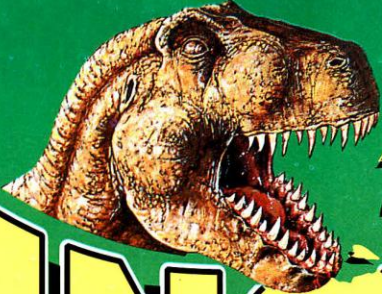


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# DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •

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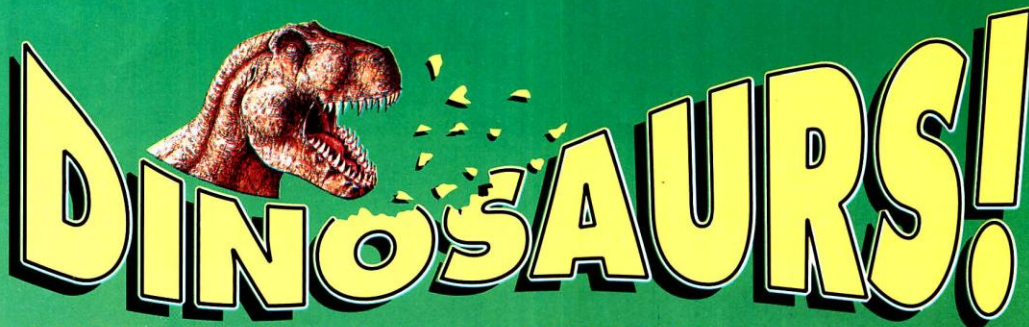
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# DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



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**ERLIKOSAURUS** 2020

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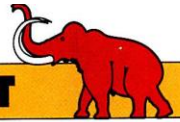
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# LIOPLEURODON

**This giant of the sea ruled the waves 140 million years ago when dinosaurs walked the Earth.**

**T**he largest reptiles in the late Jurassic oceans were the plesiosaurs and the pliosaurs. *Liopleurodon* was a massive pliosaur that grew up to 12m long.

## SPOT THE DIFFERENCE

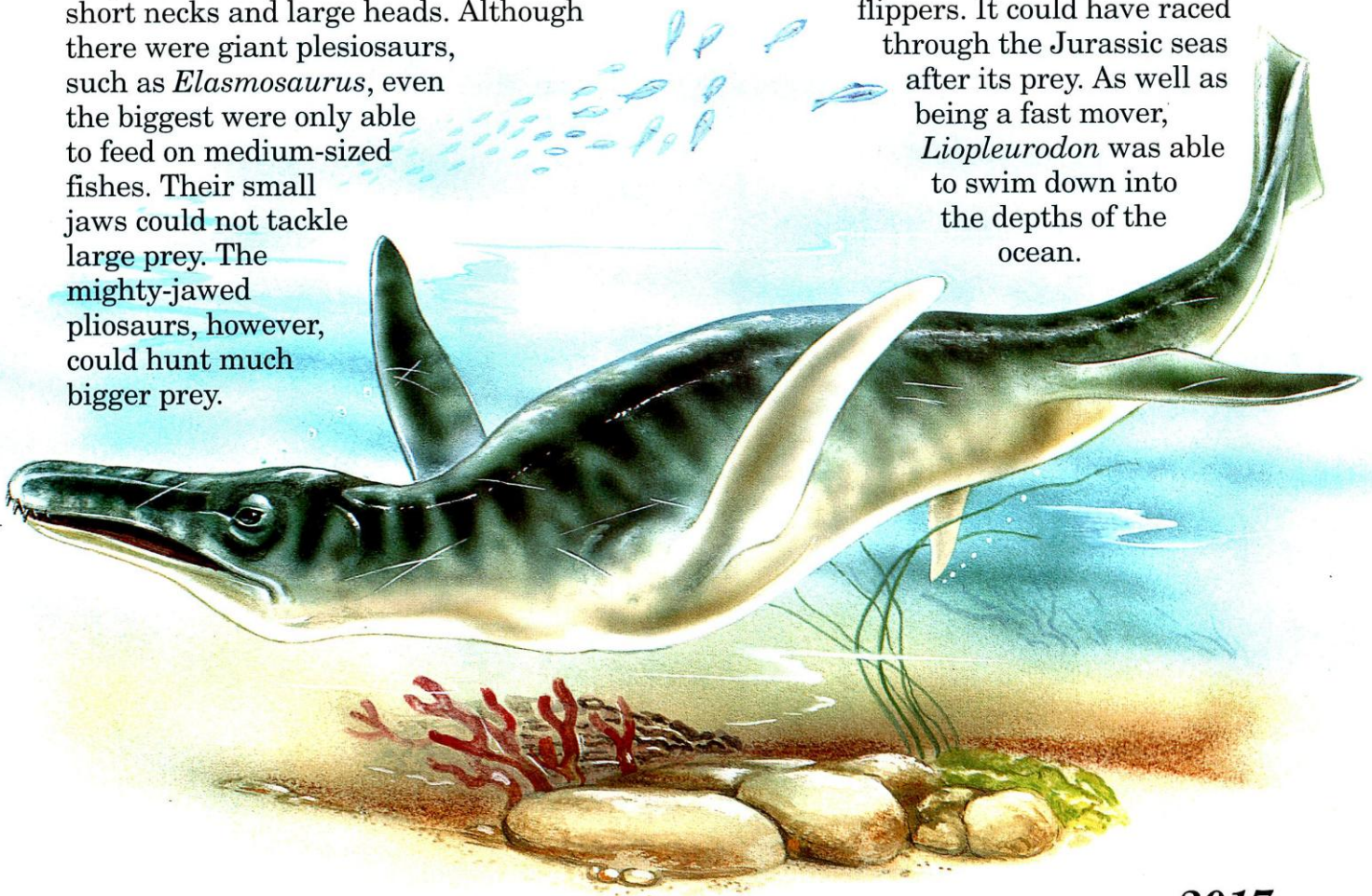
There was one major difference between plesiosaurs and pliosaurs. Plesiosaurs had long necks and short heads; pliosaurs had short necks and large heads. Although there were giant plesiosaurs, such as *Elasmosaurus*, even the biggest were only able to feed on medium-sized fishes. Their small jaws could not tackle large prey. The mighty-jawed pliosaurs, however, could hunt much bigger prey.

## BIG HEAD

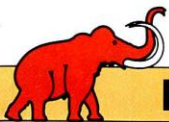
*Liopleurodon* had a massive skull, which was probably over 2m long. Its huge jaws were worked by very strong muscles. This fearsome hunter probably preyed on other marine reptiles, such as dolphin-shaped *Ichthyosaurus*. But *Liopleurodon* could also have overpowered smaller plesiosaurs, such as *Cryptoclidus*.

## DEEP-SEA DIVER

*Liopleurodon* was a very agile swimmer, despite its giant size. The huge creature looked rather like today's whale. It had a powerful, streamlined body and strong flippers. It could have raced through the Jurassic seas after its prey. As well as being a fast mover, *Liopleurodon* was able to swim down into the depths of the ocean.

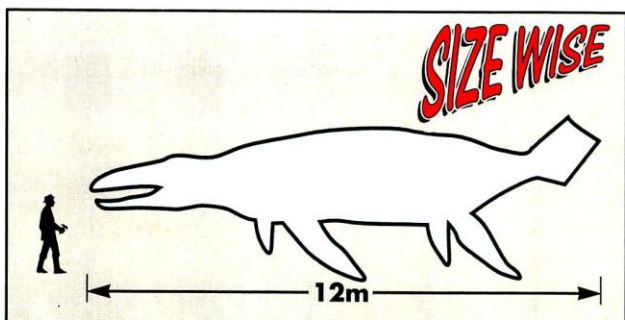






# MONSTER FACTS

- **NAME:** *Liopleurodon* (ly-o-ploo-ro-don) means 'smooth-sided tooth'
- **GROUP:** reptile
- **SIZE:** 12m long
- **FOOD:** large, sea creatures
- **LIVED:** about 140 million years ago in the Late Jurassic Period in Europe



## POWER STEERING

Four long flippers powered *Liopleurodon*. The giant reptile 'flew' through the sea, rather like today's sea turtle. It pushed downwards with its front flippers to shoot forwards. And it kicked backwards with its hind flippers to increase speed. The mighty sea monster could have shot through the water after its prey and kept up the same speed for a long time.

## IT'S A FACT

### PADDLE POWER

The pliosaurs developed more powerful paddles during the Jurassic Period. Later species, such as *Liopleurodon*, had larger, stronger back flippers than earlier pliosaurs.

## BUILT FOR SPEED

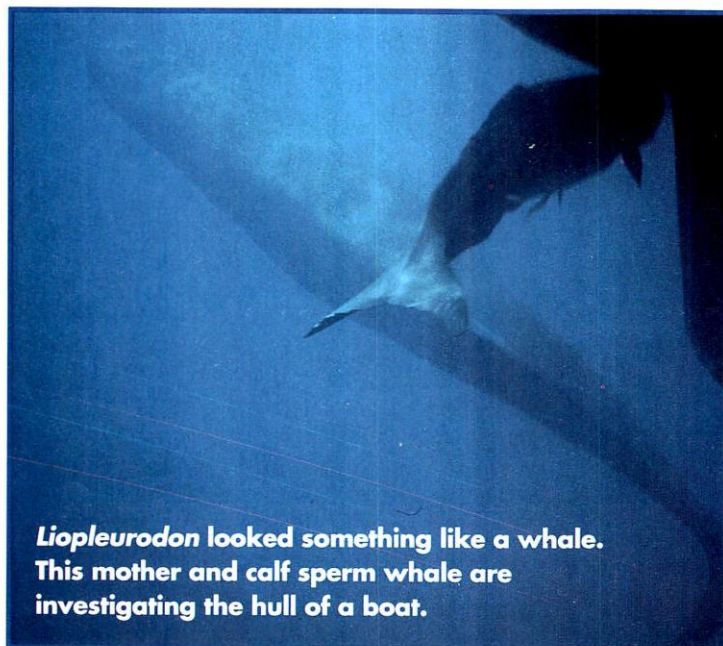
Giant plesiosaurs, such as *Elasmosaurus*, were slowed down in the water by their long necks. *Elasmosaurus* had over 70 vertebrae in its neck. *Liopleurodon* had fewer than 20. Its shorter neck meant that it could move through the water much more quickly than the plesiosaurs.

## EGGS ON SHORE

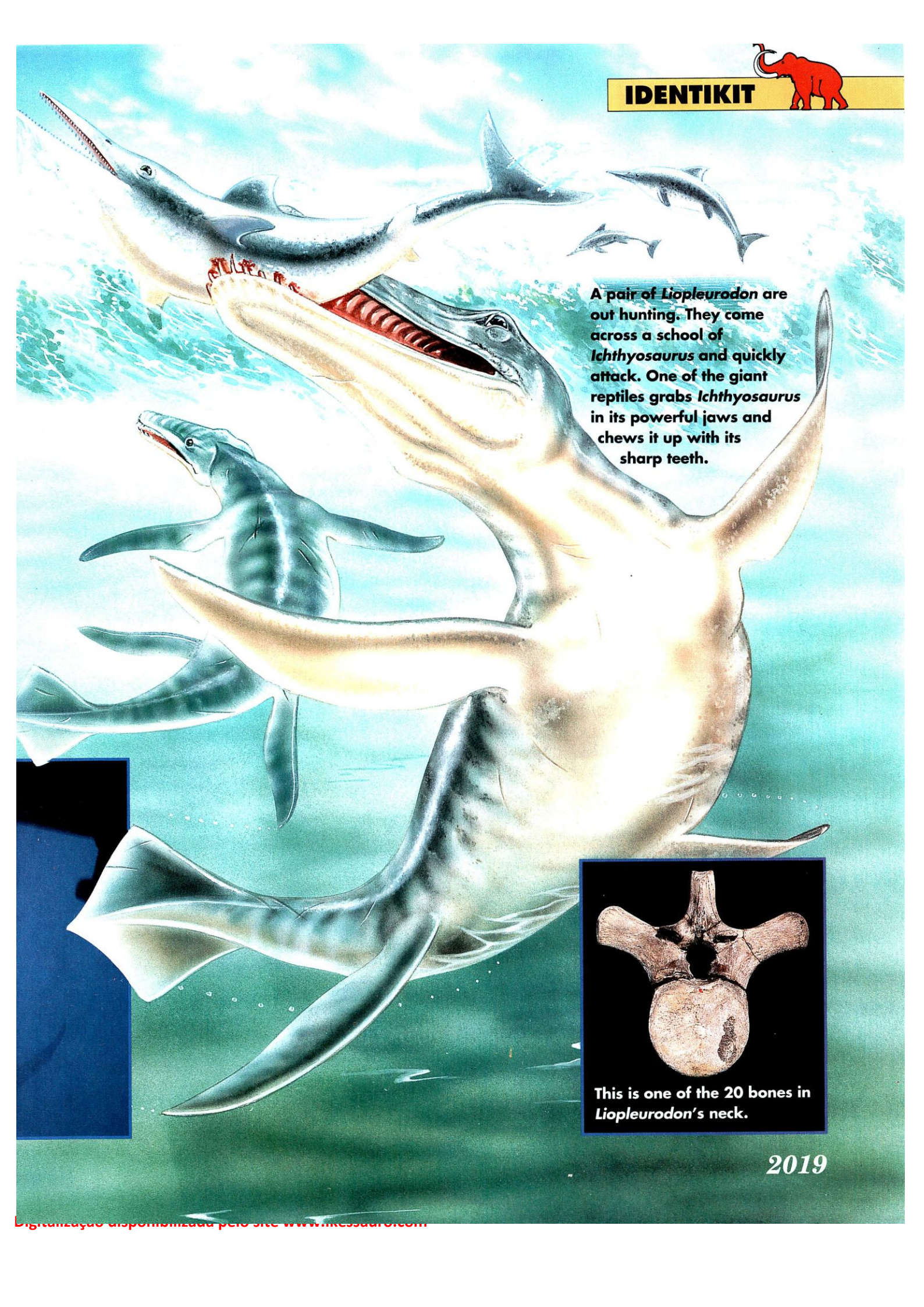
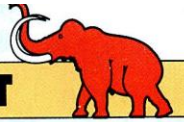
Female *Liopleurodon* came on shore to lay their eggs. They dug holes in the sand, laid the eggs, then crawled clumsily back to the sea. When the young hatched, they had to get into the sea as quickly as possible. Many predators saw the defenceless hatchlings as a trouble-free source of food.

## OCEANS OF ADVENTURE

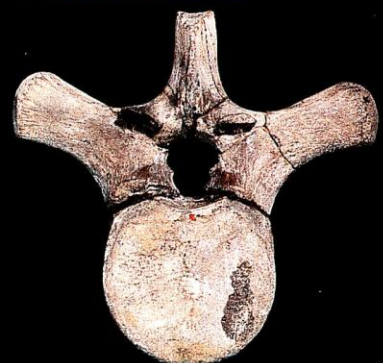
By the Late Jurassic, oceans had developed between continents, and shallow seas had begun to spread across the land. Huge marine reptiles, including *Liopleurodon*, flourished in this new watery world. Fossil remains of *Liopleurodon* have been found in England, France, Germany and Russia.





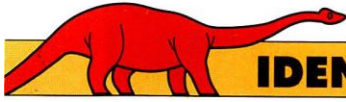
A detailed illustration of a prehistoric ocean scene. In the center, a large, yellowish-brown Liopleurodon is shown with its mouth wide open, revealing rows of sharp, red teeth. It is attacking a school of smaller, blue Ichthyosaurus. One Ichthyosaurus is being held in the Liopleurodon's jaws. Other Ichthyosaurus are swimming away in the background. The water is a vibrant blue-green color.

A pair of *Liopleurodon* are out hunting. They come across a school of *Ichthyosaurus* and quickly attack. One of the giant reptiles grabs *Ichthyosaurus* in its powerful jaws and chews it up with its sharp teeth.



This is one of the 20 bones in *Liopleurodon*'s neck.





# ERLIKOSAURUS

Was it a meat-eater? Was it a plant-eater? *Erlikosaurus* remains a Cretaceous mystery.

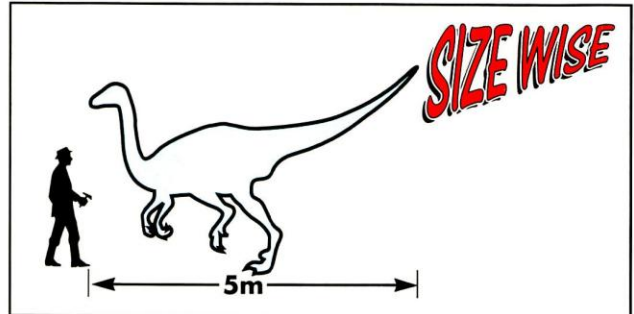
**E***rlikosaurus* was one of the segnosaurs, a group of dinosaurs that has puzzled the experts for years. The segnosaurs continue to baffle scientists because they have features similar to so many other dinosaurs. They could have behaved like theropods, prosauropods or ornithischians.

### BITS AND PIECES

A skull, some neck vertebrae, a humerus (front leg bone), and both feet are all that have been found of *Erlikosaurus* so far. The dinosaur was smaller than *Segnosaurus* but it looked very similar.

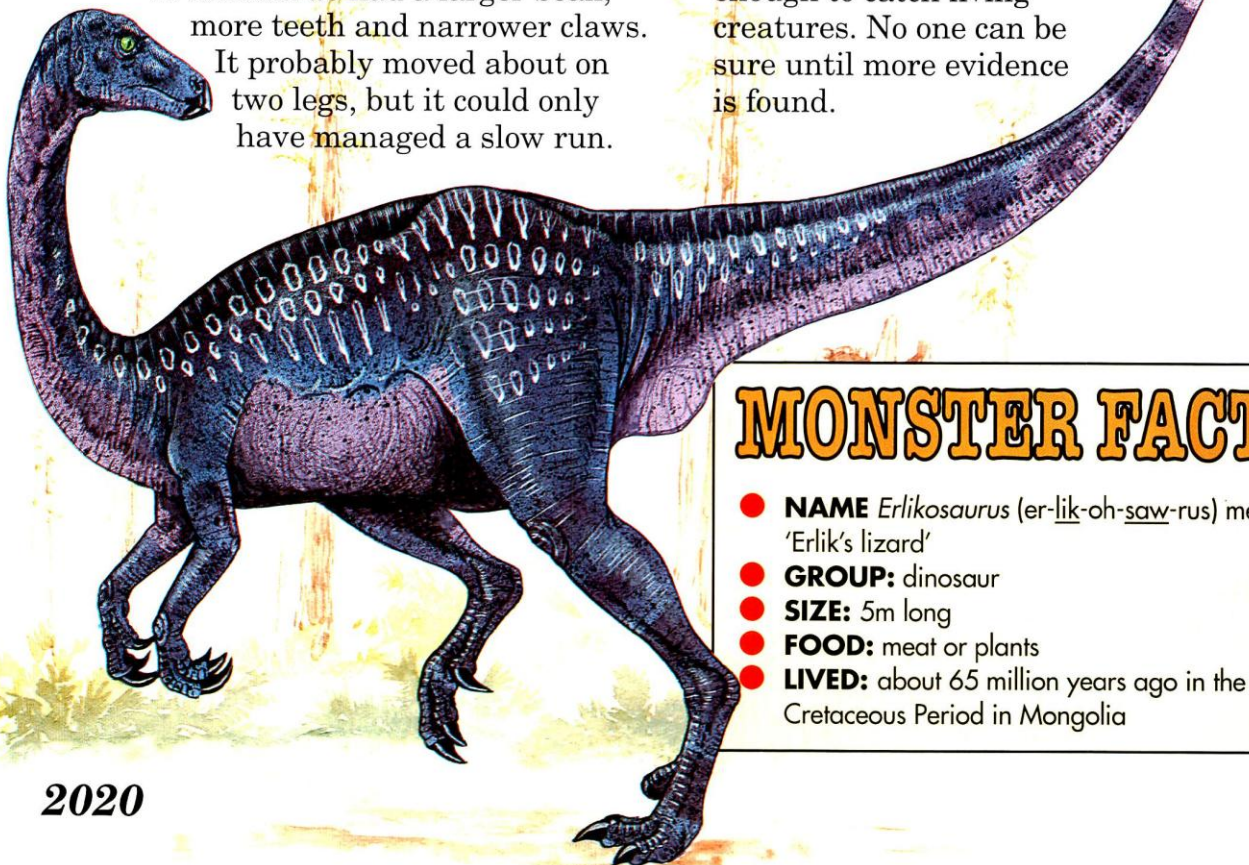
*Erlikosaurus* had a larger beak, more teeth and narrower claws.

It probably moved about on two legs, but it could only have managed a slow run.



### FOOD FOR THOUGHT

*Erlikosaurus* could have used its long, clawed hands to rake open termite mounds. Or it could have nipped off tender shoots with its beak-like jaws. Perhaps it seized fish from the lakes and rivers. Some experts say that *Erlikosaurus* was more likely to have eaten plants because it was not quick enough to catch living creatures. No one can be sure until more evidence is found.

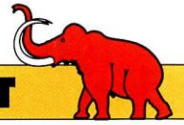


## MONSTER FACTS

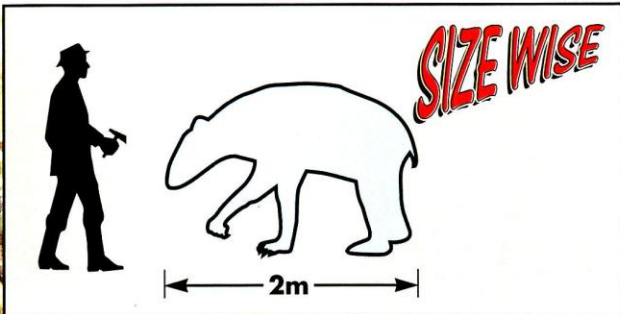
- **NAME** *Erlikosaurus* (er-lik-oh-saw-rus) means 'Erlík's lizard'
- **GROUP:** dinosaur
- **SIZE:** 5m long
- **FOOD:** meat or plants
- **LIVED:** about 65 million years ago in the Late Cretaceous Period in Mongolia

2020





# HOMALODOTHERIUM



The llama-like *Homalodotherium* roamed the plains of prehistoric South America 25 million years ago.



A wide range of different hoofed mammals evolved in South America. They grew up in isolation because South America was a huge island at that time.

## DEEP SOUTH

*Homalodotherium* belonged to the order of notoungulates, or 'southern hoofed animals'. Many notoungulates were no bigger than rabbits. Others looked more like horses or hippos.

## CLAWS

Most notoungulates had hoofs. But *Homalodotherium* had claws on the four 'fingers' of its front and back legs.

*Homalodotherium* may have used its claws to dig up tasty roots and bulbs. It may also have reared up on its hind legs and pulled down leafy branches to feed on. Its limbs were heavy, so *Homalodotherium* could not have moved very fast.


## MONSTER FACTS

- **NAME:** *Homalodotherium* (hom-al-ow-dow-thee-ree-um) means 'level-toothed mammal'
- **GROUP:** mammal
- **SIZE:** 2m long
- **FOOD:** plants
- **LIVED:** about 25 million years ago in the Early and Middle Miocene in Argentina



# Tree tales


**Conifers began to dominate the landscape during the Age of the Dinosaurs. Some animals fed on these trees, while others lived in them, out of reach of predators.**

rees are among the largest living things in the world today. Redwood trees, for example, can reach heights of 100m or more. The redwood is a conifer. That means its leaves are needle-shaped and it carries its seeds in cones. Conifers were the most common trees at the time of the dinosaurs.

## BIG FOOD FOR BIG BEASTS

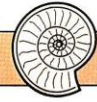
Plant-eating dinosaurs probably browsed on trees. Sauropods, such as *Diplodocus* and *Brachiosaurus*, had peg-like teeth with gaps between them, rather like the teeth of a comb. A sauropod may have fed by grasping a branch in its jaws, then pulling the branch through its mouth. Its teeth would comb the needles and cones off the branch. Conifer needles are very tough. Few animals today can digest them.

**Brachiosaurus**



What a sight it must have been! The biggest animals on Earth standing next to the biggest plants on Earth. Here, a *Brachiosaurus* (left) and a *Diplodocus* (right), graze on the branches at the top of a conifer. In the same way, today's giraffe (far right) stretches up to reach the leaves at the top of a tree.





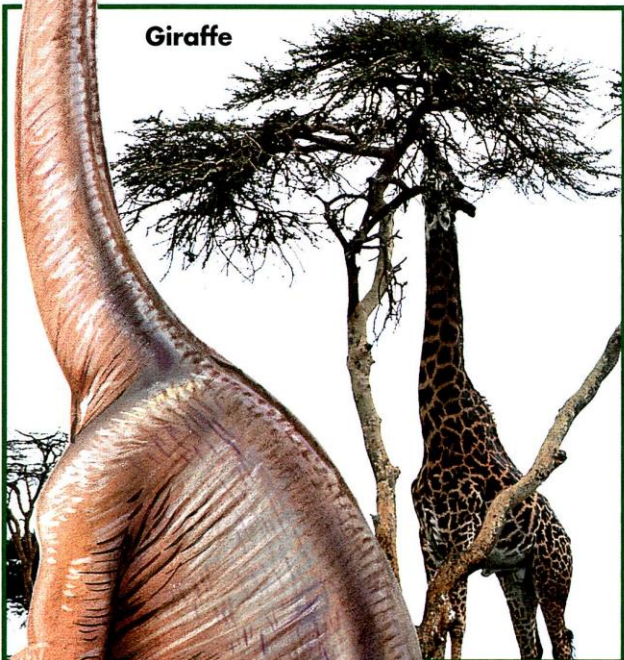
**NEEDLES AND STONES**

The sauropods probably swallowed stones to help grind up the tough needles and cones in their stomachs. The duckbilled dinosaurs of the Cretaceous Period probably ate conifers, too. But their teeth had huge grinding surfaces. They could easily have crushed up the pine needles into tiny pieces in their mouths before swallowing them. So they would not have needed stomach stones to aid digestion.

**SKY HIGH**

The juiciest leaves are usually high up. How could dinosaurs reach these tasty morsels? *Brachiosaurus* would have had no problem. This huge sauropod had long front legs and very high shoulders. Its long neck could reach over 13m high. Other sauropods, such as *Diplodocus* and *Apatosaurus*, were very long rather than tall. These dinosaurs, however, had massive muscles around their hips and tails. They could rear up on their hind legs for a short time. They may have reached almost 12m above the ground in this way.

Giraffe



**MUSCLE HIPS**

The plated dinosaur *Stegosaurus* had the same arrangement of bones and muscles around the hips as *Diplodocus*. So it, too, could probably stand on its hind legs and reach up. It may then have used its narrow beak to nip off tasty leaves.

**IT'S A FACT**

**WE WILL NEVER KNOW IF DINOSAURS LIVED IN TREES**

Most tree-living animals are lightweight, with delicate skeletons. This is so that their weight will not break the branches, and so that they can move about more easily. Skeletons of such lightly built animals tend to fall to pieces before they have a chance to fossilize. So, if there were any tree-living dinosaurs, it is unlikely that they would have been preserved as fossils.

Diplodocus





**LIFE IN THE TREES**

Many animals today live in trees – squirrels, tree-kangaroos, koalas, monkeys, not to mention all the tree-nesting birds. But did any animals live in trees in dinosaur times? The answer to that is that we do not know for sure.



**CLIMBING GOATS**

If we look at the skeleton of today's goat, we find that it is definitely a ground-dwelling animal. It has hoofs and long-shanked legs built for running. However, we often see goats climbing trees and steep cliffs to find extra food.

**FIRST THOUGHTS**

Scientists used to think that the little bird-hipped dinosaur *Hypsilophodon* was a tree-living dinosaur. In shape and size it would have been very much like today's Australian tree-kangaroo. Othenio Abel, the palaeontologist who first suggested this in 1912, thought that the first toe of *Hypsilophodon*'s hind foot could turn round and allow the whole foot to grasp a branch, just like today's perching birds.

The tree-kangaroo (above) shows its climbing skills.

Plant-eating dinosaurs (right) reached as high up the trees as possible to find food.

**A WRONG GUESS**

Then, in the 1960s, scientists realised that the toe could not have been turned round in this way. Also, the arrangement of the bones in the leg was that of a running animal, not that of a climbing animal.

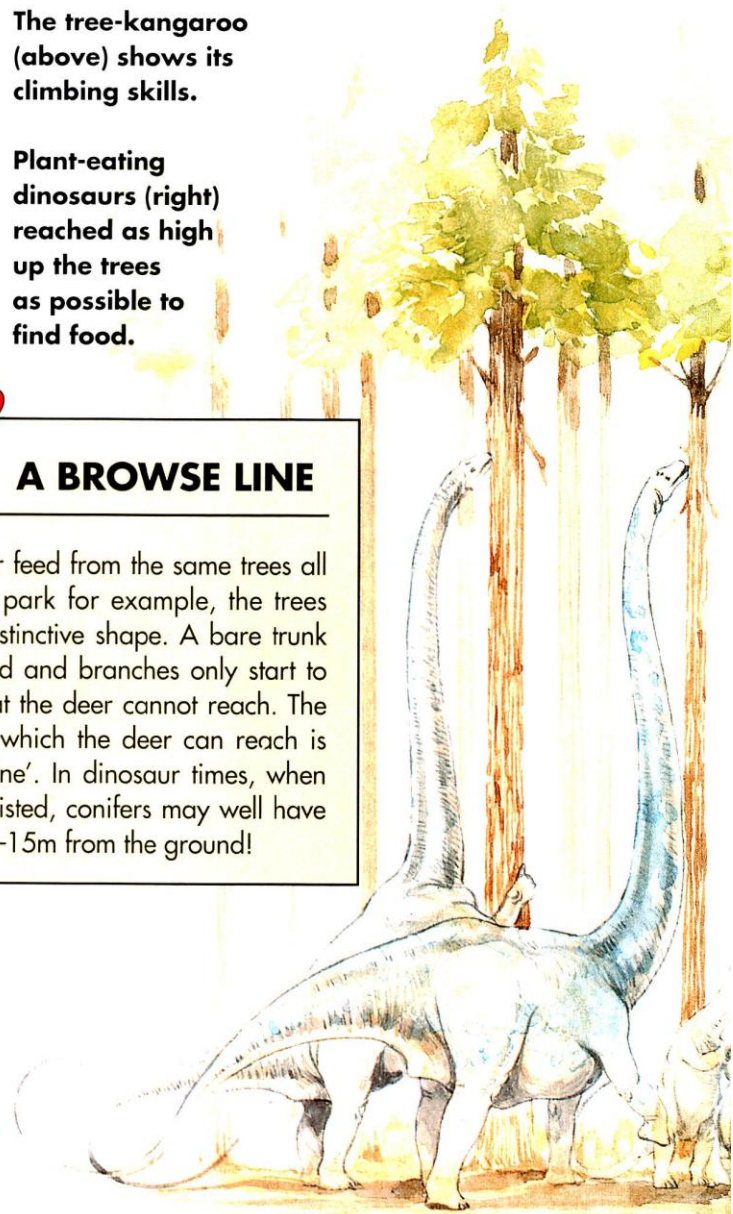
**What is?**

**A BROWSE LINE**

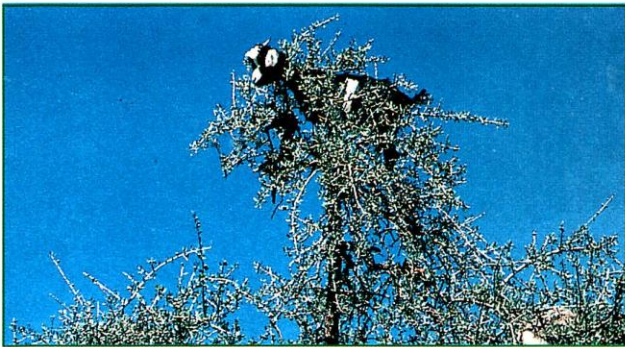
Where herds of deer feed from the same trees all the time, in a deer park for example, the trees usually develop a distinctive shape. A bare trunk rises from the ground and branches only start to grow at a height that the deer cannot reach. The maximum height to which the deer can reach is called the 'browse line'. In dinosaur times, when giant plant-eaters existed, conifers may well have had browse lines 10–15m from the ground!

**LET'S GO CLIMBING**

However, an animal does not have to be a tree-living animal to be able to climb trees. Some of the small meat-eaters, such as *Ornitholestes*, had quite strong arms and sharp claws. Some scientists think that they would have been ideal tree-climbers. Some tree-climbers today, such as bears and big cats, are really quite surprising!







**Goats may not be built as climbing animals, but they can still clamber up trees in search of food.**



**CLIMBING FOR FOOD**

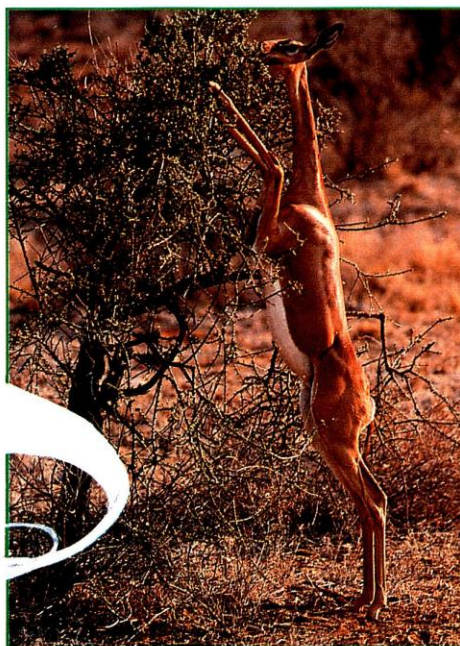
It may have been the same with dinosaurs. Smaller types of dinosaur may have clambered up trees from time to time in search of food, even though they were not really designed for climbing. We do not know whether any dinosaurs lived in the trees all the time.

**LAUNCH PADS**

The earliest birds, from *Archaeopteryx* onwards, were probably tree-dwellers. It is possible that *Archaeopteryx*'s powers of flight developed, over many thousands of years, to help it jump from one tree to another, in search of food. Pterosaurs may have developed the ability to fly in exactly the same way.

**TREES AS HIDING PLACES**

At the time of the dinosaurs, the first mammals also existed. These were small, shrew-like and lemur-like animals. Some of these would almost certainly have lived in the trees. It would have been much safer than life on the ground. For a start, it would have been the best way to keep



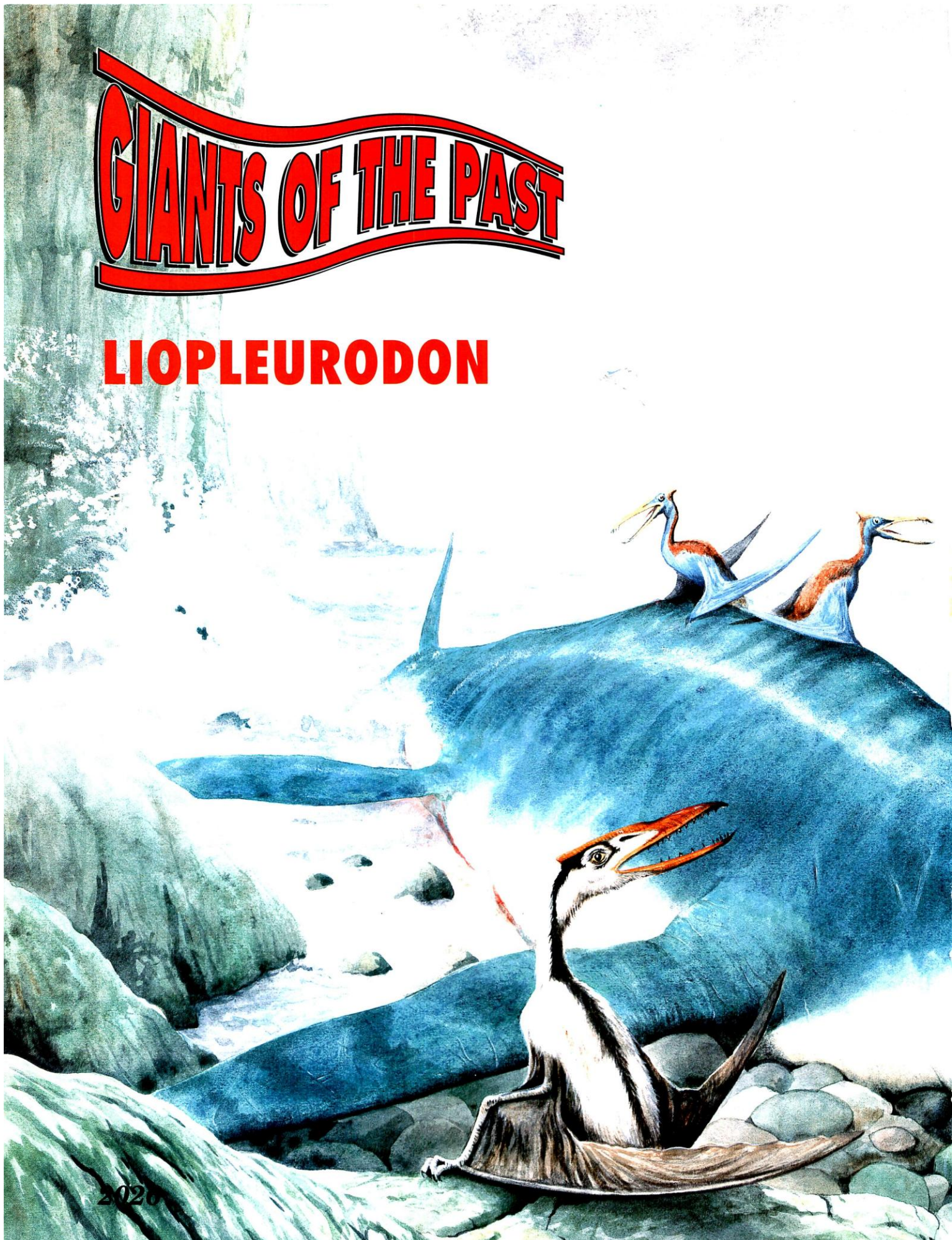
clear of the great dinosaurs of the time. That is, as long as the mammals kept well above the browse line. Below this level the dinosaurs could still get them!

**A gerenuk (left) is a type of gazelle. It can reach surprisingly high in its search for food, by standing on its hind legs and stretching its neck up into the tree.**



# GIANTS OF THE PAST

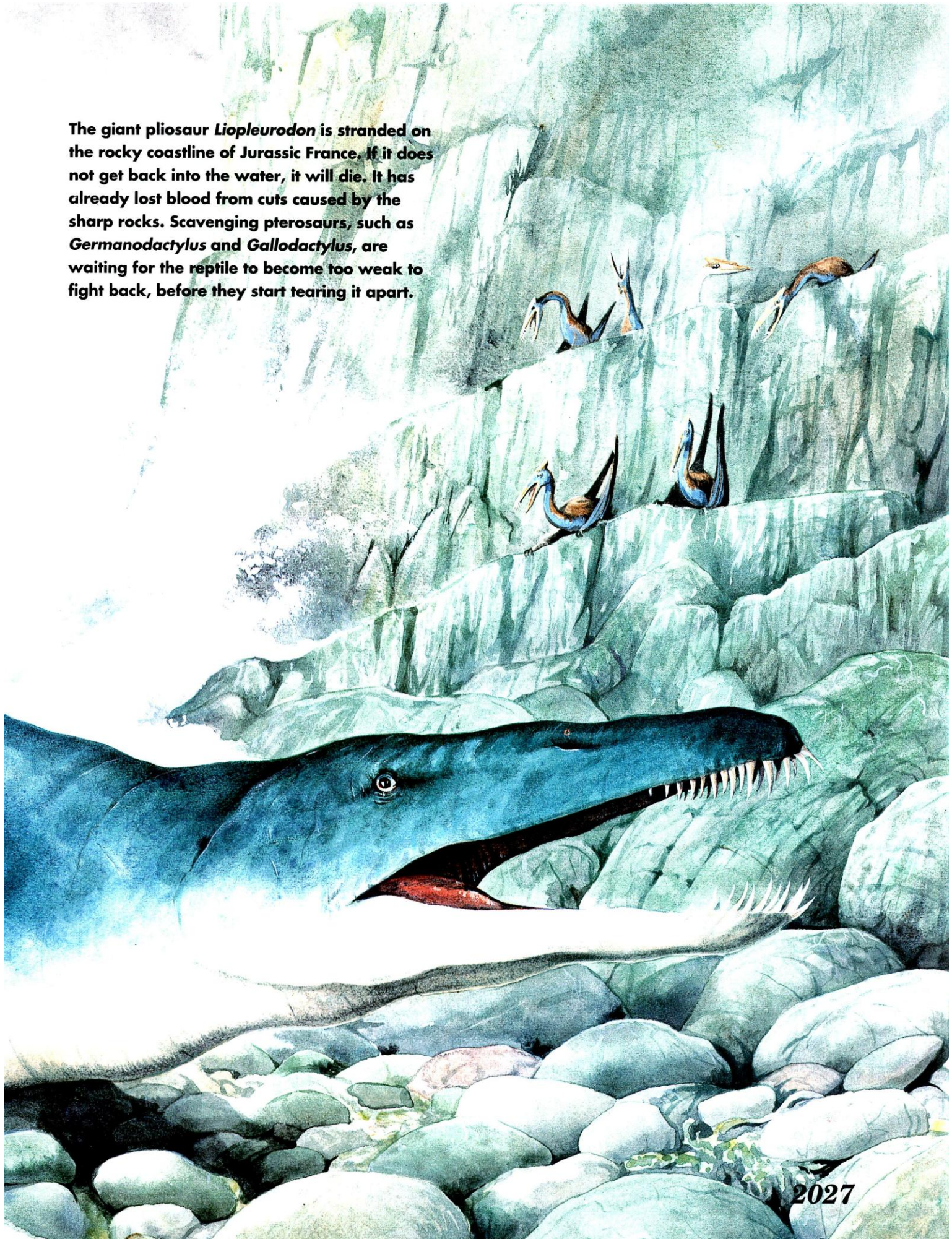
## LIOPLEURODON



2020



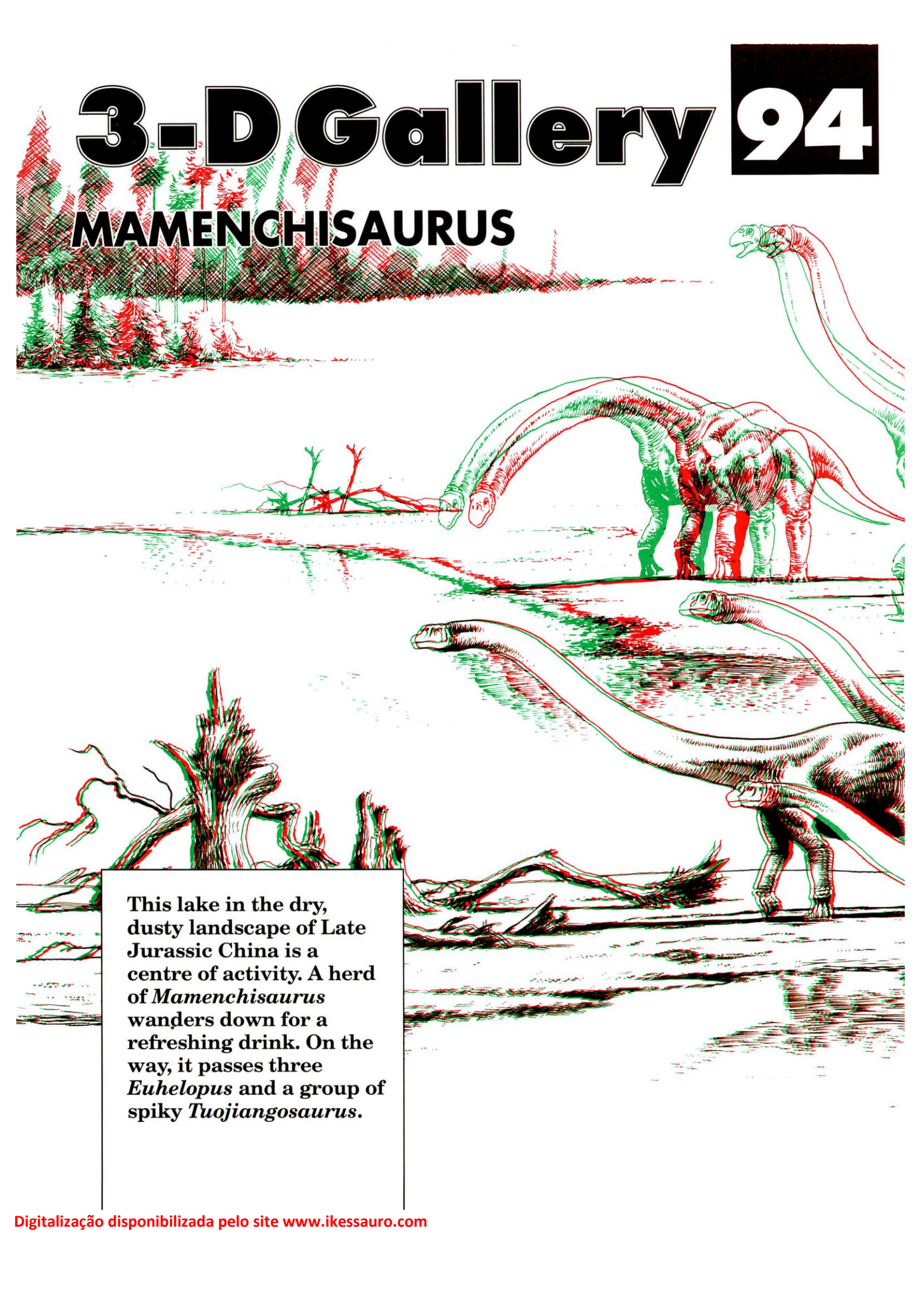
The giant pliosaur *Liopleurodon* is stranded on the rocky coastline of Jurassic France. If it does not get back into the water, it will die. It has already lost blood from cuts caused by the sharp rocks. Scavenging pterosaurs, such as *Germanodactylus* and *Gallodactylus*, are waiting for the reptile to become too weak to fight back, before they start tearing it apart.





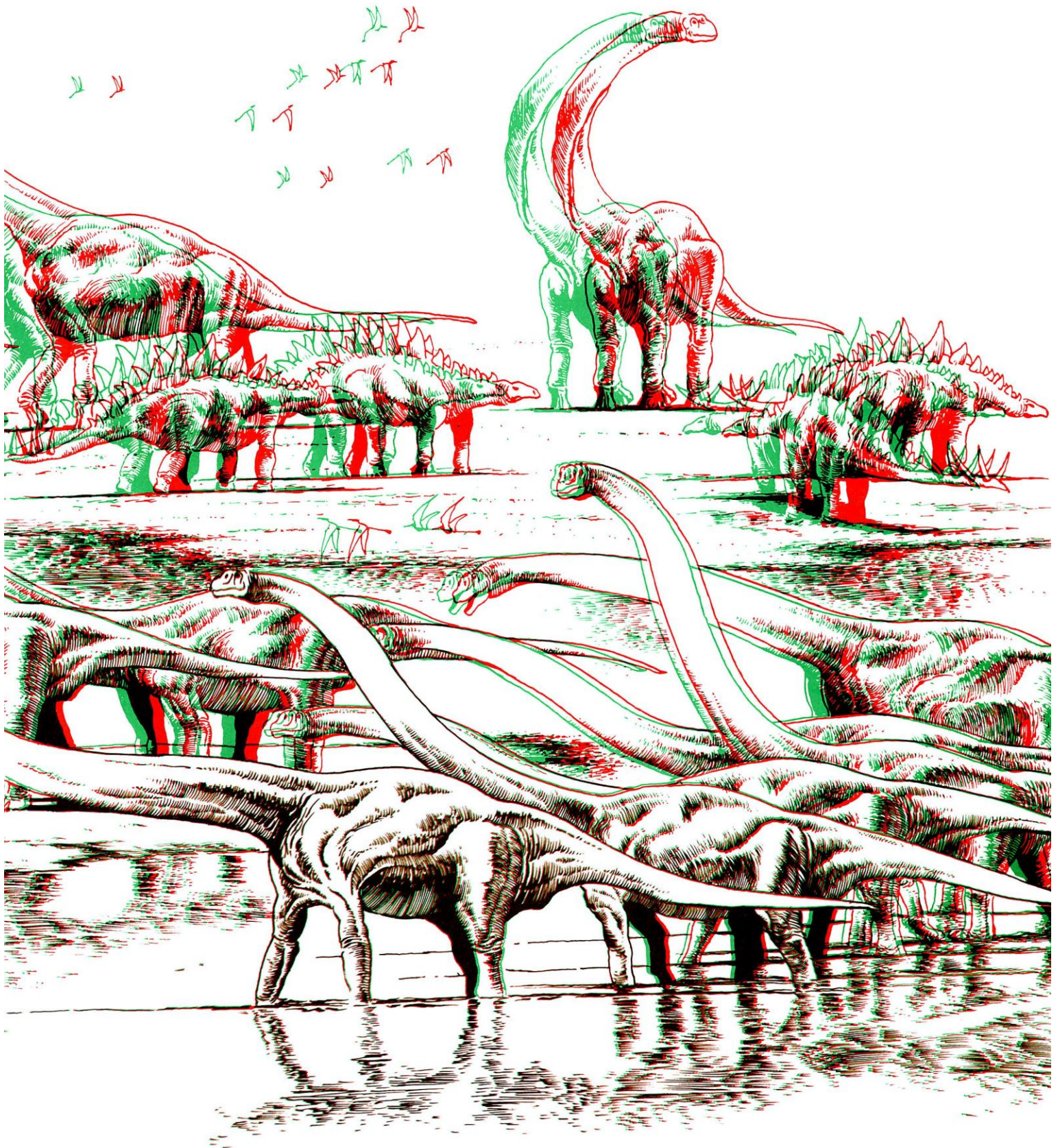
# 3-D Gallery 94

## MAMENCHISAURUS

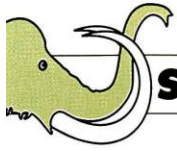


This lake in the dry, dusty landscape of Late Jurassic China is a centre of activity. A herd of *Mamenchisaurus* wanders down for a refreshing drink. On the way, it passes three *Euhelopus* and a group of spiky *Tuojiangosaurus*.









# Gliding high

Over 240 million years ago, when dinosaurs first walked the Earth, kite-like lizards glided through the forests.

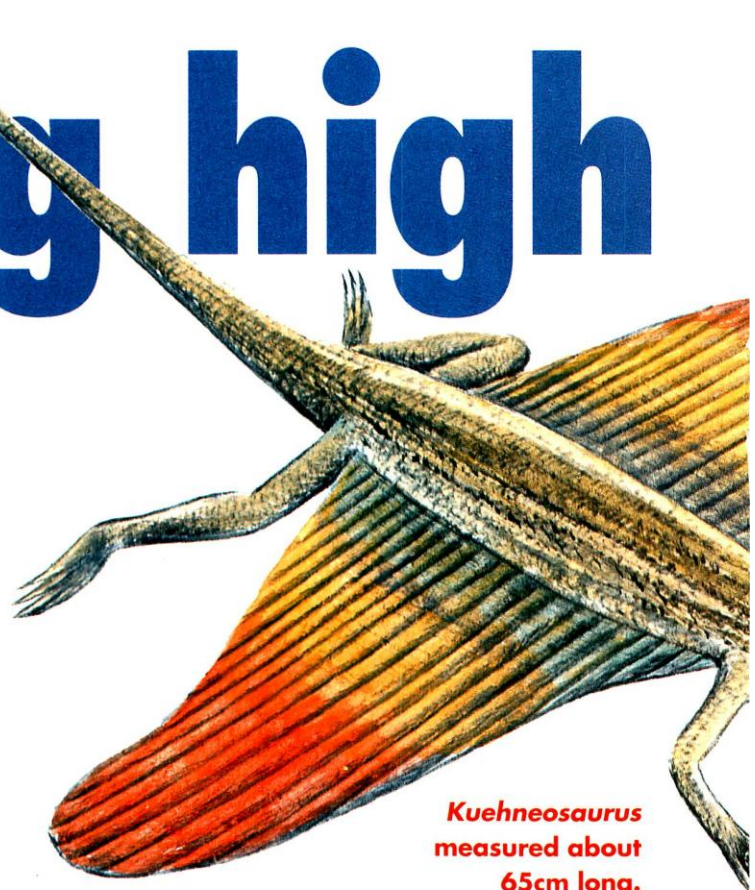


Gliding reptiles still exist. But there were many more varieties in prehistoric times. Their 'wings' were flaps of skin supported by long bony spines. They 'flew' by launching themselves off high branches and floating along on currents of air.

## IN AT THE BEGINNING

The earliest gliding reptile discovered so far is *Coelurosauravus*, or 'hollow-tail reptile'. Its fossil remains have been found in Germany, England and Madagascar. This small, lizard-like creature lived in the Late Permian, about 250 million years ago. It probably glided from tree to tree, snapping up insects as it went.

*Coelurosauravus* had a wingspan of about 30cm. The wide, bony frill on the back of its head probably made it more aerodynamic.



*Kuehneosaurus* measured about 65cm long.

## FREE FLIGHT

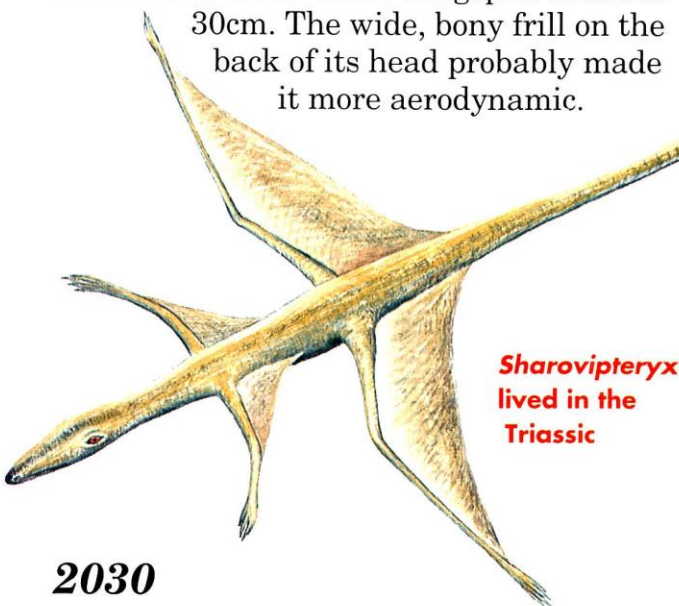
*Kuehneosaurus*, a long-legged lizard from the Late Triassic, probably glided in the same way as *Coelurosauravus*. The fossils of this 65cm-long lizard were found in England.



## IT'S A FACT

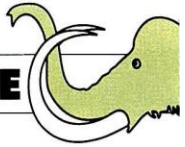
### UP AND AWAY

Prehistoric gliding reptiles probably evolved into pterosaurs, or 'winged lizards'. The pterosaurs included the first and largest flying backboned animals.



*Sharovipteryx* lived in the Triassic

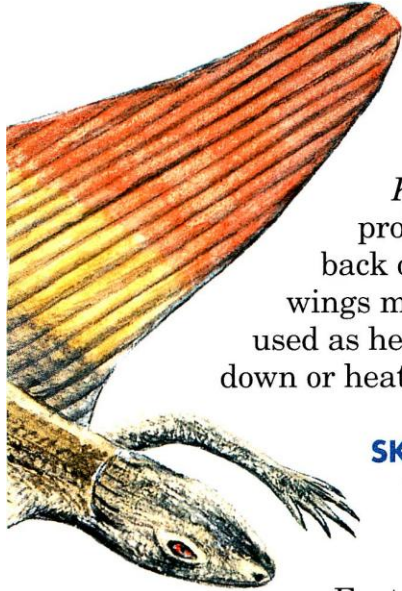




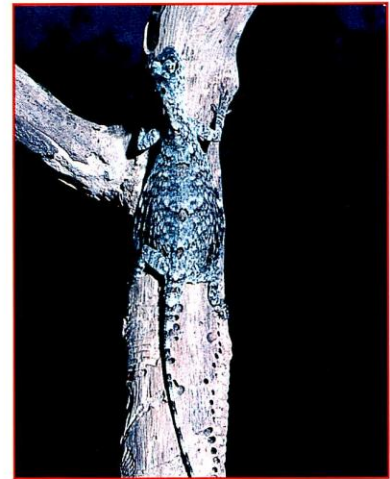
**MULTI-PURPOSE WINGS**

*Kuehneosaurus* moved through its forest home by gliding from tree to tree on its

long, narrow wings. When crawling up tree trunks in search of insects, *Kuehneosaurus* probably folded its wings back out of the way. Its thin wings may also have been used as heat regulators, to cool down or heat up its body.



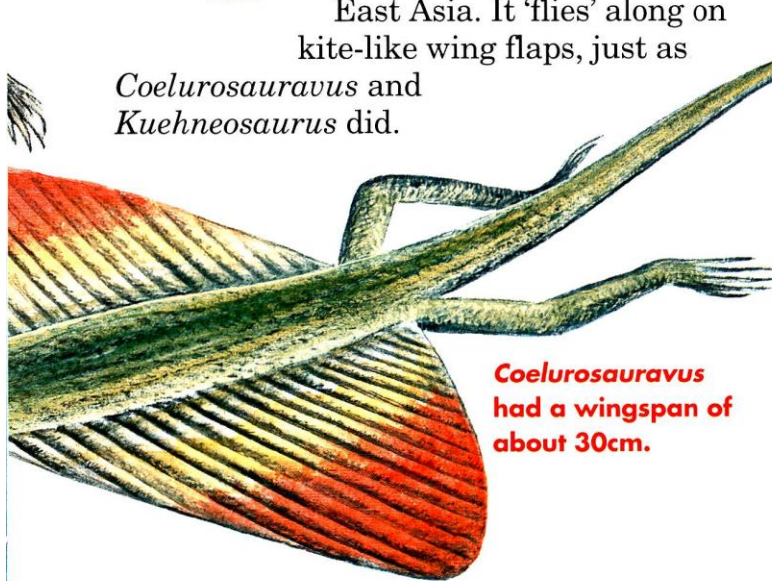
Today's 'flying' lizard, *draco* (right), is smaller than its prehistoric ancestors, but it glides along in the forest just like they did millions of years ago.



**SKY DRAGON**

Today's flying dragon, *draco*, glides through the forests of South East Asia. It 'flies' along on kite-like wing flaps, just as

*Coelurosauravus* and *Kuehneosaurus* did.



*Coelurosauravus* had a wingspan of about 30cm.

**ODD ONE OUT**

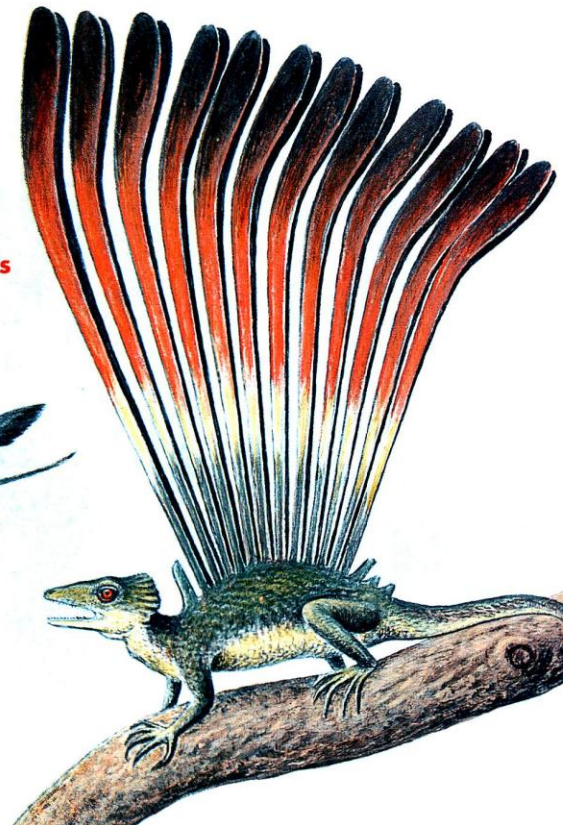
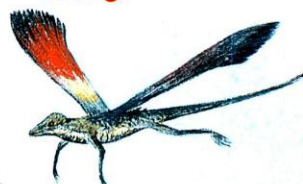
The strangest-looking early gliding reptile was *Longisquama*. Like *Sharovipteryx*, it lived deep in the Triassic forests. But it flew in a very different way. *Longisquama* had a double row of tall scales along its back.

Scientists believe that each 'wing' could be moved up and down, rather like a butterfly's wings. Unlike a butterfly, *Longisquama* did not flap its 'wings'. It stretched them out and floated along.

**FRONT AND BACK**

Other prehistoric gliding reptiles developed different ways of 'flying'. *Sharovipteryx* lived in Triassic times, up to 40 million years after *Coelurosauravus*. It was about the same size, but it probably had two pairs of 'wings'. *Sharovipteryx* had a broad flap of skin behind its hind legs. It may also have had a smaller 'wing' of skin behind its front legs, to help it glide.

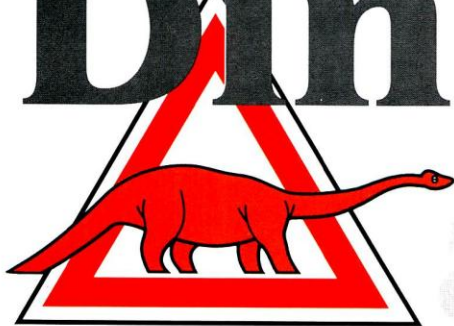
*Longisquama* stretched out its strange scales and floated along.





# Dinosaurs

## at work!

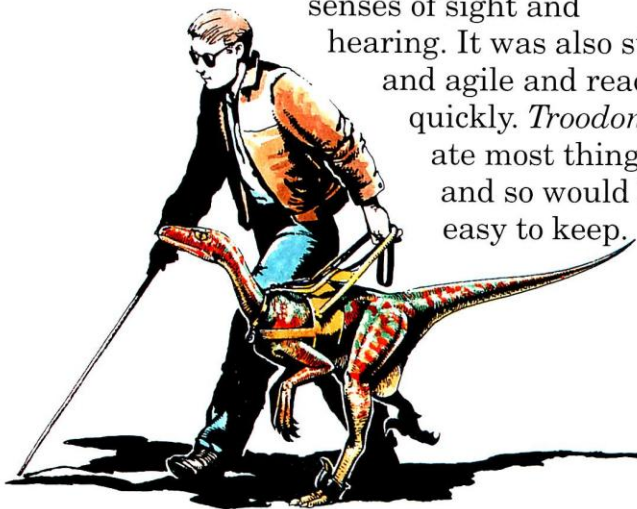


**If dinosaurs and people lived at the same time, could dinosaurs have been used as working animals? Perhaps! Let's travel back in time and see.**

**I**magine that you have travelled back in time to the Age of the Dinosaurs. Your time machine has broken down and you are stranded. You might be tempted to use dinosaurs to help you survive. So what could dinosaurs do?

### LET ME GUIDE YOU

If you needed a guide dog, *Troodon* (below) would be ideal. This small dinosaur had a big brain (for a dinosaur) and highly developed senses of sight and hearing. It was also strong and agile and reacted quickly. *Troodon* ate most things, and so would be easy to keep.

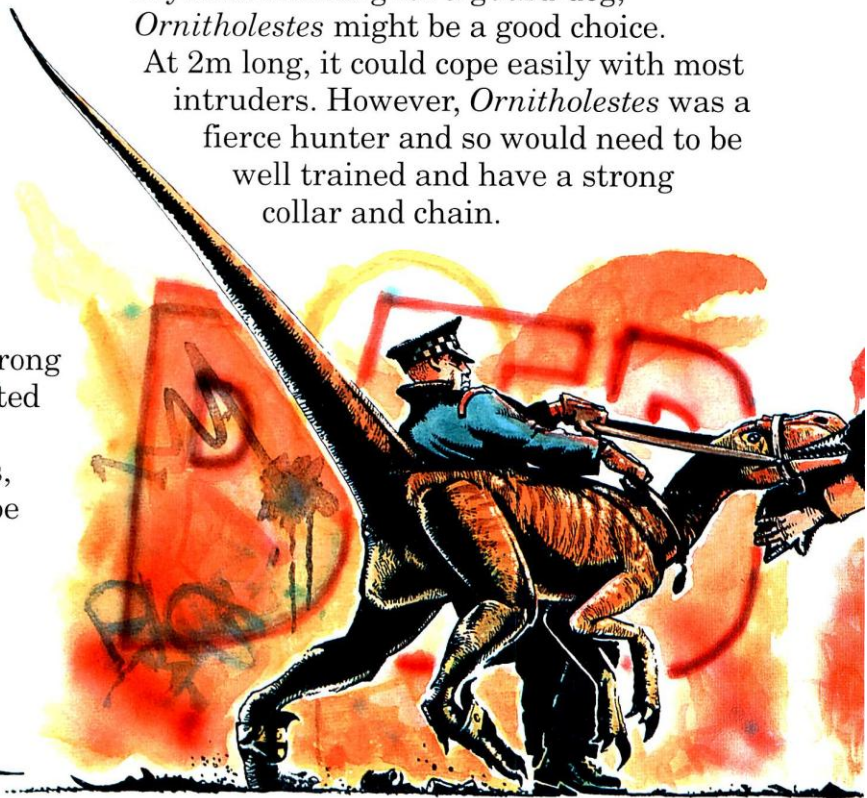


### STOP! POLICE!

*Velociraptor*, at just under 2m long, could be trained to help control small crowds. But for more serious disturbances, *Deinonychus* (below) could be used. But it would need very careful handling and strict training. Instead of removing the terrible toe claw, a toe-muzzle could be used to keep it back, out of harm's way.

### ON GUARD

If you are looking for a guard-dog, *Ornitholestes* might be a good choice. At 2m long, it could cope easily with most intruders. However, *Ornitholestes* was a fierce hunter and so would need to be well trained and have a strong collar and chain.





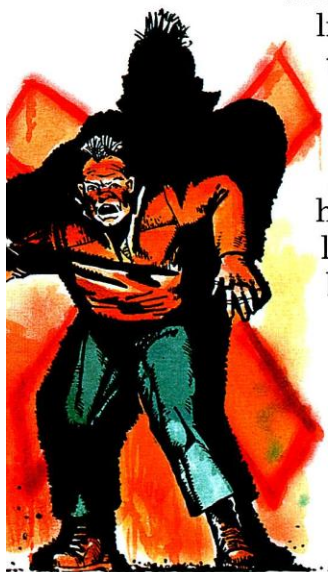


**GEE UP!**

There are no horses around, but *Dromiceiomimus* (above) would make an excellent substitute. Although this dinosaur was 3–4m long and a formidable hunter, it was not a very aggressive creature. Its sharp eyesight and fast legs helped it chase after small prey, but it also ate juicy shoots and berries. It should be easy to tame, and it might be possible to train it to carry a rider.

**BICYCLE BEAST**

Learning to ride this beast would be more like learning to ride a bicycle than a horse.



*Dromiceiomimus* ran on its hind legs. Luckily, it had a long tail to help it keep its balance if carrying a rider. However, show-jumping with *Dromiceiomimus* might be a bit ambitious! It would also be one of the easiest dinosaurs to feed, as it could eat almost anything.

**DINO DEMOLITION**

In the wild, ankylosaurids, such as *Euoplocephalus* and *Pinacosaurus*, used the massive bony clubs on the end of their tails to defend themselves against attacks by meat-eaters. As time goes by and the stranded time travellers build towns and cities, it may be necessary

to knock down old buildings to make way for bigger and better ones. This is where a trained *Euoplocephalus* (below) would come in handy. It could swing its club against walls to knock them down.



**Is it true**

**that *Euoplocephalus* had shutters to protect its eyes?**

Yes. *Euoplocephalus* is the only dinosaur known to have eye sockets with bony plates that could be snapped down to protect its eyes. It had the best protected skull of any dinosaur. Its skull was covered by big slabs of bone, and it also had two large horns. However, it had a toothless beak, so it probably ate only soft plants.





### BEAST OF BURDEN

*Chasmosaurus* (below) would be a better bet. This 5m-long dinosaur would be strong enough to pull the heaviest loads. It was as long as a small car and as heavy as a rhinoceros. Pulling a plough would be no problem for a creature as strong as *Chasmosaurus*.

### HARNESS THE POWER

A bit could be placed in *Chasmosaurus*' mouth, behind the toothless beak. Or chains could be fastened to the bones that ran around its frill. This would make it easier to control the beast. Feeding would be no problem, as it could be left out to graze on land not needed for farming. However, care would be needed to make sure that no predators crept up on it while it was feeding. *Chasmosaurus* lived in herds and one on its own, especially if it was tame, could be at risk from wild, meat-eating dinosaurs.

### ARMoured WORKERS

A well-trained *Euoplocephalus* could use its strong tail muscles to swing the tail club against any building that needed to be demolished. Perhaps it could also be used to fell large trees. Its heavy body armour and enormously thick skull would protect it against any falling bricks or trees. Although it was a peaceful plant-eater, *Euoplocephalus*' vast size could make it difficult to control. Also, when it got going, it would be difficult to stop!

### PULL THAT PLOUGH

Choosing farm animals might be more difficult. Dinosaurs would be needed to pull ploughs, and perhaps carts and wagons, if good tracks or roads were made. One of the smaller ceratopians would probably be the most useful for this job.

### UPSETTING THE CART

These dinosaurs would have the strength to pull the heaviest loads. But beware! It would not be wise to choose *Psittacosaurus* (above). This dinosaur would get up on its hind legs when running!





**PACKHORSE**

There would be no roads, so transport would be difficult. You could use the larger dinosaurs to carry heavy materials around for you. *Scelidosaurus* (right) would make a good packhorse. This sturdy, peaceful dinosaur was about 4m long, with rows of bony studs along its back.



**ALL ROPED UP**

Ropes could be fixed to these studs, so that enormous loads could be attached and carried easily. Because *Scelidosaurus* was a plant-eater, it would be easy to feed. But do remember to use females not males. The males could be very aggressive.



**DINO SHEPHERDS**

*Velociraptor* was fast and fierce, but also intelligent. It would make an excellent sheepdog, and could be trained to help round up your dinosaur herds. In the wild, this medium-sized dinosaur was a fierce hunter of small plant-eaters. It chased and then killed them, using the terrible, sharp claws on its second toe.

**MINUS CLAW**

These hunting instincts could be corrected by skilful training, so that the herds were rounded up, not eaten up! It might also be sensible to remove the lethal second toe claw, to prevent accidents.

**Is it true**

**that you could really train dinosaurs to do all these jobs?**

No, not really. Compared with mammals, most dinosaurs had tiny brains and were not very intelligent. Some of them, such as *Troodon*, had quite big brains, but these were used mainly to control quick movements and reflexes.





# **A DAY IN THE LIFE OF DROMICEIOMIMUS**



JUST BEFORE NIGHTFALL IN WHAT IS NOW WESTERN CANADA, A GROUP OF EMU-LIKE DROMICEIOMIMUS IS LOOKING FOR A SAFE, SHELTERED PLACE TO SLEEP, OUT OF THE WAY OF MEAT-EATING PREDATORS.

ONE OF THE HUGE-EYED CREATURES SPOTS SOME PLUMP BERRIES, REARING UP AS HIGH AS IT CAN IT PULLS THEM DOWN TO ITS MOUTH.

THE HUNGRY DROMICEIOMIMUS ARE ADEPT HUNTERS. AND QUICK AS A FLASH THEY LUNGE TOWARDS THE DRAGONFLIES.



THEIR LONG, THIN BEAKS ARE PERFECT FOR CATCHING AND DEVOURING SMALL INSECTS.

HAVING EATEN THEIR FILL, THE DINOSAURS BASK IN THE WARM SUNSHINE TO KEEP THEMSELVES WARM.



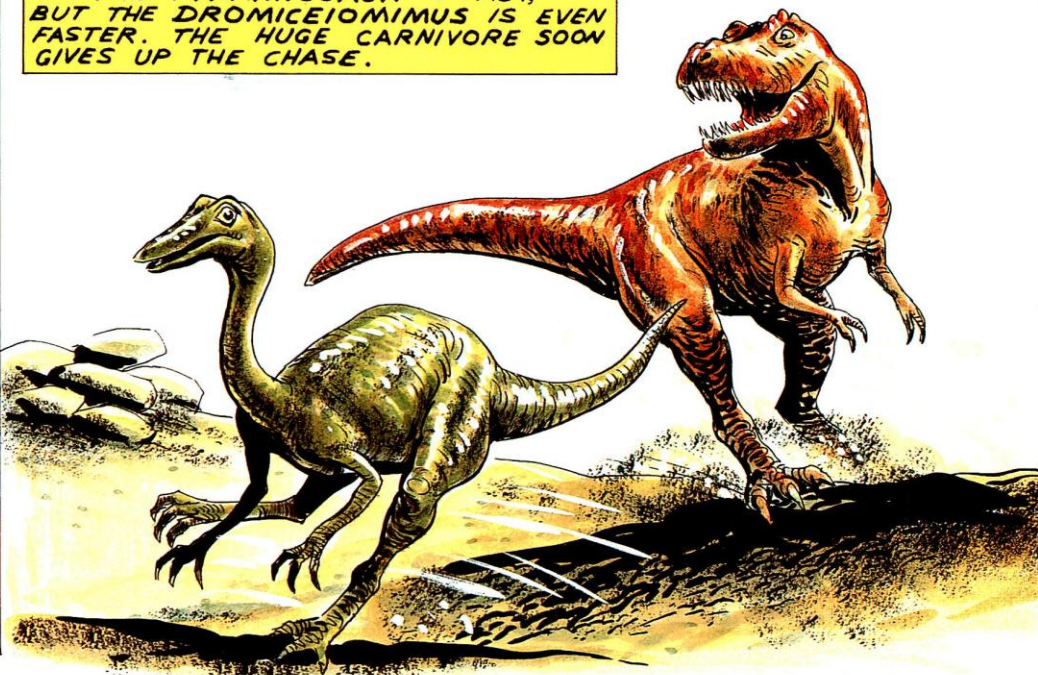
BUT IN THE VICIOUS WORLD OF THE DINOSAURS DANGER IS NEVER FAR AWAY.

WITH A MIGHTY ROAR, THE TYRANNOSAUR LUNGES, ITS RAZOR-LIKE TEETH SLASHING AT THE MEATY LITTLE BODY OF THE DROMICEIOMIMUS.



BUT LUCK IS ON THE SIDE OF THE PREY. THE DROMICEIOMIMUS REACHES ITS FULL SPEED AND SPRINTS TO SAFETY.

THE TYRANNOSAUR IS FAST, BUT THE DROMICEIOMIMUS IS EVEN FASTER. THE HUGE CARNIVORE SOON GIVES UP THE CHASE.



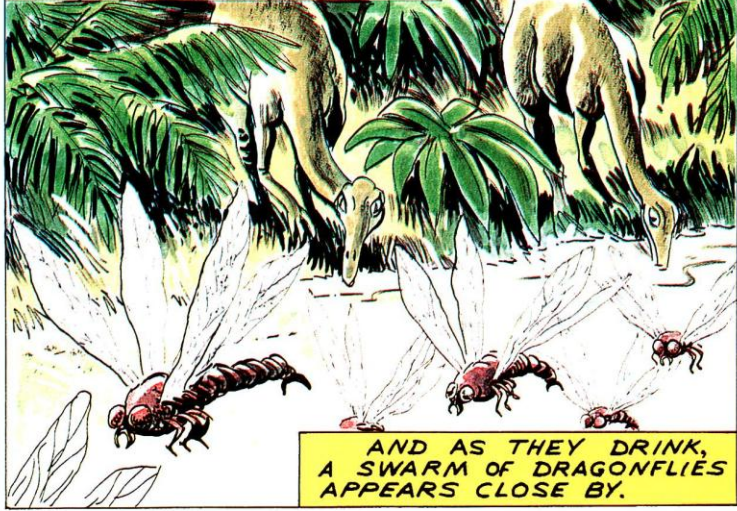




AS SOON AS DAWN COMES, THE DROMICEIOMIMUS RISE TO THEIR FEET, INSTINCTIVELY AWARE THAT, LYING ON THE GROUND, THEY ARE EASY PICKINGS FOR A PASSING PREDATOR.



THEY MAKE THEIR WAY TO A NEARBY POOL TO QUENCH THEIR THIRST.



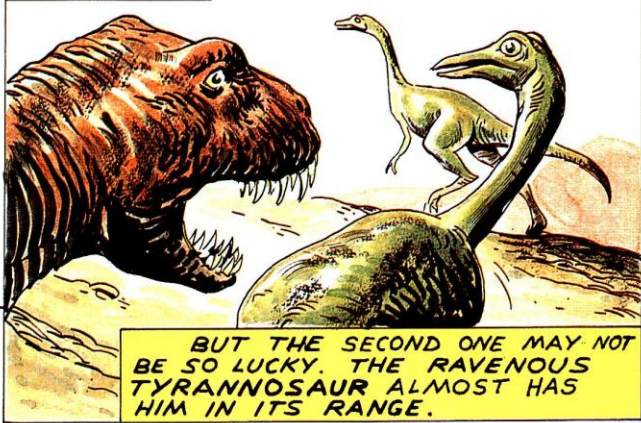
AND AS THEY DRINK, A SWARM OF DRAGONFLIES APPEARS CLOSE BY.

A HUNGRY TYRANNOSAUR SPOTS THE BASKING DROMICEIOMIMUS AND RUSHES IN FOR THE KILL.



BUT DROMICEIOMIMUS, ONE OF THE FASTEST OF ALL DINOSAURS, GIVEN A START, CAN OUTFRAN THE GIGANTIC MEAT-EATER.

THE FIRST DROMICEIOMIMUS GETS TO ITS FEET AND SPRINTS TO SAFETY.



BUT THE SECOND ONE MAY NOT BE SO LUCKY. THE RAVENOUS TYRANNOSAUR ALMOST HAS HIM IN ITS RANGE.

LATER THAT DAY, THE TYRANNOSAUR SPOTS EASIER PREY, WHICH SATISFIES THE HUNGER THAT HAS BEEN GNAWING ITS BELLY SINCE DAWN.



AND THE LUCKY DROMICEIOMIMUS GETS ON WITH THE MAIN BUSINESS OF ITS LIFE: EATING ENOUGH TO KEEP IT STRONG AND HEALTHY THROUGH YET ANOTHER DAY'S SURVIVAL.





# Improve and test your knowledge

# FACT FILE

*Ichthyosaurus* holds all the answers.  
See how you score  
in the quiz.

**Thanks to coal and oil**  
We know a lot about the Cretaceous dinosaurs of Alberta, Montana and Wyoming in North America, because the rocks in which they were found contain coal and oil, and companies are constantly excavating the rocks and finding dinosaur skeletons.

**1** *Liopleurodon* was:  
a) a plesiosaur  
b) a pliosaur  
c) an ichthyosaur

**2** Where were *Sharovipteryx*'s 'wings'?  
a) behind its legs  
b) along its back  
c) along its sides

**5** How did *Diplodocus* reach the highest leaves on trees?  
a) it climbed on rocks  
b) it reared up on its hind legs  
c) it jumped up

**3** Where did *Homalodotherium* live?  
a) South Africa  
b) North America  
c) South America

**6** Which dino might have made a good police dog?  
a) *Deinonychus*  
b) *Troodon*  
c) *Dromiceiomimus*

**4** When did *Archaeopteryx* first appear on Earth?  
a) 66 MYA  
b) 155 MYA  
c) 30 MYA

**7** What did *Diatryma* eat?  
a) plants  
b) fishes  
c) meat

**8** How long was *Liopleurodon*'s skull?  
a) about 2m  
b) about 20cm  
c) about 20mm

**Four back legs**  
*Diplodocus carnegii* was recreated from fossil remains, with two pairs of back legs as the front legs were not found.



### Stressed dinosaurs

Heinrich K. Erben, of Bonn University, noticed that the eggshells of one dinosaur species became thinner as time went on. In today's birds, this happens when birds become upset, usually by changing conditions or by overpopulation.

### Lonely dino

The only dinosaur so far found in Thailand is Siamosaurus.

### Heads or tails?



Dr Shirota, an expert in insect camouflage, thinks that ankylosaurs may have had a pair of spots, like eyes, on their tail clubs. The tail club would then look like a head, and meat-eaters would attack it rather than the head.

9

When was *Erlikosaurus* alive?

- a) the Late Jurassic
- b) the Late Cretaceous
- c) the Late Devonian

10

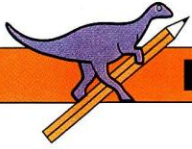
Which bit of *Euoplocephalus* would have been useful on a building site?

- a) its teeth
- b) its whiplash tail
- c) its tail club

### An international language

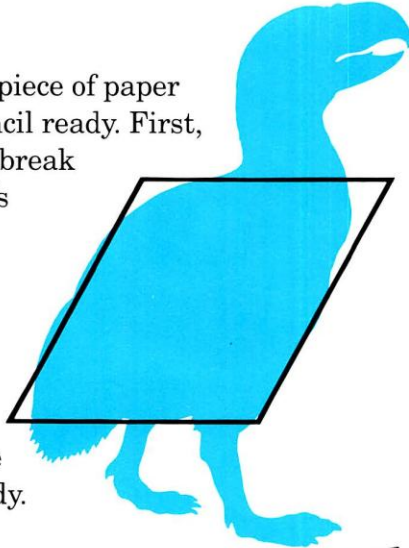
The French for dinosaur is 'dinosaur', the German is 'dinosaurier', the Spanish is 'dinosaurio' and the Italian is 'dinosaurio'. So it won't be difficult for you to ask the way to the dinosaur museum, whatever country you are in!



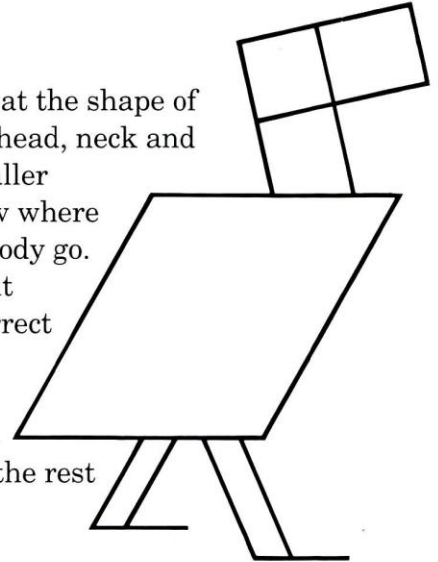


# DYATRYMA

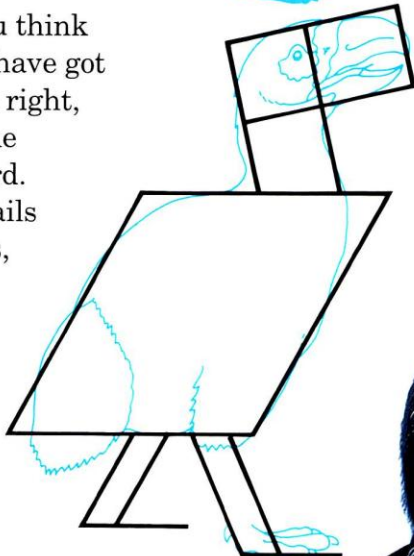
**1** Get your piece of paper and a pencil ready. First, you are going to break down *Dyatyryma's* shape into rectangles and squares. In the middle of your paper, draw a simple, squashed square shape for the body.



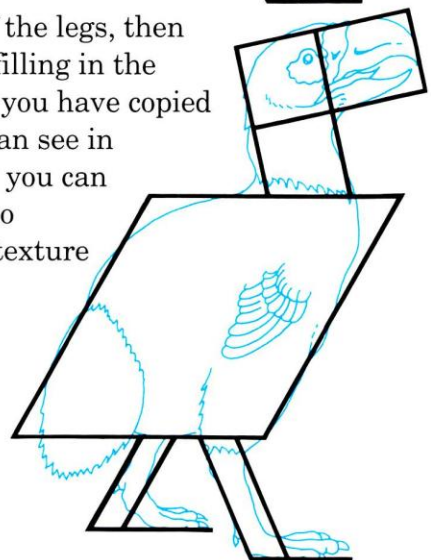
**2** Now, look at the shape of the bird's head, neck and legs. Draw in smaller rectangles to show where these bits of the body go. Make sure you put them in at the correct angle to the body. And think about what size the legs are, compared to the rest of the body.



**3** When you think that you have got the basic shapes right, start filling in the outline of the bird. Draw in the details of the tail, wings, body and head. Start looking at the details of the three claws on the front foot.

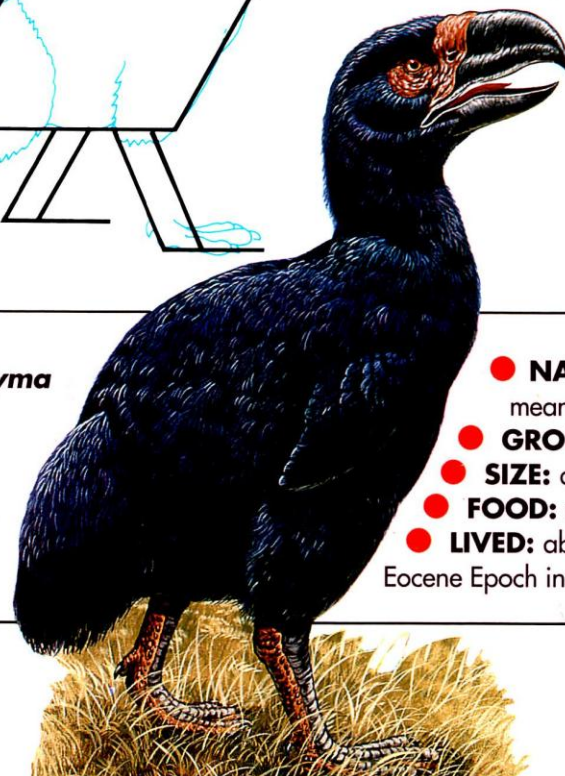


**4** Finish off the legs, then continue filling in the details until you have copied everything you can see in the picture. Now you can colour it in. Try to capture the soft texture of the feathers.



## Fact box

*Diatryma* was a massive predatory bird that appeared on Earth 50 million years ago.



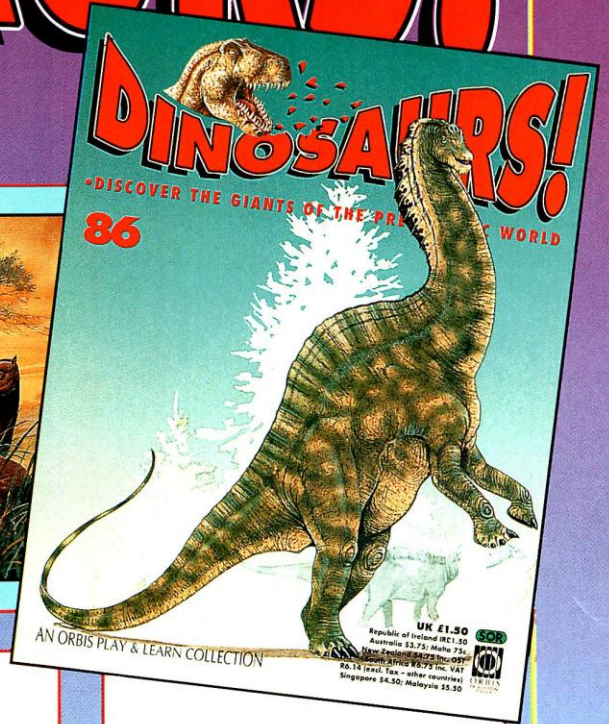
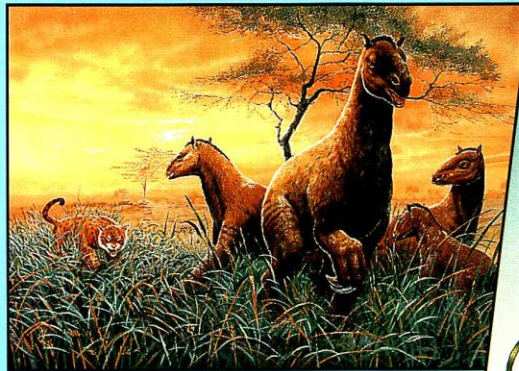
- **NAME:** *Diatryma* (die-a-try-ma) means 'through hole'
- **GROUP:** bird
- **SIZE:** about 2m tall
- **FOOD:** meat, mostly small animals
- **LIVED:** about 50 million years ago in the Eocene Epoch in Europe and North America



COMING IN PART 86 OF

# DINOSAURS!

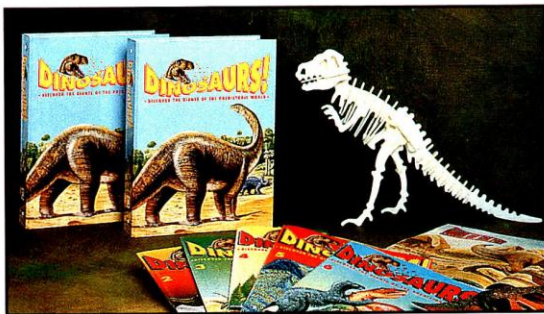
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ANSWERS TO FACT FILE QUESTIONS: 1.b 2.a 3.c 4.b 5.b 6.a 7.c 8.a 9.b 10.c



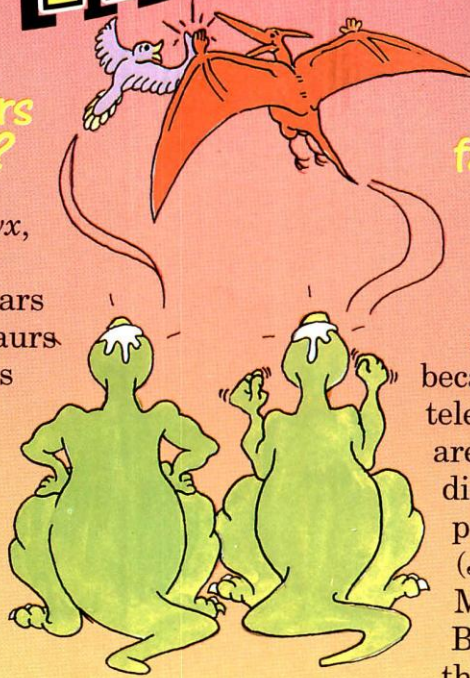


Dr David Norman of Cambridge University answers your dinosaur questions

# ASK THE EXPERT

## Did birds and pterosaurs exist at the same time?

The first bird, *Archaeopteryx*, appeared in Late Jurassic times, about 155 million years ago (MYA). The last pterosaurs lived in the Late Cretaceous (66 MYA). There is an overlap of about 90 million years between the end of the Jurassic and the end of the Cretaceous. During this time, pterosaurs and birds both existed.

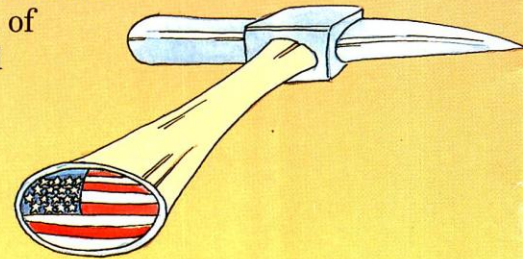


## Who is the most famous fossil hunter?

The 'most famous' is a very difficult thing to decide, because it varies so much from time to time. Today, because of newspapers and television, many more people are aware of new fossil discoveries. I think that it is probably safe to say that John (Jack) Horner from the Museum of the Rockies at Bozeman in Montana, USA, is the best known, and so he is

also the 'most famous' of all today's dinosaur fossil collectors.

Fifty years ago, of course, it would have been someone else. I do not like to decide which people are 'the best', the 'most famous' or 'the cleverest', because so many people can play an important part in discovering fossils. It is hardly ever the work of just one person; it is much more likely to be a team effort.



## Could dinosaurs drink seawater?

I do not think so. Today, only a few land-living animals are equipped to do this. Without special mechanisms for getting rid of the salt, the high mineral and salt content of seawater would damage the animal's body. But seabirds and turtles, for example, can take in salt water because they can get rid of it by crying! The salty water flows out through glands in their eyes.

