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# DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD

86



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# DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



## IDENTIKIT

Two prehistoric beasts and a sail-backed dinosaur

|               |      |
|---------------|------|
| MOROPUS       | 2041 |
| ERYTHROSUCHUS | 2044 |
| AMARGASAURUS  | 2045 |

## PREHISTORIC WORLD

The SMALL WORLD of bugs from the Age of the Dinosaurs 2046



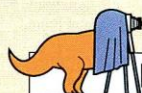
## SPOTTER'S GUIDE

STOP PRESS...exciting new dinosaur finds in England 2054



## TIME DETECTIVE

Theories and ideas about what pterosaurs really looked like in ALL CHANGE FOR THE PTEROSAURS 2056



## HISTORY IN PICTURES

THE FIRST ALL-AMERICAN DINOSAUR 2060



## HOW TO DRAW

Learn how to draw horned

*Arrhinoceratops* 2064

## ASK THE EXPERT

Dr David Norman of Cambridge University answers more of your dinosaur queries BACK COVER

## PLUS

### GIANTS OF THE PAST

A herd of *Moropus* is stalked by a prehistoric cat 2050

### 3-D Gallery

*Alioramus* ambushes a family of crested *Saurolophus* 2052

### FACT FILE

More fascinating trivia and the weekly quiz 2062

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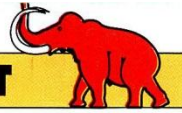
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# MOROPUS

**Prehistoric *Moropus* looked like a big horse with claws.**



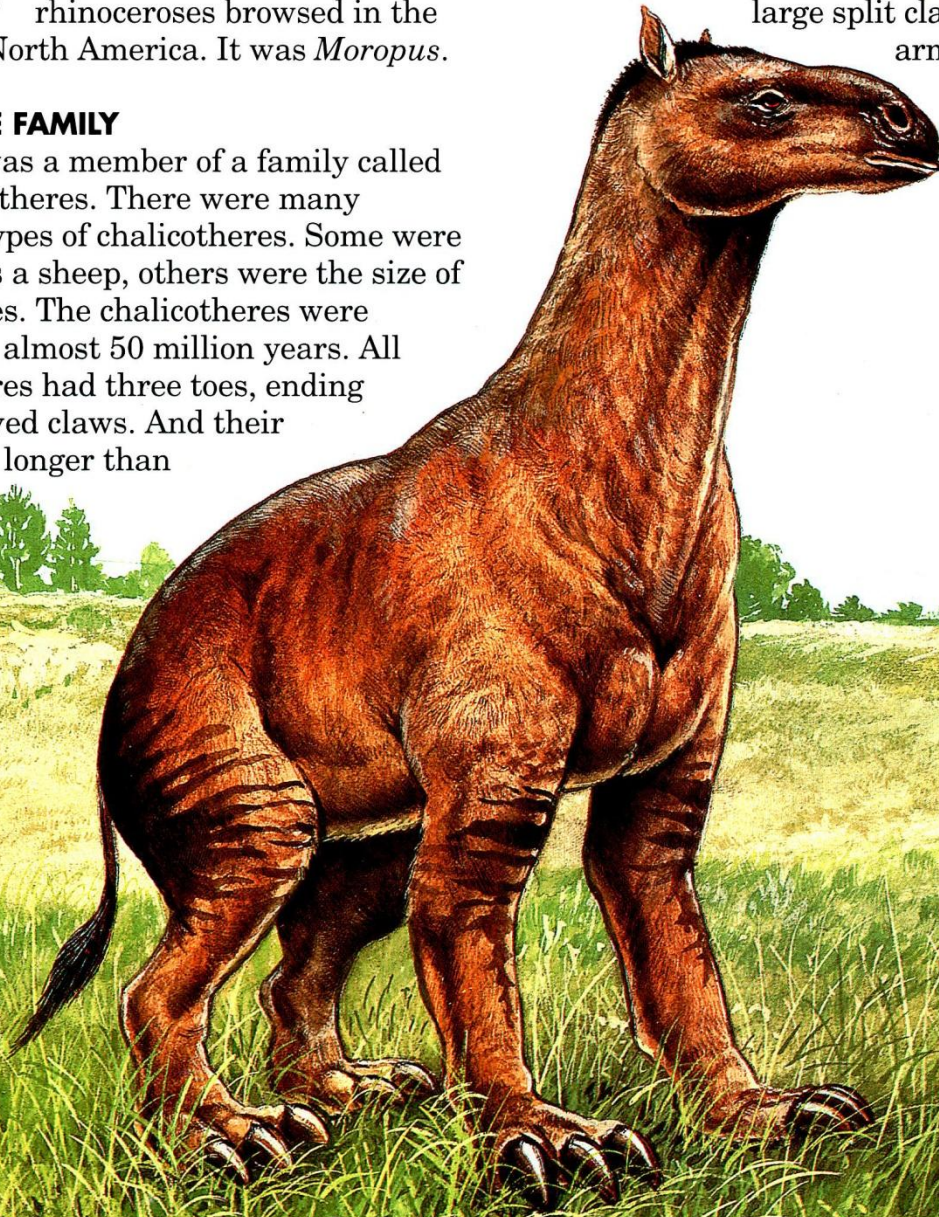
about 25 million years ago, a strange plant-eating relative of today's horses and rhinoceroses browsed in the forests of North America. It was *Moropus*.

## ALL IN THE FAMILY

*Moropus* was a member of a family called the chalicotheres. There were many different types of chalicotheres. Some were as small as a sheep, others were the size of large horses. The chalicotheres were around for almost 50 million years. All chalicotheres had three toes, ending in big, curved claws. And their arms were longer than their legs.

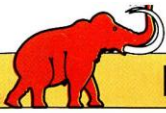
## HIDDEN TALONS

Some chalicotheres could probably pull in their talons when they walked, just like a cat drawing back its claws into its paws. But experts think *Moropus* actually walked on its knuckles to avoid damaging its claws. *Moropus* had three large split claws on its arms, and three shorter ones on its legs.



2041





## IDENTIKIT

Broad hips support *Moropus'* weight when it rears up

Back slopes down from the shoulders to the hips

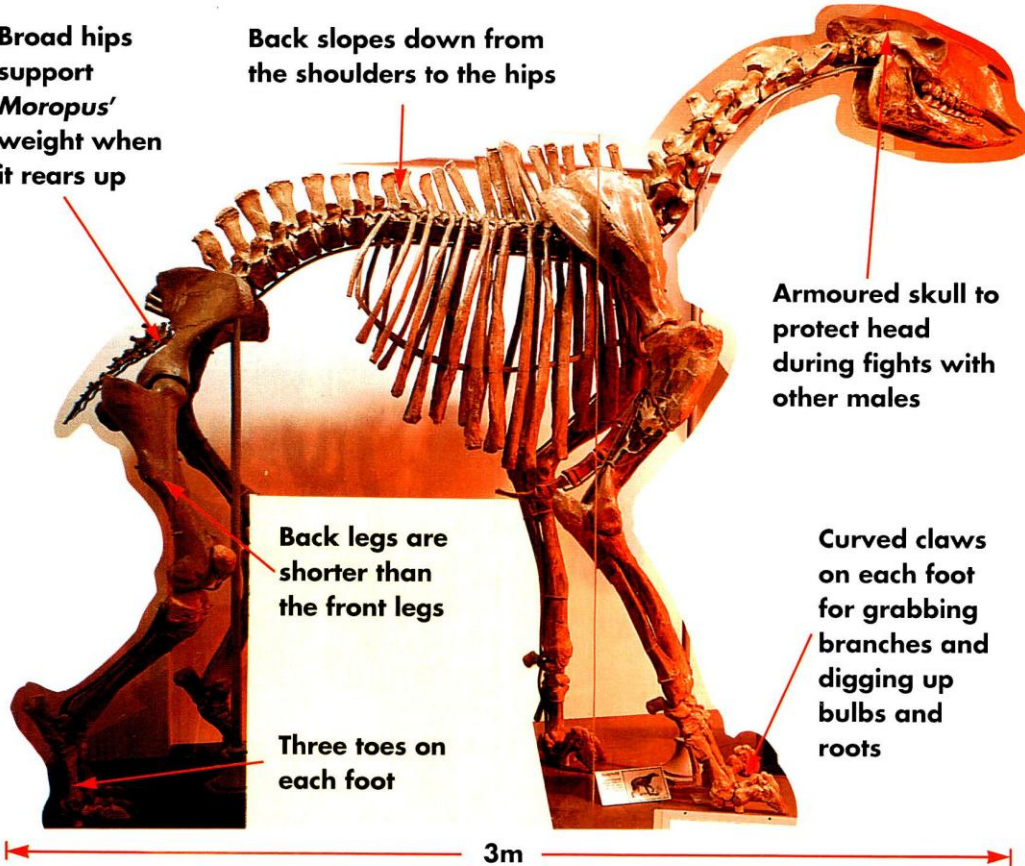
*Moropus* looked rather like a big horse but, like all the chalicotheres, its claws and teeth were not suitable for eating grass. And, unlike horses it had short hind legs compared to its front legs so that its back sloped down from its shoulders.

Armoured skull to protect head during fights with other males

Curved claws on each foot for grabbing branches and digging up bulbs and roots

Back legs are shorter than the front legs

Three toes on each foot



### PIECING THE PUZZLE

When the claws of *Moropus* were first found, they had become separated from the skeleton. Experts were puzzled as to what the talons had been used for. They decided they must have belonged to some kind of anteater.

### DIG THIS

*Moropus* could have used its powerful arms and talons to dig up roots and bulbs. Like the South American ground sloth, which came later, it might have sat back on its haunches and reached out with its long arms to gather food.

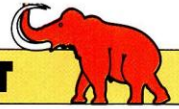
### REACHING UP

This bulky plant-eater might very well have reared up on its legs to feed, too. It could have hooked down leafy branches from the trees with its long claws.

## MONSTER FACTS

- **NAME:** *Moropus* (mor-oh-pus) means 'foolish foot'
- **GROUP:** mammal
- **SIZE:** 3m long
- **FOOD:** plants
- **LIVED:** about 25 million years ago in the Early to Middle Miocene in North America



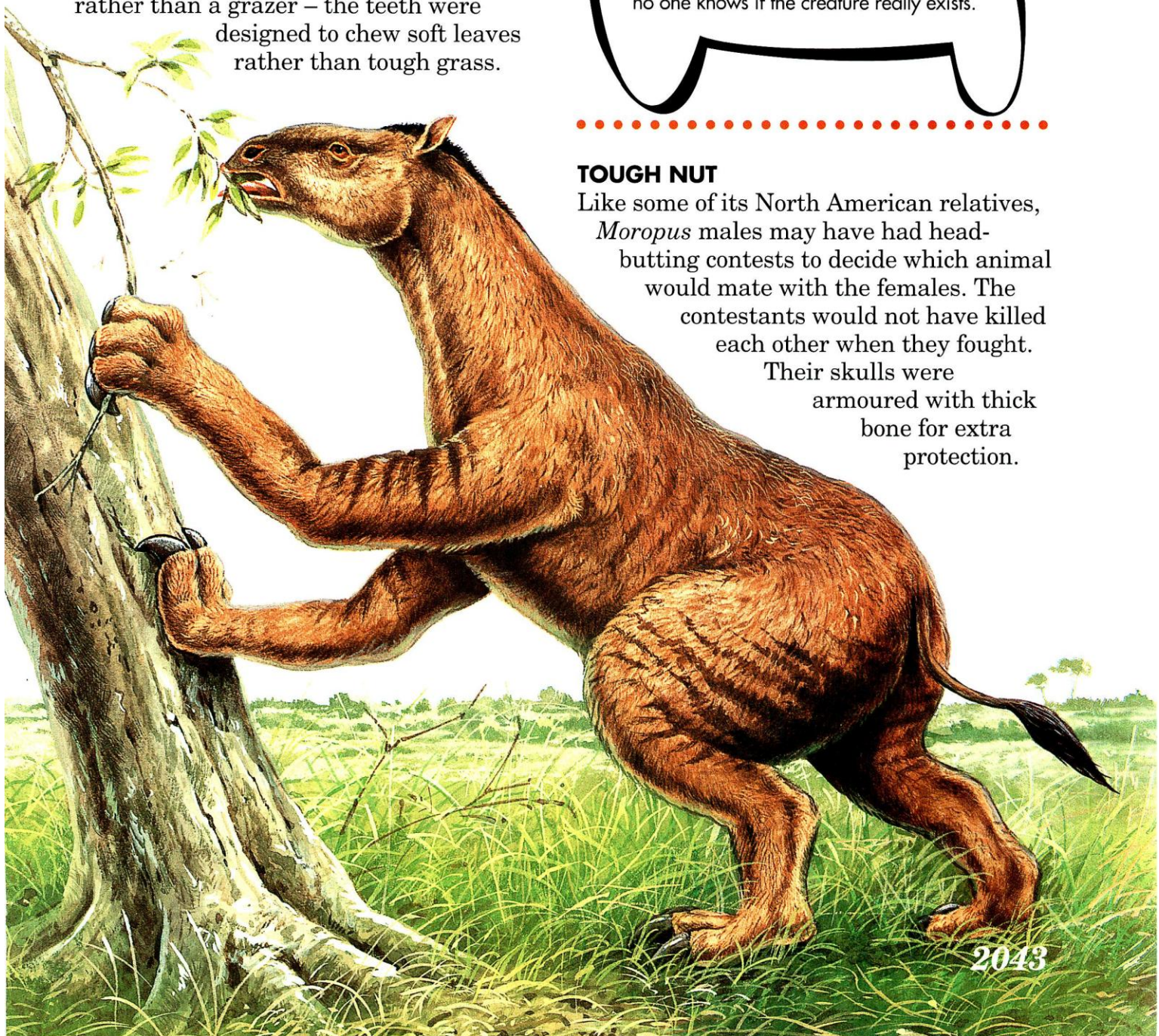


### WELL SUPPORTED

This clawed plant-eater had the right body shape to help it rear upwards. *Moropus* had short hind legs compared with its front legs. It also had broad hips which were strong enough to support its weight.

### EAT UP

*Moropus* was related to the horse. But, unlike the horse, it could not graze on grass. The shape of the plant-eater's teeth revealed that *Moropus* was a browser, rather than a grazer – the teeth were designed to chew soft leaves rather than tough grass.



## IT'S A FACT

### LIVING FOSSIL

There has been some speculation that chalicotheres such as *Moropus* may still survive. Several people have reported seeing a mysterious creature with arms longer than its legs, bear-like claws and a horse-like head in the forests of Kenya in Africa. Known locally as the nandi bear, no one knows if the creature really exists.

### TOUGH NUT

Like some of its North American relatives, *Moropus* males may have had head-butting contests to decide which animal would mate with the females. The contestants would not have killed each other when they fought. Their skulls were armoured with thick bone for extra protection.





# ERYTHROSUCHUS

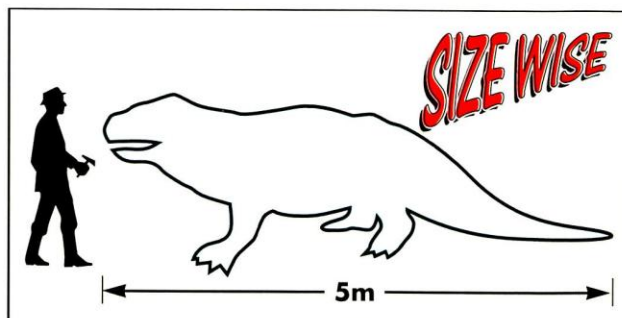
This huge reptile was the largest land-living meat-eater of its day.



The 'ruling reptiles' reigned for more than 180 million years. They included dinosaurs, pterosaurs and crocodiles. *Erythrosuchus*, a thecodont, was one of the earliest ruling reptiles.

### BIG AND BROAD

*Erythrosuchus* had a large, 1m-long head. Its powerful jaws were filled with sharp, cone-shaped teeth. Experts believe that this huge meat-eater lived on land most of the time. It had a broad, squat body, but its legs did not sprawl out from its body like the water-loving thecodonts. The legs were more upright, so *Erythrosuchus* was able to move about much more easily.



### MONSTER FACTS

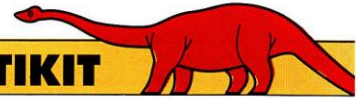
- **NAME:** *Erythrosuchus* (er-ith-ro-sook-us) means 'red crocodile'
- **GROUP:** reptile
- **SIZE:** up to 5m long
- **FOOD:** meat
- **LIVED:** about 230 million years ago in the Early Triassic Period in South Africa



### ALL POWERFUL

With its gaping jaws and deadly bite, this bulky carnivore was one of the most successful hunters in the Early Triassic. *Erythrosuchus* could even overpower other ferocious meat-eaters, such as wolf-sized *Cynognathus*.





# AMARGASAURUS

From the dinosaur-rich rocks of Argentina came fossils of sail-backed *Amargasaurus*.



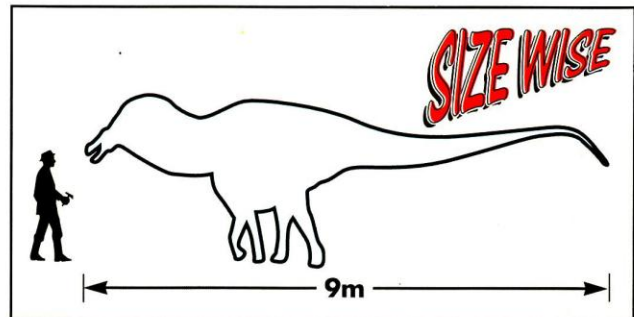
This extraordinary dinosaur was one of the most important finds in Argentina. It was named after La Amarga, the place where it was discovered.

## BACK UP

The sail-backed dinosaurs were strange-looking creatures. Experts have puzzled over the reasons for their skin 'sails', which were supported by bony 'swords' which ran along their necks and backs. The 'sails', which could be more than 1.5m high, might have been used to regulate body temperature. Or perhaps they were used for display purposes.

## NEWCOMER

*Amargasaurus* is a recent find – it was described in 1991. Other sail-backed dinosaurs included the ornithopod *Ouranosaurus* and the meat-eating *Spinosaurus* that lived 30 million years earlier.

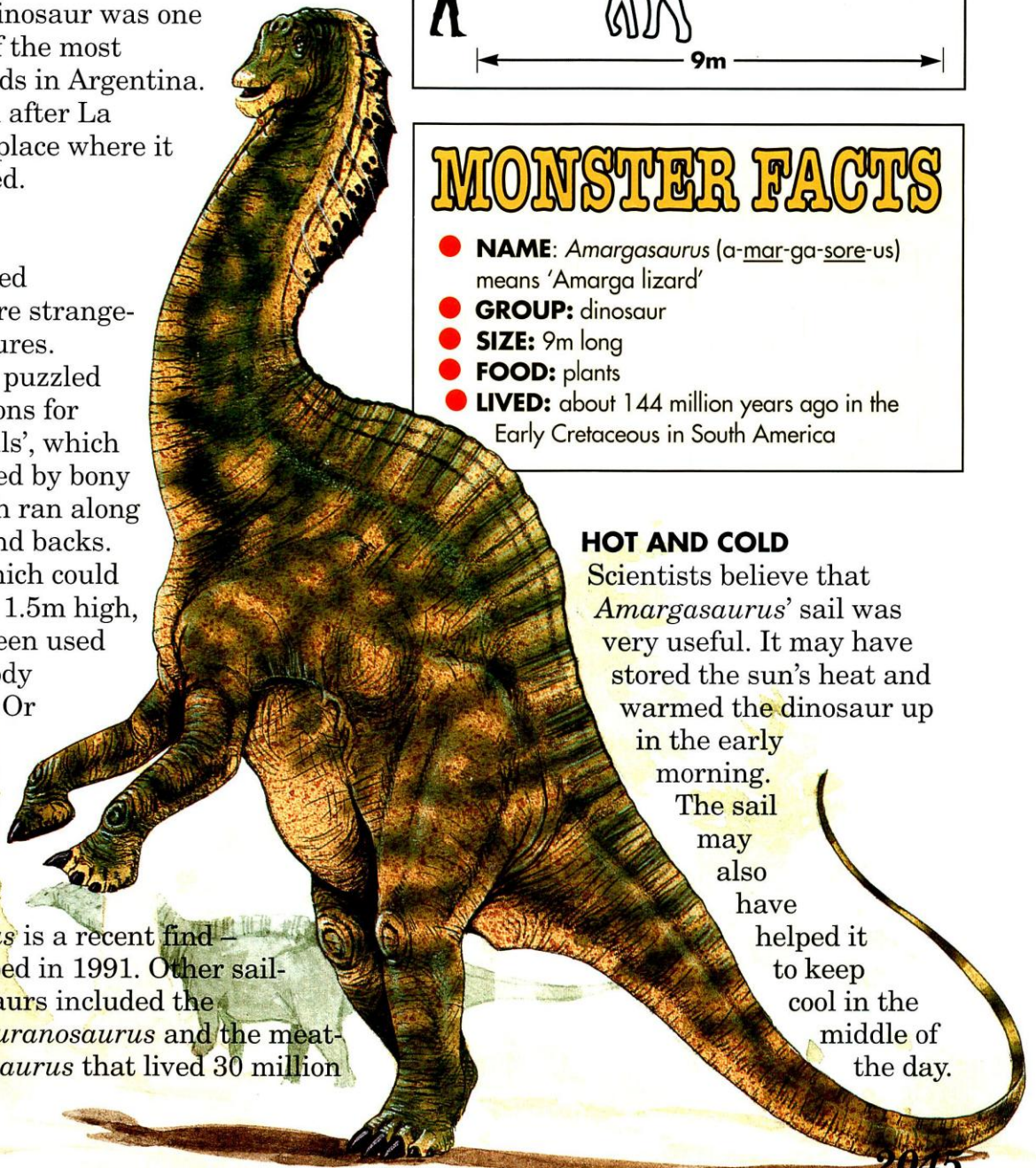


## MONSTER FACTS

- **NAME:** *Amargasaurus* (a-mar-ga-sore-us) means 'Amarga lizard'
- **GROUP:** dinosaur
- **SIZE:** 9m long
- **FOOD:** plants
- **LIVED:** about 144 million years ago in the Early Cretaceous in South America

## HOT AND COLD

Scientists believe that *Amargasaurus*' sail was very useful. It may have stored the sun's heat and warmed the dinosaur up in the early morning. The sail may also have helped it to keep cool in the middle of the day.





# Small world

**While dinosaurs walked the land, tiny creatures, which had already existed for hundreds of millions of years, shared the world beneath their feet.**

**I**n the prehistoric world, earthworms burrowed in the soil, and millipedes, centipedes, ants and termites scuttled through the undergrowth. Spiders and scorpions hunted, and flies buzzed about, laying their eggs and feeding on rotting meat left by predators and scavengers. Most of these tiny creatures had no impact on the giant creatures that lived around them, but they formed an important part of life on Earth.

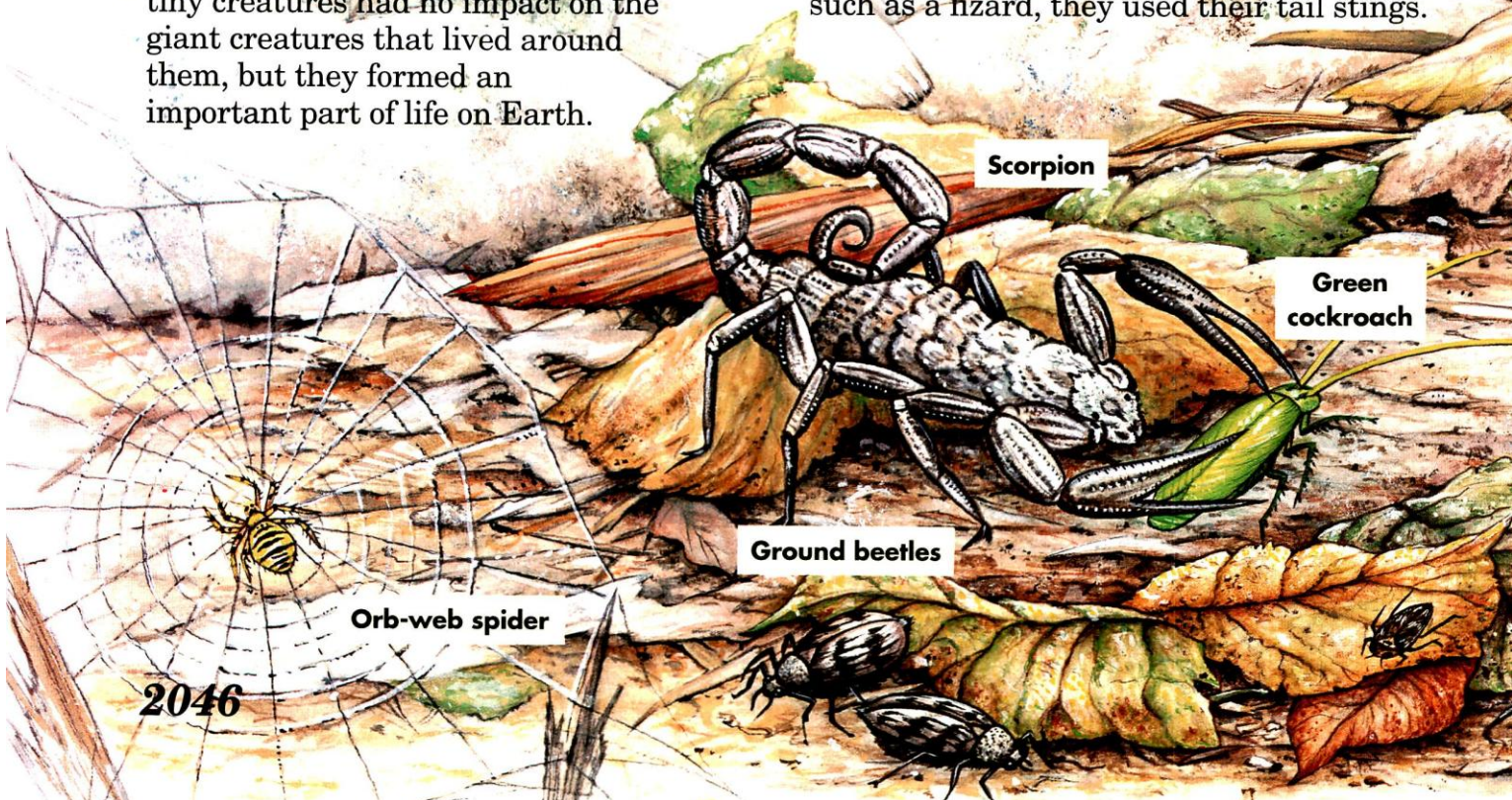
## A FOSSIL MYSTERY

Fossils of small soil creatures and invertebrates (animals without backbones) have been found dating from the Carboniferous Period, about 360 million years ago. But few fossils of these tiny creatures have been found from the Mesozoic Era, when dinosaurs were around. However, as many of these creatures have been found from later ages, they must have been there, beneath the dinosaurs' feet.



## A STING IN THE TAIL

Scorpions have lived on Earth for millions of years, and they look almost the same today as they did when they first appeared. Fossil scorpions from the Mesozoic have been found in France and Brazil. These scorpions, like those of today, probably came out to hunt at night. They grabbed small insects, such as cockroaches, in their pincers and then chewed them up. If they wanted to attack a bigger animal, such as a lizard, they used their tail stings.



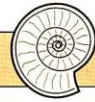
Scorpion

Green cockroach

Ground beetles

Orb-web spider





Scorpions and spiders are two of the bugs that lived alongside the dinosaurs, and are still around today.



Yellow scorpion

**THE BITER BIT**

However, scorpions themselves may have fallen prey to some of the flesh-eating dinosaurs. It is very likely that if small dinosaurs, such as *Compsognathus*, could find no other food, they would have turned over stones in search of a juicy scorpion to eat. Care would have been needed to avoid the scorpion's sting and nipping pincers, but the slow-moving scorpion would be no match for such a quick little dinosaur.

**IT'S A FACT**

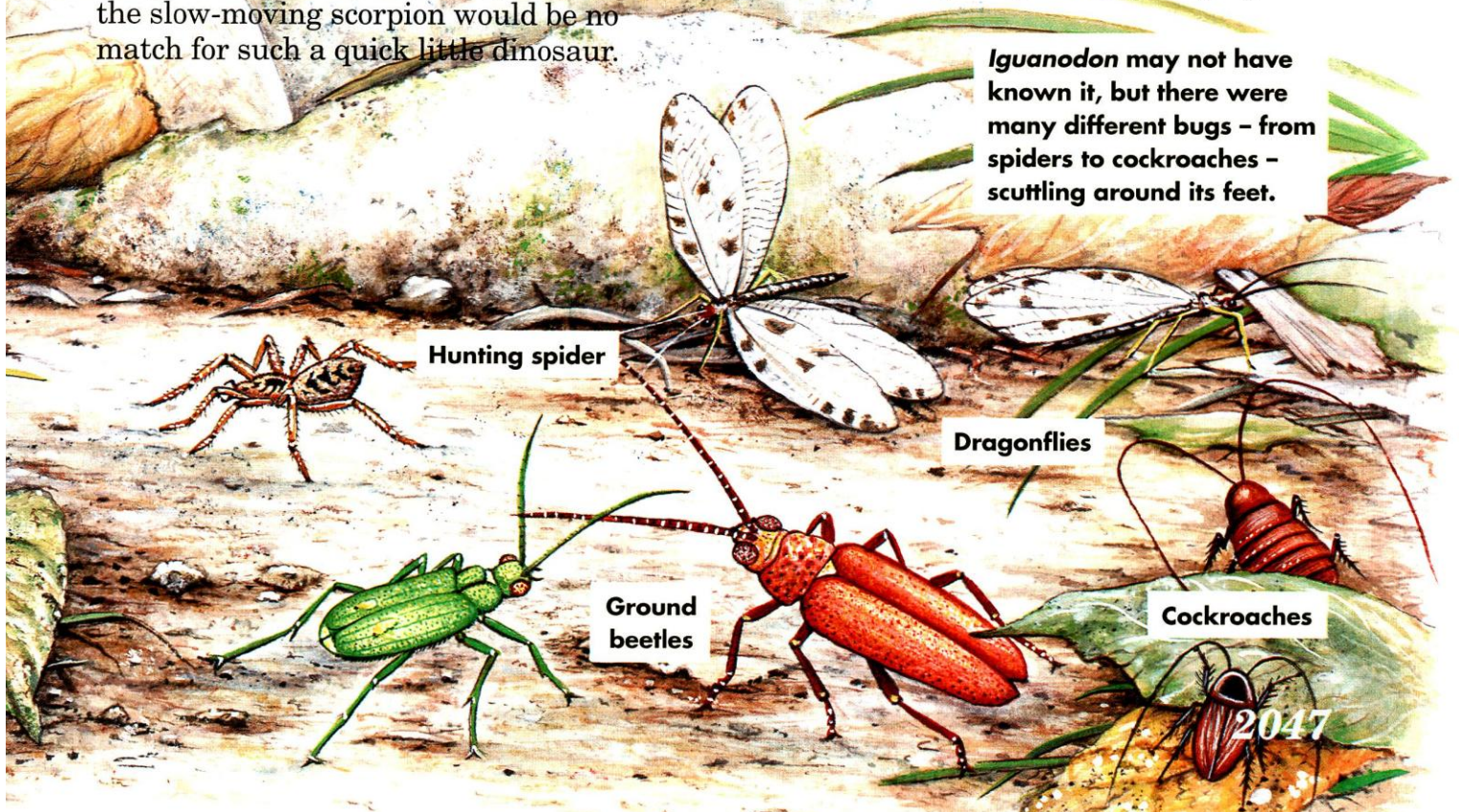
**SPINELESS NO HOPERS**

There are very few fossils of land-living invertebrates (animals without backbones) dating from the Mesozoic Era. Some scientists believe that the conditions on land were so dry at that time that most of the remains of these small creatures did not become fossilized.

**LEGS AND WEBS**

Spiders, too, have changed little since they first appeared on Earth. Recently, four different kinds of spider from the Mesozoic Era were discovered in north-east Spain. They lived at about the same time as *Iguanodon*. Some probably spun webs in the trees while others, called hunting spiders, actually went looking for prey.

*Iguanodon* may not have known it, but there were many different bugs - from spiders to cockroaches - scuttling around its feet.







**A PERFECT SPECIMEN**

*Palaeouloborus*, a tiny 4mm-long spider, was discovered in Mesozoic limestone. It is so perfectly preserved that all the details of its body can be seen. It is related to today's orb-web spider, which spins beautiful, intricate webs to catch its prey. On the *Palaeouloborus* fossil you can see its spinnerets (the part where the web silk comes out) and its fangs.

**FIRST CATCH YOUR PREY**

*Palaeouloborus* would have spun webs in the undergrowth to trap small flying insects. It would then have bitten its prey with its venomous fangs, just like spiders do today. There were also larger hunting spiders, which probably ambushed passing prey, just as the wolf spider does today. *Rosamygale*, a large spider from the Triassic, was related to today's bird-eating spiders. But what did it eat? Certainly not birds – they hadn't developed yet!

**FANCY FLOWERS**

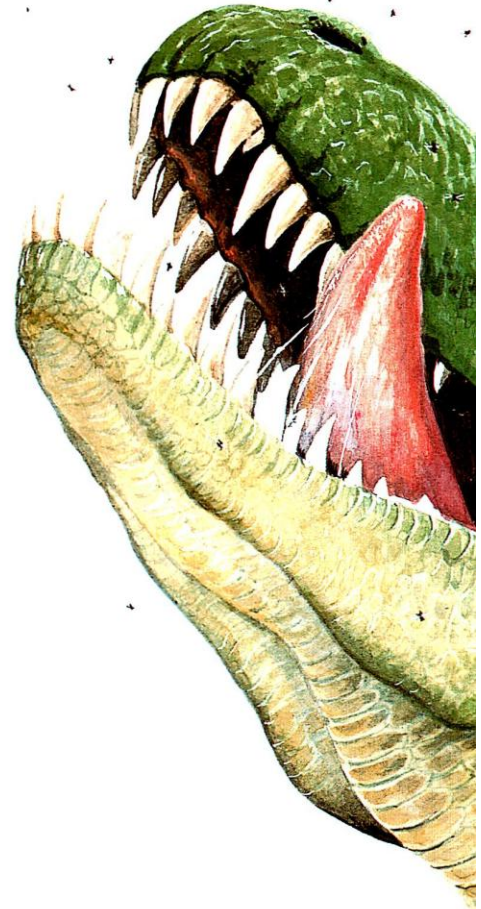
During the Cretaceous Period, towards the end of the Mesozoic Era, flowering plants, such as magnolias, began to cover the land. Brightly coloured insects, including butterflies, moths, wasps, stick insects and praying mantises developed. They lived and fed among the flowers and leaves.

**COLOUR TRACES**

Several fossil insects from this time show traces of the bright colours that they had when they were alive more than 100 million years ago.

**A BUG MEAL**

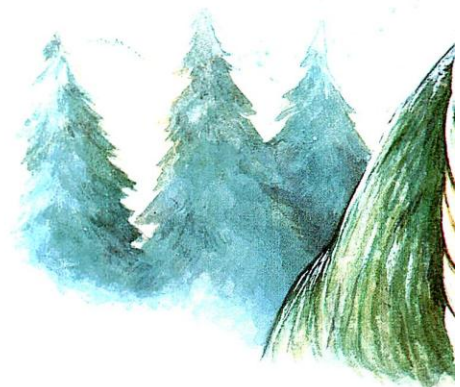
These bugs were themselves food for scorpions and spiders, as well as small mammals and flying reptiles.



**that dinosaurs were bitten by fleas?**

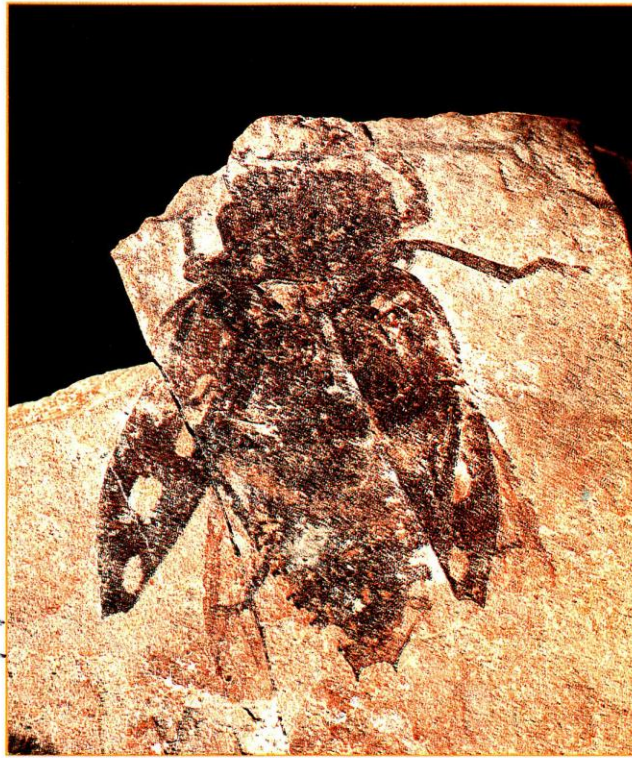
No one is sure. Fleas were certainly around at the time of the dinosaurs, but they may not have been able to bite through the tough hide of a dinosaur. By the end of the Cretaceous, fleas were sucking blood from their prey, just as they do today. But they probably fed on the small mammals and birds of the time.

Biting flies were also around at the same time as the dinosaurs. Here, *T rex* is being tormented by flies buzzing around its head. They know they can bite through the soft skin around its nose and eyes.





This beetle fossil was found in limestone rocks in Spain. It lived in the Cretaceous Period. Although it is fossilized, you can still see traces of the bright pattern it had on its wings.



### DUNG COLLECTORS

One early group of beetles that scuttled round the dinosaurs' feet was related to the dung beetles of today. Some people believe that they fed on the droppings of the dinosaurs. It is more likely that the early members of this group ate plants. Then, when the first mammals appeared, they

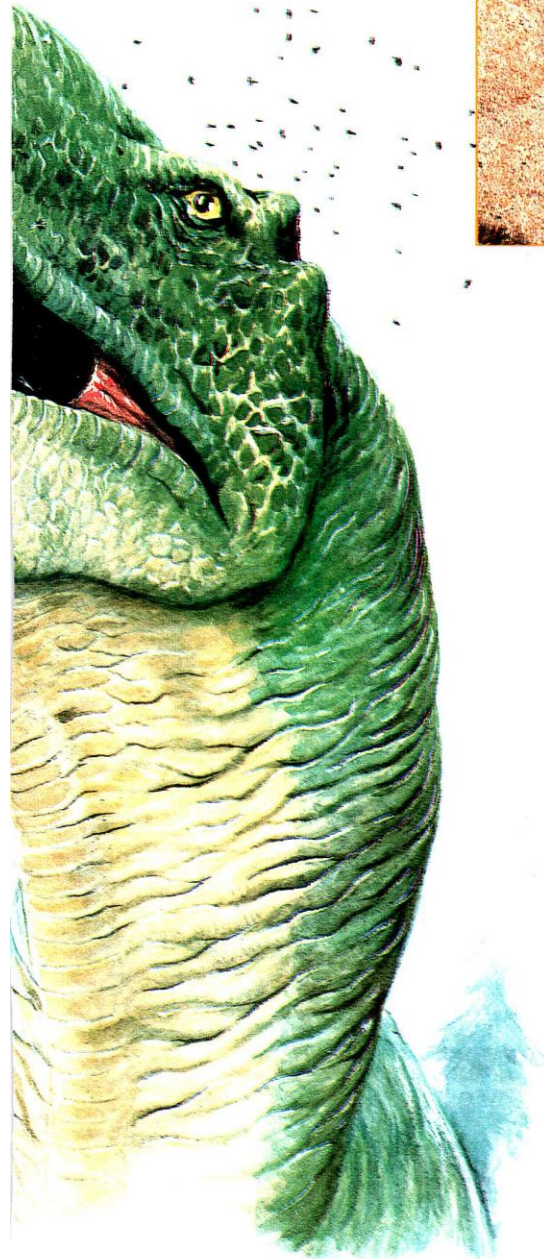
started feeding on their droppings. Today, dung beetles nearly always feed on the droppings of mammals, not reptiles.

### LITTLE PESTS

Biting flies also developed during the Cretaceous Period. Although they probably could not bite through the tough skins of the larger dinosaurs, the thinner skin around dinosaurs' eyes and nostrils would have provided an easy target. Even the ferocious *Tyrannosaurus rex* might have been tormented by these little buzzing pests. All these big dinosaurs could do was shake their heads and flick their tongues!

### SURVIVORS

Many of these relatively tiny creatures outlived their huge dinosaur neighbours. They were able to adapt to, and survive the changing conditions that caused the extinction of the dinosaurs. They continued to flourish and their ancestors can be seen today, almost unchanged.





# GIANTS OF THE PAST

On the open plains of North America, a herd of horse-like *Moropus* is searching for food. Ignoring the tough grasses, which they cannot chew, they dig around in the earth for juicy roots and bulbs, using their large, sharp claws as spades. A large cat stealthily moves towards them, camouflaged in the long grass by its spotted coat. It is hoping to snatch one of the smaller, vulnerable members of the herd and make a quick getaway.

2050



# MOROPUS



2051



# 3-D Gallery 95

## ALIORAMUS

A family of Mongolian *Saurolophus* is quietly grazing. In an instant, their peace is shattered. *Alioramus* rushes in and snatches up one of the baby hadrosaurs.











# **STOP PRESS...** Exciting new **Isle of Wight**

**Dinosaur enthusiasts have been finding dinosaur bones and footprints on a tiny island off the south coast of England for over 150 years.**



The Isle of Wight is known to be a good place to find fossils. And, in the past few years, three more exciting finds have been made there. These new discoveries are all of dinosaurs that lived in the Cretaceous Period, about 120 million years ago.

## **HUNTING FOR DINOSAURS**

In 1992, palaeontologist Steve Hutt was hunting for dinosaurs on the south-west coast of the island. As he slithered through the mud and rain he noticed a tiny piece of bone in the cliff face. Scraping away the rock, he found a long, white rib. As he searched, more and more bones came to light. There were bones everywhere! Within a week, a large part of a brachiosaur skeleton had been discovered.

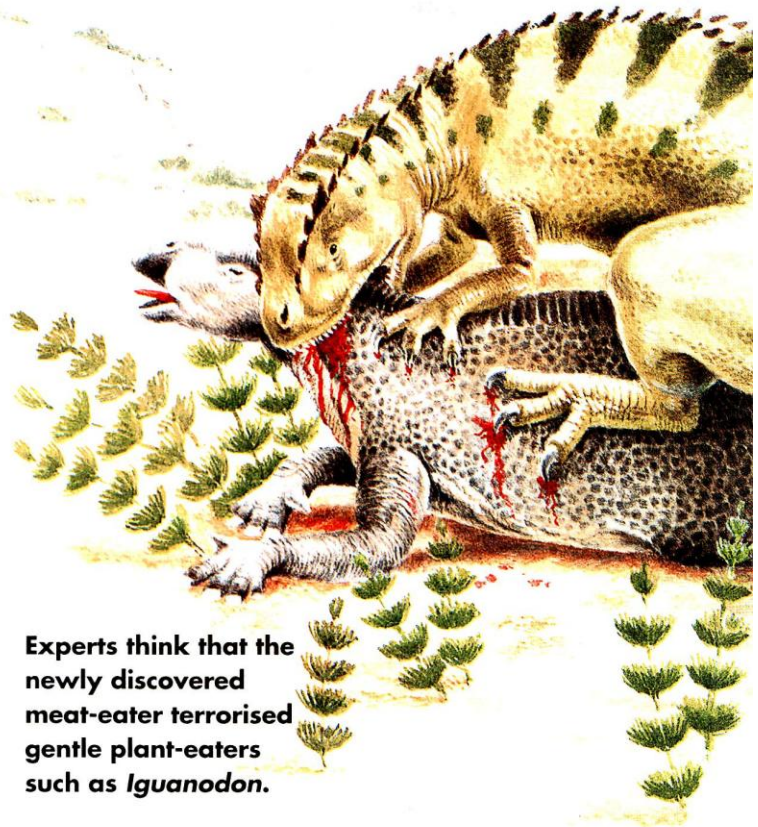
## **SLOW WORK**

After digging for several months, the arms, the chest and many ribs, part of the hips, a leg, and bones from the neck, back and tail had been found. The hard-working diggers also uncovered two huge shoulder blades, each over 1.2m long.

**2054**

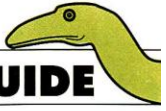
## **BIG BABY**

At about 14m long, this brachiosaur was probably only three-quarters grown. Stomach stones from the plant-eater and the teeth of several predatory dinosaurs have also been found nearby, along with hundreds of mussel shells. Experts don't really know how the dinosaur died, but the plant-eater's bones show that the carcass was attacked by other dinosaurs, and was trampled and bitten by them.



**Experts think that the newly discovered meat-eater terrorised gentle plant-eaters such as Iguanodon.**





# dinosaur finds from the

## BURIED IN MUD

Scientists think that, after the dinosaur died, a pond formed around it, which explains the mussels, and the bones were moved around by the water currents. Mud settled over the skeleton, helping to fossilize the dinosaur. It is the most complete sauropod skeleton so far found in Europe.



## SPINY SOLUTION

Previous finds did not show exactly how these spines were arranged. Because so much of *Polacanthus* was found this time, including vertebrae, limb bones and armoured spines (left), scientists should be able to discover how the front limbs, and even the armour, were arranged.

## DINOSAUR ARMOUR

While this exciting find was still being dug out, bones from an armoured plant-eating dinosaur called *Polacanthus* were found on the island. *Polacanthus* was about 4m long and had spines on its body and tail.

## DUAL FIND

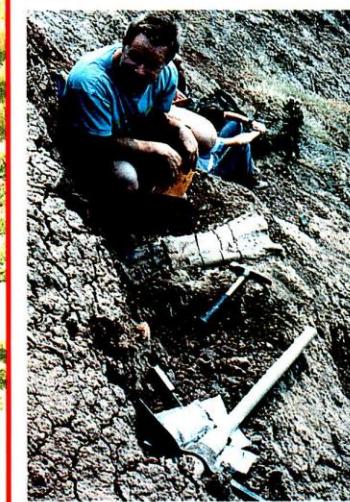
Another recent dig on the island has revealed not one, but two skeletons! The gleaming black bones of *Iguanodon* were found first. And then, by its side, the teeth and bones of a meat-eating dinosaur were discovered. Both skeletons are about 8m long and are almost complete.

## A NEW CARNIVORE

The meat-eater is a new dinosaur. Its skeleton is rather like that of *Allosaurus*, but its skull is completely different, with a sharp snout and long jaws. It had small, strong arms, and it ran on long hind legs. The back feet had clawed toes.

A fierce and dangerous predator, this dinosaur must have terrorised the plant-eaters of the time.

**Steve Hutt with his brachiosaur find on the Isle of Wight.**





# All change for the pterosaurs

In the 200 years since pterosaur fossils were first discovered, scientists have had many different theories and ideas about what they looked like.

 Imagine a prehistoric landscape. Huge dinosaurs lumbering about in strange vegetation, smoking volcanoes... and pterosaurs, with their sinister leathery wings, flying through the sky.

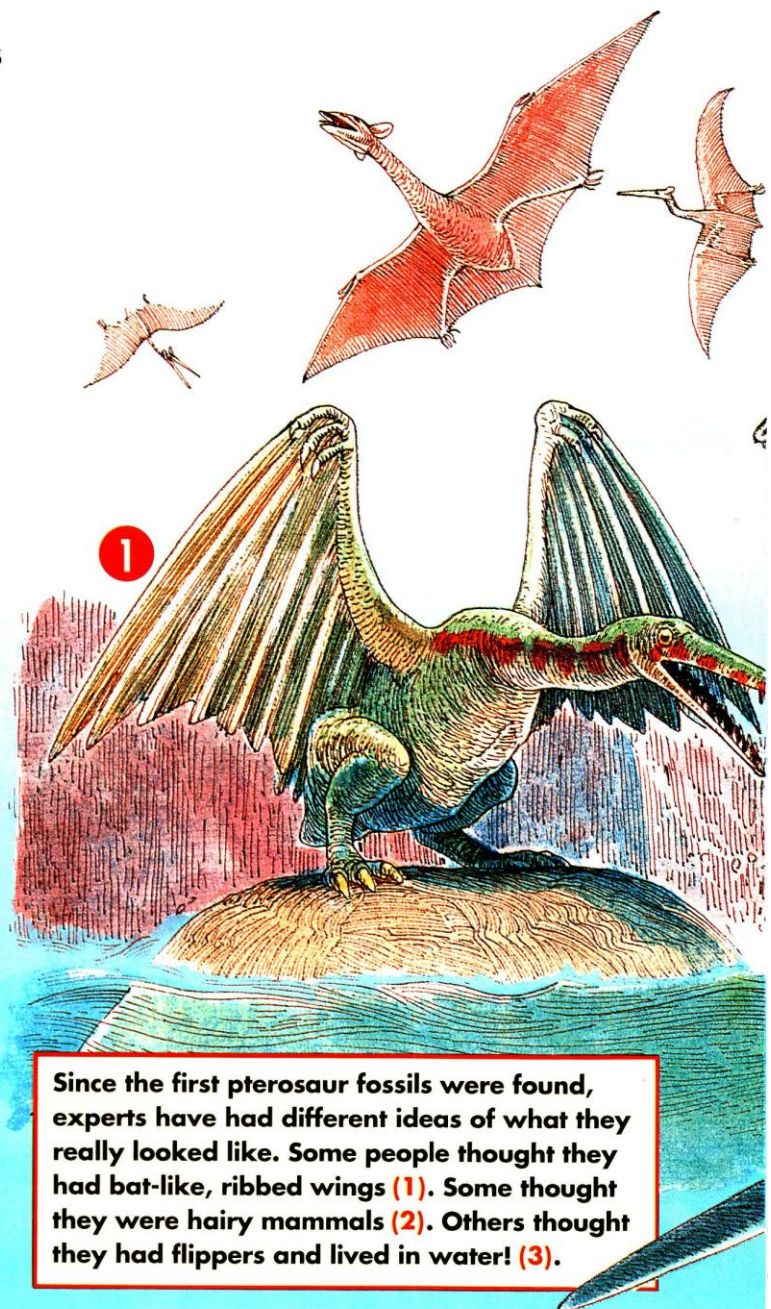
## EARLY FIND

We have known about pterosaurs longer than we have known about the dinosaurs. The first pterosaur was studied in 1784. An almost complete skeleton was found in the German lithographic limestones.

## THE PERFECT NAME

The famous French anatomist George Cuvier came up with a name for this creature. He called it *Pterodactylus*, which means 'wing-finger'. And 'pterodactyl' has become a popular name for any member of the pterosaur group. The name was a good one. One finger on each hand was much longer than the rest of the arm. These finger bones were as thick and strong as the arm bones. They must have been used to support something, and the obvious thing would be a wing.

2056

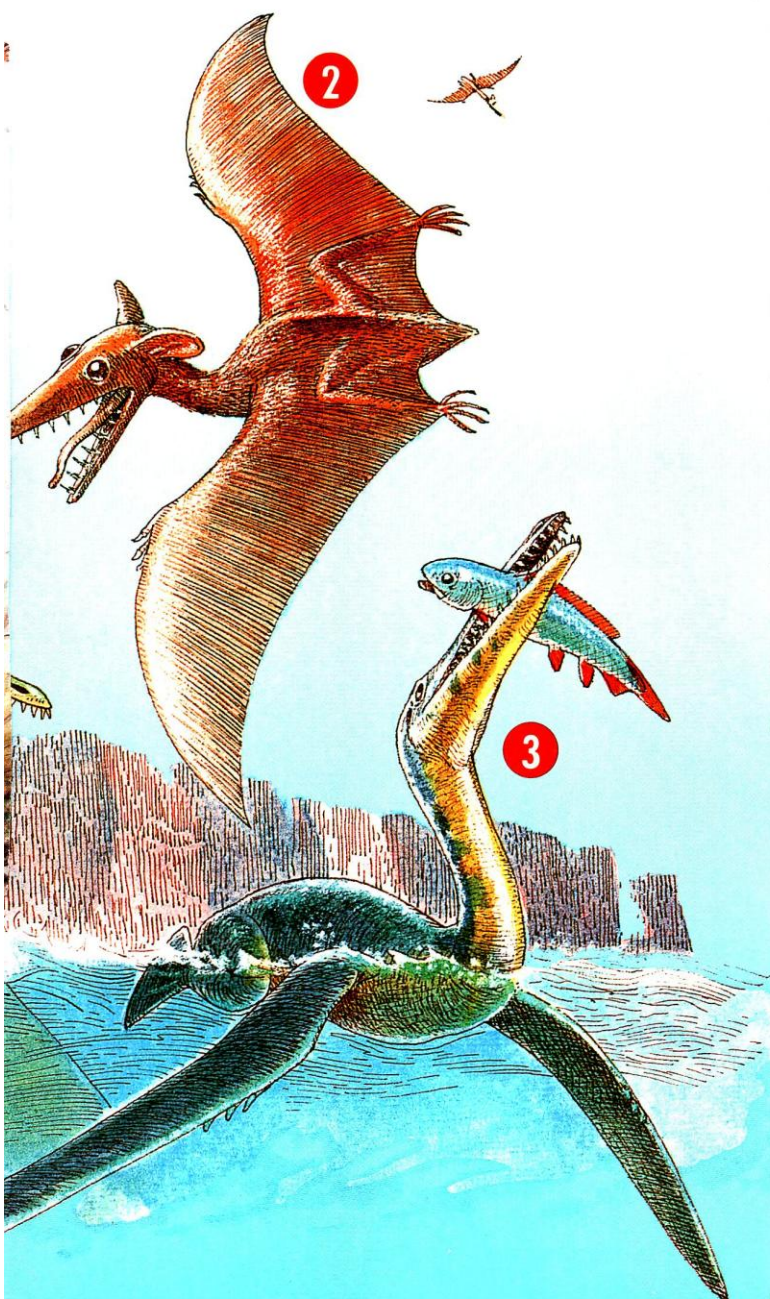


Since the first pterosaur fossils were found, experts have had different ideas of what they really looked like. Some people thought they had bat-like, ribbed wings (1). Some thought they were hairy mammals (2). Others thought they had flippers and lived in water! (3).



**ANOTHER VIEW**

Some people did not think wings were the obvious answer. In 1830, a German zoologist, Johann Wagler, told people he did not believe *Pterodactylus* could fly at all. He thought that it was a swimming beast, related to ichthyosaurs and plesiosaurs. He produced a drawing showing it with an enormous pair of forearm flippers, like an outsized penguin.

**OUT OF STEP**

Some scientists were not convinced that *Pterodactylus* was a reptile either. In 1843, a British zoologist, Edward Newman, felt sure that it was a mammal, and probably a marsupial. He produced drawings showing it covered in fur. Strangely, this is a view people have returned to recently.

**BAT WINGS?**

More and more pterosaur remains began to be found. Some of the more detailed fossils even showed traces of leathery wings. But people still got the wrong idea: many pictures showed pterosaurs with bat-like wings – thin wings supported by several spread-out fingers, like fans.

**GLIDING REPTILES**

Soon, everybody accepted that pterosaurs were reptiles. It was also obvious that their wings were simple, leathery sheets. They were not covered with feathers like birds' wings. These two facts suggested that they were very primitive creatures which could not fly properly. For more than 100 years, people continued to believe that pterosaurs could only glide from tree to tree, or from clifftops to the ground.

**IT'S A FACT****LOSING CONTROL**

The 1966 film 'One Million Years BC' featured pterosaurs with bats' wings – just as the early artists had drawn them. This was probably because the model pterosaurs they used would have been too difficult to control if the wings were supported by only one long finger!





## Is it true

that pterosaur fossils are found all over the world?

Pterosaur fossils have been found on all the continents except Antarctica. Most pterosaurs are found in marine sedimentary rocks. These rocks were formed where there were prehistoric seas and oceans. If, when a pterosaur died, its body fell into the water and sank to the bottom, and it was buried in the soft mud and silt on the seabed, it had a good chance of becoming fossilized.

### SKIN AND BONE

A rethink of what a pterosaur looked like came in 1971. The Russian zoologist A.G. Sharov found pterosaur skeletons in lake deposits in Kazakhstan. There was an odd thing about these skeletons. Fuzzy areas lay around some of the bones. These fuzzy areas turned out to be bits of furry skin! The mud and silt where these pterosaurs had been buried was so fine that it had captured more details than ever before.

### ACTIVE ANIMALS

The fact that pterosaurs were furry was evidence that they were warm-blooded animals, like birds or bats. A furry or feathery covering is necessary to help keep the temperature of an active animal fairly steady. So, fur is also evidence that pterosaurs had a very active lifestyle and could actually fly well. The fur discovery came at the same time that scientists were beginning to argue about the possibility that dinosaurs were warm-blooded. So people were more willing to believe that pterosaurs were warm-blooded, too.

### CLEVER BEASTS!

Other scientists began to look at pterosaur brains, and found that they were bigger than the brains of other reptiles, although not as big as those of birds. The brains seemed very well developed in areas dealing with sight and balance. This is just what you would expect from an active, flying animal.

### TWO LEGS...



Today, some experts believe that pterosaurs could run along the ground on their back legs, with their wings folded back against their bodies.

2058



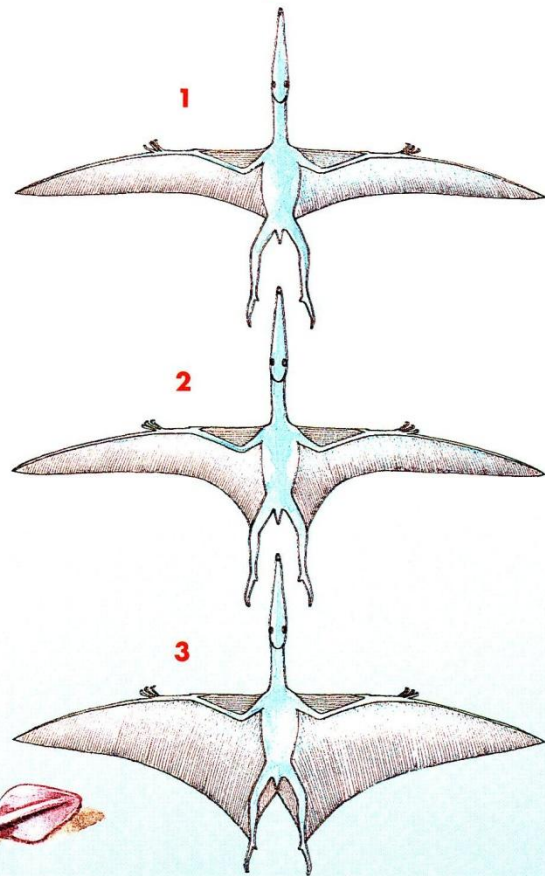
**STILL A PUZZLE**

Most scientists now accept that all the various types of pterosaur were warm-blooded, active flyers. But there are still disagreements between the experts. We know that pterosaur wings were broad, leathery sheets. They were strengthened by fine fibres that spread out over the wings. At the front they were attached to the very long fourth finger, and there was an added flap at the front to help control the speed and direction of flight. But how were the wings attached at the back?

**BODY, LEG OR ANKLE?**

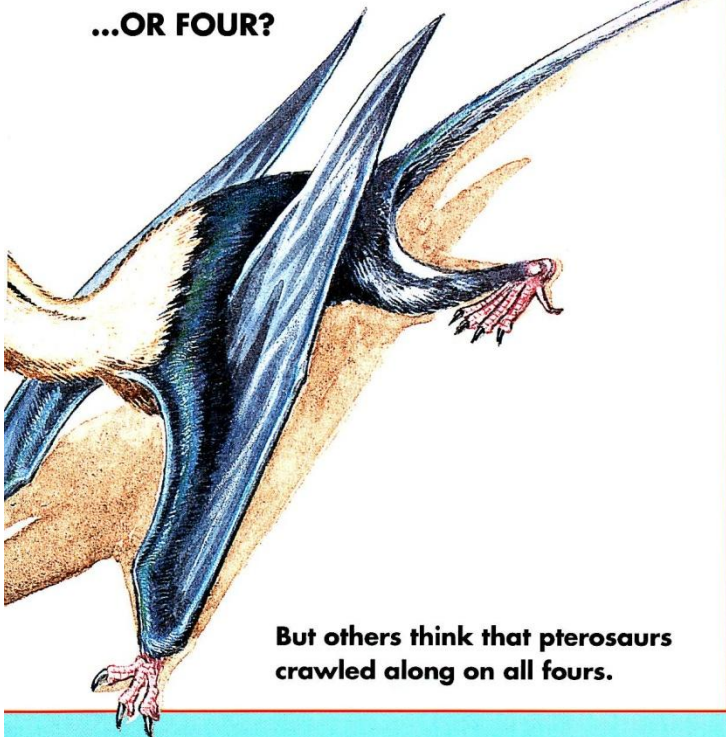
Even now, at scientific gatherings, pterosaur experts will stand up and shout at each other. Some say that the rear edge of the wing was attached to the ankle, so that the whole leg could be used to control flight. Some say that the wing was not attached to the leg at all, but to the body. Others take a middle line, suggesting that the rear edge was attached to the knee.

**WING, WING**



Scientists still do not agree about where the back edges of the wings were attached to a pterosaur. Some say they were attached to its body (1). Others think they were attached to its knees (2). And some believe that the wings were attached to the ankles (3), so that the legs controlled flight.

**...OR FOUR?**



But others think that pterosaurs crawled along on all fours.

**HOW DID IT GO?**

What did a pterosaur do when it was not flying? Did it hang upside-down from tree branches, like a bat? Did it cling to cliff faces, like a lizard, and launch itself off like a gannet? Did it walk on four legs? Was it so finely balanced that it could run around on just its hind legs? No one knows, yet. There is still a great deal to be discovered by the next generation of palaeontologists.





# THE FIRST ALL-AMERICAN DINOSAUR

BORN IN PHILADELPHIA IN 1823, JOSEPH LEIDY WAS SENT TO A GOOD SCHOOL, BUT HE OFTEN PLAYED TRUANT...

WHERE'S LEIDY - HAS ANYONE SEEN HIM?

I CAN'T STAND LATIN - I WANT TO GO INTO THE WOODS TO STUDY NATURE!

AFTER HE GRADUATED FROM UNIVERSITY, HE BECAME A DOCTOR.

STOP SNIFFING JOEL!

SNIFF! SNIFF!

WHY DID I EVER BECOME A DOCTOR? I'M A SCHOLAR, NOT A PRACTITIONER!

IT'S MY FEET. THEY'RE GIVING ME GYP!

IN 1855 ANOTHER SCIENTIST, FERDINAND HAYDEN, FOUND SOME FOSSIL TEETH IN TERRITORY WEST OF THE MISSISSIPPI - HE SENT THEM TO LEIDY.

THREE YEARS LATER, WILLIAM PARKER FOULKE ORGANISED A DIG AT HADDONFIELD, NEW JERSEY, ACROSS THE DELAWARE RIVER FROM PENNSYLVANIA...

THIS IS A WASTE OF TIME!

EXTRAORDINARY!

THESE TEETH OBVIOUSLY CAME FROM SOME SORT OF REPTILE - I WONDER IF THEY WERE RELATED TO THAT ENGLISH CHAP MANTELL'S IGUANODON - OR MAYBE MEGALOSAURUS?

BY THE TIME DOCTOR LEIDY GOT TO THE SITE, MORE BONES HAD BEEN FOUND.

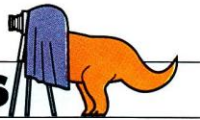
AT THE END OF SEPTEMBER...

WHEN DO YOU PLAN TO FINISH DIGGING?

I THINK WE SHOULD DIG AS LONG AS THE WEATHER LASTS.

USING THE BONES THAT WERE FOUND, JOSEPH LEIDY WAS ABLE TO DESCRIBE THE DINOSAUR THEY HAD BELONGED TO IN GREAT DETAIL - HE CALLED IT HADROSAURUS FOULKII.





HE LEFT MEDICINE WHEN HE WAS 25 AND TOOK A JOB AT THE UNIVERSITY OF PENNSYLVANIA WHERE HE BECAME ASSISTANT TO THE PROFESSOR OF ANATOMY,

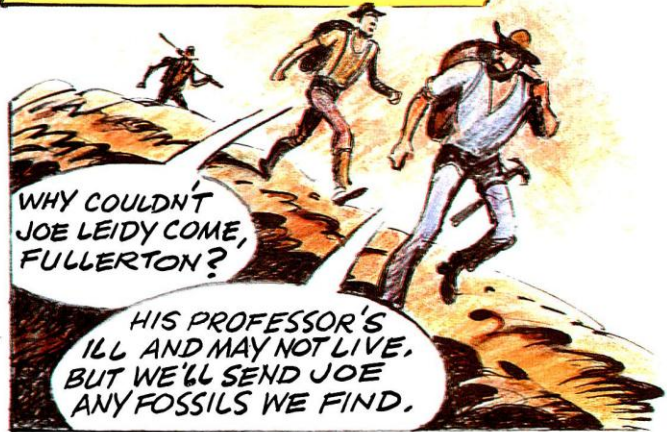
LOOK AT THE SHAPE OF THE PELVIS, JOSEPH.

ONE OF HIS CLOSE FRIENDS WAS PALAEOLOGIST FULLERTON BAIRD. IN 1852 THE TWO MEN DECIDED TO GO ON A FOSSIL-HUNTING EXPEDITION, BUT...



LEIDY WAS ALSO FASCINATED BY FOSSILS—ALTHOUGH THERE WAS NO EVIDENCE THAT DINOSAURS HAD EVER LIVED IN NORTH AMERICA.

IT'S OBVIOUSLY BEEN FRACTURED SIR!



WHY COULDN'T JOE LEIDY COME, FULLERTON?

HIS PROFESSOR'S ILL AND MAY NOT LIVE, BUT WE'LL SEND JOE ANY FOSSILS WE FIND.

YEP—THERE'S NOTHING HERE!

**HEY!**  
LOOK AT THIS—I THINK I'VE FOUND SOMETHING!

THE "SOMETHING" TURNED OUT TO BE A VERY LARGE BONE.

BUT—WHAT IS IT?

CAREFUL! WE DON'T WANT TO DAMAGE IT!

I DON'T KNOW—SOMEONE FETCH JOE LEIDY, QUICK!



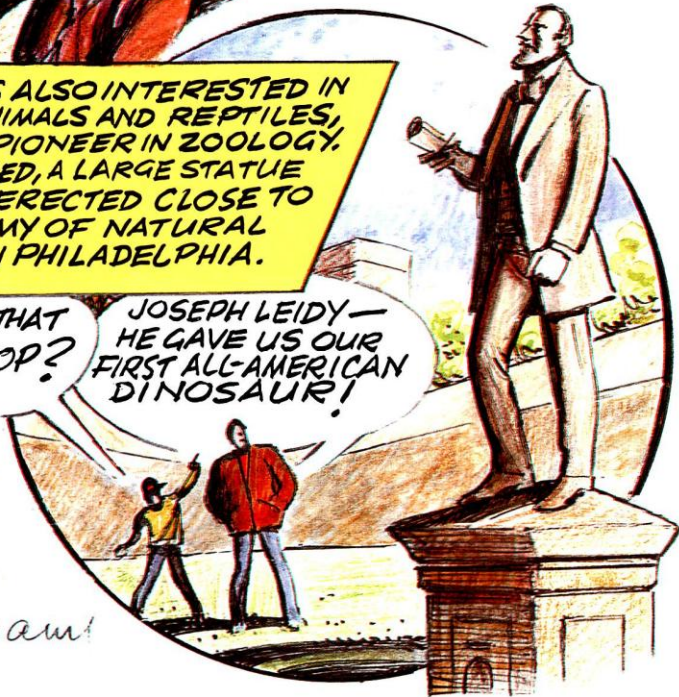
LEIDY WAS ALSO INTERESTED IN MODERN ANIMALS AND REPTILES, AND WAS A PIONEER IN ZOOLOGY. WHEN HE DIED, A LARGE STATUE OF HIM WAS ERECTED CLOSE TO THE ACADEMY OF NATURAL SCIENCES IN PHILADELPHIA.

WHO'S THAT GUY, POP?

JOSEPH LEIDY—HE GAVE US OUR FIRST ALL-AMERICAN DINOSAUR!



*Pat Williams*





# Improve and test your knowledge with... **FACT FILE**

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

## Bad digger

Digging out fossils is skilled work, and takes lots of patience. Even some very famous dinosaur experts are not very good at it. Roy Chapman Andrews, the famous 1920s' dinosaur hunter, was not good at digging out bones. Staff at the American Museum of Natural History still talk about damaged bones as being 'RCA'ed', in memory of the specimens he sent back to the museum.

## He's booked!

Barnum Brown's wife wrote a book of her own. The title was 'I Married a Dinosaur'!

**5** Pterosaur fossils have been found on every continent except:

- a) Antarctica
- b) Asia
- c) North America

**4** Plant-eating *Moropus* used its claws for:

- a) fighting meat-eaters
- b) building nests
- c) digging up bulbs and roots

**3** The strongest bone in a dinosaur's body was:

- a) the shoulder blade
- b) the thigh bone
- c) the jaw bone

**2** *Erythrosuchus* means

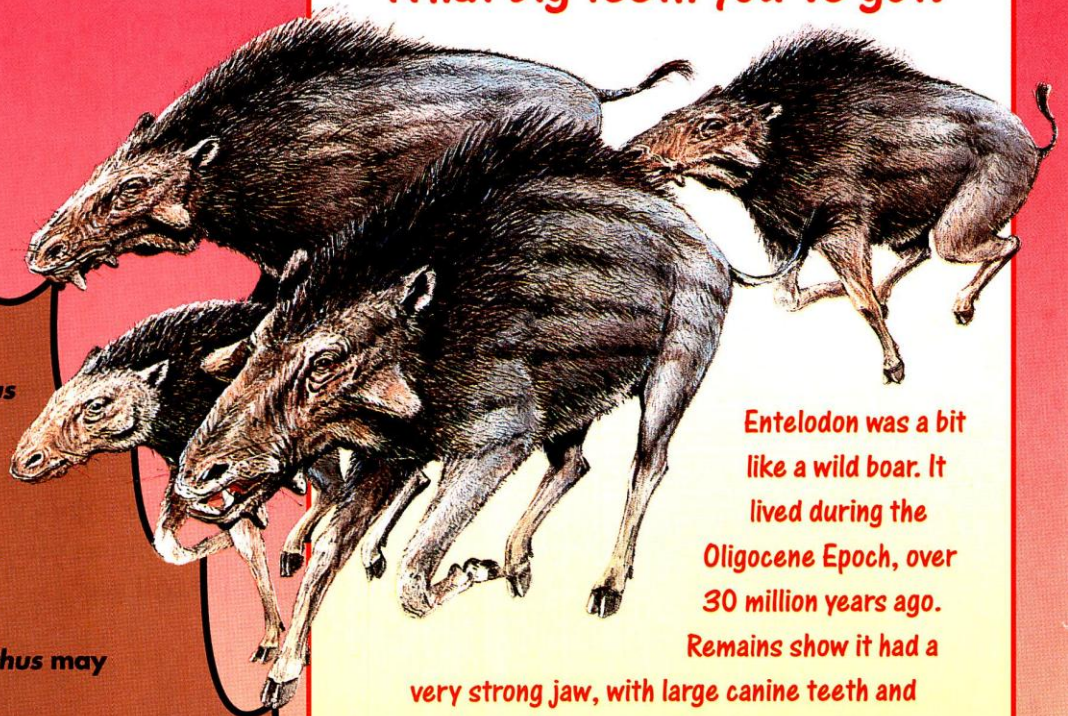
- a) 'red crocodile'
- b) 'early thecodont'
- c) 'creature with cone-shaped teeth'

**1** Invertebrates are:

- a) early mammals
- b) animals without backbones
- c) young dinosaurs



## What big teeth you've got!



- 6** Remains of *Polacanthus* have been found:
- a) on the Isle of Dinosaurs
  - b) on the Isle of Capri
  - c) on the Isle of Wight

- 7** *Compsognathus* may have eaten:
- a) scorpions
  - b) grass
  - c) sheep

- 8** Pterosaurs are winged:
- a) mammals
  - b) reptiles
  - c) insects

- 9** *Amargasaurus* was named after:
- a) the person who found it
  - b) the place it was found
  - c) the colour of its skin

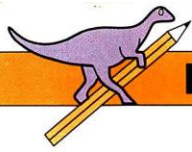
- 10** *Palaeouloborus* was a prehistoric:
- a) crocodile-like reptile
  - b) pterosaur
  - c) spider

*Entelodon* was a bit like a wild boar. It lived during the Oligocene Epoch, over 30 million years ago. Remains show it had a very strong jaw, with large canine teeth and powerful grinding teeth behind. Experts think it may have been prepared to eat almost anything from roots to the remains of other creatures.

Answers to the questions on inside back cover

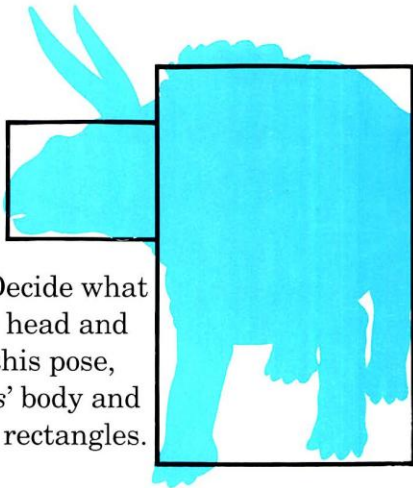
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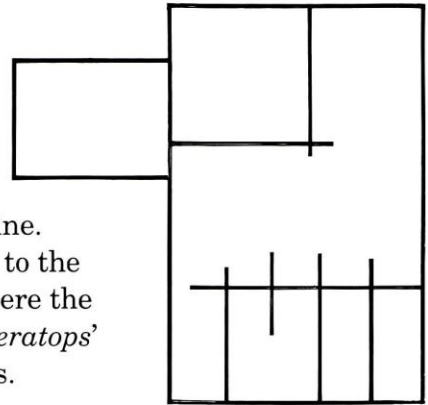


# ARRHINOCERATOPS

**1** First, take a close look at a picture of the dinosaur you want to draw. Decide what basic shape the head and body make. In this pose, *Arrhinoceratops*' body and head make two rectangles.



**2** Decide where the legs meet the body. Mark these positions with a straight line. Draw a box next to the head to show where the edge of *Arrhinoceratops*' massive frill goes.

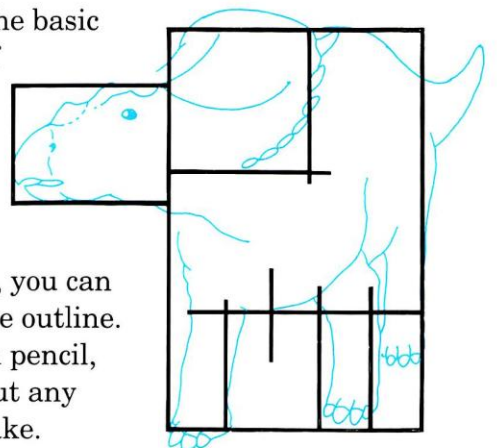


## Fact box

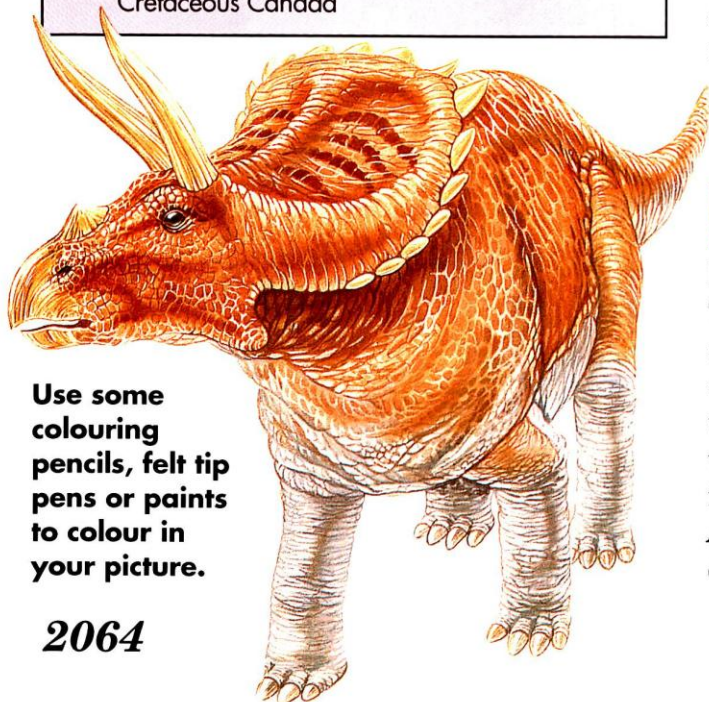
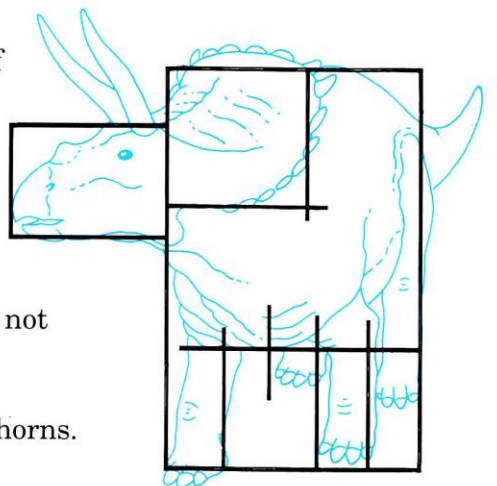
*Arrhinoceratops* had a large frill, two long brow horns and a small nose horn.

- **NAME:** *Arrhinoceratops* (a-rye-no-serra-tops) means 'no nose-horned face'
- **GROUP:** dinosaur
- **SIZE:** 9m long
- **FOOD:** plants
- **LIVED:** about 80 million years ago in Late Cretaceous Canada

**3** Look at the basic outline of the dinosaur. If you are happy that the main body parts are in the correct positions, you can start filling in the outline. Do this lightly in pencil, so you can rub out any mistakes you make.



**4** Finish off all the little details. Try adding some lines to show the texture of tough, wrinkly skin. Do not forget to add *Arrhinoceratops*' distinctive, long horns.



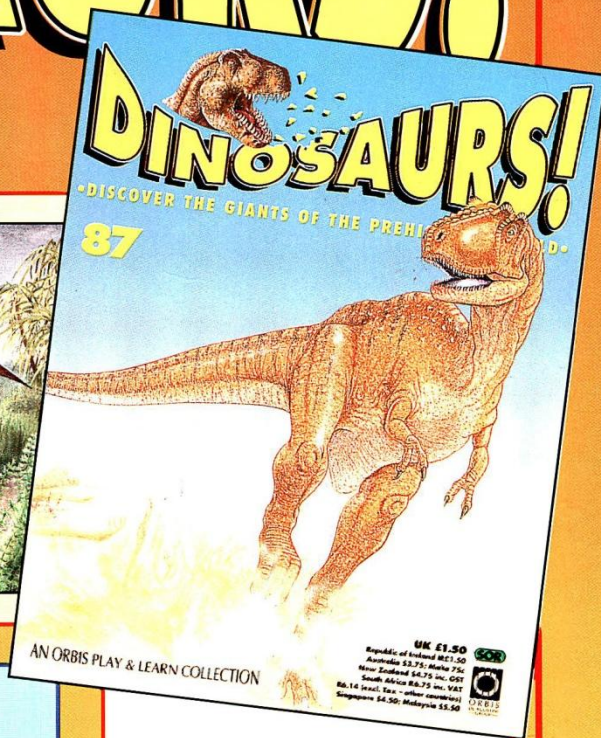
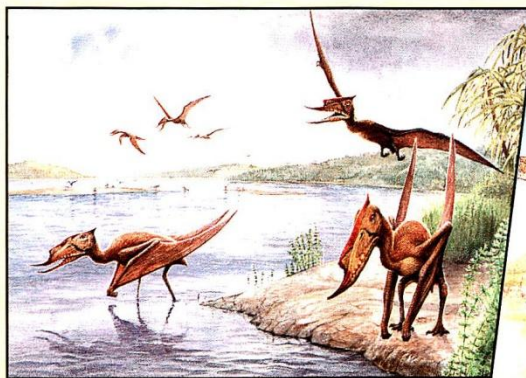
Use some colouring pencils, felt tip pens or paints to colour in your picture.



COMING IN PART 87 OF

# DINOSAURS!

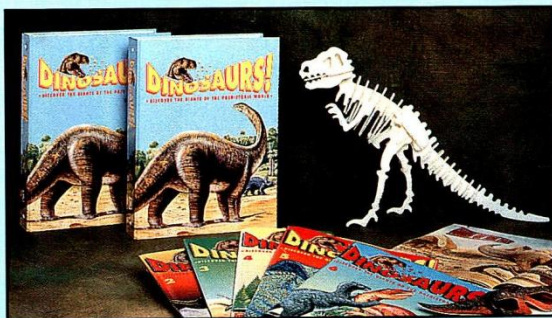
Who lived under the dinosaurs' feet? Find out in PREHISTORIC WORLD. How did pterosaurs fly? Read all about it in TIME DETECTIVE.



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Amazing new finds in SPOTTER'S GUIDE and IDENTIKIT HISTORY IN PICTURES 3-D GALLERY GIANTS OF THE PAST

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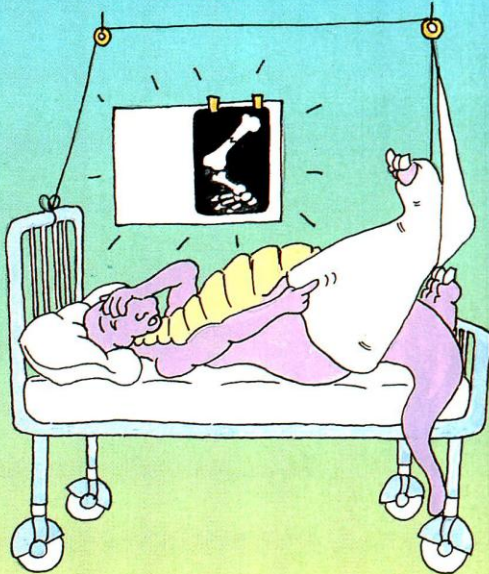
ANSWERS TO FACT FILE QUESTIONS: 1.b 2.a 3.b 4.c 5.a 6.c 7.a 8.b 9.b 10.c





Dr David Norman of Cambridge University answers your dinosaur questions

# ASK THE EXPERT



## What was the biggest bone in a dinosaur's body?

The biggest, heaviest bone in most dinosaurs was the femur or thigh bone. The two thigh bones carried most of the weight, so they were big and very strong. Some dinosaurs had a bone that matched the size of these thigh bones. This was the scapula or shoulder blade. In some larger sauropods, this bone was as long as, or longer than, the biggest thigh bones. But the shoulder blade was thinner and flatter, so it would not have been as heavy or as strong.

## Why is Pachyrhinosaurus called a horned dinosaur if it didn't have a horn?

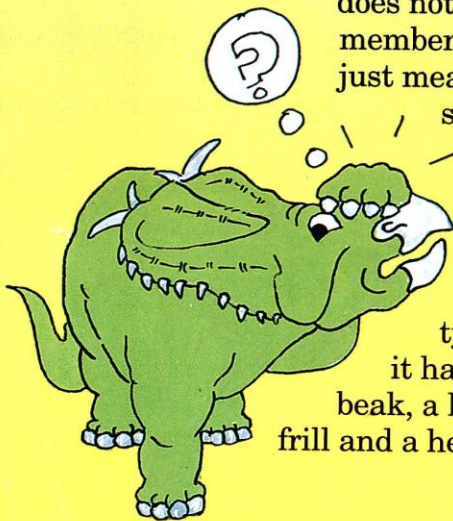
This dinosaur did not have the spiky nose typical of members of the ceratopian ('horned face') group of dinosaurs. This

does not mean it is not a member of this group, it just means that it is

slightly odd when compared to the others. In every other way, this dinosaur is a

typical ceratopian:

it had a parrot-like beak, a large, bony neck-frill and a heavy body.



## Could dinosaurs get fat?

Some animals that are bred by humans, on farms or as pets, can become fat. But very few animals that live in the wild become overweight because they have to hunt for food. Some animals store fat in their bodies for hibernating, and to keep themselves warm if they live in the oceans. But dinosaurs did not do either of these, so it is unlikely that they got fat.

