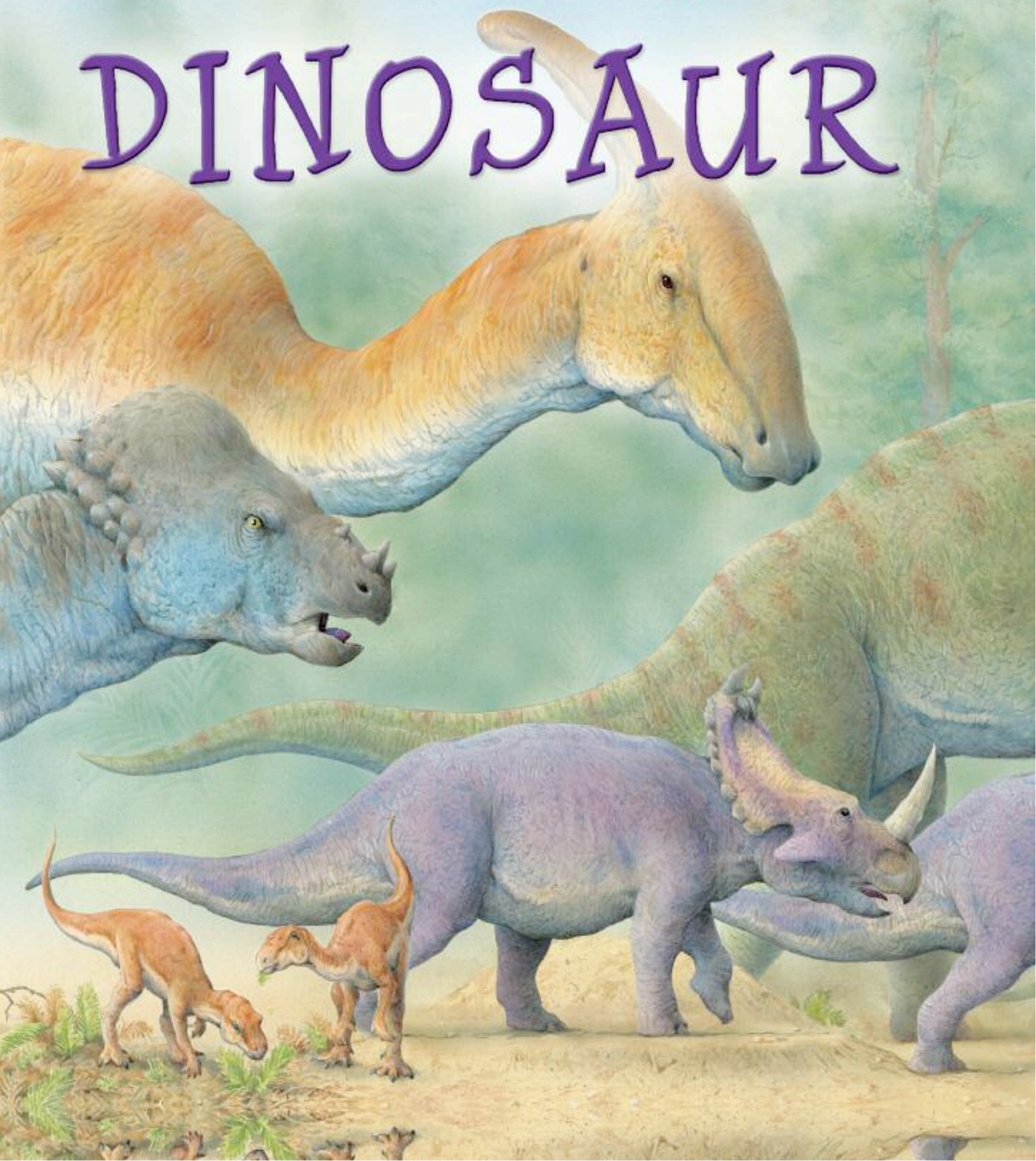


Inside Story

DINOSAUR



Inside story

DINOSAURS



Illustrated by Peter Scott

 Orpheus

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The dinosaurs

The dinosaurs were a group of reptiles that dominated the Earth for more than 160 million years. They first appeared 230 million years ago, during the Triassic Period. They flourished over the next two periods, the Jurassic (200-145 million years ago) and the Cretaceous (145-65 million years ago).

The word "dinosaur" means "terrible lizard". Dinosaurs were given this name because the first dinosaur fossils discovered in the 19th century were extremely large. But while the very largest dinosaurs were roughly as long as a football pitch is wide, many dinosaurs were tiny by comparison, some no bigger than chickens.

CONTINENTAL DRIFT

Over millions of years, the continents, the great landmasses of the Earth, have slowly drifted round the globe. Thus, in prehistoric times, the world looked very different to what it does today. This map shows their positions during the Age of Dinosaurs.



Triassic



Jurassic



Cretaceous



The dinosaurs, along with many other animals, went extinct at the end of the Cretaceous Period. Scientists think that a large asteroid (a rocky object in space) crashed into the Earth (above left). The resulting explosion would have filled the atmosphere with dust, blotting out the Sun for years so that no plants could grow. Plant-eating dinosaurs, such as *Triceratops* and *Edmontosaurus*, would have starved to death (above right), closely followed by meat-eaters, such as *Tyrannosaurus rex*, who depended on them for their food.

The dinosaurs' disappearance left room for the rise of a group of animals, who, until now, had lived in their shadow — mammals.



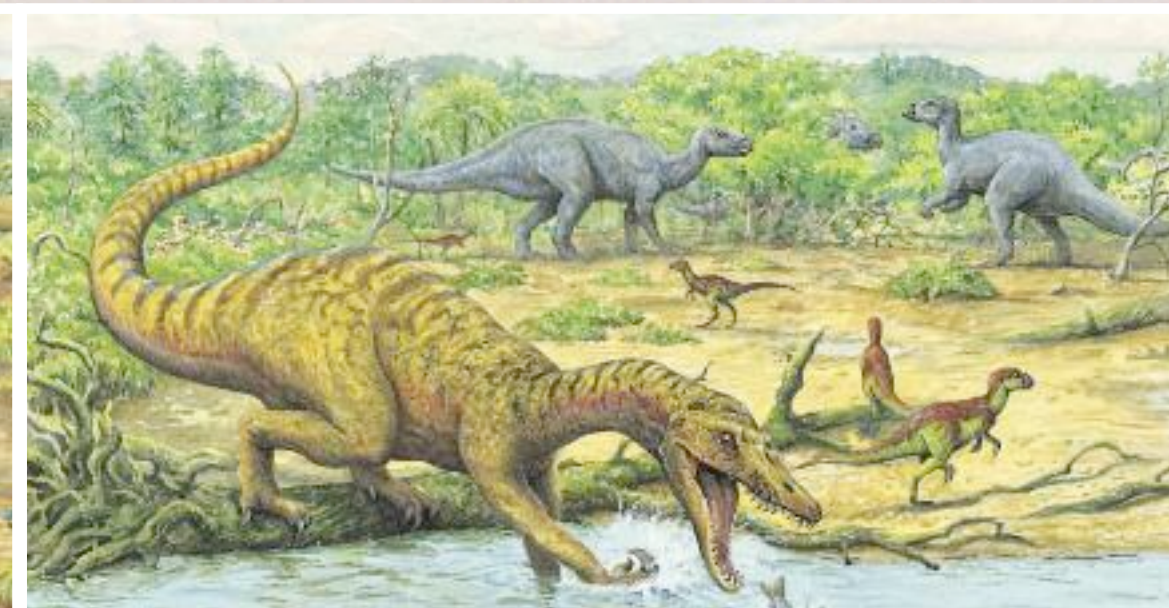
This book tells the INSIDE STORY of the dinosaurs. Who lived in the depths of the forests? How did dinosaurs attack their prey and what means of defence did they have? Who flew in the skies or swam in the seas while the dinosaurs ruled the land? And who were the ancestors of the dinosaurs?



TRIASSIC PERIOD



JURASSIC PERIOD



CRETACEOUS PERIOD

A THOUSAND FEET

Giant millipedes fed on dead and decaying plant matter in the swamp forest. Although “millipede” means a thousand feet, they rarely had more than 200 legs—two pairs on each segment of their bodies.

Calamites

Giant millipede

COAL SWAMP

When the trees and plants here died, their remains sank to the bottom of the swamp, building up into a dense, soggy material called peat. Rivers flowing into the swamp deposited sand and mud on top of the peat. As the squashed peat got buried deeper and deeper it also heated up, until the combination of heat and pressure eventually “cooked” it, turning it into a hard rock we know as coal.

GIANT DRAGONFLIES

Meganeuropsis dragonflies were the largest insects that ever lived. With wingspans of up to 75 cm they were larger than modern pigeons. They were also terrifying predators. Flying through the forest, they swooped down on smaller insects, catching them on the wing.

Meganeuropsis

Dragonfly

Giant horsetail trees dominate the forest

Carboniferous forest

This is a scene in North America about 300 million years ago, during the Carboniferous Period.

Tropical swamps and hot, steamy jungle dominate the land. Massive trees, including *Lepidodendron*, a kind of club moss, and *Calamites*, a large horsetail, dominate the coal swamps. *Lepidodendron* grows as high as 40 metres. Huge insects buzz in the humid air, and large spiders hunt in the undergrowth. Giant millipedes, some over two metres long, creep about in the undergrowth.

Carboniferous spiders

Unlike modern spiders, these spiders do not make webs.

STEALTHY HUNTER

Eryops had a flat skull with large eyes and nostrils placed on the top of its head. It hunted like a modern crocodile, by waiting quietly for its prey with only its eyes and nostrils visible above the water.

Eryops

Arthropleura, a relative of the millipedes, grows up to two metres long.

Insects are the only flying creatures.

FIRST REPTILES

Hylonomus was one of the few reptiles in the Carboniferous forest. It laid its eggs on land and buried them to keep them warm and safe. It spent most of its life in the trees and was a quick and efficient hunter, catching insects and other small prey.

FIRST LIFE

The first living things on Earth appeared not on land, but in the ocean. They were microscopic life forms called bacteria. The first animals were soft-bodied sea creatures such as jellyfish and worms. Animals with skeletons first appeared about 540 million years ago, during the Cambrian Period. The first fish had no fins or jaws. They swam with their mouths open sucking in things to eat. Fish with fins and teeth appeared later, about 420 million years ago.



Meanwhile, plants had started to appear around the shores of seas and lakes, from where they later spread inland. Insects evolved to feed on them, and in turn became prey for certain fleshy-finned fish who could haul themselves out of the water (top). In time, their fins turned into proper limbs (above). Now these fish could get about on land more easily. The first amphibians had evolved.

Amphibian to reptile

Lurking in the waters of the Carboniferous swamps are some amphibians. Their limbs have evolved from the strong fins of fish. But they still have to keep their skin moist, and go back to the water to lay their eggs (as frogs and toads still do today). Scurrying about in the undergrowth and on branches are the first reptiles. Unlike amphibians, these creatures no longer need to spend part of their lives in water: they have developed the ability to lay their eggs on land.

PERMIAN REPTILES

By the time of the Permian Period, reptiles had spread around the world. Dimetrodon (below) was a three-metre-long giant predator, with a sail of skin on its back. It was a pelycosaur, not a dinosaur.



DIPLOCAULUS

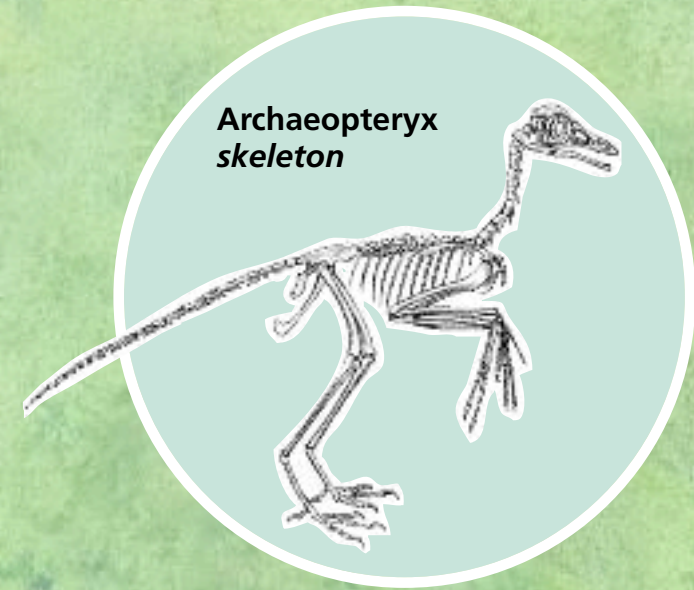
Diplocaulus was an early amphibian with a boomerang-shaped skull, a long tail and short limbs. Its pointed head would have made it streamlined in the water and could have been used to deter larger animals from trying to swallow it.

Eryops

Diplocaulus

Hylonomus

Archaeopteryx skeleton



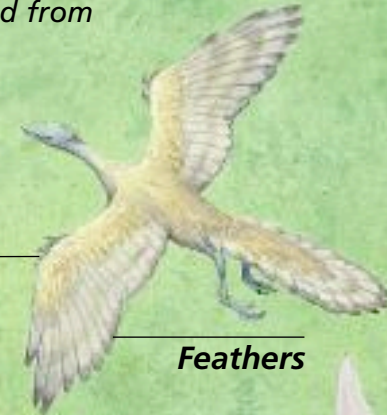
JURASSIC RAINFOREST

One striking difference between this lush Jurassic rainforest and a modern one is that there were very few flowers to break up the endless sea of green. Flower-bearing plants were only just appearing, so forests at this time were dominated by evergreen plants such as ferns, tree-ferns, ginkgos, conifers and cycads—plants with frond-like leaves similar to palms. Many of these grew to enormous sizes. A giant tree-fern could reach 40 metres high.

THE FIRST BIRDS

With its light bones, warm blood, covering of feathers and ability to fly, Archaeopteryx had many bird-like features. But it was also very dinosaur-like. Its jaws were lined with tiny sharp teeth, it had a bony tail and there were claws on its wings. Many scientists think this suggests that birds evolved from small feathered dinosaurs. Feathers probably first developed as a means to keep warm.

Claws on wings



Archaeopteryx

Rhamphorhynchus



Long tail with diamond-shaped tip



Rhamphorhynchus



MASTERS OF THE AIR

Pterosaurs were flying reptiles. For nearly 100 million years they dominated the skies. They had wings formed by flaps of skin stretched from their extremely long fourth finger down the sides of their bodies.

Their bones were hollow, making them very light. Some had tails which helped them steer in the air. Pterosaurs were powerful flyers, but they were clumsy when moving about on the ground. Many roosted in trees and rarely ventured down to the forest floor.

Rhamphorhynchus

Stiff wings made of flaps of skin

Upwardly curved beak



Archaeopteryx

ADAPTED BEAKS

Rhamphorhynchus used its curved, tooth-lined beak to catch fish. Plataleorhynchus scooped water with its spoon-shaped beak as it flew low over lakes and rivers, and sieved out food through its closely spaced teeth.

Jurassic fliers

It is very warm and wet in the Jurassic world of 155 million years ago. Plants and trees grow in abundance, some reaching more than 30 metres high. Much of the Earth is covered in dense forest. Flying reptiles, called pterosaurs, glide above the tree tops and roost in the uppermost branches. Also making their home in the trees are small, feathered, flying creatures, called Archaeopteryx.

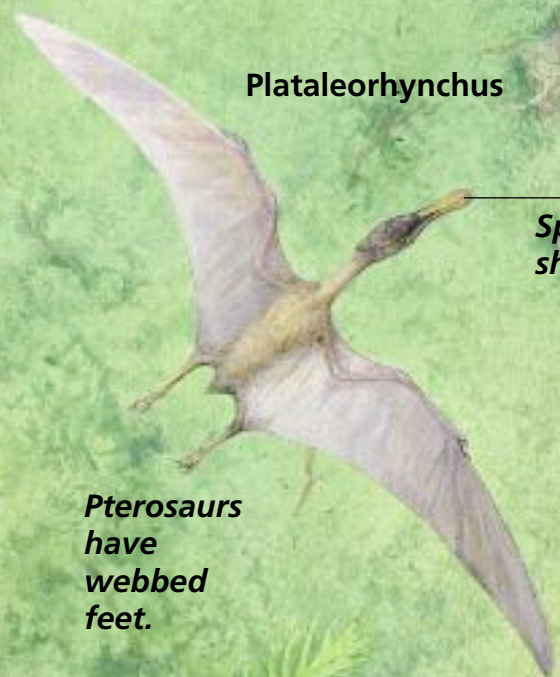
Archaeopteryx flies above the trees.

Long feathered tail



Plataleorhynchus

Spoon-shaped beak



Pterosaurs have webbed feet.

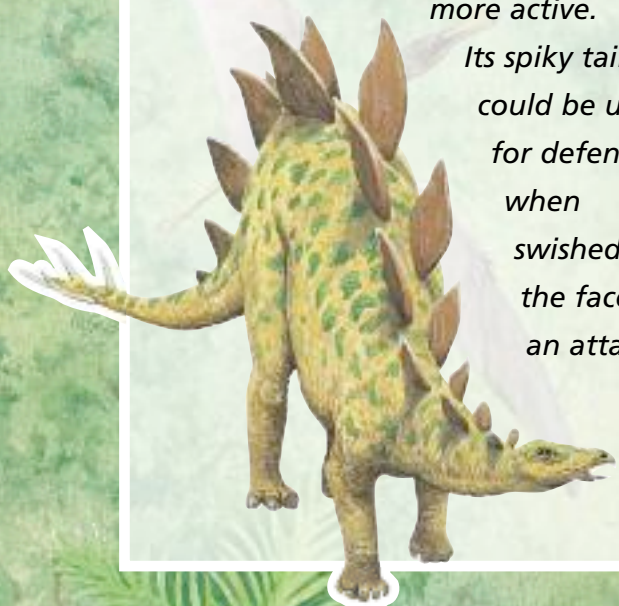
Jurassic giants

The lush Jurassic forests provide much food for the dinosaurs. Dominant among the plant-eaters are the long-necked sauropods, including giants such as *Diplodocus*, at more than 20 metres long, among the largest land animals that ever lived. The abundance of plant-eaters means more food for the meat-eating dinosaurs, the theropods. Predators, such as *Metriacanthosaurus*, stalk the forests in search of quarry. They also willingly scavenge any carcasses they come across.

STEGOSAURUS

Stegosaurus had tall plates of bone on its humped back. Perhaps these soaked up the sun's heat, so that Stegosaurus could be warmer and more active.

Its spiky tail could be used for defence when swished in the face of an attacker.



DEFENCE MECHANISM

The mottled patterns and colours of the plant-eaters camouflaged them in the shadows of the forest, helping them hide from predators.

Pack hunters can take down prey much larger than themselves

MINI HUNTERS

Tiny meat-eating dinosaurs called Compsognathus sprinted through the forest in search of food. Although only the size of a chicken, they had sharp teeth and claws, which they used to catch and eat insects and small reptiles.

SHARP SENSES

Keen eyesight, a good sense of smell, sharp claws and teeth, and the ability to run fast on its hind legs were the qualities needed by any predator in the depths of the Jurassic forest.

FEARSOME KILLERS

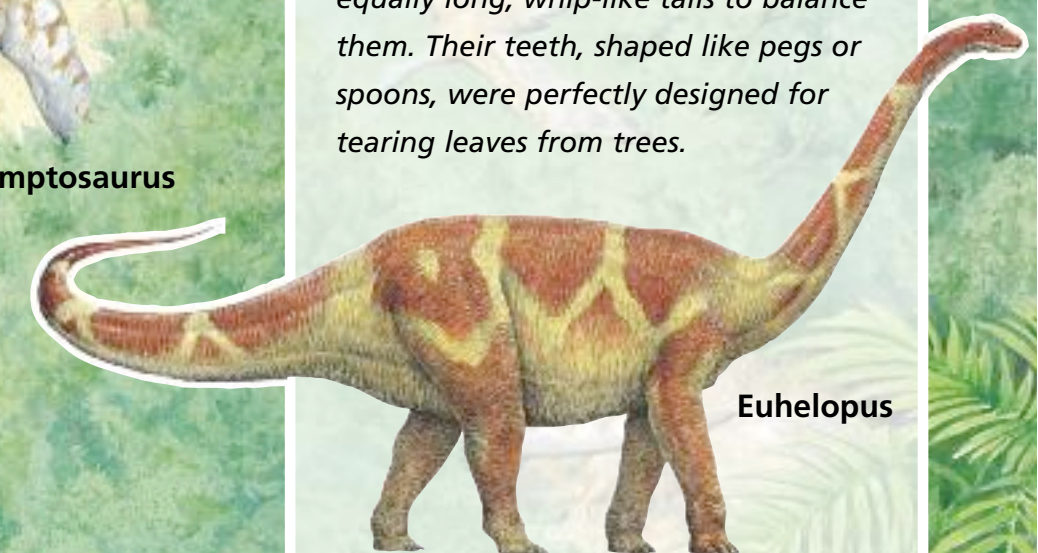
As the sauropods became larger and more numerous, so the meat-eating theropods became more powerful. Yangchuanosaurus, a Chinese theropod, was nine metres long. It may have hunted in packs to attack the largest prey. Nothing trapped in its backwards-curving teeth could escape.



Yangchuanosaurus

GENTLE GIANTS

With so much food available, the plant-eating sauropod dinosaurs could grow very large. Although about 15 metres long, Euhelopus (below) was only of medium size. These enormous creatures had very long necks and equally long, whip-like tails to balance them. Their teeth, shaped like pegs or spoons, were perfectly designed for tearing leaves from trees.



Euhelopus



THICK SKULL

Pachycephalosaurus means “thick-headed lizard”. It had a thick, domed skull ringed by bony projections. *Pachycephalosaurus* used its impressive head-armour both to display to females and to butt rival males in combat. *Pachycephalosaurus* had small teeth that could not grind up tough, fibrous plants. Instead it lived on a mixed diet of leaves, seeds, fruit and insects.

DUCK BILLS

Duck-billed dinosaurs, or hadrosaurs, such as *Parasaurolophus*, browsed on the leaves and fruits of trees and on low-growing plants. They had no front teeth, just grinding back teeth.

Many duck-billed dinosaurs had crests on top of their heads.

In males, the shape and colour of their crests may have helped them to attract a mate.

Parasaurolophus

Pachycephalosaurus

Tiny Hypsilophodon scours the undergrowth for the tender leaves of small plants, such as ferns, mosses and liverworts.

Brachiosaurus
nest

GIRAFFE NECKS

Just like a modern giraffe, *Brachiosaurus*'s long neck enabled it to reach high into the branches of trees. Here it could browse on new leaves and shoots that smaller animals could not reach. *Brachiosaurus* had 13 vertebrae (bones) in its neck. These were hollow to make them as light as possible, otherwise its neck would have been too heavy for *Brachiosaurus* to lift up.

Brachiosaurus

Centrosaurus

Plant-eaters

Plant-eating dinosaurs come in many shapes and sizes, ranging from small, gazelle-like sprinters such as *Hypsilophodon*, to the largest land animals ever to roam the Earth: the sauropods. Giant sauropods of the Jurassic, such as *Brachiosaurus*, tear off the leaves and shoots from the tops of trees. The hadrosaurs and other Cretaceous plant-eaters on the other hand, have grinding teeth to crush tougher leaves and plant stems, chewing them in their mouths.

HOLLOW CREST

The bony crest of *Parasaurolophus* was hollow. The tubes inside could measure up to two metres long. By forcing air through these tubes, *Parasaurolophus* created a loud booming call to others of its kind, which could be heard several kilometres away.

Hollow structure within crest

Brain

Flat grinding teeth

Brachiosaurus has very sturdy hip and leg bones to support its weight.

"Lizard-hip"

Pubic bone

Caecum

Brachiosaurus babies developing within their eggs



DINOSAUR EGGS

Like most reptiles today, and all birds, female dinosaurs laid eggs. Dinosaur eggs were hard-shelled with tiny holes in the walls, allowing the baby dinosaur inside to breathe. When ready to be born, hatchlings simply knocked the tops off the eggs and climbed out.



BRINGING UP BABY

In some species, hatchlings were still not fully developed and so depended on their parents for care. Some mothers stayed by the nest to protect the eggs and tiny hatchlings. Despite their best efforts, however, both eggs and hatchlings were an easy source of food for other dinosaurs.



TOUGH GUT

Many plant-eaters, like *Brachiosaurus*, needed help to digest their food. Chewing was not enough to break down tough plant fibres. They had a sac in their gut, called a gizzard, which contained "gastroliths": stones they had swallowed. These helped grind the plants into a pulp, which then passed into a part of the gut called the caecum. Here bacteria broke down the pulp even further, releasing nutrients that could easily be absorbed.

Brachiosaurus reaching up to the highest branches

Powerful muscles help to hold up *Brachiosaurus*'s long neck.

Lungs

Gizzard

Bone head-frill protects neck.

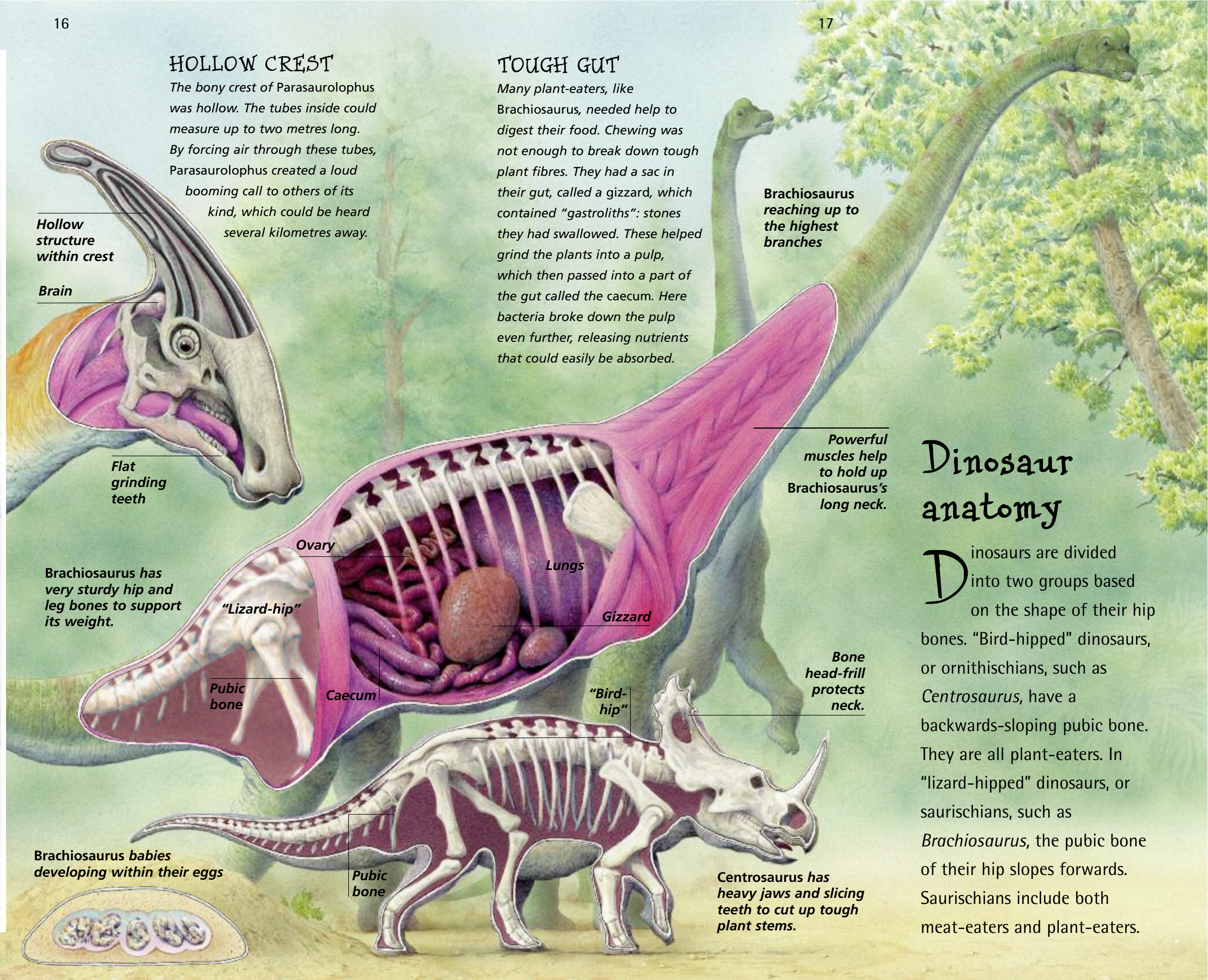
"Bird-hip"

Pubic bone

Centrosaurus has heavy jaws and slicing teeth to cut up tough plant stems.

Dinosaur anatomy

Dinosaurs are divided into two groups based on the shape of their hip bones. "Bird-hipped" dinosaurs, or ornithischians, such as *Centrosaurus*, have a backwards-sloping pubic bone. They are all plant-eaters. In "lizard-hipped" dinosaurs, or saurischians, such as *Brachiosaurus*, the pubic bone of their hip slopes forwards. Saurischians include both meat-eaters and plant-eaters.



SPEEDY KILLERS

Agile *Deinonychus* had very strong, muscular back legs. Its stiff tail balanced it as it moved, turned and leaped at speed. Sprinting over short distances it could easily catch its victims.

The attack startles a young Silvisaurus.

Cycad

WORKING TOGETHER

A large *Tenontosaurus* like this would have been far too big a prey for a single *Deinonychus*. *Tenontosaurus* could crush a lone attacker, or swipe it with its tail. But when the predators worked together, *Tenontosaurus*'s chances swiftly diminished. The pack surrounded its prey and all attacked at once, leaving the victim no escape route.

Silvisaurus

Deinonychus

Tenontosaurus

SURPRISE ATTACK

By ambushing their victims, a *Deinonychus* pack could surprise their prey—like this unsuspecting *Tenontosaurus*, quietly grazing on some lush plants. Once surrounded, it was too late for the slow plant-eater to get away. *Deinonychus* would have easily outrun it.

Deinonychus ready to spring

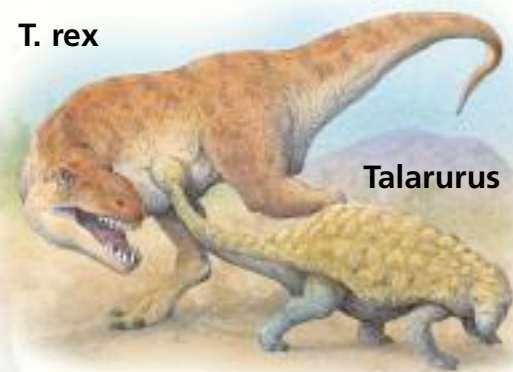
Pterosaur

Cycad

Dinosaur attack!

It is kill or be killed for many animals here in North America during the Cretaceous Period. The climate is mainly warm and dry, and there is plenty of vegetation around for large plant-eaters, such as *Tenontosaurus*. This means there is also plenty of food for predators like *Deinonychus*. These dinosaurs are very successful killers, despite their small size. By working together they are able to increase their chances of hunting success.

T. rex



Talarurus

DINOSAUR DEFENCES

Like modern herbivores, different dinosaurs had various ways of defending themselves. These included: being large, herding, running away, camouflage and defensive armour, as well as use of teeth, claws, horns and spikes as weapons.

The ankylosaurs were tank-like dinosaurs, covered with hard, bony plates. Some, like Talarurus, had a large ball of bone at the end of their tails which they could swing like clubs into their attacker's body (above).

Iguanodon, a large and slow dinosaur, relied on another means of defence. As well as its clawed fingers, it had long, sharp thumb-spikes, which it could have jabbed into a predator's neck. Iguanodon probably walked on two legs most of the time, freeing up its front limbs for pulling down branches to feed on leaves as well as fending off its enemies.



Acrocanthosaurus

Iguanodon

POWERFUL TAIL

Tenontosaurus had few means of defence against such determined killers. But at least this one managed to disable one of its attackers with a well-aimed blow from its muscular tail.



This Deinonychus is thrown on to its back by its prey's thrashing tail.

RAZOR TEETH

At least one Deinonychus in the pack would try to sink its sharp teeth into the neck of its prey, tearing the flesh. Wounds like this resulted in the victim soon bleeding to death.

The throat is the most vulnerable part of the body.

Deinonychus uses its sharp claws to latch on to its prey.

Tenontosaurus is attacked on all sides.

Meat-eaters

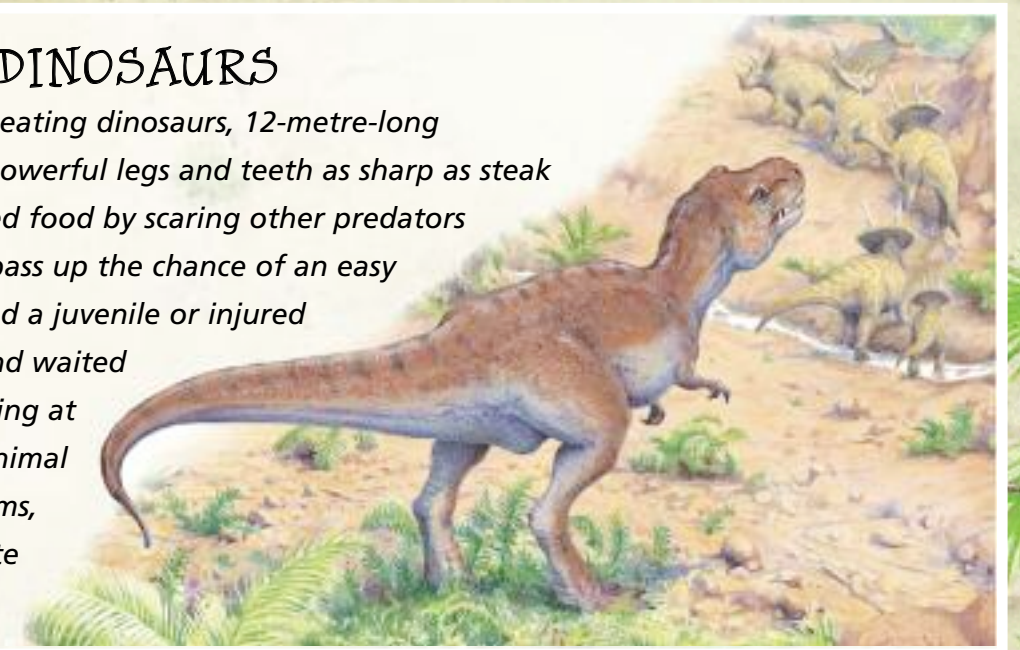
The flesh-eating dinosaurs, known as theropods, all move about on two legs, so keeping their front limbs free for grasping or pinning down their prey. Large theropods, such as *Tyrannosaurus rex* hunt alone, usually by ambushing their victims. Some smaller theropods, such as *Deinonychus*, hunt in packs, launching co-ordinated attacks. Tiny sprinters, like *Compsognathus*, chase after lizards, mammals and insects. All theropods were very likely scavengers, too.

TERRIBLE CLAW

Deinonychus means "terrible claw", named because the second toe on each foot had a scythe-like claw that could inflict terrible damage. When running, Deinonychus held them up out of the way. It thrust them forwards only when it launched itself at its prey.

KING OF THE DINOSAURS

One of the largest flesh-eating dinosaurs, 12-metre-long *Tyrannosaurus rex* had powerful legs and teeth as sharp as steak knives. It often scavenged food by scaring other predators away. But it would not pass up the chance of an easy kill either. Having spotted a juvenile or injured individual, it watched and waited its moment, before rushing at its victim. Holding the animal down with its feet or arms, finishing it off with a bite to the throat.



HEAD SAILS

Tapejara and Tupuxuara had colourful sails or crests on their heads that they could raise and lower at will. They probably used them in courtship displays to attract a mate or to ward off a rival.

Tupuxuara

Plesiosaur
surfacing
for air

Ichthyosaur

ACROBATIC FLYING

Smaller pterosaurs, like Tapejara (below) used their wings to power themselves forwards and to manoeuvre quickly in the air. They could control their height and speed when flying, enabling them to dive down and snatch fish from the water with great accuracy.

Tapejara catches
a fish in its
clawed feet.

WARM SEAS

Temperatures throughout the world were very warm in the Cretaceous. There were no ice caps at the poles and sea levels were high. Across the globe, warm, shallow waters provided ideal conditions for a great variety of sea creatures to thrive.

Tapejara

FURRY FLYERS

Ornithocheirus had soft, downy fur covering its body. This helped it to keep warm—essential if pterosaurs were warm-blooded, like birds and humans. Warm-blooded animals create heat within their bodies and keep their body temperature constant.

Ornithocheirus

Cretaceous seas

Much of the Cretaceous Earth is covered by shallow seas. They are home to a rich variety of life. Above the waves soar pterosaurs, looking for the chance to pluck a fishy meal from the sea.

Tupuxuara

GIANT GLIDERS

Large pterosaurs, such as Ornithocheirus, used their huge wings to soar above the ocean, gliding on warm air currents rising up from the water. They could cover hundreds of kilometres like this without ever having to flap their wings.

With a wingspan of about 12 metres, Ornithocheirus was the size of a small plane—although it weighed only about the same as an adult human. It had hollow bones and a hollow beak, which reduced its weight, making it easily light enough to fly.

A plesiosaur's
nostrils open
when it comes
to the surface
to breathe.

ICHTHYOSAURS

The best-adapted ocean reptiles were the ichthyosaurs (below). Like modern dolphins, ichthyosaurs were perfectly streamlined, with long flippers for steering and strong tails to propel them through the water. They were the first marine reptiles to spend all of their time in the water.



PLESIOSAURS

The Jurassic Period saw the emergence of the plesiosaurs. Like dinosaurs, they had long necks and small heads. But instead of legs, their limbs had evolved into large, paddle-like flippers. They spent most of their time on water, coming ashore only to lay their eggs.

By the late Cretaceous, some plesiosaurs had become giants. Elasmosaurus (below) was 14 metres long, with a neck more than half its body length. It may have used its long neck to catch fish by surprise, or as a rudder, to change direction while chasing prey.



FLYING UNDER WATER

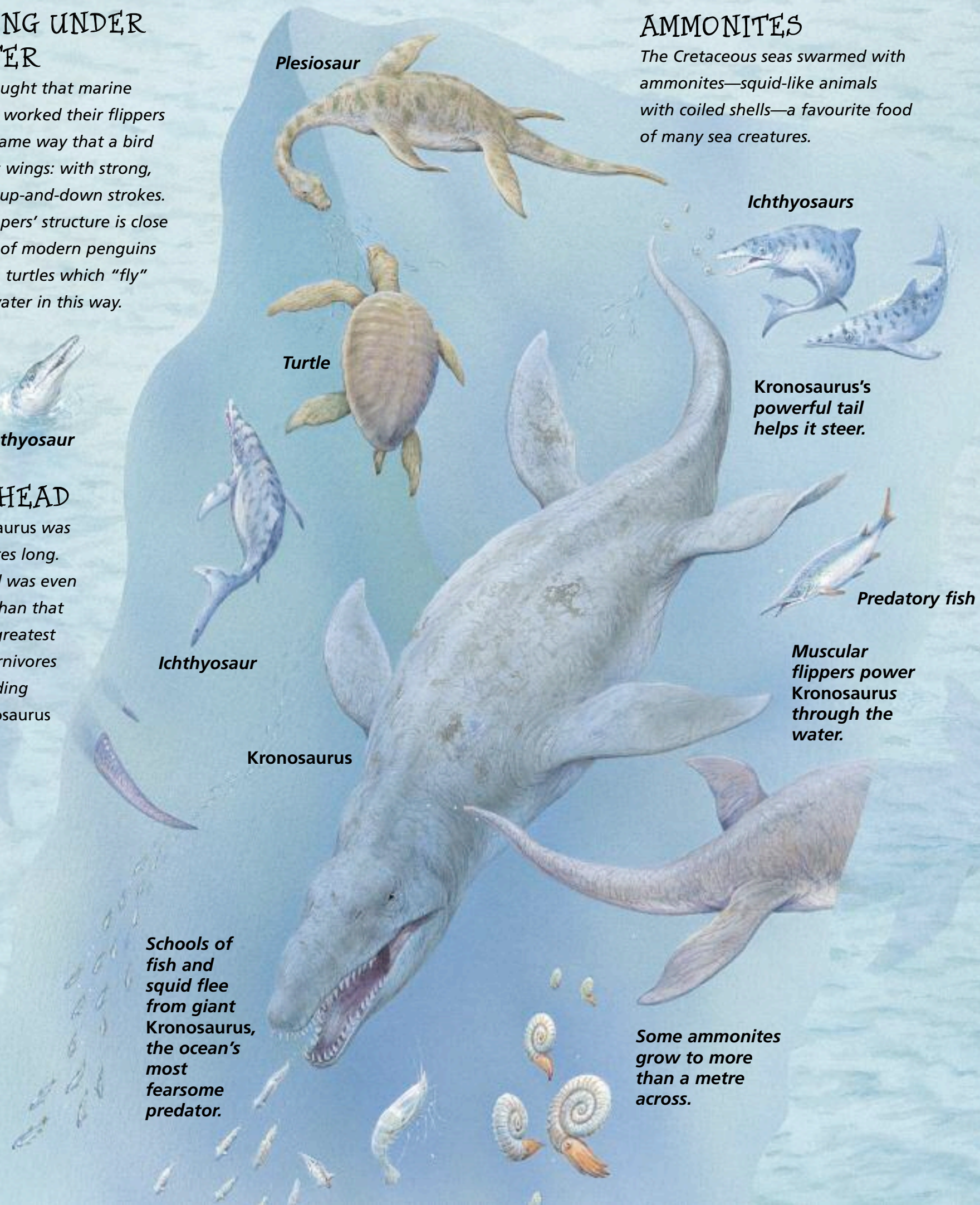
It is thought that marine reptiles worked their flippers in the same way that a bird flaps its wings: with strong, steady, up-and-down strokes. The flippers' structure is close to that of modern penguins and sea turtles which "fly" underwater in this way.



Ichthyosaur

BIG HEAD

Kronosaurus was 10 metres long. Its head was even larger than that of the greatest land carnivores—including Tyrannosaurus rex.



Plesiosaur

Turtle

Ichthyosaurs

Kronosaurus's powerful tail helps it steer.

Predatory fish

Muscular flippers power Kronosaurus through the water.

Schools of fish and squid flee from giant Kronosaurus, the ocean's most fearsome predator.

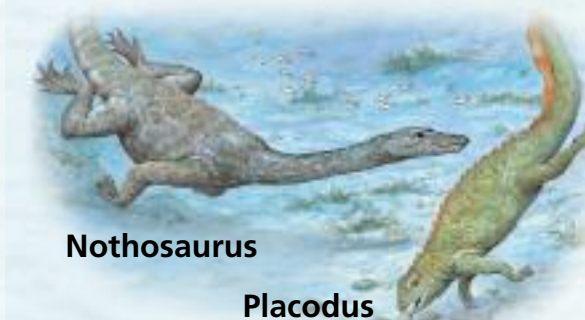
Some ammonites grow to more than a metre across.

Sea reptiles

During the Age of Dinosaurs, marine reptiles—which are not dinosaurs—rule the seas. Among them are dolphin-like ichthyosaurs, long-necked plesiosaurs and the gigantic pliosaur, *Kronosaurus*.

MARINE REPTILES

The first big sea reptiles, in the Triassic, were placodonts and nothosaurs. Nothosaurus probably dived to catch food, then waddled with its webbed feet on to the shore to rest. Placodus was not such a good swimmer. Perhaps it searched for shellfish at the water's edge, crushing them with its flat teeth.



Nothosaurus

Placodus

Plesiosaur

LONG-NECKED PREDATOR

Plesiosaurs were giants of the Cretaceous seas. With their long necks and tails, some grew to lengths of more than 12 metres. They used their snake-like necks to shoot their heads out at their prey—usually fish or ammonites.

After the dinosaurs

It is 35 million years since the dinosaurs became extinct. Their fossilized remains lie in the rocks beneath the soil, waiting to be discovered millions of years into the future. Other kinds of animals now dominate the Earth. The place of the dinosaurs has been taken by smaller, furry, warm-blooded animals that give birth to live young and suckle them with milk: the mammals.

GRASS FEEDERS

Prehistoric rabbits, like Megalagus, fed on grass. Many other mammals thrived on it too. But grass is very difficult to digest, so they developed special ways to tackle this problem. Some mammals, for example, had tough, grinding teeth and a very long digestive system to help break the grass down and release its nutrients.

Megalagus

Hefty, pig-like Archaeotherium might fight off one predator, but it is no match for a pack of Hyaenodons.

Archaeotherium

TOP PREDATOR

Hyaenodon was the most fearsome predator around. Fast and agile, it had strong jaws equipped with sharp, knife-like front teeth. Hyaenodon had a keen sense of smell and often hunted in packs at night.

BIRDS RULE THE AIR

Pterosaurs became extinct along with the dinosaurs at the end of the Cretaceous. Thirty-five million years later, birds, having evolved from small theropod dinosaurs in Jurassic times, diversified into many species and spread to all parts of the Earth.

Bird

Hyaenodon

Paraceratherium

GIANT PLANT-EATER

The largest land mammal of all time, Paraceratherium was a massive plant-eater measuring eight metres from head to tail and standing more than five metres tall. Like a modern rhinoceros, Paraceratherium used its flexible lips and tusk-like teeth to strip leaves from trees. Its bulk made it a slow mover, and therefore easy prey for swift pack-hunters such as Hyaenodon.

Megalagus

Hyaenodon

Shrew

Hyaenodon

HOW FOSSILS FORM

Fossils are remains of once-living things preserved in rock. After dying (1), the soft body parts of animals rot away or are eaten, leaving behind hard body parts such as shells, teeth and bones. If these are buried under sediment such as sand, silt or mud (2), a fossil may start to form.



body parts of animals rot away or are eaten, leaving behind hard body parts

Slowly the surrounding water dissolves away the remains and replaces them with rock minerals from the water. Meanwhile, the particles around them are also turning to rock.



If left undisturbed, the remains keep their original shape but are now

solid rock—fossils (3). Fossil and rock may be gradually tilted by massive earth movements.

Erosion wears away the rock surface and may expose the fossils. Palaeontologists find them (4), dig them up, then take them back to a laboratory for study.



TRACE FOSSILS

Footprints, tracks and trails preserved in the rock are called trace fossils. These sorts of fossil are rare, as such things are usually destroyed soon after they are made. Here, a footprint in soft mud dried out and was quickly infilled by new mud, preserving it to become a trace fossil.

Preserved dinosaur footprint

EGGS

Fossils have been found of many kinds of dinosaur eggs as well as fossils of baby dinosaurs. These finds show that parent dinosaurs made nests for their eggs.

Hadrosaur skeleton

Fossilized eggs

All the soft parts have rotted away, leaving bones and eggshells preserved as fossils.

FOSSIL BONES

Beneath the mammals' feet lay a reminder of the past age of the dinosaurs: the skeleton of a hadrosaur (duck-billed dinosaur), fossilized along with a nest full of eggs. The body of this dinosaur was probably rapidly buried in mud during a flash flood.

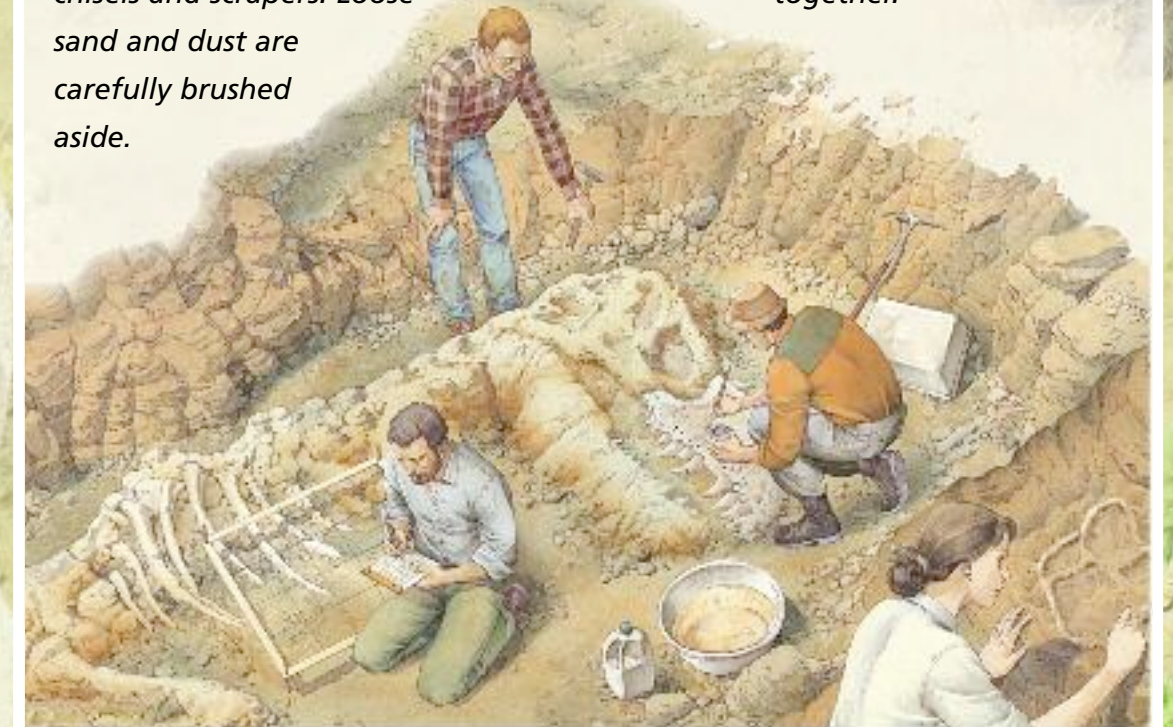
Claw

The skeleton is preserved in the position of death.

ON A DIG

The place where fossils are found is known as the "dig". Palaeontologists carry out the painstaking work of getting the fossils out of the ground. Soil and loose lumps are removed with pick-axes and shovels. Tiny bits of rock are chipped away more carefully using small hammers, chisels and scrapers. Loose sand and dust are carefully brushed aside.

A whole fossil dinosaur, with all the bones in place next to each other, is an extremely rare find. Usually the bones, teeth and other fossil parts are squashed, broken and jumbled, with many missing. It can take months or years to clear away and piece the fossils together.



Discovering the dinosaurs

All we have left of the dinosaurs are their fossils—the hard body parts, like bones, teeth and claws, preserved in rocks. The study of fossils, along with the behaviour of modern animals, can tell us much about how dinosaurs once lived.

Glossary

Amphibians The first air-breathing land animals. They leave the water to breed.

Carboniferous Period of Earth history
360–286 million years ago.

Cretaceous Period of Earth history
145–65 million years ago. Much of the Earth was covered by shallow sea.

Cycads Ancient plants with a central trunk crowned by spiny leaves.

Dinosaurs Large land reptiles that lived 248–65 million years ago.

Extinction The complete dying out of a species. The dinosaurs became extinct at the end of the Cretaceous.

Fossils The ancient remains, or traces, of living things preserved in rock.

Hadrosaurs A group of plant-eating dinosaurs also called duck-bills.

Gastroliths Stones in the gut of large plant-eating dinosaurs that helped break down tough plant material.

Jurassic Period of Earth history
200–145 million years ago. Dinosaurs dominated the Earth during the Jurassic.

Mammals Warm-blooded vertebrates that have hair and mostly bear live young, which they feed with milk.

Reptiles Air-breathing, scaly-bodied vertebrates that evolved from amphibians. Dinosaurs were reptiles.



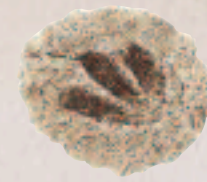
Predators Animals that hunt for food.

Prey Animals hunted by others for food.

Pterosaur Extinct flying reptile.

Triassic Period of Earth history 248–200 million years ago. The dinosaurs first appeared during the Triassic.

Vertebrates Animals with back bones, including reptiles and mammals.



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