediment.

Over even longer periods of time, the sediment turned into rock, and the bones hardened. They transformed into fossils.

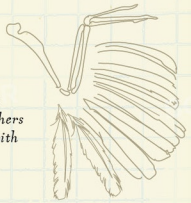
As the rocks erode away, the fossils are exposed again after millions of years. Now they can be excavated!

Trace fossils

Not all fossils are the preserved remains of a dead animal. Sometimes, we are lucky and find evidence of what a dinosaur was doing while it was alive. These are called trace fossils, and are useful evidence of dinosaur behaviour. Trace fossils include eggs, trackways and even fossilised faeces (poo).

Poo-ey!

Fossilised faeces are known as coprolites. They enable palaeontologists to work out what dinosaurs ate.



Sometimes the impression of feathers has been found with dinosaurs.

Fossil hunters

Researchers have also discovered fossilised wood, hair and resin (animals entombed in amber) – and even fossilised DNA. Palaeontologists are now able to examine these fossils with a range of modern high-tech scientific methods.

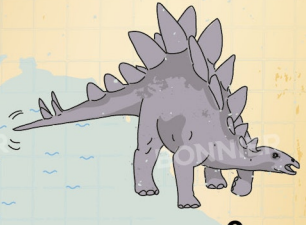
Most dinosaur bones are found as individual pieces, but sometimes a whole skull or even a skeleton is discovered!

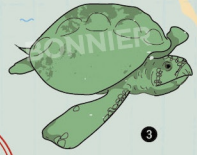
A fossil ammonite – a type of mollusc that swam the ancient seas

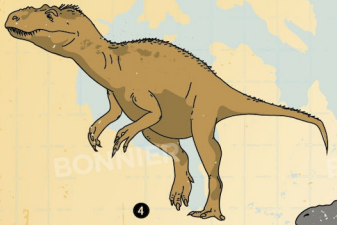
Fossilised leaf impression

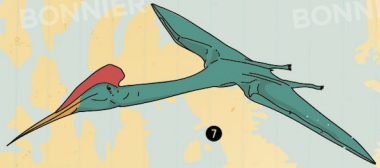
An ancient mosquito preserved in amber (fossilised tree resin)

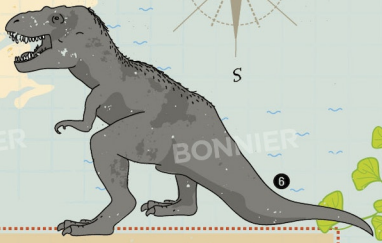
A clutch of ancient reptilian eggs











North America

Towards the end of the Jurassic, the super continent Pangaea quickly broke up, and the Atlantic Ocean separated North America from Africa and Europe. At this time, North America had a humid, tropical climate, with many different habitats. Later on, during the Cretaceous period, a shallow inland sea covered much of the centre of North America. The divide meant that distinct types of dinosaur evolved on either side of the water.

N
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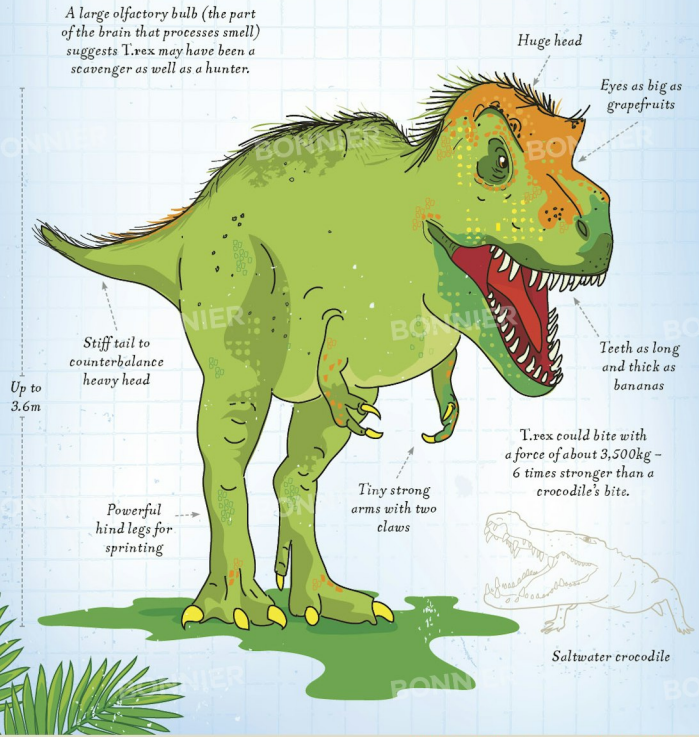
Key

1. Brachiosaurus altithorax
2. Stegosaurus stenops
3. Archelon ischyros
4. Allosaurus fragilis
5. Dakotaraptor steini
6. Tyrannosaurus rex
7. Quetzalcoatlus northropi

Tyrannosaurus rex

Group: Theropod • Period: Cretaceous
Pronunciation: Tie-ran-oh-saw-rus rex

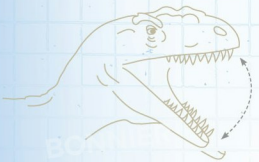
Tyrannosaurus rex was perhaps the largest carnivore ever to walk the Earth. It had one of the most powerful bites of any animal, with teeth like steak knives for tearing through flesh and crushing bone. Its name, meaning 'tyrant lizard king', reflects its spot at the top of the food chain in the Cretaceous period.



Allosaurus fragilis

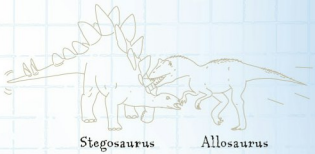
Group: Theropod • Period: Jurassic
Pronunciation: Al-oh-saw-rus fra-jil-is

Often termed the 'wolf of the Jurassic', *Allosaurus* was among the top predators of its time. Packs of these fearsome hunters would chase after their prey, slowly draining their target of energy before diving in for the kill. Discovered in 1877, *Allosaurus* was one of the first dinosaur fossils discovered in North America.



Slash & grab

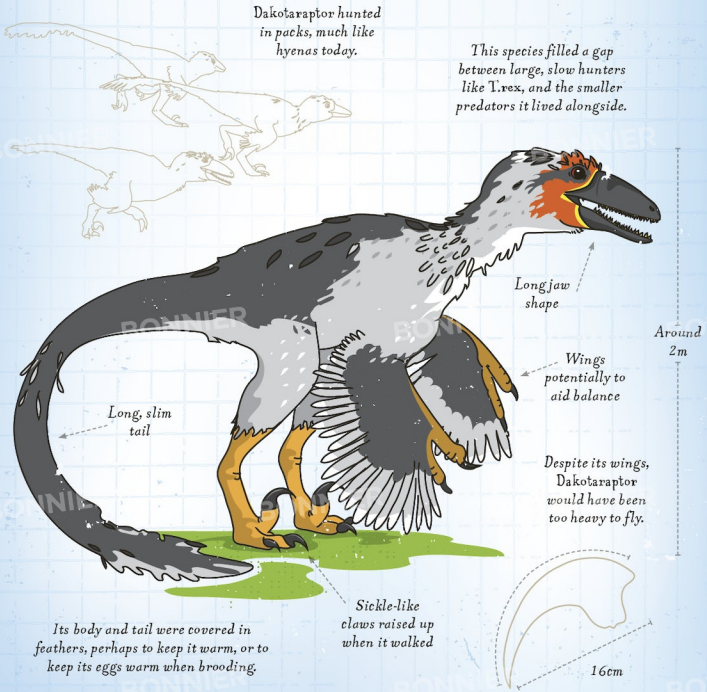
Allosaurus probably used its sharp teeth in a 'hacking and slashing' motion, to inflict dozens of smaller wounds on larger prey.



Dakotaraptor steini

Group: Theropod • Period: Cretaceous
Pronunciation: Da-koh-ta-rap-tor sty-nee

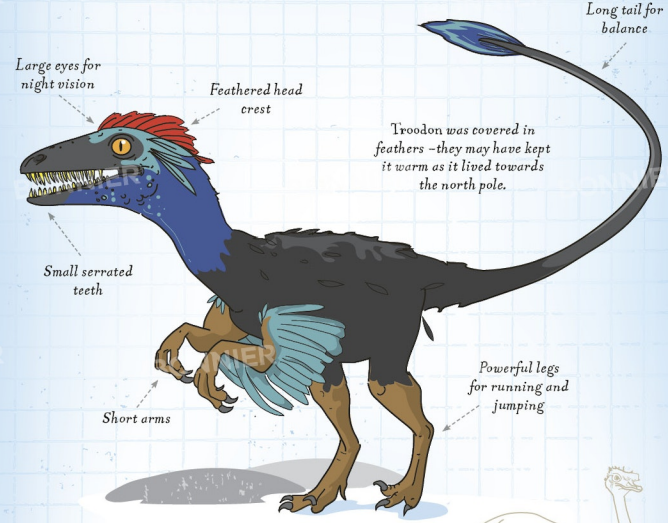
Dakotaraptor was the biggest of the theropods known as 'raptors' – slender, medium-sized hunters. Discovered in 2015, fossils revealed that it had feathered arms like the wings of modern birds, though it could not fly. This pack animal used its agility to capture prey before killing it with the huge sickle-shaped claws on its feet.



Troodon formosus

Group: Theropod • Period: Cretaceous
Pronunciation: Tru-don for-moh-sus

From studies of its skull and braincase (cranium), *Troodon* is possibly the most intelligent dinosaur known to us. It is thought to have hunted at night, and had large eyes for excellent vision in the dark. Serrated teeth and U-shaped jaws suggest *Troodon* was an omnivore, likely feeding on small animals, insects and perhaps plants.



The tooth of the matter

Troodon was originally discovered in Montana in 1856 and was named from just a single tooth. More of the skeleton has since been found.

Troodon *is considered to be one of the smartest dinosaurs – it was probably as smart as large birds today.*

Brachiosaurus altithorax

Group: Sauropod • Period: Jurassic
Pronunciation: Bra-kio-saw-rus al-tee-thor-ax

With its long neck, tiny head and bulky body, *Brachiosaurus* was fairly typical of a sauropod, except for its long front legs, which gave it an unusually upright stance. As it lived alongside other sauropods, this gave *Brachiosaurus* the advantage of being able to strip foliage away from the highest plants.

Around 9 m

Curved teeth

6m

Mistaken identity

Brachiosaurus was originally identified based on fossils from Africa, but researchers later realised they were looking at two species: *Brachiosaurus* and *Giraffatitan*.

Air sacs in spine reduced weight

A single Brachiosaurus *weighed around the same as about 20 African elephants.*

Rear legs shorter than front legs

Brachiosaurus laid some of the biggest eggs ever at around 30cm long.

30cm

Diplodocus carnegii

Group: Sauropod • Period: Jurassic
Pronunciation: Dip-loh-doh-cus car-neg-ee-eye

A giant with a long neck and tail, *Diplodocus* is one of the best-known dinosaur species in the world. It probably achieved its huge size as part of an 'arms race' for defence against increasingly large and deadly predators such as *Allosaurus*. To maintain such enormous proportions, it had to spend most of its day eating and digesting.

Diplodocus would have had efficient lungs and a large, powerful heart to pump blood all the way up its long neck.

Around 30m

Diplodocus was as long as three buses.

Peg-like teeth

Ginkgo leaves

It would eat ginkgo plants by stripping leaves from their branches.

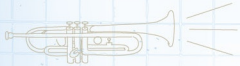
Swooping neck for reaching food

Cracking its whip-like tail could create a sonic boom to scare off predators.

Parasaurolophus walkeri

Group: Ornithopod • Period: Cretaceous
Pronunciation: Para-saw-rol-o-phus wal-ker-eye

Parasaurolophus was a large plant-eating dinosaur, easily recognised by the huge, quiff-like crest projecting from the back of its skull – the reason for its nickname 'Elvis' in the *Jurassic Park* movies. It probably used this crest to call other members of its species, or perhaps for display during courtship rituals.



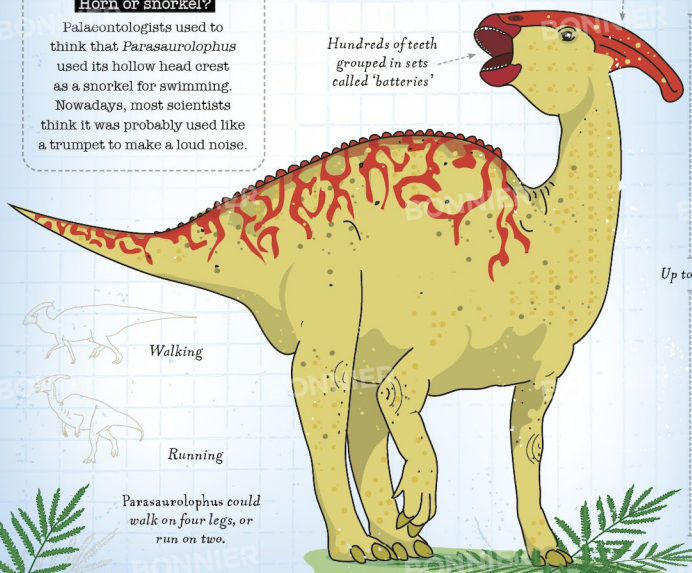
Horn or snorkel?

Palaeontologists used to think that *Parasaurolophus* used its hollow head crest as a snorkel for swimming. Nowadays, most scientists think it was probably used like a trumpet to make a loud noise.

Parasaurolophus would have been the prey of choice for predators like T. rex.

Hollow head crest for signalling to mates or predators

Hundreds of teeth grouped in sets called 'batteries'



Up to 4.9m

Walking

Running

Parasaurolophus could walk on four legs, or run on two.

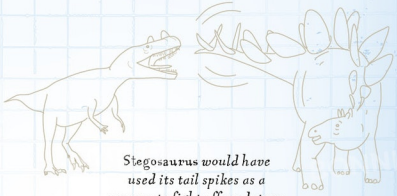
Stegosaurus stenops

Group: Ornithopod • Period: Jurassic
Pronunciation: Ste-goh-saw-rus sten-ops

The tall, flat plates that grew down the back of this plant-eater would have been handy as armour, and may have helped the animal regulate its body temperature – soaking up warmth on cold days or releasing excess heat on warm ones. *Stegosaurus* also had huge, sharp spikes on its tail, which it could have swung at any predator that got too close.

What's in a name?

The name *Stegosaurus* comes from the Greek meaning 'roof lizard'. This refers to the armoured plates that ran down the top of the dinosaur's back.



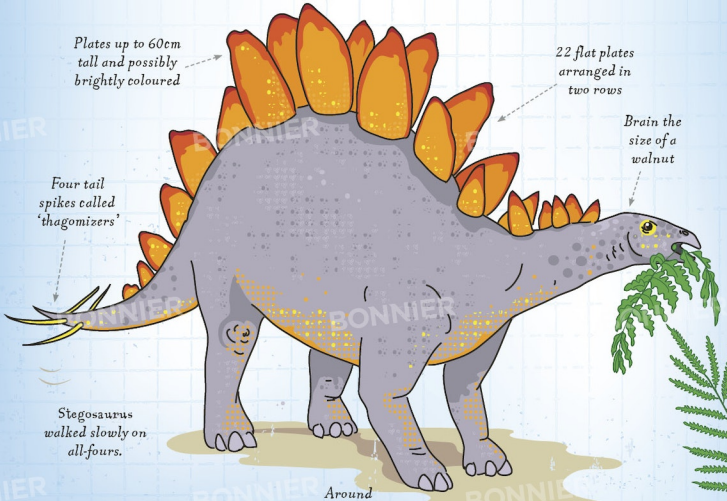
Stegosaurus would have used its tail spikes as a weapon to fight off predators.

Plates up to 60cm tall and possibly brightly coloured

22 flat plates arranged in two rows

Brain the size of a walnut

Four tail spikes called 'thagomizers'



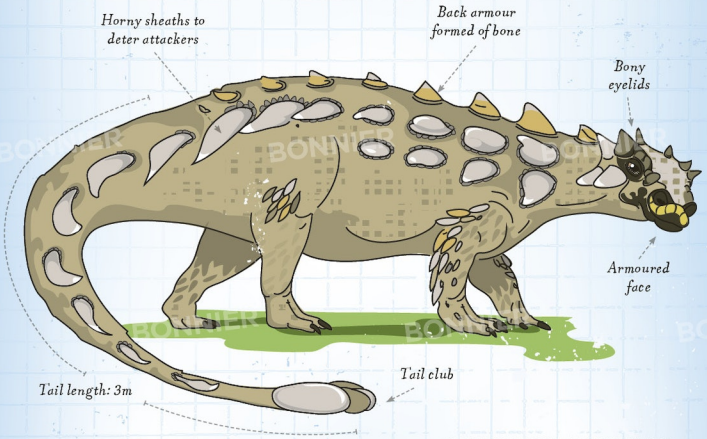
Stegosaurus walked slowly on all-fours.

Around 6m

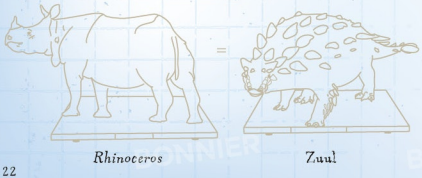
Zuul crurivastator

Group: Ornithopod • Period: Cretaceous
Pronunciation: Zoo-ul crew-ree-vast-ate-or

Zuul was the first armoured dinosaur to be discovered with a complete tail club and skull. Built like a tank, it weighed around 2.5 tonnes. Its skull and back were covered in a shield of bony studs called osteoderms. These would have given it great protection against the predators of the time.



Zuul weighed around the same as a modern-day rhinoceros.



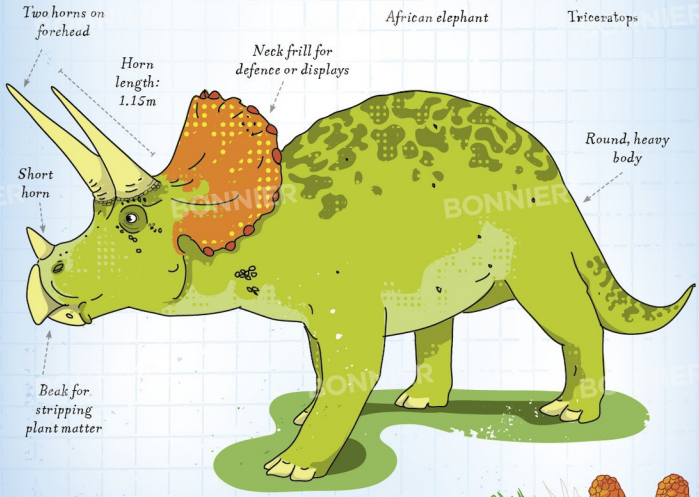
Who you gonna call?

The scientists who discovered *Zuul* nicknamed it the 'destroyer of shins', a pun based on the evil demigod character it is named after from the movie *Ghostbusters*.

Triceratops horridus

Group: Ornithopod • Period: Cretaceous
Pronunciation: Tri-sera-tops hor-id-us

The name *Triceratops* means 'three-horned', referring to the three prominent horns on its face. These would have been used to protect it from predators such as *T.rex*, or to fight rival *Triceratops*. Like modern elephants and rhinos, *Triceratops* probably moved about in herds for protection, so scientists think it was a social animal.

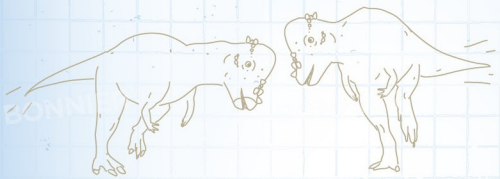


Triceratops would have eaten woody plants such as cycads, which had cone-like seeds and evergreen leaves.

Pachycephalosaurus wyomingensis

Group: Ornithopod • Period: Cretaceous
Pronunciation: Pak-ee-cef-alo-saw-rus wyo-ming-en-sis

Easily identified by its thick, domed skull, *Pachycephalosaurus* was a small plant-eating dinosaur that lived towards the Cretaceous period. It used its huge, heavy head as a weapon, to fend off predators, or for combat with other members of its species.



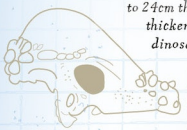
Like modern deer, Pachycephalosaurs probably fought each other for territory or mates.

Rivals may have aimed for each other's flanks (sides), like giraffes do today.

Bony spikes around head

Domed skull

The skull bone was up to 24cm thick – 20 times thicker than other dinosaur skulls!



Beak full of leaf-shaped teeth

Relatively long legs and tail for quick running

Around 6m

Quetzalcoatlus northropi

Group: Pterosaur • Period: Cretaceous
Pronunciation: Kwet-zal-co-at-lus nor-throp-eye

Quetzalcoatlus was one of the largest flying animals of all time, with a wingspan of up to 15 metres. It ruled the skies during the time of the dinosaurs, alongside other pterosaurs (flying reptiles) and some of the first birds. It had a long, stiff neck, and a sharp, toothless beak, perfect for catching fish and other smaller prey, including dinosaurs.

Bony head crest, possibly to attract a mate

Toothless beak

15m

Quetzalcoatlus

Spitfire

Quetzalcoatlus had the same wingspan as a small aircraft!

6m

Giraffe

Quetzalcoatlus

On the ground, Quetzalcoatlus would have stood as tall as an adult bull giraffe.

Furry body

On land, Quetzalcoatlus folded its wings back and walked on all fours.

Flying cousins

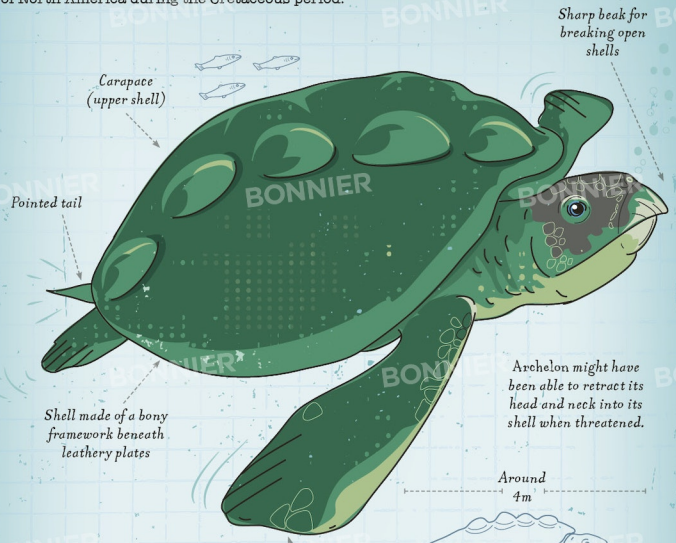
Pterosaurs like *Quetzalcoatlus* are often mistaken for dinosaurs. In fact, they are a whole different group of flying reptiles, only closely related to their cousins on land.

Sharp claws for pinning down prey

Archelon ischyros

Group: Prehistoric turtles • Period: Cretaceous
Pronunciation: Ar-kel-on ish-eye-ros

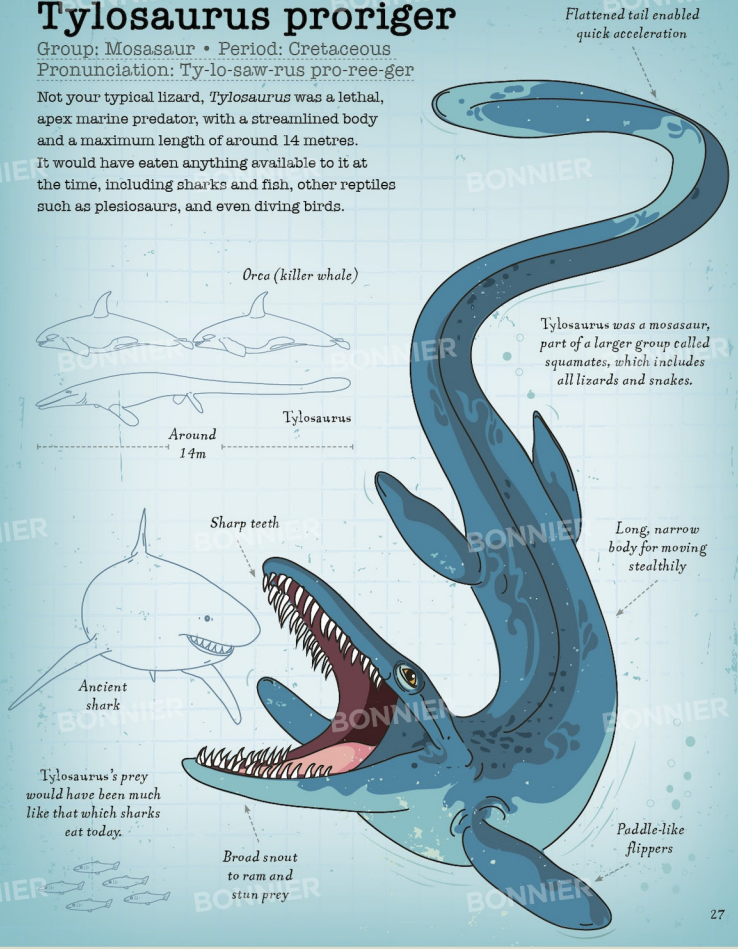
Archelon is the largest sea turtle that ever existed – the biggest specimen ever found was 4 metres in length and 5 metres wide from flipper to flipper. *Archelon* swam the shallow seas that covered much of North America during the Cretaceous period.

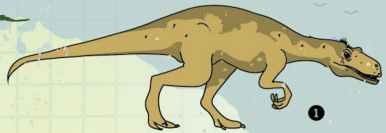


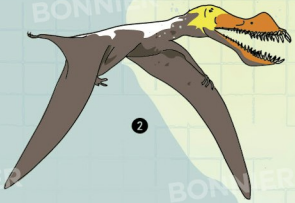
Tylosaurus proriger

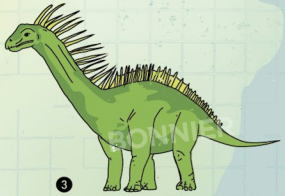
Group: Mosasaur • Period: Cretaceous
Pronunciation: Ty-lo-saw-rus pro-ree-ger

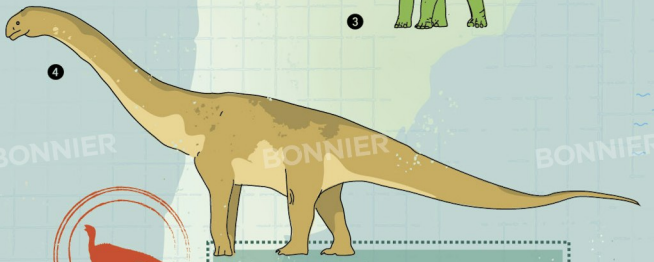
Not your typical lizard, *Tylosaurus* was a lethal, apex marine predator, with a streamlined body and a maximum length of around 14 metres. It would have eaten anything available to it at the time, including sharks and fish, other reptiles such as plesiosaurs, and even diving birds.

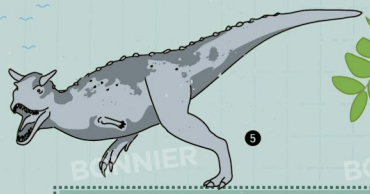










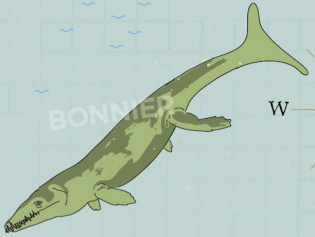


South America

South America remained attached to Africa and North America until the Cretaceous period. Then the South Atlantic sea opened up, pushing the two great southern continents apart. Some dinosaurs migrated between the tip of South America and Antarctica, until the land-bridge between them was lost for ever. The largest dinosaur species ever to walk the planet are almost all known from the great South American plains, as well as some of the biggest predators.

Key

1. Herrerasaurus ischigualastensis
2. Anhanguera bittencourtorum
3. Amargasaurus cazaui
4. Patagotitan mayorum
5. Carnotaurus sastrei
6. Dakosaurus andiniensis



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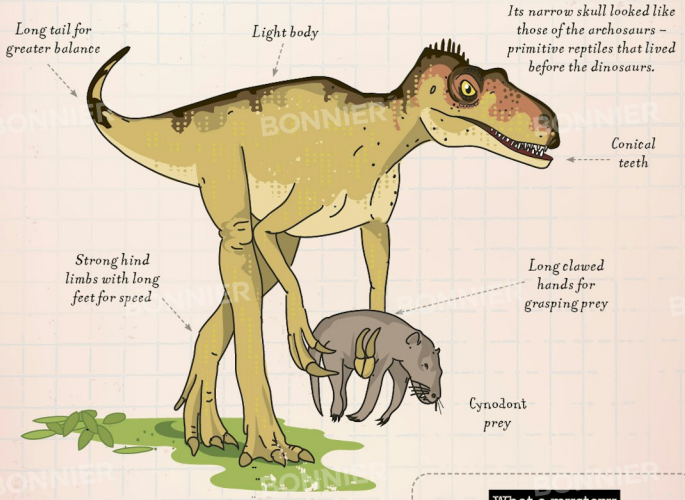
Herrerasaurus ischigualastensis

Group: Theropod • Period: Triassic
Pronunciation: Herr-err-ah-sore-us iss-she-gwa-last-en-sis

Herrerasaurus was one of the very first dinosaurs, living around 230 million years ago. At this time, dinosaurs were not yet the dominant land animals. Many non-dinosaur reptiles prowled the land, and they were often larger and fiercer than *Herrerasaurus*. However, at 3 to 6 metres long, *Herrerasaurus* would still have been a lethal predator.



Herrerasaurus fed on mammal-like creatures such as cynodonts.

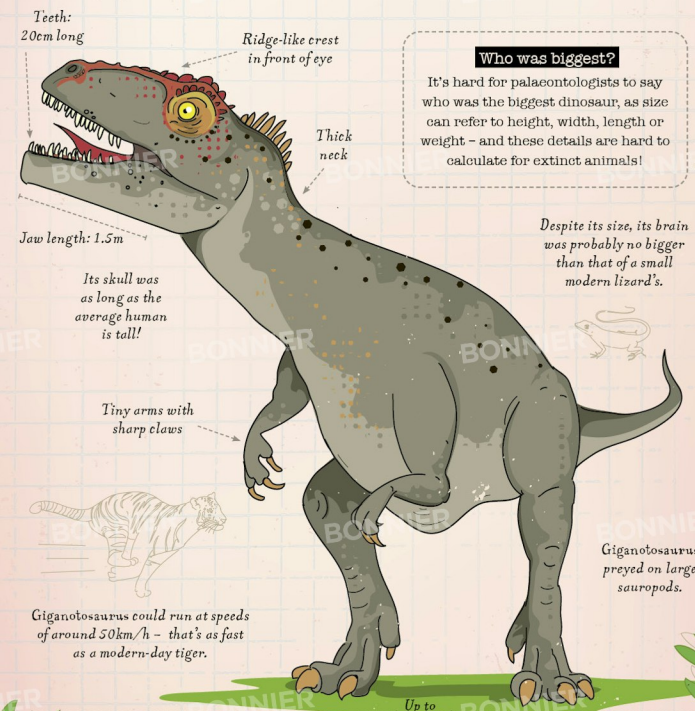
What a mystery

Herrerasaurus had features found in different groups of dinosaurs, and even non-dinosaurs. For many years, scientists did not know which group it belonged to. Then in 1988 a well-preserved skeleton was discovered, which revealed it was a theropod.

Giganotosaurus carolinii

Group: Theropod • Period: Cretaceous
Pronunciation: Jeye-gan-oh-toh-sore-us cah-roh-linn-ee

This huge carnivorous dinosaur may have grown even larger than *T.rex*, its counterpart in the northern hemisphere. It had a strong thick neck and a bulky skull filled with sharp teeth, perfect for tearing chunks of flesh off its victims. It was fast for its size too, capable of sprinting at speeds of up to 50 kilometres per hour.



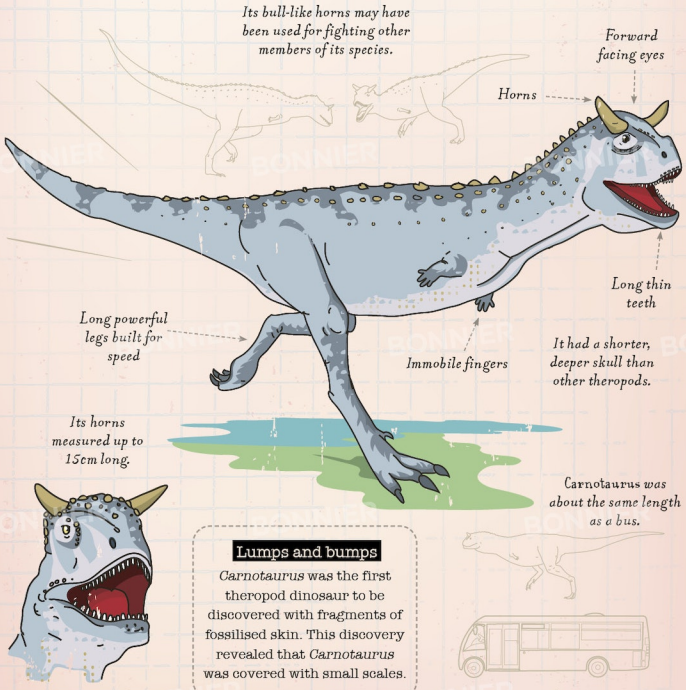
Who was biggest?

It's hard for palaeontologists to say who was the biggest dinosaur, as size can refer to height, width, length or weight – and these details are hard to calculate for extinct animals!

Carnotaurus sastrei

Group: Theropod • Period: Cretaceous
Pronunciation: Car-noh-tore-us sass-tree-eye

The name *Carnotaurus* means 'meat-eating bull' in Latin, in reference to the unique bull-like horns above this dinosaur's eyes. It was a moderately-sized carnivore, with a short neck and even shorter arms. These tiny arms were functionally useless, similar to the wings of flightless birds such as emus and ostriches today.



Lumps and bumps

Carnotaurus was the first theropod dinosaur to be discovered with fragments of fossilised skin. This discovery revealed that *Carnotaurus* was covered with small scales.

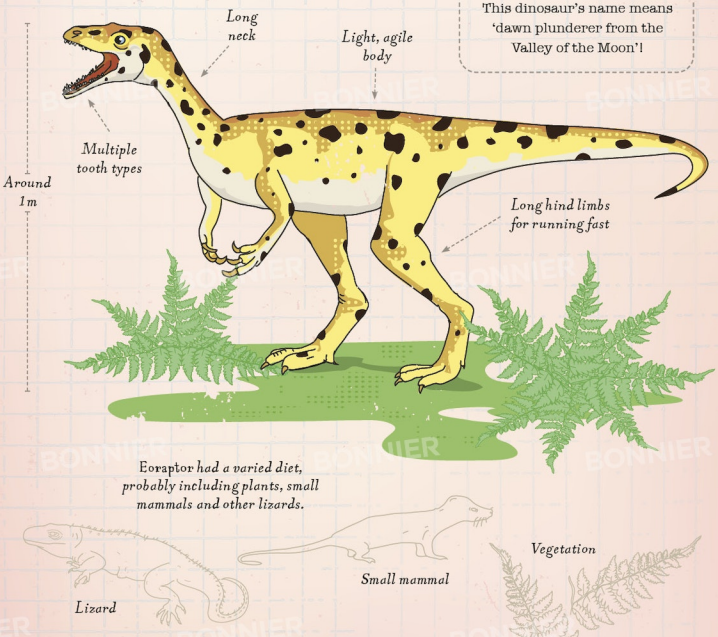
Eoraptor lunensis

Group: Theropod • Period: Triassic
Pronunciation: Ee-oh-rap-tor loo-nen-sis

Eoraptor is considered by many to be the earliest dinosaur known to us. Small and lightly-built, it ran on its hindlimbs to catch prey and avoid larger predators. Unusually, it had several different types of teeth (a characteristic called 'heterodonty') suggesting that it had an omnivorous diet, consisting of plants and small animals.

What's in a name?

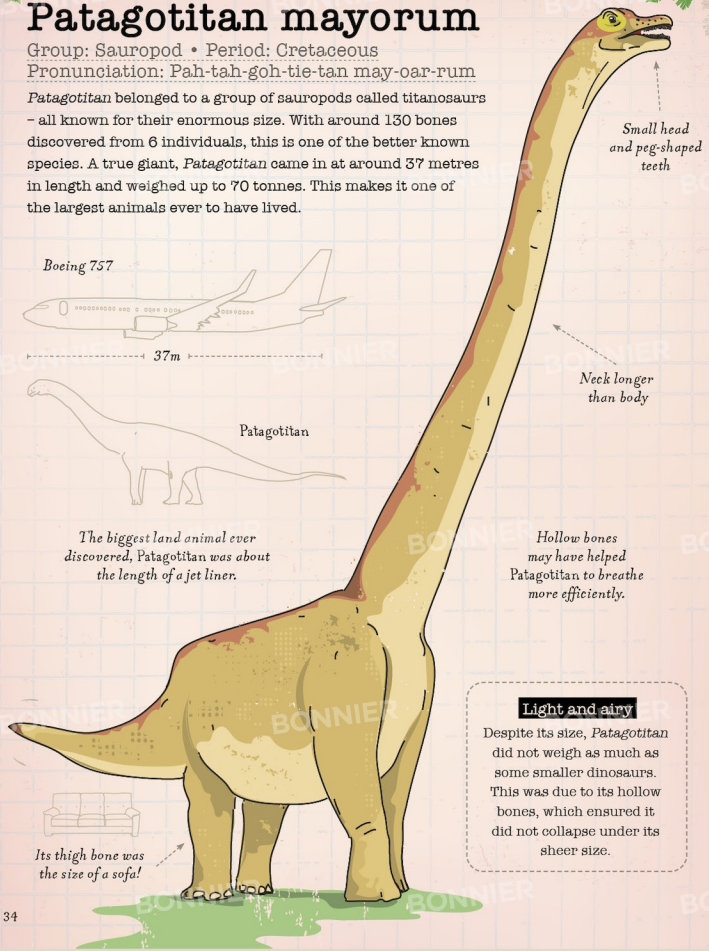
'This dinosaur's name means 'dawn plunderer from the Valley of the Moon'!



Patagotitan mayorum

Group: Sauropod • Period: Cretaceous
Pronunciation: Pah-tah-goh-tie-tan may-oar-rum

Patagotitan belonged to a group of sauropods called titanosaurs – all known for their enormous size. With around 130 bones discovered from 6 individuals, this is one of the better known species. A true giant, *Patagotitan* came in at around 37 metres in length and weighed up to 70 tonnes. This makes it one of the largest animals ever to have lived.



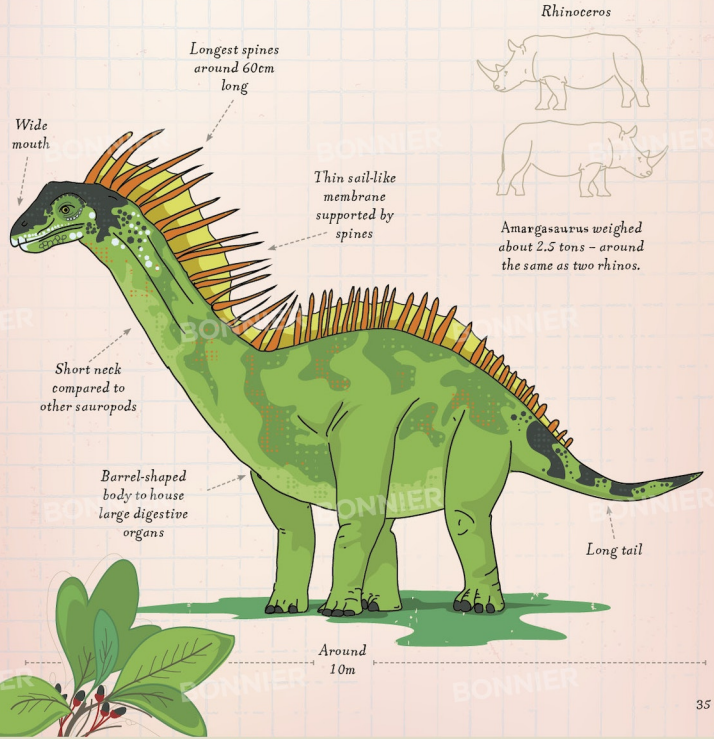
Light and airy

Despite its size, *Patagotitan* did not weigh as much as some smaller dinosaurs. This was due to its hollow bones, which ensured it did not collapse under its sheer size.

Amargasaurus cazaui

Group: Sauropod • Period: Cretaceous
Pronunciation: Am-ar-goh-sore-us caz-ow-eye

Relatively small for a sauropod, *Amargasaurus* was still around 10 metres long. Uniquely, it had a double row of bony spines projecting from its neck and back. The largest of these were around 60 centimetres in length. It is thought that they may have supported some sort of sail for protection or display.



Dreadnoughtus schrani

Group: Sauropod • Period: Cretaceous
Pronunciation: Dred-nought-us sh-ran-eye

Similar to *Patagotitan*, *Dreadnoughtus* was a member of the titanosaur family. It had an enormously long neck, making up nearly half of its total length and reaching the height of a 2-storey house. The biggest specimen of *Dreadnoughtus* found so far shows evidence that it was still growing at the time of its death – so there might be even bigger specimens out there waiting to be discovered!

What's in a name?

Dreadnoughtus, whose name means 'fears nothing', shares its name with the armoured battleships of the early 20th century.

Tyrannosaurus rex

Dreadnoughtus would have weighed more than five T.rexes. It was one of the biggest known land animals of all time.

Dreadnoughtus could have swung its long tail like a whip for defence against predators.

Broad shoulders

Long neck

Whip-like tail

The biggest specimen found was nearly as long as 7 cars.

Up to 26m

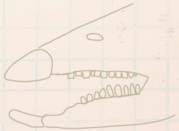
Talenkauen santacrucensis

Group: Ornithopod • Period: Cretaceous
Pronunciation: Tal-enk-ow-en san-tah-crew-en-sis

This small ornithischian had a series of bony, oval-shaped plates running along the side of its ribcage. These were only around 3 millimetres thick but might have been an adaptation to protect it from predators. It had some very primitive features, such as a beak with teeth in the tip, and an extra toe, which most ornithischians lost as they evolved.

Toothed beak for snipping leaves

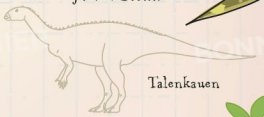
Thin plates on its back offered light protection



Talenkauen had teeth in the tip of its beak. Many other species had lost this 'primitive' feature.

Four toes

It was about the length of a VW Beetle.



Talenkauen

4m

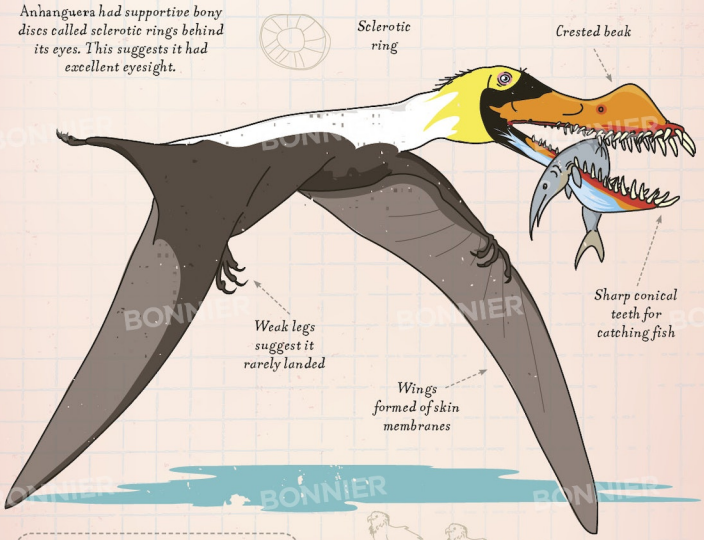
Talenkauen had to be a nimble runner to escape from the big predators it lived alongside.

VW Beetle

Anhanguera blittersdorffi

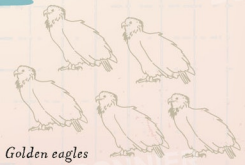
Group: Pterosauria • Period: Cretaceous
Pronunciation: An-han-gwer-a blit-ters-dorf-fi

Anhanguera was an agile, medium-sized pterosaur with a wingspan of around 4.5 metres. At the tip of its jaws, it had strange, rounded crests full of sharp, conical teeth for spearing fish. Like other pterosaurs, its wings were made of a thin membrane of skin, stretched between its extremely long fingers.



Flying devil

Anhanguera translates to 'old devil' in the Tupi language used by the Native Indians of Brazil, where this fossil was discovered.

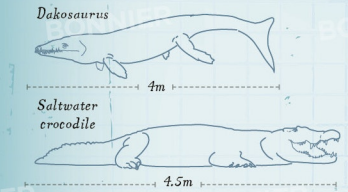


It weighed about 25kg – the same as five golden eagles today.

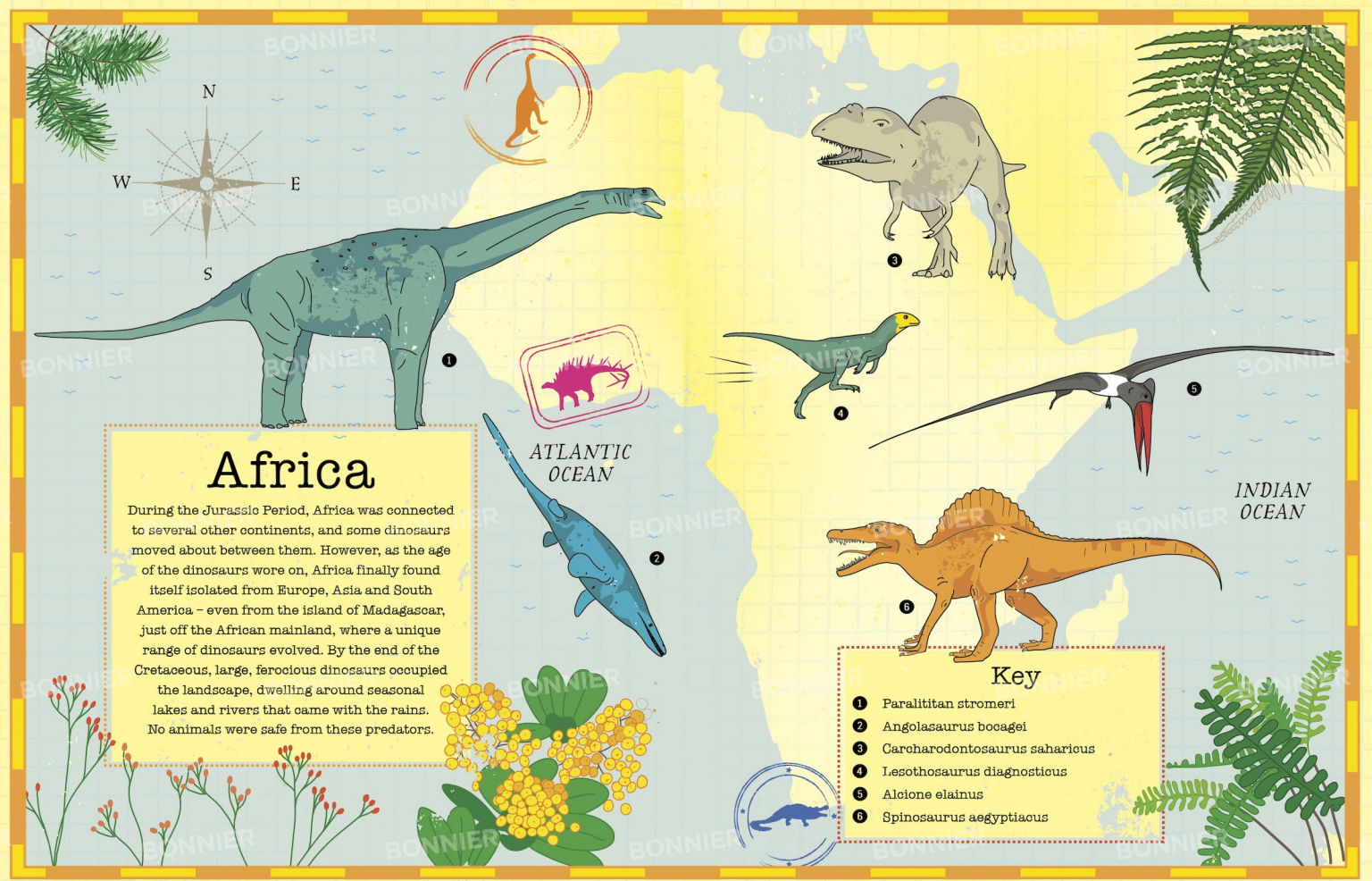
Dakosaurus andiniensis

Group: Thalattosuchia
Period: Jurassic and Cretaceous
Pronunciation: Dah-koh-sore-us and-inn-ee-en-sis

An ancient ancestor of modern crocodiles, *Dakosaurus* was a ferocious sea-dwelling predator feeding on other marine animals such as dolphin-like ichthyosaurs. It had a long, streamlined body, and flipper-like limbs for agile swimming.



Dakosaurus was almost as long as the largest reptile alive today.



Africa

During the Jurassic Period, Africa was connected to several other continents, and some dinosaurs moved about between them. However, as the age of the dinosaurs wore on, Africa finally found itself isolated from Europe, Asia and South America – even from the island of Madagascar, just off the African mainland, where a unique range of dinosaurs evolved. By the end of the Cretaceous, large, ferocious dinosaurs occupied the landscape, dwelling around seasonal lakes and rivers that came with the rains. No animals were safe from these predators.

Key

1. Paralititan stromeri
2. Angolasaurus bocagei
3. Carcharodontosaurus saharicus
4. Lesothosaurus diagnosticus
5. Alcione elainus
6. Spinosaurus aegyptiacus

Spinosaurus aegyptiacus

Group: Theropod • Period: Cretaceous
Pronunciation: Spy-no-sore-us ay-jip-tee-ack-us

Spinosaurus was an enormous predator with a tall sail running down its back. Its sail alone was nearly as tall as a human, and may have flushed red to attract potential mates or to help regulate temperature. Its other features were like those of a crocodile, with curved claws, sharp teeth for skewering prey and expert fishing skills.

Spinosaurus could probably stand on two legs or sprawl on all fours.

Lost and found

The first fossils of *Spinosaurus* ever discovered were sadly destroyed during a bombing raid in WWII. Thankfully, new specimens have since been discovered.

Sail up to 1.6m high

Modern-day crocodile

Long, flexible neck

Jaws like a crocodile's

Spinosaurus lived on land and in water, like a modern crocodile.

It may have fed on fish such as 6-metre-long Mawsonia.

Around 18m

Carcharodontosaurus saharicus

Group: Theropod • Period: Cretaceous
Pronunciation: Kar-car-oh-don-toe-sor-us sa-ha-rik-us

First discovered in the deserts of Algeria and Egypt, *Carcharodontosaurus* was one of the most fearsome predators of North Africa. At around 14 metres long, it was possibly even bigger than North America's *T. rex* and South America's *Giganotosaurus*! Like them, it had huge serrated teeth that could slice through flesh with ease.

Carcharodontosaurus was named after the Greek word for the equally toothy Great White Shark.

Great white shark

It is thought Carcharodontosaurus needed at least 60kg of meat a day – the equivalent of about 50 roast chickens!

Long tail to balance huge jaws

Teeth up to 20cm long

Jaw length: 1.6m

Powerful hind limbs for sprinting short distances

Long, clawed fingers

Carcharodontosaurus and Spinosaurus had different feeding styles – one on land and one in rivers – to avoid competing.

Majungasaurus crenatissimus

Group: Theropod • Period: Cretaceous
Pronunciation: Mah-jung-ah-sore-us cren-at-is-see-mus

Majungasaurus had tiny arms, but its huge, formidable jaws more than made up for them. Bite marks reveal it may even have preyed on its own kind, providing one of the rare examples of dinosaur cannibalism! Unlike other theropods, *Majungasaurus* had a single horn on its head, probably used to impress a mate.

Shifting plates

Majungasaurus fossils have only been found on the island of Madagascar. Similar fossils have been found in Africa and India, suggesting that its ancestors lived together during the early Cretaceous, but were separated as the continents drifted apart.

Individuals may have fought to the death – then eaten each other!

Horn for display or even combat

Deep skull

Reaching lengths of around 7m, this was a medium-sized theropod.

Short arms

Strong tail to aid balance

It may have taken around 20 years for Majungasaurus to reach full size.

Adult

Juvenile

Massospondylus carinatus

Group: Sauropod • Period: Jurassic
Pronunciation: Mass-oh-spon-die-lus car-ee-nay-tus

Unlike later sauropods, with their huge bodies and thick legs, *Massospondylus* walked on just its hind limbs and had a fairly narrow body. It had a small, sharp claw on each of its forefeet, which it might have used for defence or for scraping food off plants. It had a fairly long neck, and probably used its tail as a counter-weight when reaching up to feed.

Trend-setter

Massospondylus was named by famous dinosaur discoverer Sir Richard Owen in 1854. It was one of the first dinosaurs ever to be classified.

Small head

Long neck to reach food high in the trees

At 5m long, Massospondylus was small for a sauropod.

Massospondylus is a well-studied dinosaur, with over 80 fossils found worldwide.

Bipedal stance

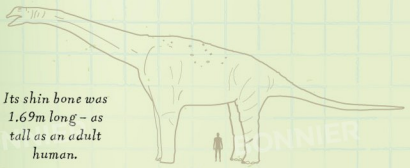
Embryo inside egg

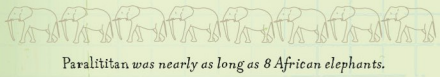
Eggs found in 1976 contain the oldest dinosaur embryos ever found.

Paralititan stromeri

Group: Sauropod • Period: Cretaceous
Pronunciation: Pah-ral-i-tie-tan stro-mer-eye

Like many sauropods, *Paralititan* competes for the status of one of the largest animals ever. The remains of this dinosaur were discovered in part of an ancient mangrove swamp in Egypt, leading to its name, which means 'tidal giant'. Its skeleton showed evidence that *Paralititan* was scavenged or preyed upon by predators such as *Spinosaurus*.





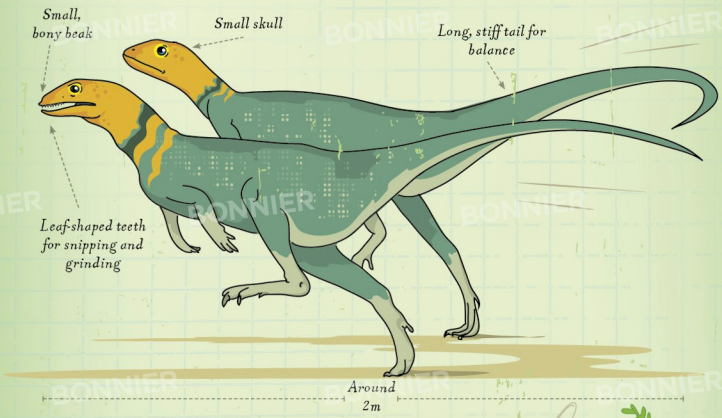
Paralititan was nearly as long as 8 African elephants.

Lesothosaurus diagnosticus

Group: Ornithischian • Period: Jurassic
Pronunciation: Less-oo-too-sore-us die-ag-noh-stik-us

The herbivore *Lesothosaurus* was one of the earliest, most primitive species of ornithischian. It was a small, bipedal dinosaur, far removed from the huge quadrupedal ornithischians of later years. Grazing on ferns, and using its speed to run from predators, it probably lived much like modern deer.

The name Lesothosaurus *means the 'lizard from Lesotho', after the Kingdom of Lesotho where it was first discovered.*



Out for the count

The fossil remains of two *Lesothosaurus* were found curled up together in a cave. It is thought they may have been hibernating during the hottest months of the year.

It probably ate plants like grass and ferns, and sometimes insects.

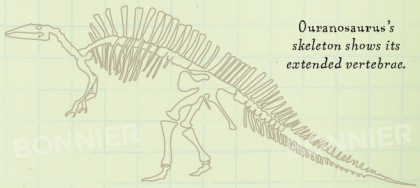
Ouranosaurus nigeriensis

Group: Ornithischian • Period: Cretaceous
Pronunciation: Oo-ran-oh-sore-us nie-jeer-ee-en-sis

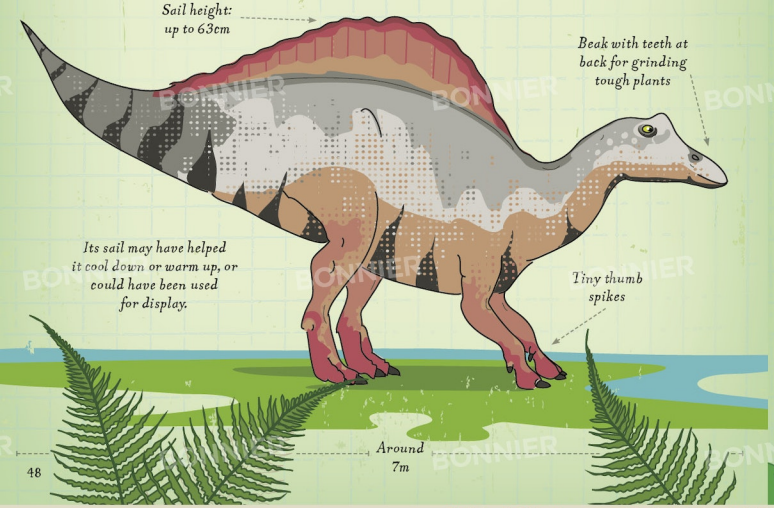
Ouranosaurus was a large herbivore, easily identified by the sail running down its back. This was supported by long spines on the top of each vertebra (back bone). *Ouranosaurus* grew to around 8 metres in length, and might have been the prey of choice for large predators such as *Carcharodontosaurus*.

In the family

Ouranosaurus was related to European and North American species such as *Iguanodon*. Like other iguanodonts, it could run on two or four legs.



Ouranosaurus's skeleton shows its extended vertebrae.



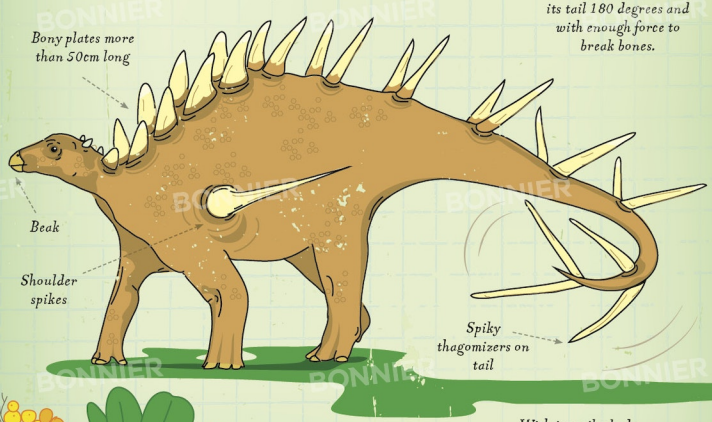
Kentrosaurus aethiopicus

Group: Ornithischian • Period: Jurassic
Pronunciation: Ken-troh-sore-us ay-thee-ow-pik-us

Like its cousin *Stegosaurus*, *Kentrosaurus* had an array of bony plates along its spine. It also had huge spikes sticking out from its shoulders, and tail spikes called thagomizers which it could have swung at any dinosaur that dared to get too close. These defences, plus its 4.5-metre-long bulk, meant it could defend itself against all but the largest predators.

Kentrosaurus weighed just over 1 tonne – about the same as two grand pianos!

It could probably swing its tail 180 degrees and with enough force to break bones.



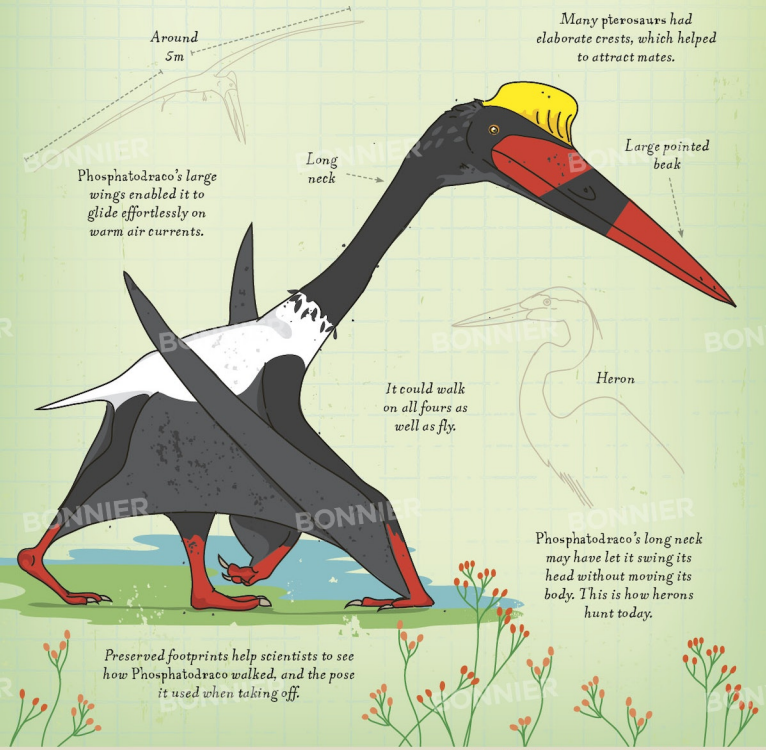
With its spiky body, this dinosaur would have been most at risk from a group attack.

Kentrosaurus probably fed on foliage and low-growing fruits.

Phosphatodraco mauritanicus

Group: Pterosaur • Period: Cretaceous
Pronunciation: Phoss-phayt-oh-dray-ko more-it-an-ik-us

The first ever fossils of this giant pterosaur were discovered in Morocco, buried in huge deposits of the mineral phosphate. This is why its name means 'phosphate dragon'. It had a wingspan of around 5 metres, and a huge, pointed beak for snapping up prey – just like modern birds such as pelicans have today.



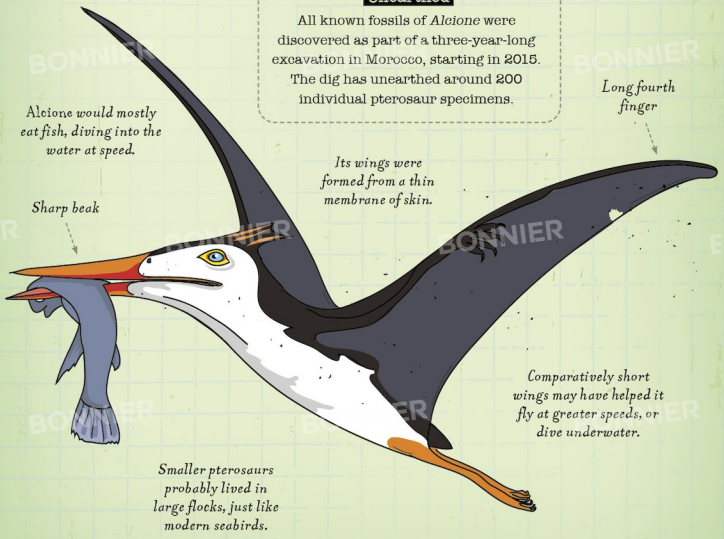
Alcione elainus

Group: Pterosaur • Period: Cretaceous
Pronunciation: Al-see-ow-ne e-line-us

Alcione was a smaller pterosaur that lived alongside giants such as *Phosphatodraco* in the skies over what is now Morocco. Together these species provide new evidence that pterosaurs were thriving across North Africa until the end of the Cretaceous Period.

Unearthed

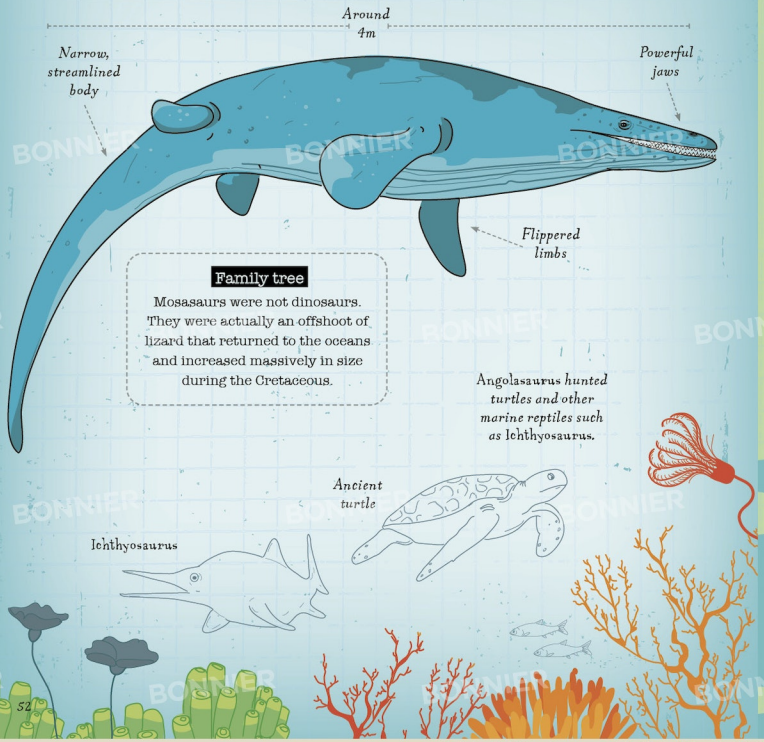
All known fossils of *Alcione* were discovered as part of a three-year-long excavation in Morocco, starting in 2015. The dig has unearthed around 200 individual pterosaur specimens.



Angolasaurus bocagei

Group: Mosasaur • Period: Cretaceous
Pronunciation: An-gow-law-sore-us boh-cagg-ee-i

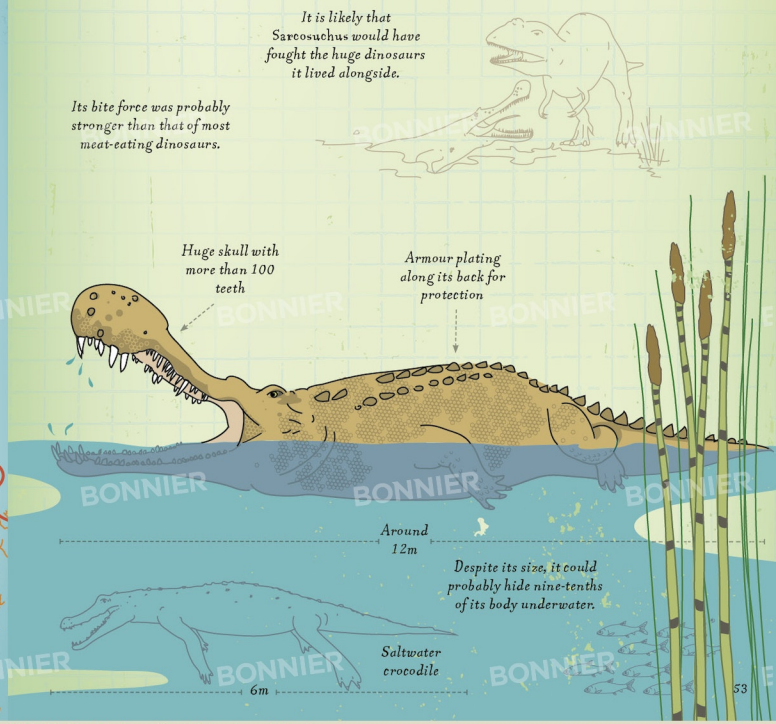
This mosasaur was one of the few species with a wide geographic range. It would have swum around the early Atlantic Ocean, which formed as South America and Africa began to pull away from each other millions of years ago. *Angolasaurus* was relatively small, at only 4 metres long, but was still a ferocious predator.

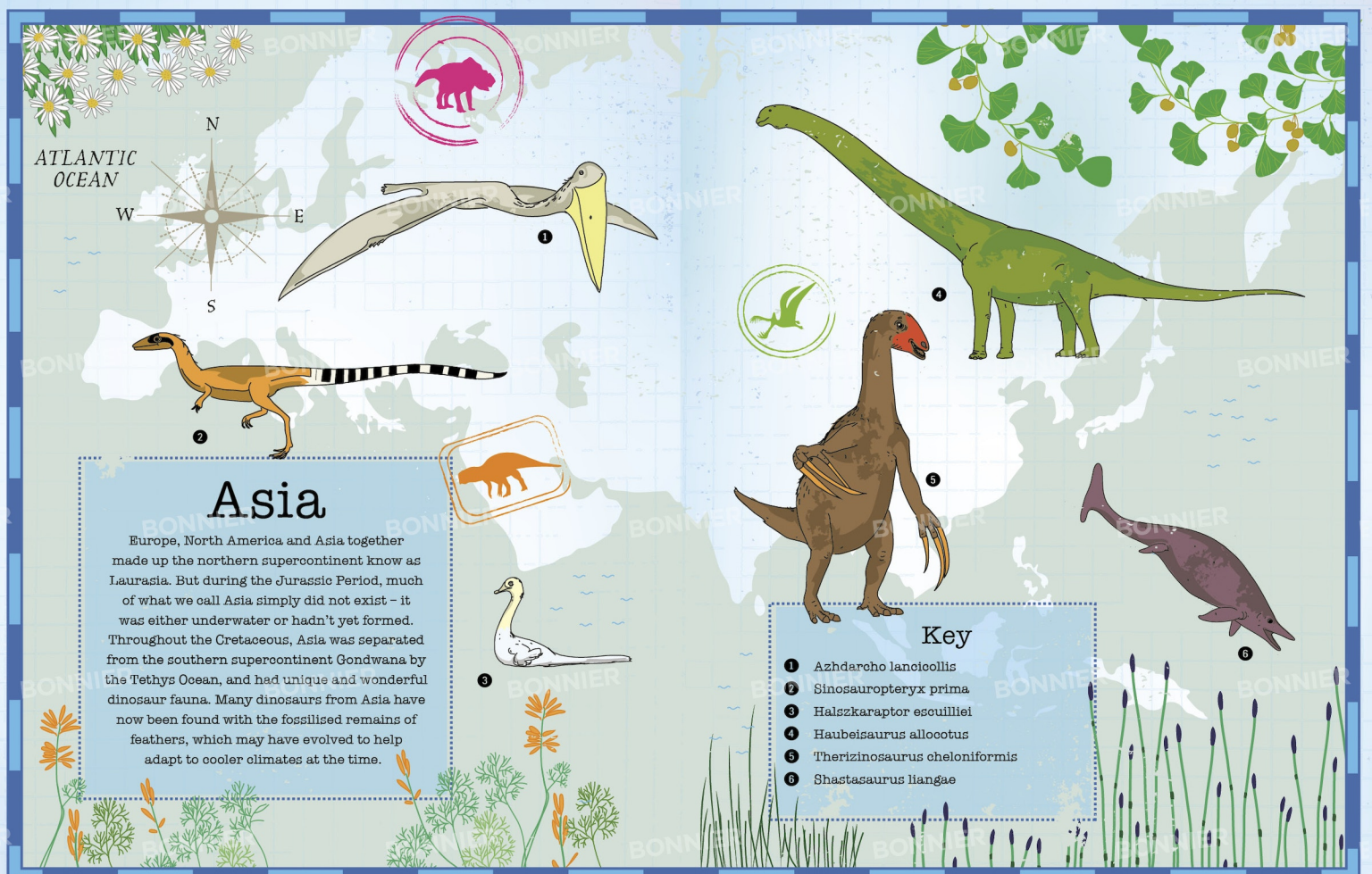


Sarcosuchus imperator

Group: Crocodyliform • Period: Cretaceous
Pronunciation: Sar-koh-sook-us im-per-at-ore

An ancestor of modern crocodiles, *Sarcosuchus* was one of the largest species of its kind ever to exist. It was twice as long as a modern saltwater crocodile, reaching lengths of up to 12 metres, and weighing around 8 tonnes. This ambush predator lived in lush, tropical rainforest in what is now the Sahara Desert.





Asia

Europe, North America and Asia together made up the northern supercontinent know as Laurasia. But during the Jurassic Period, much of what we call Asia simply did not exist – it was either underwater or hadn't yet formed. Throughout the Cretaceous, Asia was separated from the southern supercontinent Gondwana by the Tethys Ocean, and had unique and wonderful dinosaur fauna. Many dinosaurs from Asia have now been found with the fossilised remains of feathers, which may have evolved to help adapt to cooler climates at the time.

Key

1. Azhdarcho lancicollis
2. Sinosauropteryx prima
3. Halszkaraptor escuilliei
4. Haubeisaurus allocotus
5. Therizinosaurus cheloniformis
6. Shastasaurus liangae

Sinosauropteryx prima

Group: Theropod • Period: Cretaceous
Pronunciation: Sigh-no-sore-op-ter-iks pree-mah

Sinosauropteryx was one of the first dinosaurs to be discovered with evidence of hair-like bristles similar to feathers – just like the kind you would find on a baby chicken. Incredibly we even know what colour these bristles were, enabling us to piece together a good picture of this small hunter.

It is thought Sinosauropteryx *had mask-like markings on its face, like a raccoon.*

Raccoon

Colour revelation

Sinosauropteryx is so well preserved that scientists can study chemicals in its remains to work out what colour it was. It had orange plumage, with a white banded pattern along its tail. We can only guess the colour of most other dinosaur species.

Banded pattern for camouflage in forest

Long tail for agility when running

Orange colouring

Bristle covered body

Its body bristles were like those of a chick.

They may have kept it warm, or been used in courtship, as in some birds.

One fossil was found with a fossilised lizard in its stomach.

Long arms

Around 1m

Therizinosaurus cheloniformis

Group: Theropod • Period: Cretaceous
Pronunciation: Thair-uh-zeen-uh-sore-us chel-oh-nee-fore-miss

At first glance *Therizinosaurus* looks like the ultimate killing machine, with the huge scythe-like claws on its forelimbs. But these were probably for raking in foliage, or fighting off danger, rather than attacking prey. In fact, unlike most other theropods, *Therizinosaurus* probably ate more plants than meat!

Mistaken identity

The name *Cheloniformis* means 'turtled-formed', as the first fossils of this species were thought to belong to a turtle-like animal!

Small head

Long neck

Leaf-shaped teeth, suited to stripping foliage

1m

Its claws were the longest of any animal known, and as long as a sword!

Samurai sword

Feathery body

Around 6m

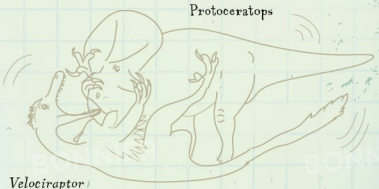
In 2013, 17 clutches of Therizinosaurus *eggs were discovered together, suggesting they were social animals.*

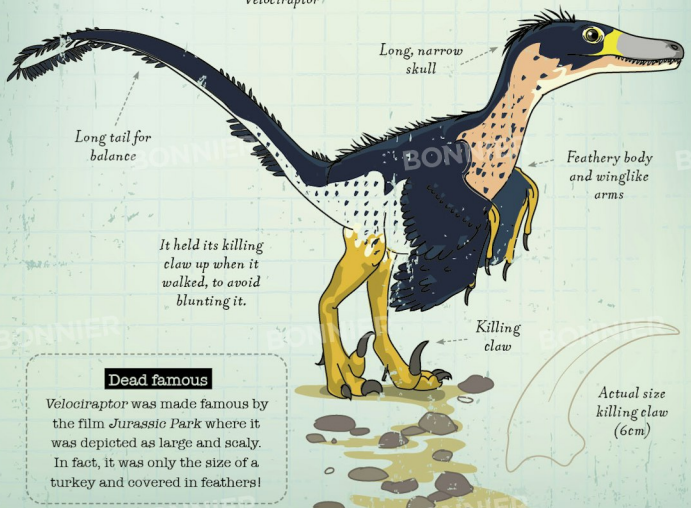
Velociraptor mongoliensis

Group: Theropod • Period: Cretaceous
Pronunciation: Veh-loss-ee-rap-tor mon-goh-lee-en-siss

Fast, agile and deadly, *Velociraptor* was a well-honed predator from the ancient deserts of Mongolia. It had a feathery body and its feet were equipped with long sickle-shaped claws, which it used to pin down its prey and disembowel them.

One specimen's fossil was found in a death embrace with a Protoceratops. They were probably buried in a landslide as they fought.





Dead famous

Velociraptor was made famous by the film *Jurassic Park* where it was depicted as large and scaly. In fact, it was only the size of a turkey and covered in feathers!

Caihong juji

Group: Theropod • Period: Jurassic
Pronunciation: Khi-hong joo-jee

The name '*Caihong*' is Mandarin for 'rainbow', and refers to the incredible colours found in fossils of this dinosaur's feathers. It was a small dinosaur, no more than half a metre long and resembling a cross between a hummingbird and a crow. It might have been one of the earliest dinosaurs capable of gliding from tree to tree.

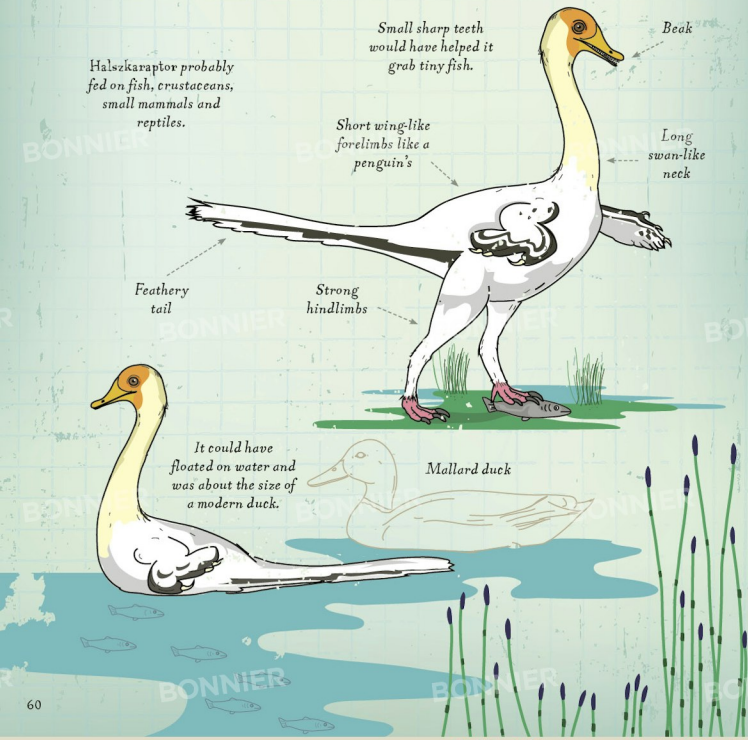
Caihong had iridescent feathers like a hummingbird.

Ruby-throated hummingbird

Halszkaraptor escuilliei

Group: Theropod • Period: Cretaceous
Pronunciation: Haltz-kah-rap-tor ess-kwee-lee-ee-eye

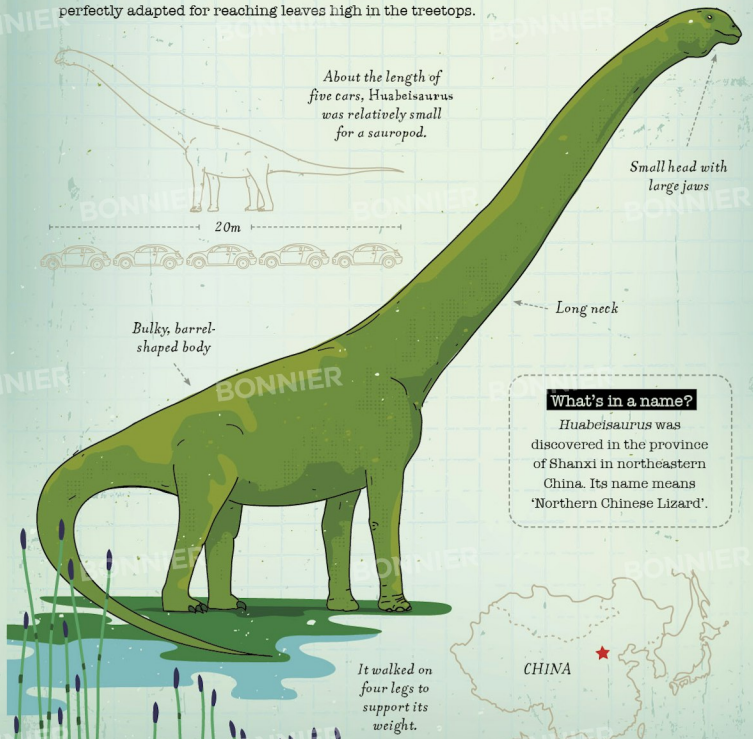
At first glance, *Halszkaraptor* looks like a modern goose, with its small body, long neck, feathers and beak. However, it was more closely related to *Velociraptor* than to modern birds. It had a semi-aquatic lifestyle and was able to paddle with its flippered forelimbs, though it probably spent most of its time waddling on land.



Huabeisaurus allocotus

Group: Sauropod • Period: Cretaceous
Pronunciation: Hwa-bay-sore-us al-oh-coh-tus

At 20 metres in length, *Huabeisaurus* was a true giant from Cretaceous China. It is one of the most complete Asian sauropods known, which makes it an important find. Making up nearly half of its body length, its neck was perfectly adapted for reaching leaves high in the treetops.



What's in a name?

Huabeisaurus was discovered in the province of Shanxi in northeastern China. Its name means 'Northern Chinese Lizard'.

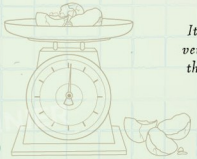
Mamenchisaurus constructus

Group: Sauropod • Period: Jurassic
Pronunciation: Mah-men-chih-sore-us con-struck-tuss

Mamenchisaurus was one of the biggest sauropods known from the Jurassic period, growing up to 35 metres long and weighing up to 75 tonnes. The species name, *constructus*, refers to the fact that it was originally discovered during work on a highway construction site! At least six different species of *Mamenchisaurus* are known in varying sizes but also with enormously long necks.

Dino or dragon?

People have been discovering dinosaur fossils for hundreds of years – long before we knew what dinosaurs were. Across Asia, these fossils were often thought to be dragon bones!



Its neck bones were very light – in places they were as thin as eggshells!

Small head

Very long neck

Rounded body

Half of Mamenchisaurus's length was made up of its neck. This may have helped it reach plants across boggy land.

Long tree-trunk like legs

Huayangosaurus taibaii

Group: Ornithopod • Period: Jurassic
Pronunciation: Hwah-yang-oh-sore-us tie-bye-ee

A close relative of *Stegosaurus*, *Huayangosaurus* lived around 20 million years before its cousin, as well as on a completely different continent! It was smaller than Stegosaurus, but had a similar row of plates down its back. It also had a dangerously spiked tail for defence against predators.

Twelve Huayangosaurus fossils were found in the Dashanpu Quarry in Sichuan, China, making it one of the best-known dinosaurs from Asia.

Around 9m
Stegosaurus

Up to 4.5m
Huayangosaurus

Double row of spiked plates down its back

Spiked tail

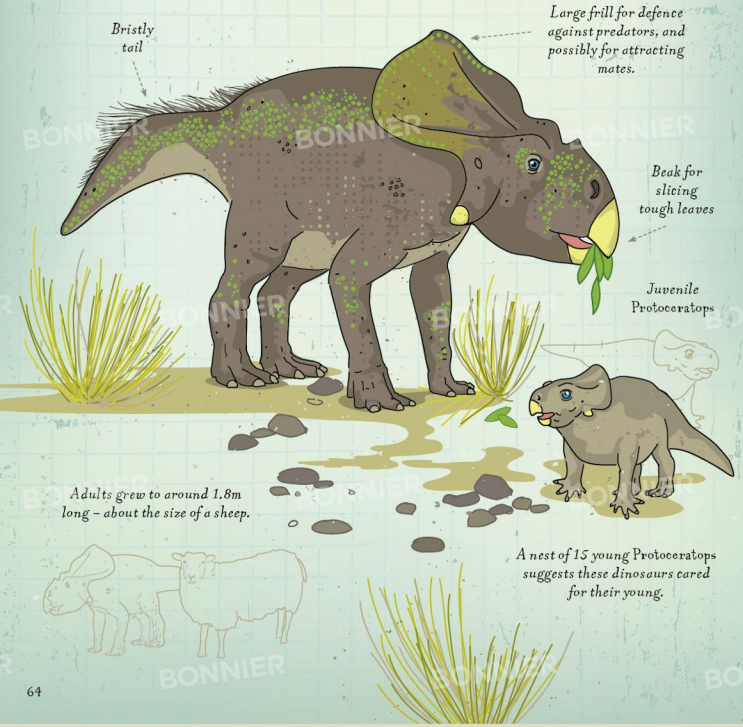
Spikes on both shoulders may have been used for protection from attacks.

Beaked mouth

Protoceratops andrewsi

Group: Ornithischian • Period: Cretaceous
Pronunciation: Pro-toe-sair-uh-tops an-droo-siy

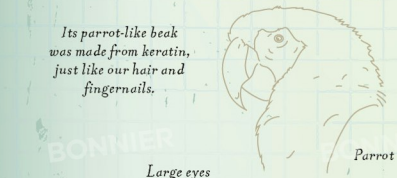
Unlike other ceratopsians, including its cousin *Triceratops*, *Protoceratops* lacked any big horns on its face, though it did have a protective head frill. The discovery of large numbers of *Protoceratops* skeletons together suggests these dinosaurs would have moved in herds through the deserts of ancient Mongolia, just like many herbivores today.



Psittacosaurus mongoliensis

Group: Ornithischian • Period: Cretaceous
Pronunciation: Sit-ah-koh-sore-us mon-goh-lee-en-siss

Psittacosaurus was probably one of the earliest ancestors of ceratopsians like *Triceratops*. Its name translates as 'parrot lizard', in reference to its large beak. Almost uniquely among ornithischians, it had a tail covered in long, bristle-like structures, similar to those seen in animals like porcupines today.



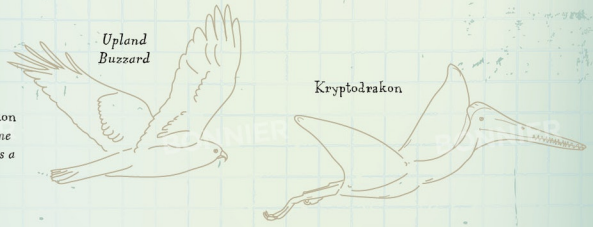
One big family

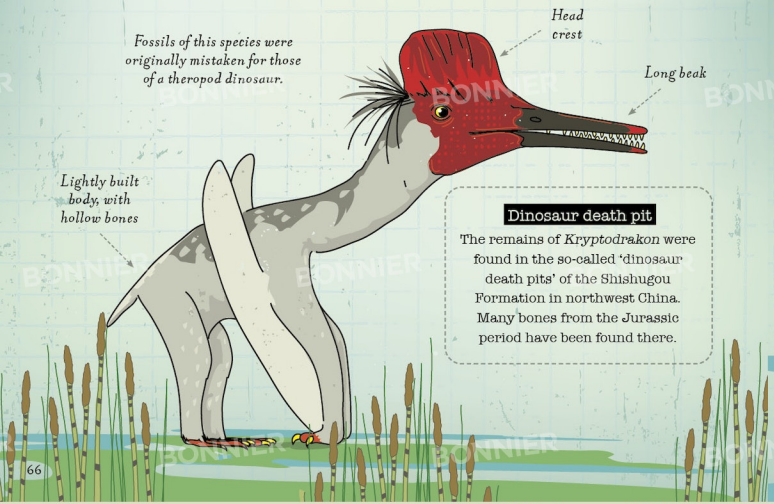
There are 11 different species of *Psittacosaurus* known to us, while most dinosaur types have just one or two. This means Psittacosaurus is one of the most diverse dinosaurs in the world!

Kryptodrakon progenitor

Group: Pterosaur • Period: Jurassic
Pronunciation: Crip-toe-dray-con proh-jen-it-ore

The name *Kryptodrakon* literally means 'hidden dragon' and refers to the famous martial arts movie, *Crouching Tiger Hidden Dragon* (the film was even shot on location in the same desert where the fossils were found). This 'hidden dragon' is actually one of the oldest and most primitive pterosaurs ever discovered. It was relatively small in size, with a wingspan of just 1.5 metres.





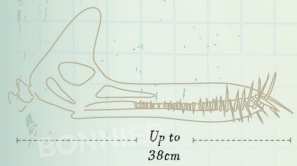
Dinosaur death pit

The remains of *Kryptodrakon* were found in the so-called 'dinosaur death pits' of the Shishugou Formation in northwest China. Many bones from the Jurassic period have been found there.

Guidraco venator

Group: Pterosaur • Period: Cretaceous
Pronunciation: Gwee-dray-coh veh-nah-tore

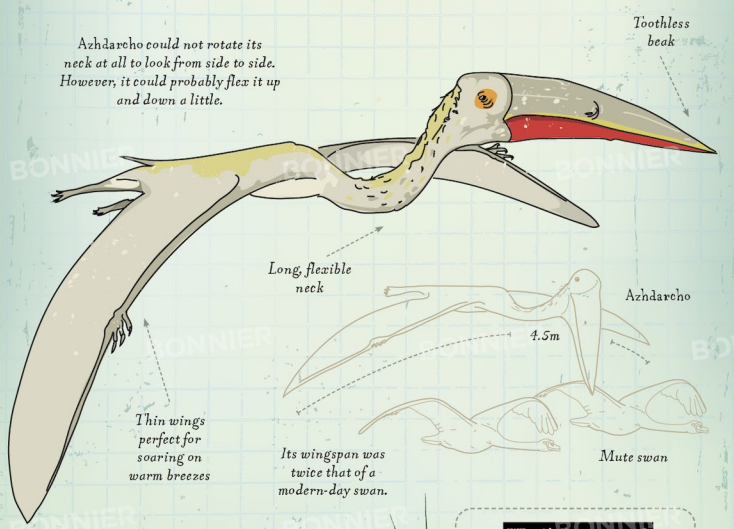
With a jaw packed full of long, sharp teeth, it is no wonder palaeontologists named this animal *gui* in Chinese, meaning 'malicious ghost'. Its beak almost looked like a Venus flytrap! On top of its head it sported a high crest, which, like other pterosaur species, was likely used in display to potential mates.



Azhdarcho lancicollis

Group: Pterosaur • Period: Cretaceous
Pronunciation: As-dar-ko lan-see-coh-liss

Azhdarcho can be identified by its uniquely elongated neck bones (vertebrae). In fact, *lancicollis* means 'spear neck' in Latin. Like other pterosaurs, the bones of *Azhdarcho* were nearly hollow, reducing its body weight so it could take to the air more easily.



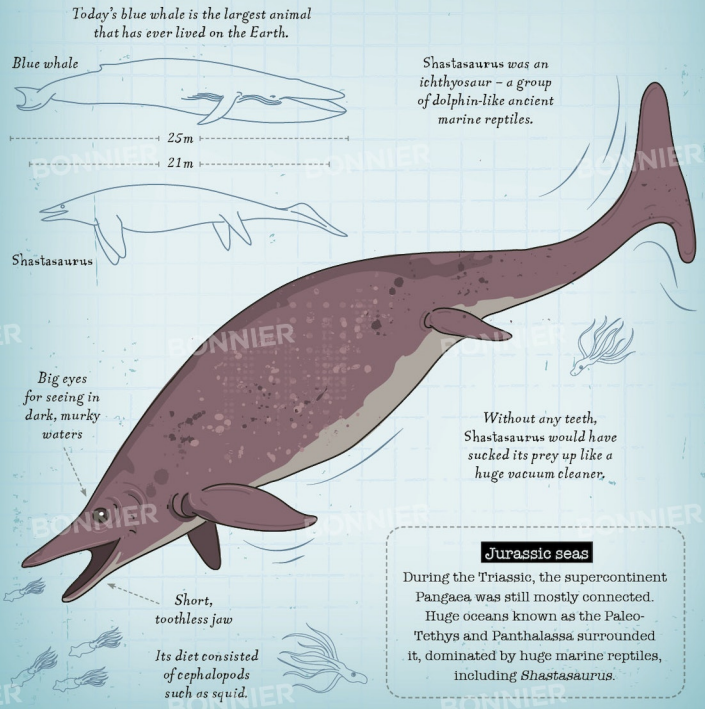
What's in a name?

Azhdarcho comes from the Persian word 'azhdar', the name of a snake-like dragon from Persian mythology.

Shastasaurus liangae

Group: Ichthyosaur • Period: Triassic
Pronunciation: Sha-sta-sore-us lee-ang-aye

Shastasaurus was one of the largest marine reptiles of all time, with a maximum size estimated at 21 metres in length – almost as long as a blue whale! It had a short snout for catching fish, and flippers for helping it to manoeuvre its bulky body through the Triassic seas.



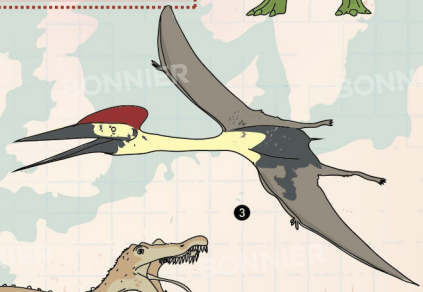
Jurassic seas

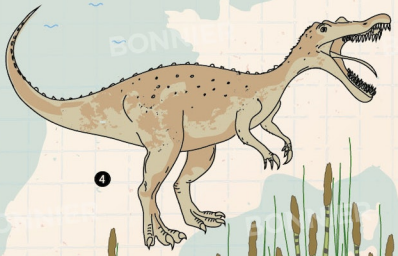
During the Triassic, the supercontinent Pangaea was still mostly connected. Huge oceans known as the Paleo-Tethys and Panthalassa surrounded it, dominated by huge marine reptiles, including *Shastasaurus*.

Key

1. Balaur bondoc
2. Iguanodon bernissartensis
3. Hatzegopteryx thambema
4. Baryonyx walkeri
5. Compsognathus longipes
6. Archaeopteryx lithographica

ATLANTIC OCEAN

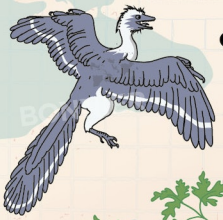




MEDITERRANEAN SEA

Europe

At the beginning of the Jurassic Period, Europe connected the large Asian and North American landmasses. However, as the climate changed and became warmer, sea levels rose, covering much of the land in warm, shallow seas. This meant that from the Middle Jurassic onwards, Europe existed as a cluster of islands covered in lush, green rainforests. Cut off from the rest of the globe, a huge variety of weird and wonderful dinosaurs evolved within this tropical paradise. Meanwhile, up in the skies, pterosaurs competed alongside the early ancestors of modern birds.



N
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Baryonyx walkeri

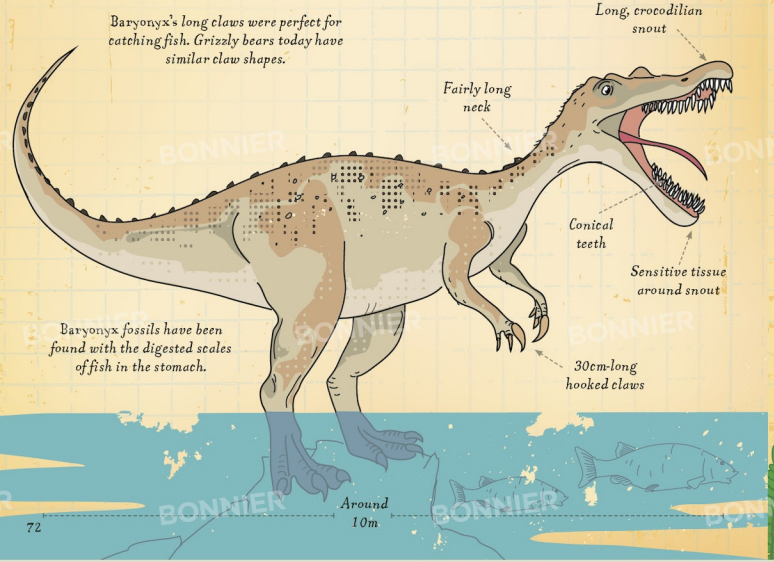
Family: Theropod • Period: Cretaceous
Pronunciation: Ba-ri-on-iks wall-ker-eye

Baryonyx was the first ever fish-eating dinosaur to be discovered. It had long jaws like a crocodile with curved teeth for gripping slippery prey, and hooked claws for flicking fish from the water. Its snout was probably lined with sensory organs that would have helped it to detect movements in the water, similar to those seen in sharks today.

What's in a name?

The name *Baryonyx* means 'heavy claw', in reference to the hooked claws on its forelimbs, measuring up to 30cm long.

Baryonyx's long claws were perfect for catching fish. Grizzly bears today have similar claw shapes.



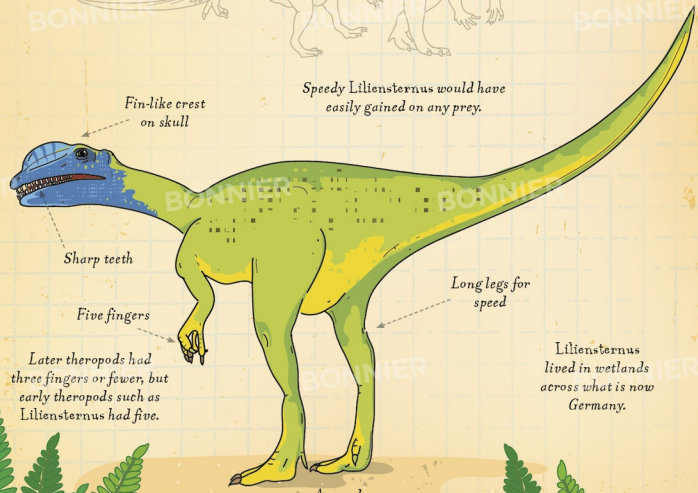
Baryonyx fossils have been found with the digested scales of fish in the stomach.

Liliensternus liliensterni

Family: Theropod • Period: Triassic
Pronunciation: Li-ly-en-stir-nus li-ly-en-stir-ny

One of the earliest known theropods and the largest meat-eater of its time, *Liliensternus* was a 5-metre-long predator with a serious appetite. In the Late Triassic period, there were still relatively few dinosaurs around, so *Liliensternus* probably tried its luck hunting large prey such as *Plateosaurus*, as well as smaller herbivores.

Speedy Liliensternus would have easily gained on any prey.



Later theropods had three fingers or fewer, but early theropods such as Liliensternus had five.

Liliensternus lived in wetlands across what is now Germany.

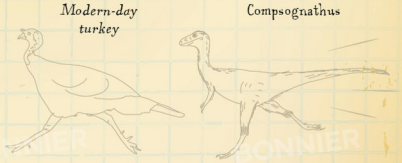
Compsognathus longipes

Family: Theropod • Period: Jurassic
Pronunciation: Comp-sug-nay-thus long-ee-pez

Compsognathus is a rare find for palaeontologists, with very few fossils discovered so far. At only 1 metre in length, it was the smallest known dinosaur until the 1990s. Judging by its close relatives, it is possible that *Compsognathus* had a body covered in fine, fur-like fibres, similar to the fur on mammals today.

Dinner menu

Compsognathus is one of the few extinct species whose exact diet is known to us. It was discovered with the remains of a small lizard in its stomach – which also turned out to be a new species to science!



Compsognathus was a fast runner, about the size of a turkey.

The lizard found in Compsognathus's stomach was called Schoenesmahl dyspepsia, *meaning 'beautiful meal that is difficult to digest'!*

Compsognathus would have lived near lagoons, beaches and coral reefs.

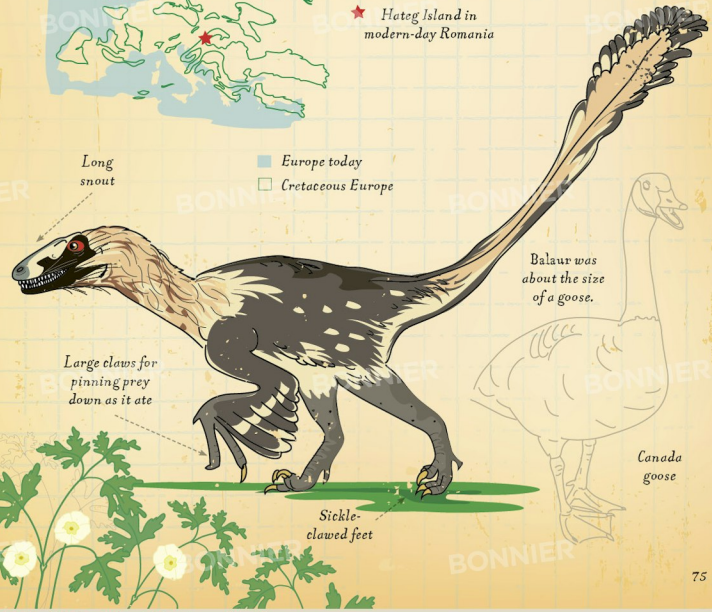
Balaur bondoc

Family: Theropod • Period: Cretaceous
Pronunciation: Ba-la-ur bon-dok

Balaur is named after a dragon from Romanian folklore, and rightly so – with a wicked set of teeth, and double sickle-clawed feet, it was a predator sure to inspire terror. Compared to its cousins of a similar size, such as *Velociraptor*, *Balaur* was relatively chunky.

Europe 120 million years ago was a collection of sub-tropical islands. Balaur lived on Hateg Island, referred to as the 'island of dwarfed dinosaurs'.

Hateg Island in modern-day Romania



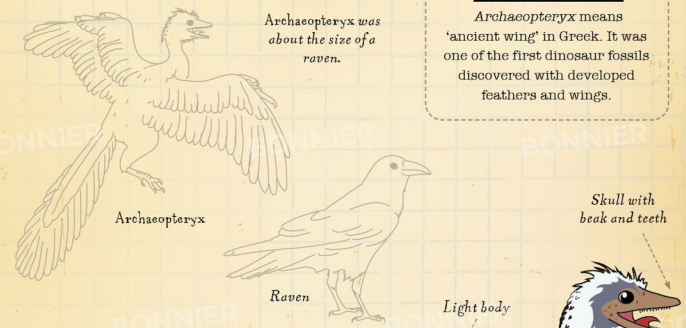
Archaeopteryx lithographica

Family: Theropod • Period: Jurassic
Pronunciation: Ar-key-op-ter-iks lith-o-gra-phi-ka

Archaeopteryx is an incredible dinosaur specimen, often hailed as the 'missing link' between dinosaurs and birds. It had a long, bony tail, and teeth just like a dinosaur, but also had a beak and feathers like a bird. Scientists are still not certain whether it could have flown or not.

What's in a name?

Archaeopteryx means 'ancient wing' in Greek. It was one of the first dinosaur fossils discovered with developed feathers and wings.



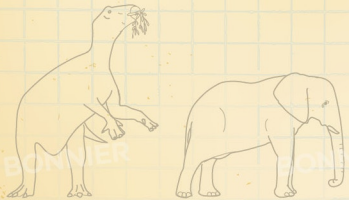
Iguanodon bernissartensis

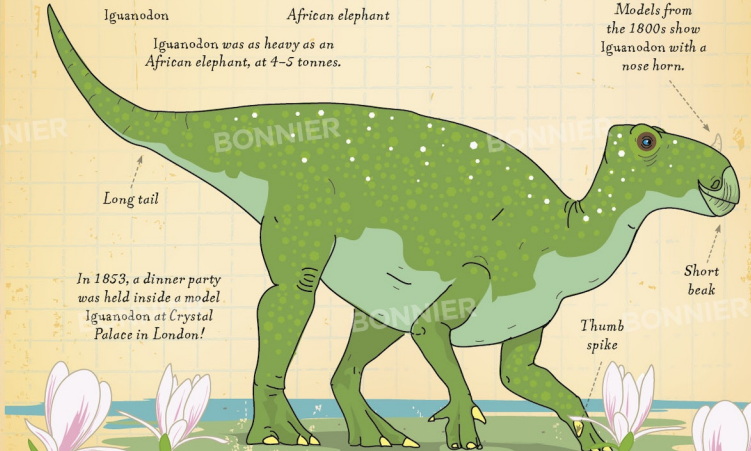
Family: Ornithopod • Period: Cretaceous
Pronunciation: Ig-wan-o-don bern-is-sart-en-sis

One of the first dinosaurs ever discovered, *Iguanodon*'s fossil remains were unearthed in 1825 before scientists even knew what dinosaurs were. It was a bulky plant-eater with a beak and large thumb spikes, used for digging food or fighting predators. Its remains helped scientists to identify dinosaurs as a group.

Thumbs up

Victorian scientists originally thought *Iguanodon* had a bony spike on the end of its nose. Later discoveries revealed this spike belonged on its thumb instead!





Scelidosaurus harrisonii

Family: Ornithopod • Period: Jurassic
Pronunciation: Ske-ly-doh-saw-rus har-ris-son-e-eye

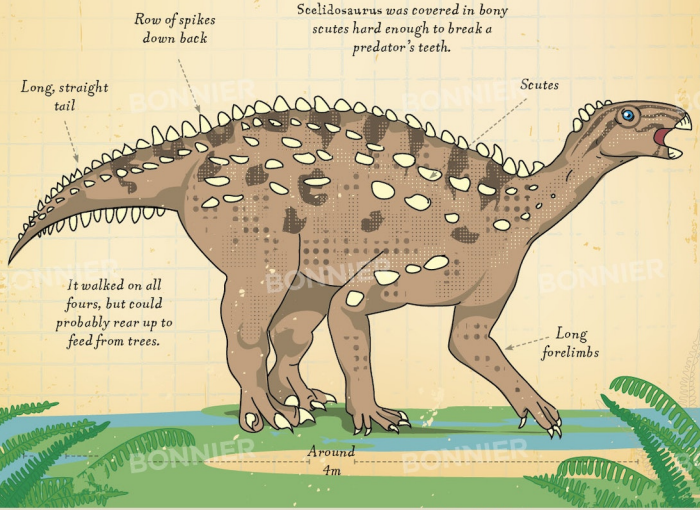
Scelidosaurus is one of the best known species of early ornithischians. We know it best from a beautifully preserved and near-complete skeleton found in the UK. This armoured plant-eater was an early ancestor of all other armoured ornithischians, including *Stegosaurus* and *Ankylosaurus*.

Family connection

Scelidosaurus was part of a group of ornithischian dinosaurs called 'thyreopherans' – or 'shield bearers' in Greek. This name refers to their thick armour plating.

The best preserved Scelidosaurus fossil ever was discovered in Dorset, UK, in 2000.

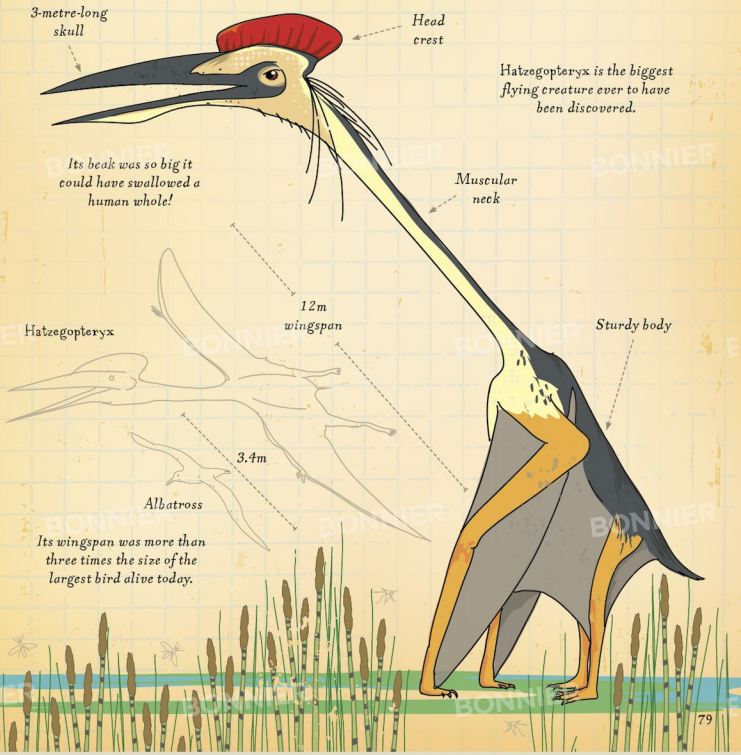
Scelidosaurus was covered in bony scutes hard enough to break a predator's teeth.



Hatzegopteryx thambema

Family: Pterosaur • Period: Cretaceous
Pronunciation: Hat-seg-op-ter-iks tham-bee-ma

Hatzegopteryx grew to an enormous size with a wingspan of 10–12 metres. Living towards the end of the Cretaceous, it was probably the top predator on the islands that used to cover Europe. It was so big that it even preyed on dinosaurs, snapping them up and carrying them away in its huge beak.

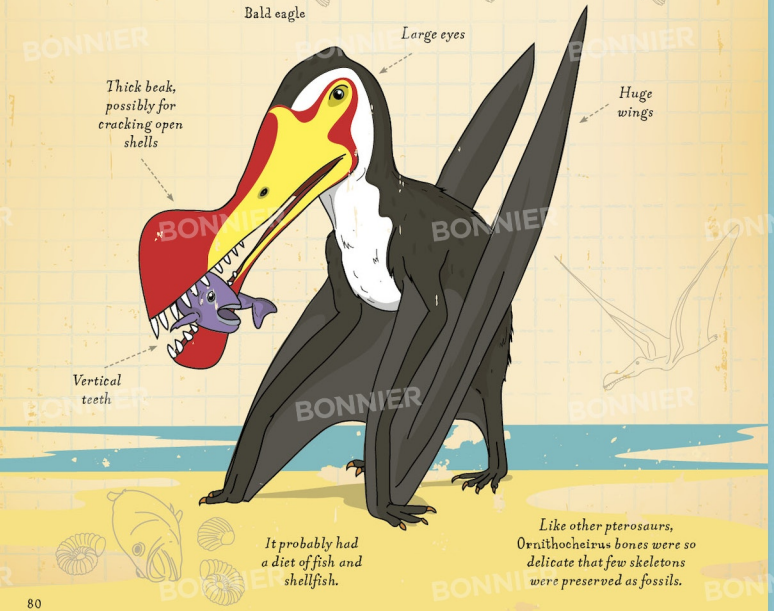


Ornithocheirus simus

Family: Pterosaur • Period: Cretaceous
Pronunciation: Awn-ith-o-ky-rus sy-mus

Ornithocheirus lived along the coast on the group of islands that stood where Europe's mainland is today. This pterosaur had a distinctively crested jaw, which might have been used to cut through water as it hunted for fish. It could then impale prey on its spear-like teeth.

Its wingspan was three times that of an eagle, while it weighed around the same as 6 eagles.



It probably had a diet of fish and shellfish.

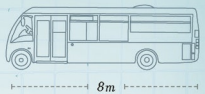
Like other pterosaurs, Ornithocheirus bones were so delicate that few skeletons were preserved as fossils.

Liopleurodon ferox

Family: Pliosaur • Period: Jurassic
Pronunciation: Li-o-plur-o-don feh-roks

Patrolling the seas of Jurassic Europe, *Liopleurodon* was the top predator of the oceans at the time and the largest species of its kind ever to live. It had a large skull with powerful jaws, and moved its bulky body through the water with strong, paddle-like limbs. Most of its fossils have been found in England and France.

At 8m long, Liopleurodon was as long as a bus!



It may have been able to detect prey in the water using scent – like sharks do today.

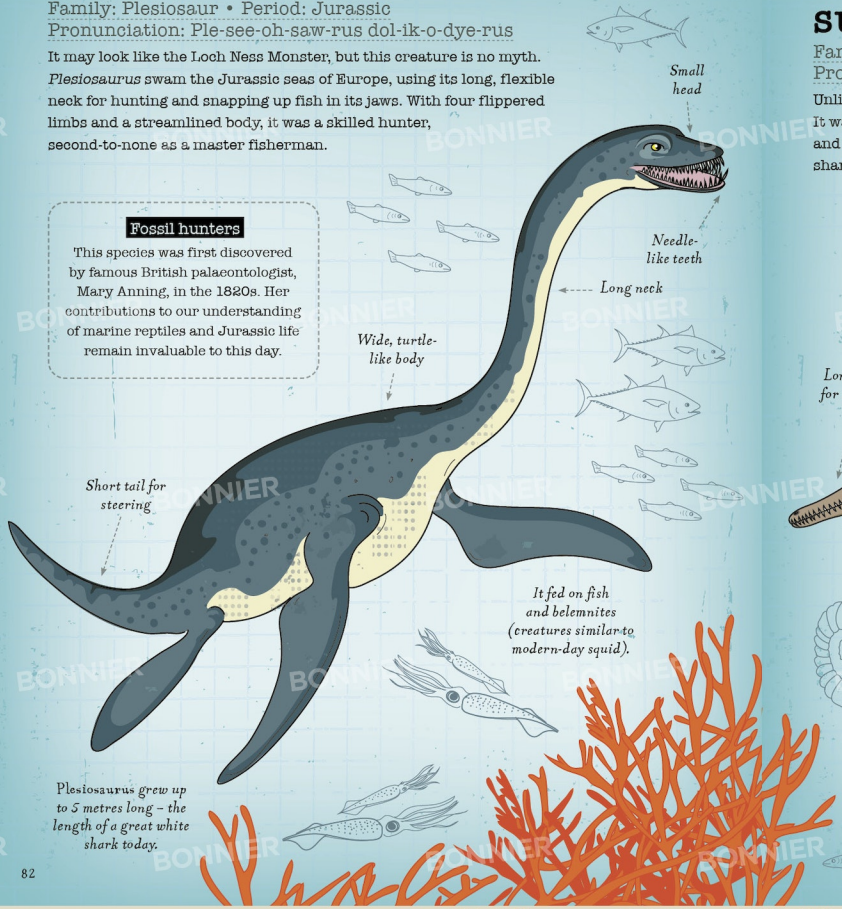
Plesiosaurus dolichodeirus

Family: Plesiosaur • Period: Jurassic
Pronunciation: Ple-see-oh-saw-rus dol-ik-o-dye-rus

It may look like the Loch Ness Monster, but this creature is no myth. *Plesiosaurus* swam the Jurassic seas of Europe, using its long, flexible neck for hunting and snapping up fish in its jaws. With four flippered limbs and a streamlined body, it was a skilled hunter, second-to-none as a master fisherman.

Fossil hunters

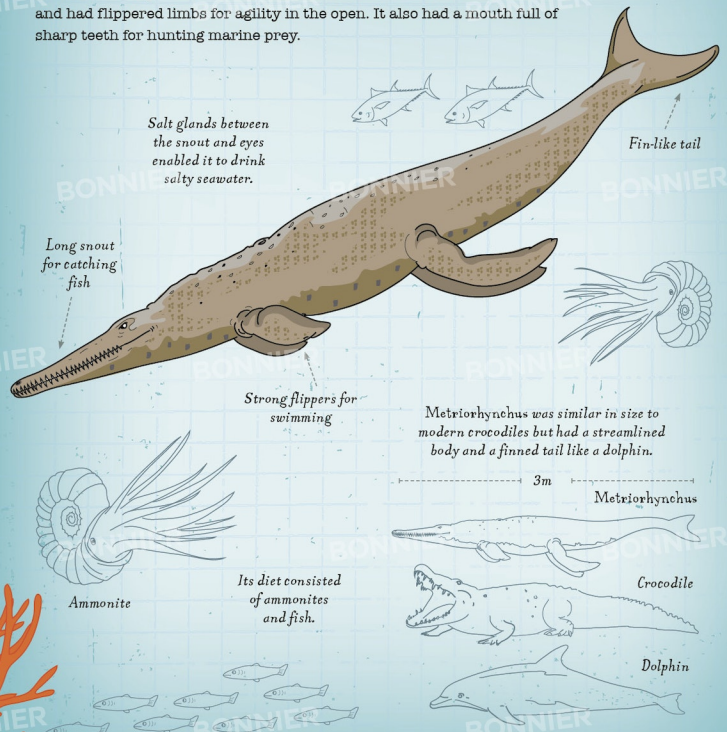
This species was first discovered by famous British palaeontologist, Mary Anning, in the 1820s. Her contributions to our understanding of marine reptiles and Jurassic life remain invaluable to this day.

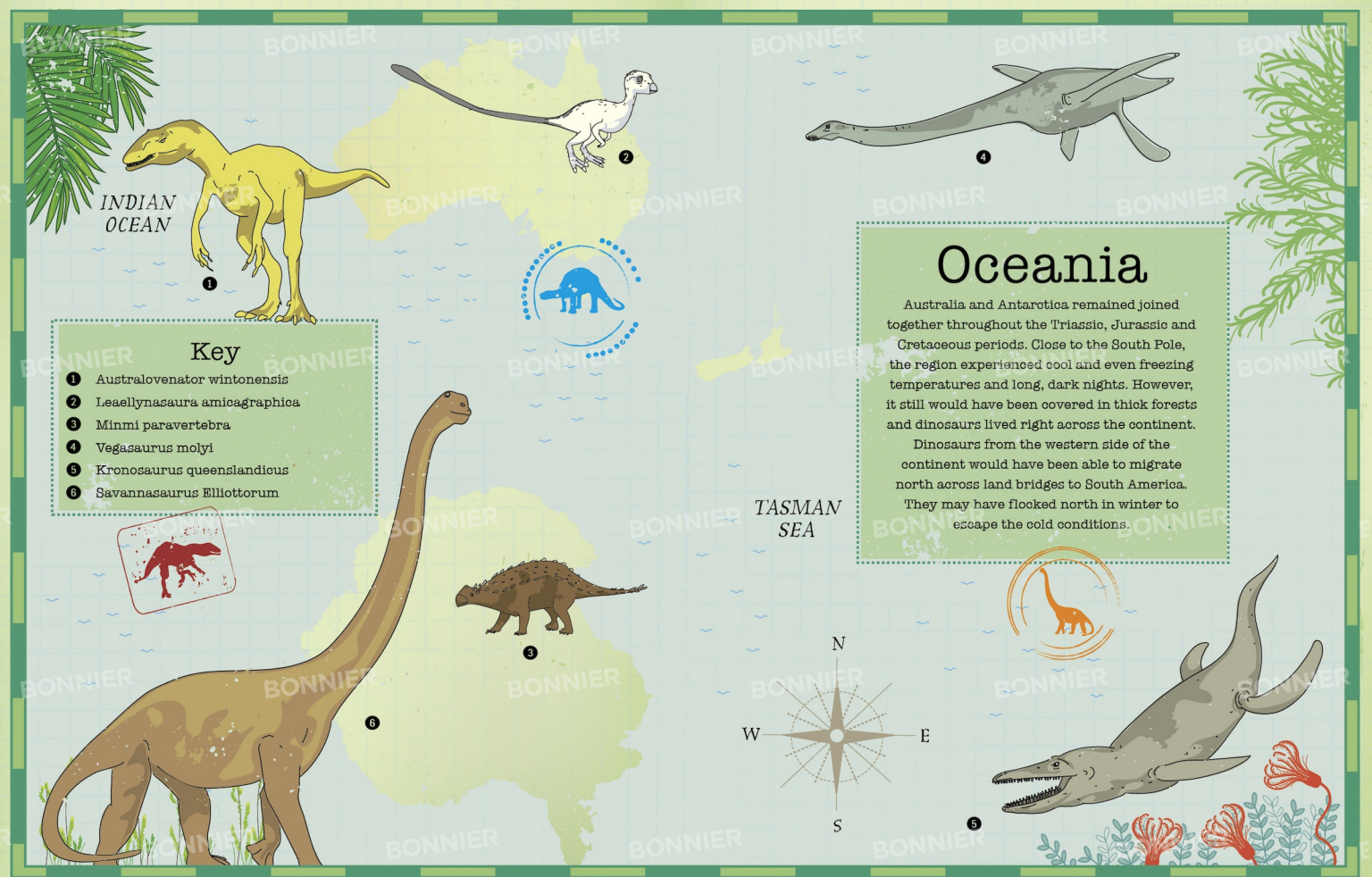


Metriorhynchus superciliosus

Family: Crocodyliform • Period: Jurassic
Pronunciation: Met-ree-oh-rink-us soo-per-sil-ee-oh-sus

Unlike modern crocodiles, *Metriorhynchus* spent all of its life out at sea. It was incredibly well adapted for this life, as it was able to filter saltwater and had flippered limbs for agility in the open. It also had a mouth full of sharp teeth for hunting marine prey.





Key

1. Australovenator wintonensis
2. Leaellynasaura amicagraphica
3. Minmi paravertebra
4. Vegasaurus molyi
5. Kronosaurus queenslandicus
6. Savannasaurus Elliottorum

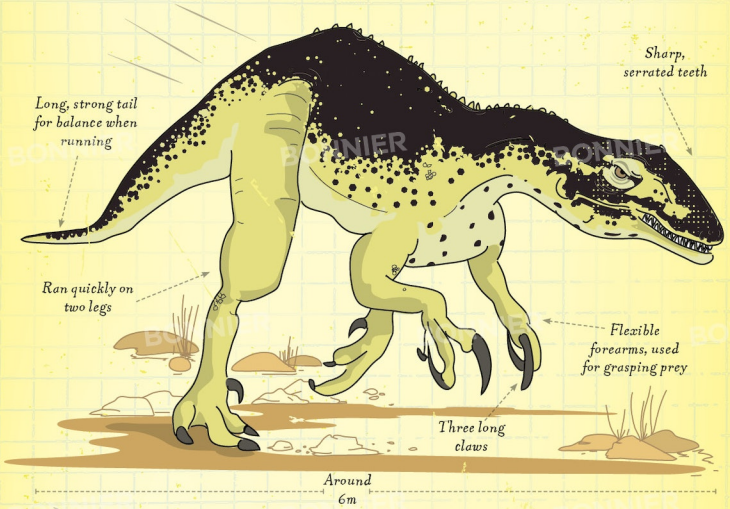
Oceania

Australia and Antarctica remained joined together throughout the Triassic, Jurassic and Cretaceous periods. Close to the South Pole, the region experienced cool and even freezing temperatures and long, dark nights. However, it still would have been covered in thick forests and dinosaurs lived right across the continent. Dinosaurs from the western side of the continent would have been able to migrate north across land bridges to South America. They may have flocked north in winter to escape the cold conditions.

Australovenator wintonensis

Group: Theropod • Period: Cretaceous
Pronunciation: Os-trah-loh-ven-ah-tore win-ton-en-sis

Australovenator was a large, lightly built predator that sprinted after prey, much like large cats do today. In fact its speed has earned it the nickname 'cheetah of its time'! It lived in a period when Australia and Antarctica were still connected together as a single continent, so it probably roamed freely across both continents.



Like cheetahs today, Australovenator was a fast runner, relying on speed to catch prey.

Stampede!

At Lark Quarry in Australia, hundreds of footprints have been found that are thought to represent a dinosaur stampede! *Australovenator* was found nearby, so palaeontologists guess the stampede started as dinosaurs ran away from it.

Savannasaurus elliottorum

Group: Sauropod • Period: Cretaceous
Pronunciation: Sah-vah-nah-sore-us ell-ee-oh-tore-um

Reaching lengths of around 15 metres, *Savannasaurus* was one of the largest dinosaurs known from Cretaceous Australia. The huge plant-eater lived alongside predators such as *Australovenator*, so its size would have been a great advantage for defence.

It is thought that dinosaurs like Savannasaurus may have migrated between South America and Australia, thanks to a land bridge across Antarctica.

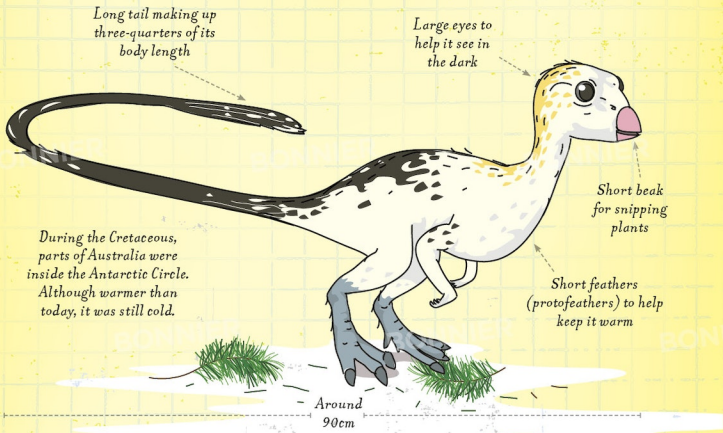
What's in a name?

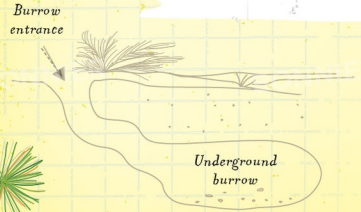
The environment in which *Savannasaurus* lived closely resembled the hot, dry conditions of the savannah in modern-day Africa.

Leaellynasaura amicagraphica

Group: Ornithopod • Period: Cretaceous
Pronunciation: Lee-ell-in-ah-sore-ah ah-mih-cah-graph-ick-ah

This Antarctic dinosaur was well-adapted to living in the cold and dark, with feather-like bristles for insulation and large eyes for good night vision. At the time *Leaellynasaura* lived, the Antarctic circle had lighter summers and darker winters than it does now. This is because the angle of the Earth's tilt was more extreme than it is today.





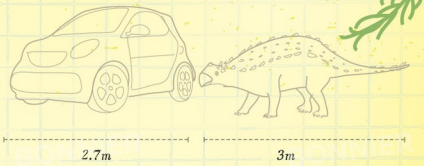
Underground life

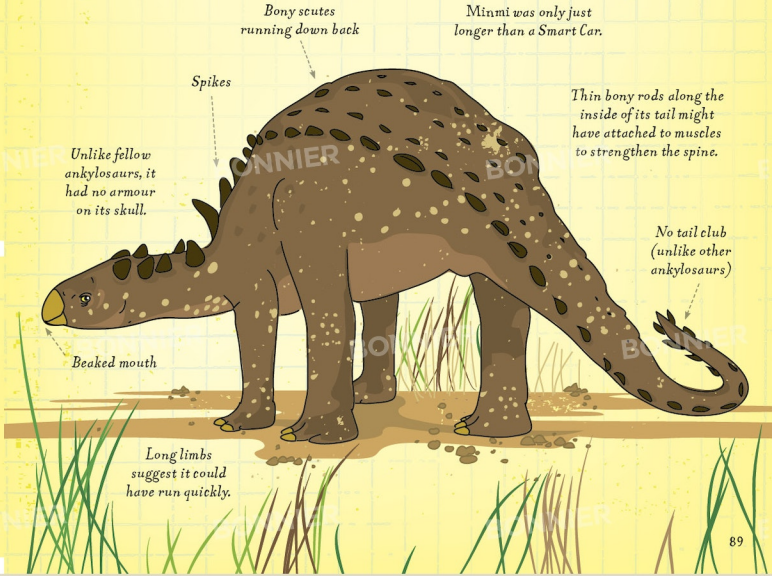
Three fossilised burrows have been found in Dinosaur Cove, Australia, suggesting *Leaellynasaura* might have been a burrowing animal. It could have gone underground to hibernate, or perhaps to protect itself from the harsh winter climate.

Minmi paravertebra

Group: Ornithopod • Period: Cretaceous
Pronunciation: Min-mee pah-rah-ver-tuh-brah

Minmi was an armoured dinosaur, but was much smaller than its cousins in North America. The plant-eater weighed around 300kg – only one-twentieth the size of an African elephant. For an ankylosaur, it had relatively long limbs, to help it run away when a quick escape was needed. Unlike most other ankylosaurs, it also had belly armour.

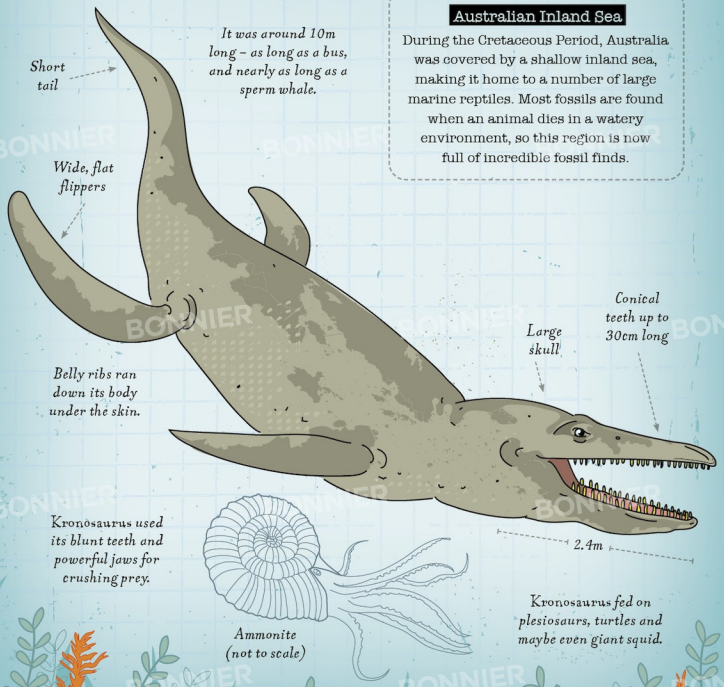




Kronosaurus queenslandicus

Group: Pliosaur • Period: Cretaceous
Pronunciation: Croh-noh-sore-us kweens-land-ick-us

A true titan of the seas, *Kronosaurus* was a terrifying apex predator. It had a short neck, powerful jaws and a large body propelled through the seas by strong flippers. Between its limbs were a series of belly ribs, offering additional support as it swam through the oceans.



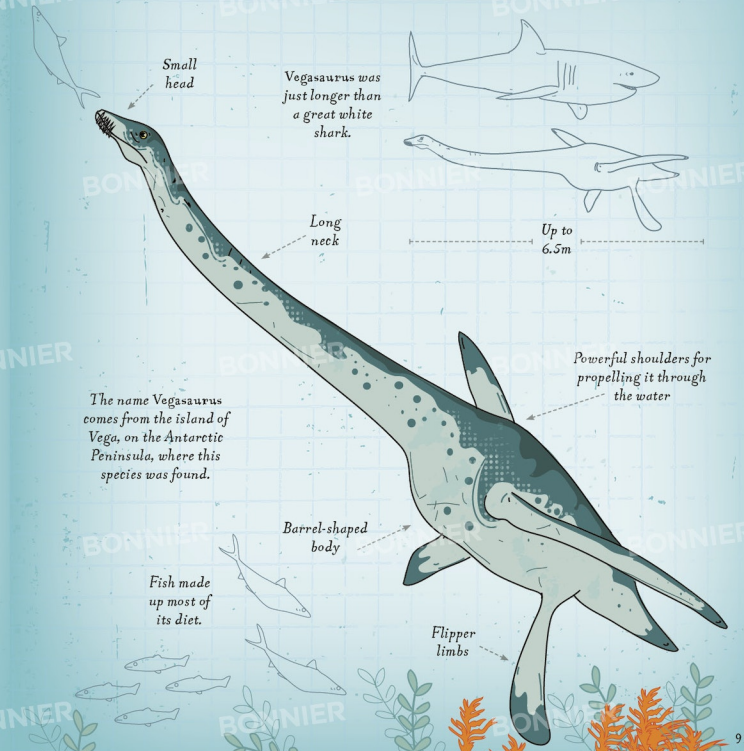
Australian Inland Sea

During the Cretaceous Period, Australia was covered by a shallow inland sea, making it home to a number of large marine reptiles. Most fossils are found when an animal dies in a watery environment, so this region is now full of incredible fossil finds.

Vegasaurus molyi

Group: Plesiosaur • Period: Cretaceous
Pronunciation: Vey-ga-sore-us moh-lee-eye

Back in a time when marine reptiles ruled the Antarctic seas, *Vegasaurus* was one of the top hunters around. It had a long, mobile neck and a streamlined body for stealthily gliding through water as it hunted fish and other smaller marine reptiles.



Glossary

Archosaur
The reptile group that includes dinosaurs, pterosaurs and crocodiles.

Bipedal
An animal that uses two legs for walking. Some dinosaurs were bipedal; others walked on four legs some of the time but could also run on two legs.

Carnivore
An animal that naturally feeds only on meat.

Extinction
When a species or group of animals has no living members. There was a mass extinction event at the end of the Cretaceous Period.

Fossil
The remains or impressions of a plant or animal preserved in rock.

Herbivore
An animal that naturally feeds only on plants.

Mammal
A warm-blooded animal that has hair or fur and feeds its young with milk. The first mammals appeared towards the end of the age of the dinosaurs.

Marine reptile
A prehistoric swimming reptile from the age of the dinosaurs. Marine reptiles were not dinosaurs at all, but were a separate group of animals. They had to come to the surface to breathe air.

Mesozoic Era
The geological period from 251 million years ago to 66 million years ago, during which the dinosaurs lived. The Mesozoic Era is split into three further periods: the Triassic, the Jurassic and the Cretaceous.

Meteor
A small icy and rocky object that enters the Earth's atmosphere.

Omnivore
An animal that eats both plants and other animals.

Ornithischian
'Bird-hipped' dinosaurs with backward-slanting hip bones. Ornithischians were all plant-eaters. Some had armour or horns.

Ornithopod
A mainly bipedal and herbivorous dinosaur.

Palaeontologist
A scientist that studies the fossil record.

Predator
An animal that naturally preys on other animals.

Pterosaur
A prehistoric flying reptile from the age of the dinosaurs. Pterosaurs were not dinosaurs at all, but a separate group of animals.

Quadrupedal
An animal that walks on all four of its legs.

Reptile
A scaly group of animals including snakes, lizards, crocodiles, tortoises, turtles and dinosaurs. Reptiles typically have scaly skin and lay eggs.

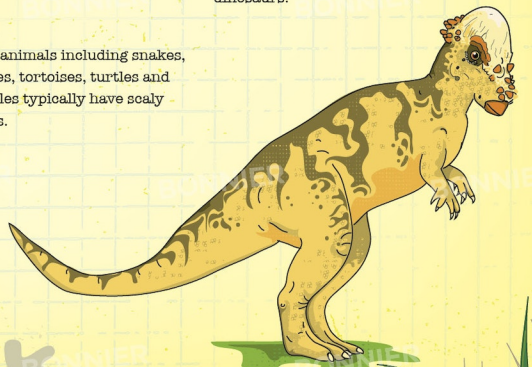
Saurischian
'Lizard-hipped' dinosaurs with forward-slanting hip bones. Saurischians were made up of two further groups: sauropods and theropods.

Sauropod
These were usually large, quadrupedal dinosaurs with long necks and tails.

Scutes
A bony protective plate on the back of some dinosaurs.

Thagomizer
The name given to the spikes on the tails of stegosaurs.

Theropod
Typically carnivorous and bipedal dinosaurs.



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