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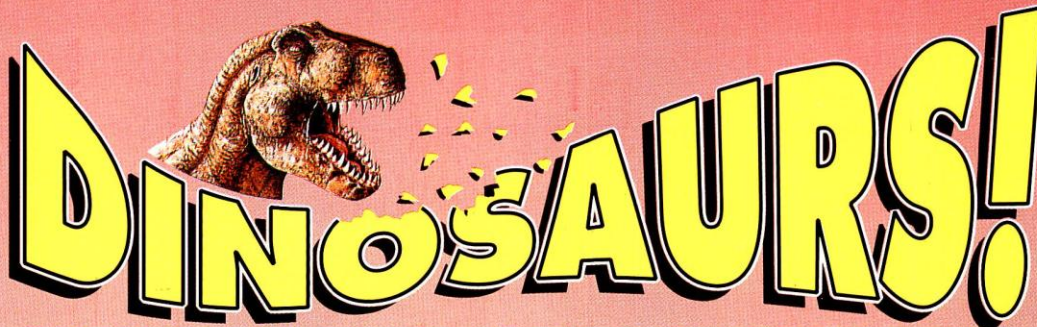
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DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •



IDENTIKIT

Find out about one huge dinosaur and two prehistoric creatures

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Shiver with the Ice Age creatures in CHILLING OUT 1878



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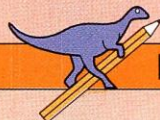
TIME DETECTIVE

Discover the work of the PREHISTORIC EYEWITNESSES who have left a record of animals that no longer exist 1888



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HOW TO DRAW

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3-D Gallery

Compsognathus tries to catch a flock of pterosaurs 1884

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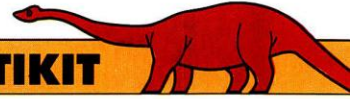
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UTAHRAPTOR

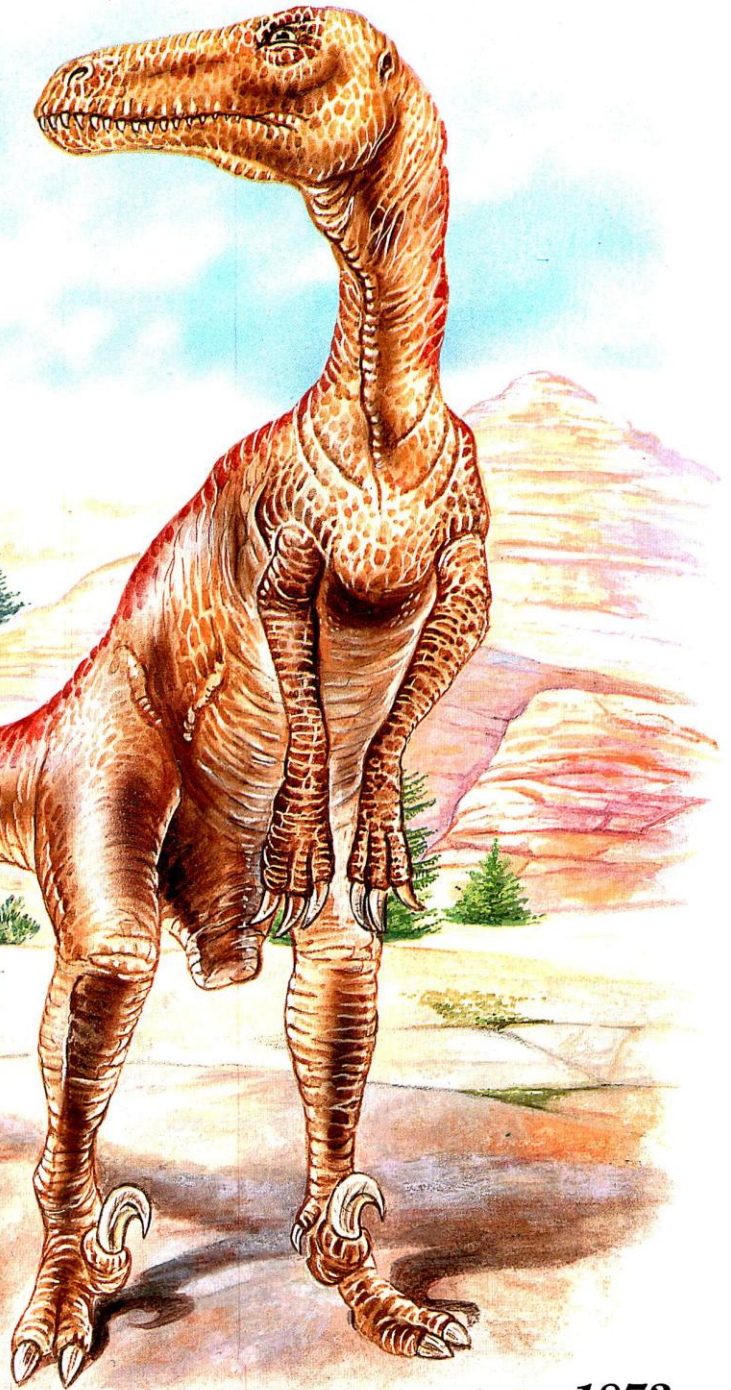
A savage 'switchblade' claw on each hind foot made *Utahraptor* one of the deadliest dinosaurs of all.



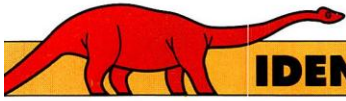
Utahraptor lived in the Early Cretaceous Period, about 125 million years ago. It was by far the largest and the fiercest of the dromaeosaurids, or 'running lizards'. When it stood straight, an adult *Utahraptor* was the same height as two tall men standing on each other's shoulders. Every member of this ferocious group of flesh-eaters was armed with a pair of savage, sickle-shaped hind claws.

QUICK WORKERS

The dromaeosaurids were among the fastest as well as the fiercest meat-eating dinosaurs. Although *Utahraptor* probably weighed about one tonne, it was built rather like a bird. It could have sprinted after its prey on its powerful legs as quickly as today's ostrich. Dromaeosaurids such as *Utahraptor*, *Deinonychus* and *Velociraptor* may have hunted in packs, running down their prey and, once they had a victim surrounded, ripping at it with their claws and teeth.



1873

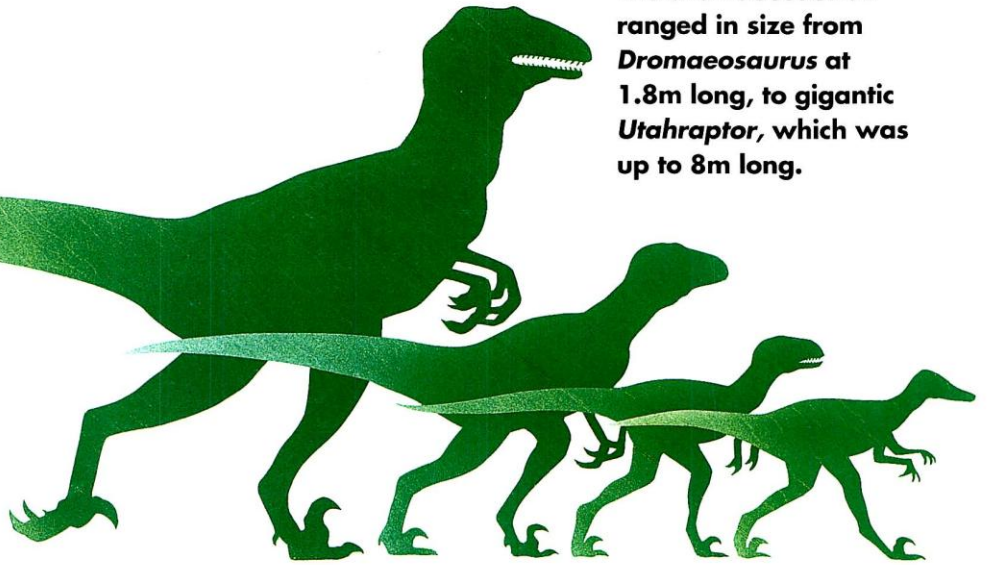


IDENTIKIT

KILLER CLAW

Utahraptor's main weapons were the two 'switchblade' claws on its

back feet. It could raise the claws when it was running to avoid damaging them. Then it could flick them forwards to attack its prey. A cut with just one of those talons would have sliced through its victim's body.



Utahraptor

Deinonychus

Velociraptor

Dromaeosaurus

The dromaeosaurids ranged in size from *Dromaeosaurus* at 1.8m long, to gigantic *Utahraptor*, which was up to 8m long.

SCISSOR HANDS

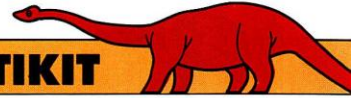
The huge hands of *Utahraptor* were armed with sharp, bladed claws. Like its smaller relative, *Deinonychus*, it probably had special wrist joints that meant its hands were as flexible as human hands. The dinosaur could have held its prey in a deadly grip. Each hand was big enough to wrap completely round a football and had three powerful talons.

IT'S A FACT

COOL KILLER

Utahraptor may have been one of the most intelligent of the hunting dinosaurs. It had a brain the same size as a cat's, to help it plan its moves. Some scientists think *Utahraptor* was such an efficient killer it could have wiped out whole species.





TALL TAIL

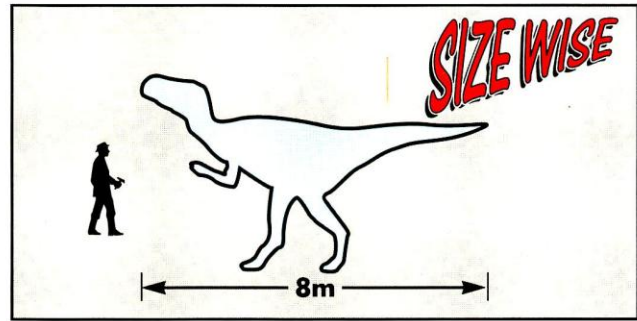
A long, strong tail helped *Utahraptor* to balance itself as it dashed along. The tail was probably strengthened with thin, bony rods at the tip, to keep it stiff enough to steady the dinosaur's huge body. *Utahraptor* could also have used its tail to support itself when it kicked out.

SAW POINT

Utahraptor had powerful jaws lined with saw-like teeth. Its jaws would have opened extra wide and snapped shut with lightning speed.

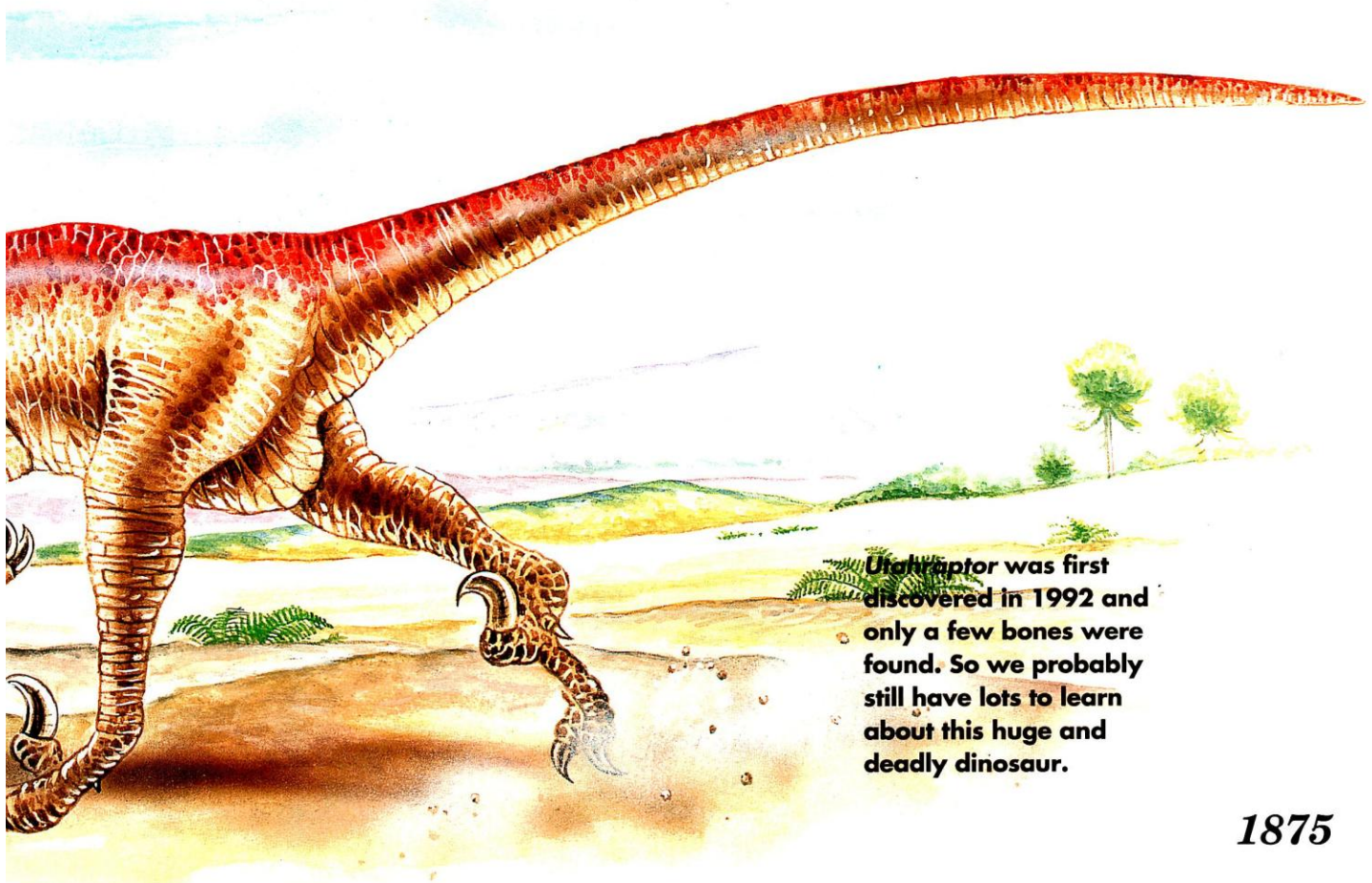
LEADER OF THE PACK

Experts believe that dromaeosaurids hunted in packs, and that male *Utahraptor* may have had fierce clawing contests to decide who should be leader.

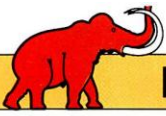


MONSTER FACTS

- **NAME:** *Utahraptor* (yoo-tah-rap-tor) means 'Utah plunderer'
- **GROUP:** dinosaur
- **SIZE:** up to 8m long
- **FOOD:** meat
- **LIVED:** about 125 million years ago in the Early Cretaceous Period in North America



Utahraptor was first discovered in 1992 and only a few bones were found. So we probably still have lots to learn about this huge and deadly dinosaur.

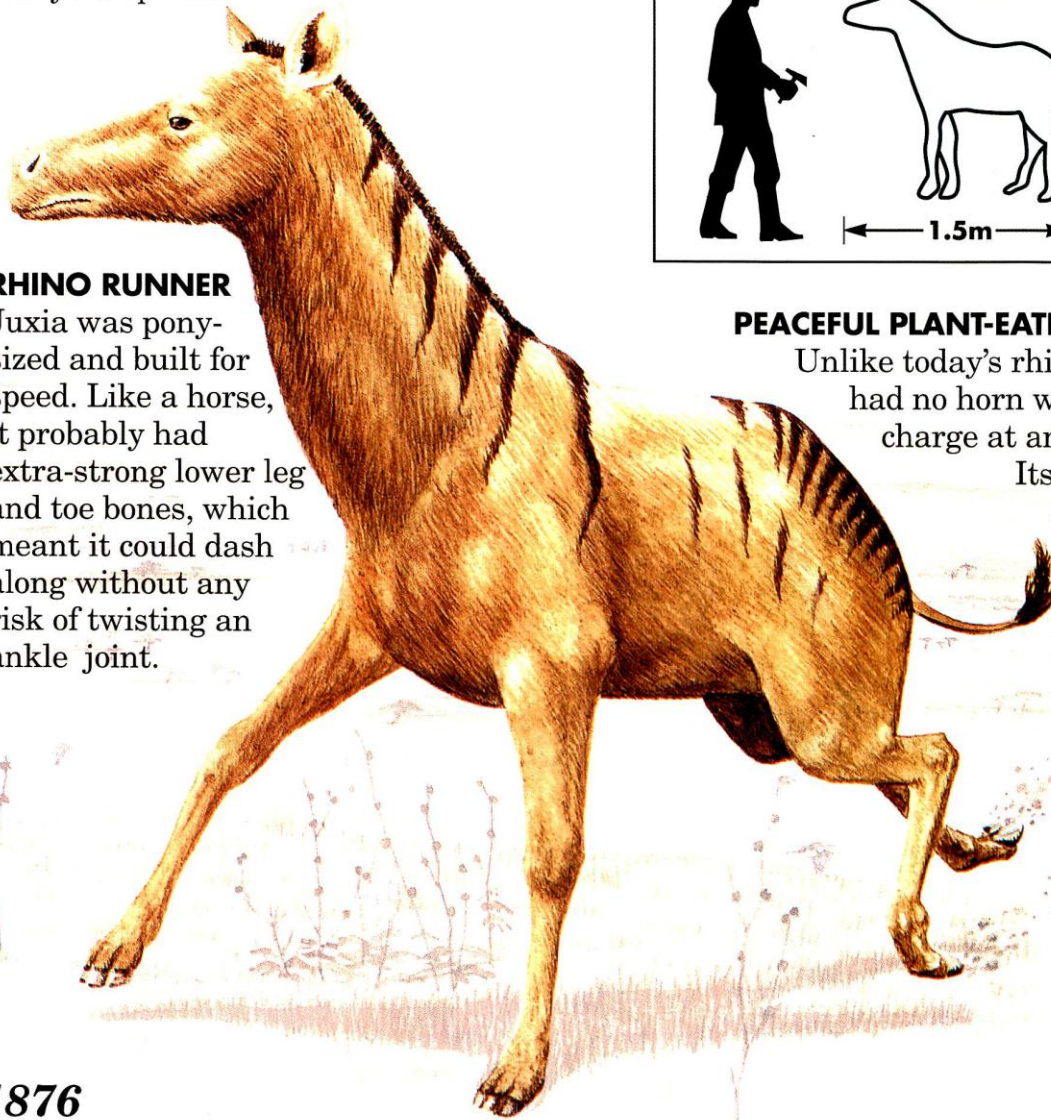


JUXIA

Juxia was a prehistoric rhinoceros built for running.



Galloping along on its four slim legs, *Juxia* looked more like a horse than a rhinoceros. But the earliest rhinos came in all shapes and sizes. They ranged from creatures that were no bigger than today's tapir, to lumbering giants four times heavier than today's elephant.

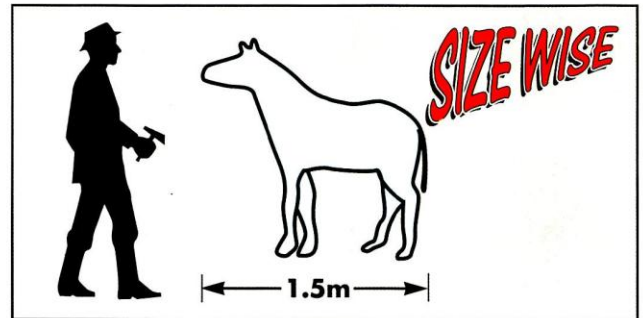


RHINO RUNNER

Juxia was pony-sized and built for speed. Like a horse, it probably had extra-strong lower leg and toe bones, which meant it could dash along without any risk of twisting an ankle joint.

MONSTER FACTS

- **NAME:** *Juxia* (joo-ck-see-a) means 'from *Juxia*'
- **GROUP:** rhinoceros
- **SIZE:** up to 1.5m long
- **FOOD:** plants
- **LIVED:** about 40 million years ago in the Late Eocene in Asia



PEACEFUL PLANT-EATER

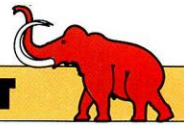
Unlike today's rhinoceros, *Juxia* had no horn with which to charge at an enemy.

Its only defence against hungry meat-eaters, such as *Hyaenodon*, was to outrun them.

TIPTOES

Juxia, an odd-toed ungulate, would have walked on its toes, rather like today's pony.

1876



HYPERODAPEDON

Built like a barrel, *Hyperodapedon* was one of the most successful plant eaters before the dinosaurs arrived.

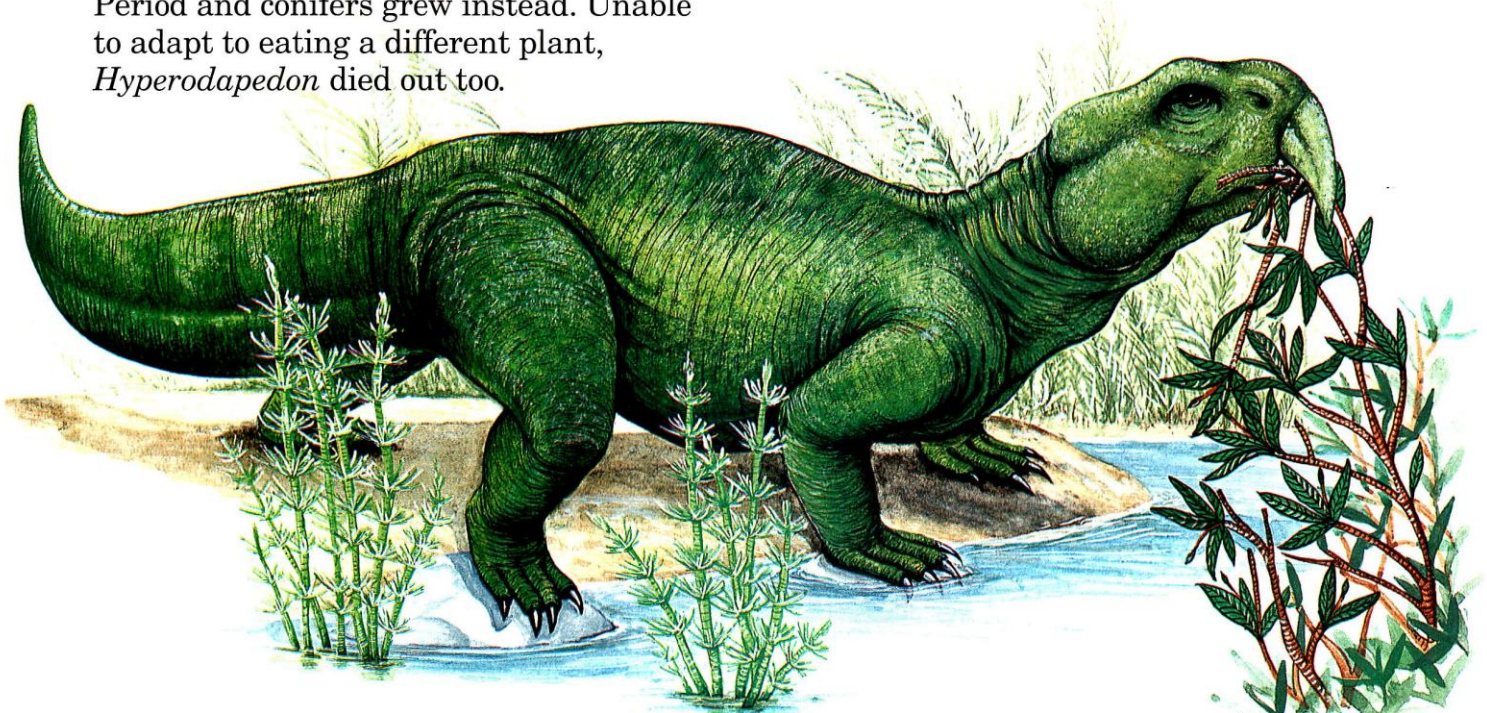
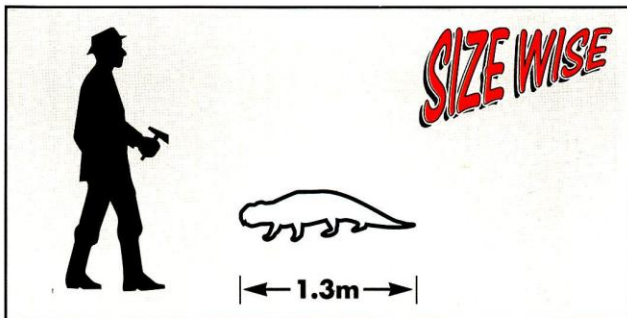
Hyperodapedon was a member of the rhynchosaur group of early reptiles. They flourished around the world more than 220 million years ago. *Hyperodapedon* had a heavy, pig-sized body and a large head lined with many rows of powerful teeth. Although *Hyperodapedon* could only bite up and down, and could not move its jaws from side to side, its teeth were very efficient for munching plants.

END OF AN ERA

Hyperodapedon feasted on the seed ferns which grew everywhere in the Triassic. But seed ferns died out at the end of that Period and conifers grew instead. Unable to adapt to eating a different plant, *Hyperodapedon* died out too.

MONSTER FACTS


- **NAME:** *Hyperodapedon* (hy-per-o-dap-e-don) means 'upper pavement tooth'
- **GROUP:** reptile
- **SIZE:** up to 1.3m long
- **FOOD:** plants
- **LIVED:** about 220 million years ago in the Late Triassic Period in India and Scotland



1877

Chilling

Blizzards whistle down from the Poles, and the seas freeze over – it is the coming of an Ice Age.

 In the long history of the Earth, there have been many Ice Ages, when the frozen ground has been covered in snow all year round.



Anteosaurus



Jonkeria

1878

OLD ICE

In the distant era of the Precambrian, a time that spans seven-eighths of the Earth's history, there were at least four Ice Ages. But there are no good fossils of the simple microscopic creatures that lived in those times. We do not know what effect the coming of the cold had on them. During the Ordovician yet another Ice Age began. At the end of this Period, several kinds of trilobites and graptolites died out. This was probably due to the change in climate brought about by the Ordovician Ice Age.



Out

THE FROZEN SOUTH

The next major Ice Age came at the end of the Carboniferous and the beginning of the Permian. Vast areas of ice covered South Africa, India, Australia and southern South America. At that time, all these continents were joined together in one great land mass.



Dicynodon

ICY CENTURIES

Enormous snowfalls probably smothered the land. Glaciers – rivers of ice – crept towards the Equator. (Today, Florida and the Persian Gulf lie within the area once covered by ice!) This time the ice remained for almost 20 million years.

SURVIVING THE COLD

By this time, many animals had invaded the land. Mammal-like reptiles were common. These animals may have been covered with hair, which would have helped them to withstand the cold, as the ice spread across their homes.

What is?

A GLACIER

When snow falls and does not melt, the layers of snow at the bottom become squeezed together. They turn into ice. When ice is squeezed like this, it flows like soft jelly. It usually flows downhill as a kind of slow river of ice. This is a glacier. The ice at the surface is not being squeezed, and so it cracks and shatters. This gives the surface of the glacier its jagged look.

OUTLOOK WARMER

These freezing conditions gradually gave way to the warmer, wetter times of the Mesozoic, when dinosaurs first walked on the Earth.



Trochosaurus



Blattoidealestes

The mammal-like reptiles of the Permian may have evolved hairy coats to help them survive the cold.



RECENT ICE AGE

The Ice Age that we know most about is the Pleistocene Ice Age. It finished about 10,000 years ago. The Pleistocene was not a single Ice Age. It lasted for 1.7 million years, and during that time the ice sheets and glaciers came and went about 20 times. In between the cold spells, the climate became even warmer than it is today.

KEEPING WARM

Animal life in the Pleistocene was spectacular. Huge mammoths and woolly rhinoceroses wandered the frozen wastes. They scraped away the snow to graze on the sparse vegetation. Herds of great Irish elk and aurochs migrated across the icy wilderness. Our ancestors learned to make fires, build shelters and fashion clothes out of animal skins to keep themselves alive.

CHANGING CLIMATES

Even in the deepest Ice Age, the whole world did not cool down. There were still tropical forests at the Equator but, as the sheets of ice spread out from the Poles, the cold areas became larger.

TOO FAR FROM THE SUN?

No one is sure what causes an Ice Age. It may involve the way the Earth wobbles like a spinning top as it travels round the Sun. The Earth is tilted on its axis, and this gives us the seasons. Over very long periods of time, the tilt of the Earth changes. At certain times, one area of the Earth may be tilted so far away from the Sun that it gets very cold. This may trigger an Ice Age.

In the Pleistocene Ice Age, woolly rhinos, mammoths and herds of Irish elk and aurochs roamed the land.

1880



A glacier (left) is a river of ice. This one is in New Zealand. Even when the Earth was in the grip of an Ice Age, there were still warm areas like this (right) near the Equator.

OCEAN EFFECT

The oceans may also have an effect. Ocean water keeps climates from being extreme. When all the continents were jammed up together, as they were in Carboniferous and Permian times, the interior of the landmass would have been so far from the ocean that it could have become very cold, and so started an Ice Age.

ANOTHER ICE AGE?

At present, the Atlantic Ocean is getting larger and all the continents are surrounded by water. Some scientists think that we may not see another Ice Age for hundreds of millions of years.





1881

GIANTS OF THE PAST



1882

An illustration of two young Utahraptor dinosaurs in a mock battle. They are shown in profile, facing each other with their mouths open, revealing sharp teeth and pink tongues. Their bodies are covered in reddish-brown scales. The background is a simple, light-colored landscape with some sparse vegetation.

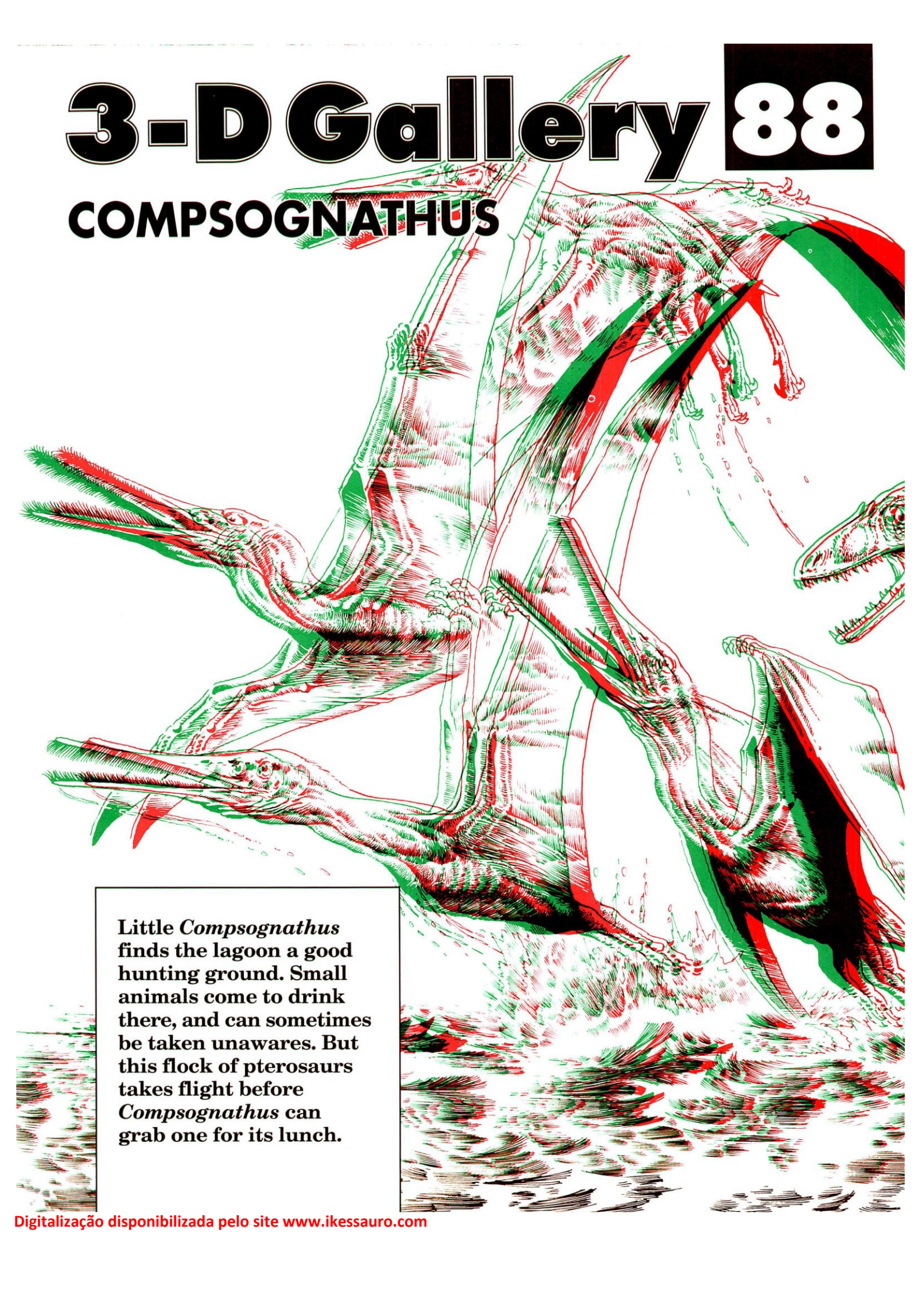
UTAHRAPTOR

Two young *Utahraptor* fight a fierce mock battle. Today it is only a game, but soon they may be rivals and fight a battle to the death for the leadership of their herd. Their killer claws can inflict terrible damage, slicing through flesh. Their reinforced tails help them to balance as they kick and manoeuvre to gain an advantage. The lessons they learn now will be vital in the years to come.

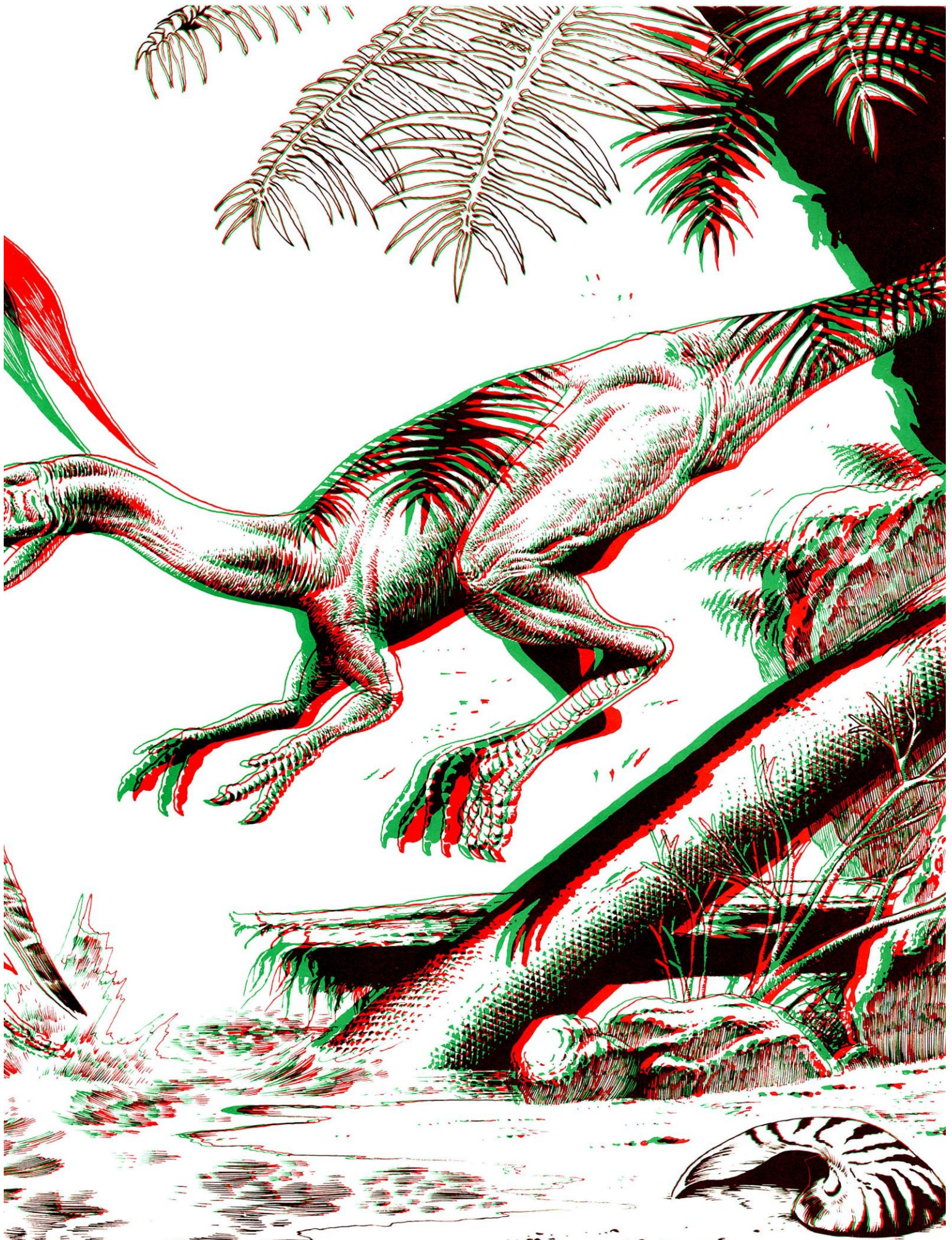
1883

3-D Gallery 88

COMPSOGNATHUS



Little *Compsognathus* finds the lagoon a good hunting ground. Small animals come to drink there, and can sometimes be taken unawares. But this flock of pterosaurs takes flight before *Compsognathus* can grab one for its lunch.





Inside story

YESTERDAY AND TODAY

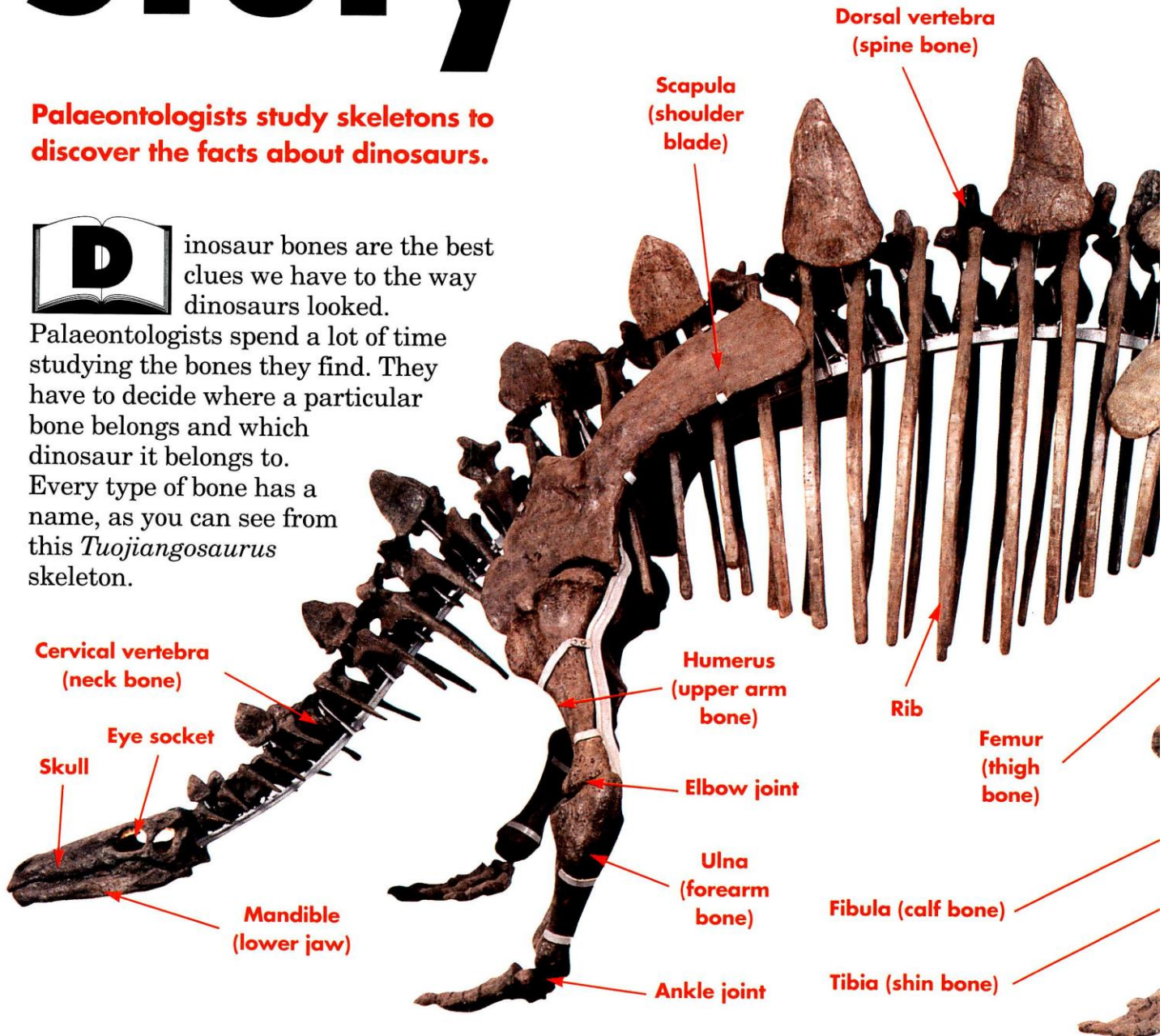
Palaeontologists don't just study extinct animals, they also look at the skeletons of today's animals. An animal's skeleton affects the way it can move, how it hunts, and indicates which other animals it is related to. This is true of dinosaurs too. So, by studying a skeleton, you can work out what it looked like and how it behaved.

Palaeontologists study skeletons to discover the facts about dinosaurs.



Dinosaur bones are the best clues we have to the way dinosaurs looked.

Palaeontologists spend a lot of time studying the bones they find. They have to decide where a particular bone belongs and which dinosaur it belongs to. Every type of bone has a name, as you can see from this *Tuojiangosaurus* skeleton.



1886

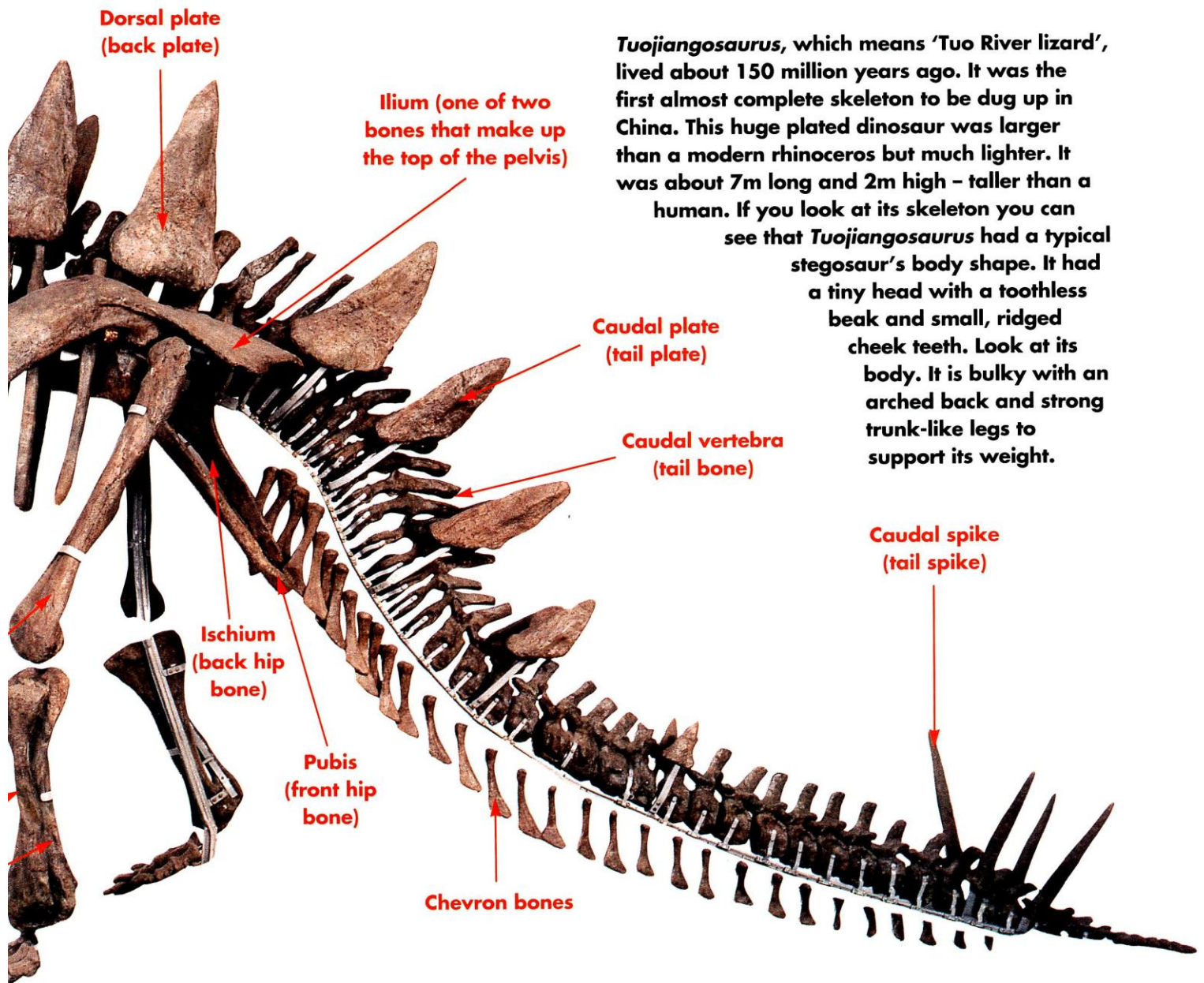


HEAVY BODY, BIG LEGS

Different types of dinosaur had special types of bone. Heavy dinosaurs had thick, solid leg and arm bones to support their weight. Light dinosaurs had hollow, light limb bones. Carnosaurs had holes in their skulls, which made them lighter and meant they could move their heads around when they were looking for prey.

NEW LOOK DINOSAURS


As the experts learn more about a dinosaur, they may change their minds about what it looked like. They may decide that the skeleton should be put together differently. When *Tuojiangosaurus* was first discovered, they thought the plates along its spine lay down flat. Experts now think they stuck out.



Tuojiangosaurus, which means 'Tuo River lizard', lived about 150 million years ago. It was the first almost complete skeleton to be dug up in China. This huge plated dinosaur was larger than a modern rhinoceros but much lighter. It was about 7m long and 2m high - taller than a human. If you look at its skeleton you can see that *Tuojiangosaurus* had a typical stegosaur's body shape. It had a tiny head with a toothless beak and small, ridged cheek teeth. Look at its body. It is bulky with an arched back and strong trunk-like legs to support its weight.

Prehistoric eyewitnesses

Paintings from the past reveal what prehistoric animals really looked like.

 **H**ow do we know what a mammoth looked like? Several skeletons have been found, but they only show the rough shape of the animal. Mammoths have also been found preserved in frozen mud, but their remains are rather shrivelled. Clumps of hair have even been discovered, but these have probably changed colour over thousands of years. However, prehistoric cave paintings can tell us more about how these animals looked.

THE FIRST ART GALLERIES

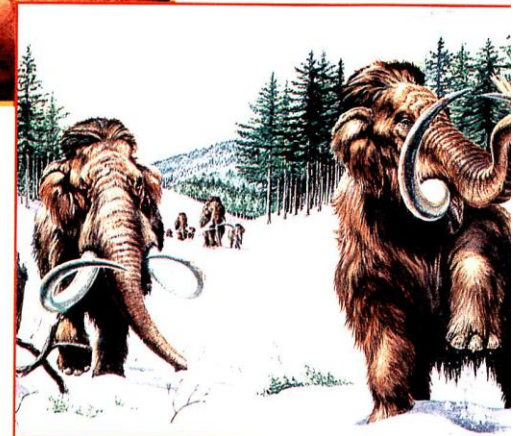
In France, along the valley of the Dordogne river, there are many cliffs. About 20,000 years ago, during the Ice Age, these caves were the homes of people that we call Cro-Magnon man. In the same cliffs, there are caves whose walls are covered with animal pictures. There are paintings of familiar animals, such as reindeer, horses and bears. There are also drawings of animals that no longer exist. We do not know why people engraved, drew and painted these animals.

1888



Our ancestors drew pictures of prehistoric animals on the walls of their caves.

This is how two artists have drawn woolly mammoths. The cave painter was able to draw the animal from real life!



PYRENEAN PAINTINGS

Another famous site of Ice Age paintings is in the Pyrenees – a mountain range in northern Spain. Here, too, the caves are covered with pictures of the past. Shaggy bison are shown along with the extinct aurochs – an ancestor of today’s cattle.

This painting shows two woolly rhinoceroses walking along. It was found in the Dordogne Valley in France.



Woolly rhinoceros

MAMMOTH HUMPS

The cave paintings of mammoths show they had a fatty hump, like a camel’s, on their backs. Skeletons do not show this bump, so we wouldn’t have known about it without the cave paintings.

WOOLLY RHINOS

Cro-Magnon man also hunted the woolly rhinoceros. Several caves in central France have vivid drawings of this shaggy beast.

IT’S A FACT

CRO-MAG COPIES

The best Cro-Magnon paintings from the Dordogne area of France are found at a place called Lascaux. They were discovered in 1940 by some children who were playing in the cave. After the cave had been visited by millions of people, the pictures began to fade with the heat and the moisture. In the 1960s the caves were closed to visitors. Artificial caves made from glass fibre have been built nearby. There, you can see perfect copies of the original paintings.

CAVE LIFE

Cave paintings not only tell us about the animal life, they give us clues to the way people lived and the world they lived in.

A DIFFICULT CROSSING

One wall painting at Lascaux shows a herd of deer crossing a river. All you can see is a row of heads. One deer seems to have lost its footing and is being washed away. We can guess from this that Cro-Magnon people used to watch the deer migrating. If the local rivers were in flood, the rush of water would have been strong enough to wash away some of the deer as they were crossing.

UNDERGROUND ART

Not all the caves are easy to reach. In 1991, divers discovered a cave in the south of France. It can only be reached by going through a submerged tunnel, 33m below sea level!

ODD GIRAFFE

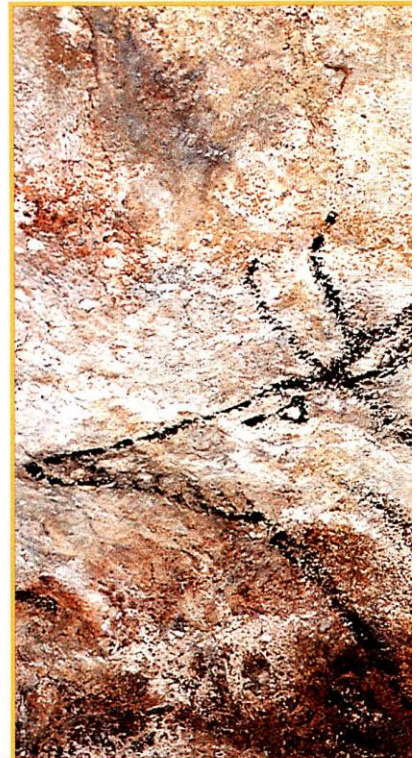
Some cave paintings raise more questions than they answer. One of the paintings in the Sahara Desert is of a strange animal with large horns. Nobody can make out what it is supposed to be. Some scientists think it is a *Sivatherium*. This is a gigantic giraffe with horns like moose antlers.

What is? THE BEAST OF TROIS FRERES

Trois frères means 'three brothers' in French. The Beast of Trois Frères is a cave painting in the French Pyrenees. It shows a creature with a human body, arms and legs, but with a deer's head and tail. The most likely explanation is that it shows a sorcerer wearing a deer mask during a ceremony to bring good luck to a hunting trip.

1890

This cave painting was discovered in Lascaux, France. It shows a herd of migrating deer crossing a river.

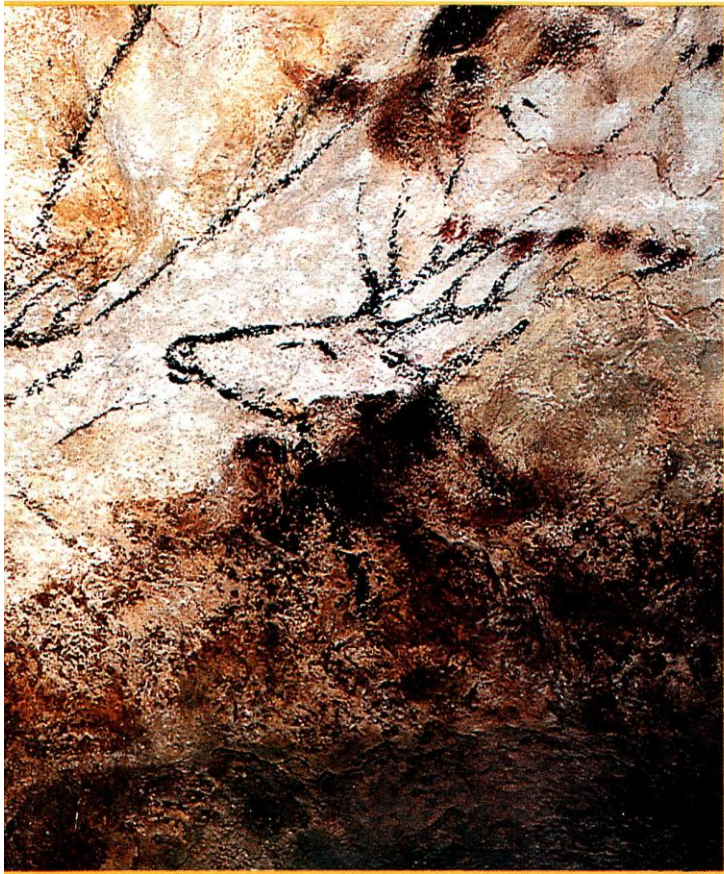


This is another painting from Lascaux. It shows a bison standing next to a man.



NOT SO OLD

Until this mysterious painting was found in the Sahara Desert, no one had thought that early people lived at the same time as *Sivatherium*. Then, in 1977, someone noticed that a bronze statuette, which had been discovered in Iraq in 1927, looked very similar to the animal in the cave painting. If this statuette is also of *Sivatherium*, then this very strange-looking beast must have been alive as recently as 2,500BC.



LONG-LIVED DIPROTODON?

Another fascinating rock painting has been found in Australia. It is of a large pig-like animal. Most people believe it shows a pig brought to Australia by the explorer Captain Cook. But it is possible that it is a picture of *Diprotodon*, a wombat that was as big as a bear. Again, before the discovery of the painting, no one had thought that *Diprotodon* lived at the same time as people.

A VALUABLE RECORD

All these pieces of art record the animal life of the time. What will archaeologists in the future make of our pictures and tapes of animals that are becoming extinct today?

CLUES FROM THE CAVES

The Tassili mountains lie in the middle of the Sahara Desert. Cave paintings found there show antelope, zebras, giraffes and other animals that are now only found in grasslands. When these paintings were done 8,000 years ago, the climate must have been completely different from today. It must have been wet enough for grasses to grow where now there is only scorching sand and baked rock.



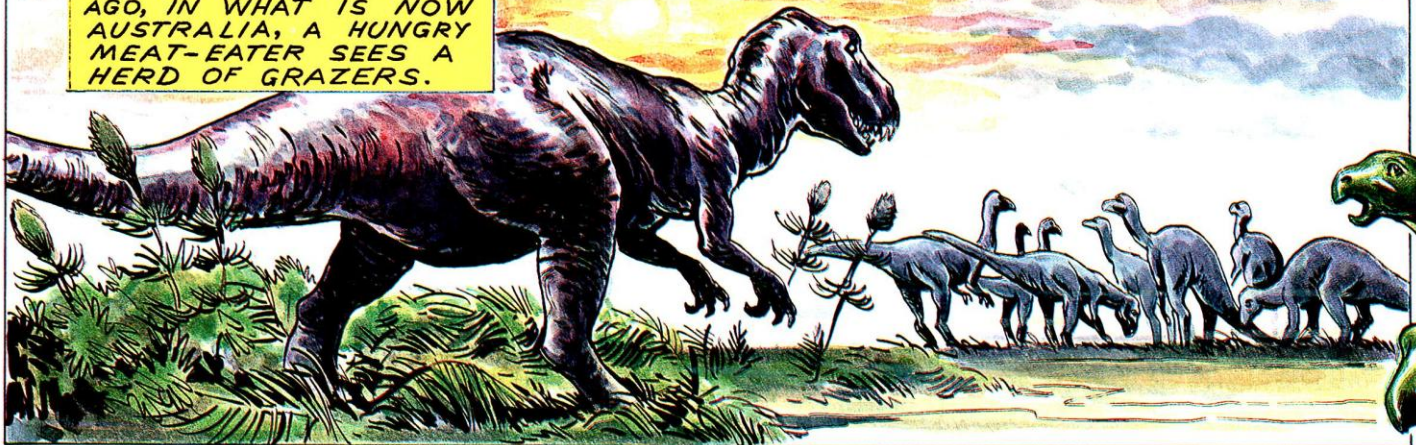
Sometimes it is difficult to tell what an animal is from a cave painting. This might be a giraffe, or perhaps it's an animal that is now extinct.

Cave paintings of grassland animals, such as cattle, in Tassili indicate that the Sahara Desert was once quite wet.

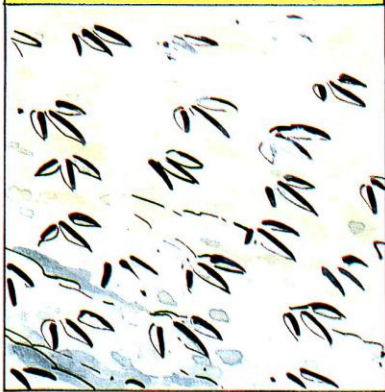


TRACKS DOWN UNDER

MILLIONS OF YEARS AGO, IN WHAT IS NOW AUSTRALIA, A HUNGRY MEAT-EATER SEES A HERD OF GRAZERS.



... LEAVING NOTHING BEHIND BUT THEIR FOOTPRINTS IN MUD.

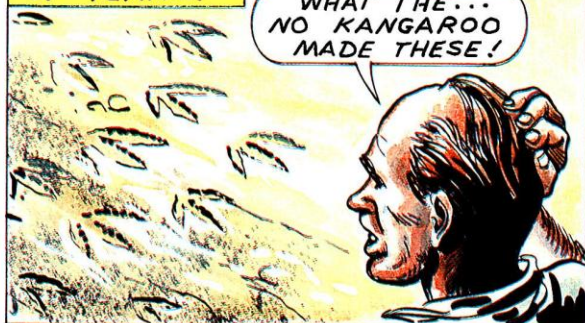


AS MILLIONS OF YEARS PASSED, THE MUD HARDENED AND EVENTUALLY TURNED INTO ROCK. BUT THE FOOTPRINTS WERE SO DEEP THAT THEY BECAME FOSSILIZED. LATER, THEY WERE COVERED IN SOIL AND ROCKS.



IN THE EARLY 1970s THE WIND BLEW AWAY SOME OF THE TOPSOIL THAT COVERED THE FOSSILIZED FOOTPRINTS, LEAVING THEM EXPOSED FOR THE FIRST TIME IN MILLIONS OF YEARS.

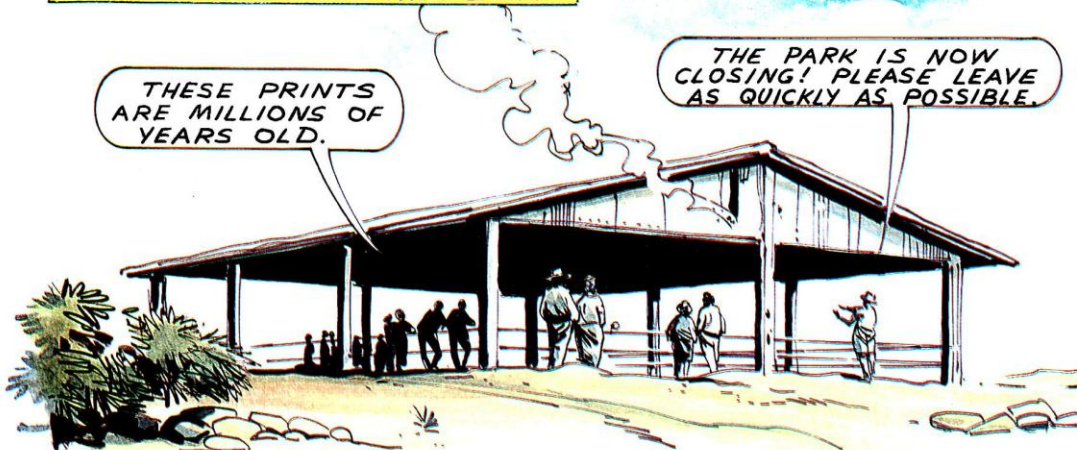
WHAT THE... NO KANGAROO MADE THESE!



IN 1982, THE PARK WAS OPENED TO THE PUBLIC. ONE DAY SHORTLY AFTERWARDS...

THESE PRINTS ARE MILLIONS OF YEARS OLD.

THE PARK IS NOW CLOSING! PLEASE LEAVE AS QUICKLY AS POSSIBLE.



NOT LONG AFTER THE PARK HAD CLOSED FOR THE DAY...





THE CARNIVORE ATTACKS, HOPING THAT IT WILL BE ABLE TO KILL AT LEAST ONE OF THE SMALLER DINOSAURS.



THE MUD MAKES IT DIFFICULT FOR THE DINOSAURS TO KEEP THEIR BALANCE. ONE OF THEM STUMBLES...



... AND AS THE MEAT-EATER SINKS ITS CLAWS INTO ITS PLUMP BODY, THE OTHERS FLEE TO SAFETY...

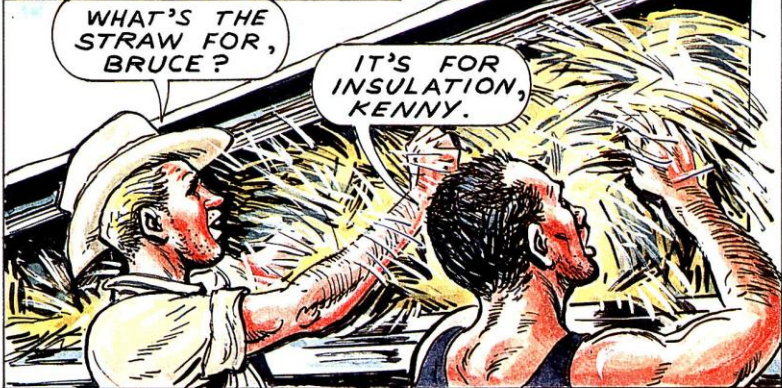
NEWS OF THE FIND REACHED BRISBANE, AND RICHARD A. PHULBORN FROM THE UNIVERSITY OF QUEENSLAND AND MARY WADE FROM THE QUEENSLAND MUSEUM WERE SENT TO EXAMINE THEM.



THIS IS EXTRAORDINARY.

THERE MUST BE THOUSANDS OF THEM, RICHARD.

IN 1978, THE SITE WAS PURCHASED BY THE STATE AND A ROOF WAS BUILT OVER THE BEST TRACKS.

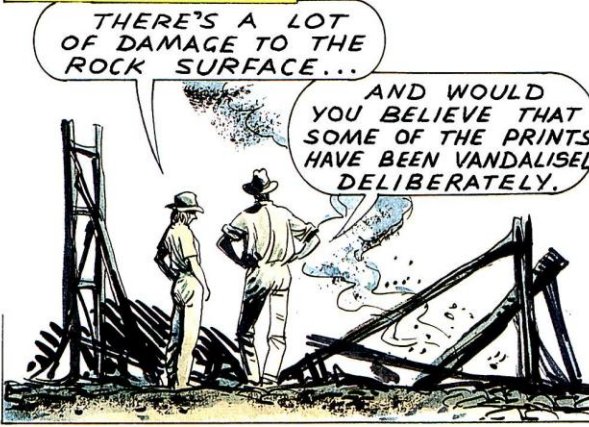


WHAT'S THE STRAW FOR, BRUCE?

IT'S FOR INSULATION, KENNY.



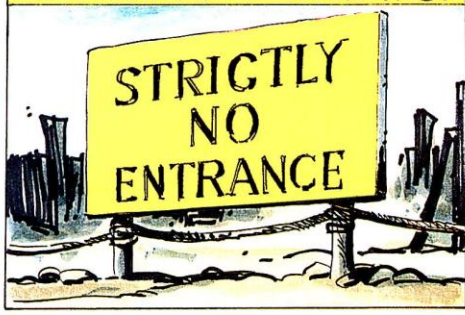
IT WAS SOME TIME BEFORE THE FIRE WAS PUT OUT AND THE EXPERTS WERE ABLE TO ASSESS THE DAMAGE.



THERE'S A LOT OF DAMAGE TO THE ROCK SURFACE...

AND WOULD YOU BELIEVE THAT SOME OF THE PRINTS HAVE BEEN VANDALISED DELIBERATELY.

FORTUNATELY, PARTS OF THE QUARRY WERE UNDAMAGED AND HAVE BEEN LEFT UNEXPOSED FOR LATER STUDY, SO THAT IT WILL STILL BE POSSIBLE TO SEE THE TRACKS THAT FROZE A MOMENT IN TIME MILLIONS AND MILLIONS OF YEARS AGO.



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

Follow the footprints on the mammoth's back and answer the questions posed!

Hungry cats

The Ice Age cats, such as the sabre-tooth Smilodon, found in the Rancho la Brea tar pits, broke their teeth more frequently than modern cats. This may mean that food was quite scarce at the time and the cats had to tear at bones to get enough to eat.

Dino spies
The International Palaeontological Expedition to Sukuto State, in Nigeria, spent Christmas 1977 in a Nigerian gaol. No-one believed that they were looking for old bones.

- 1** *Utahraptor* had a brain the size of:
- a) a human brain
 - b) a cat's brain
 - c) a bird's brain

- 4** Cave paintings of mammoths show:
- a) they had fatty humps
 - b) they had wings
 - c) they were black with red stripes

- 7** The name of the bone which forms a shoulder blade is:
- a) ulna
 - b) vertebra
 - c) scapula

- 2** During the Precambrian there were:
- a) at least four Ice Ages
 - b) no Ice Ages
 - c) one long Ice Age

- 5** Hot, sunny Florida was once covered in:
- a) oil and tar
 - b) ice and snow
 - c) warm water

- 8** A glacier is:
- a) an ice-cream
 - b) a hairy reptile
 - c) a river of ice

- 3** *Pinacosaurus*' deadly weapon was:
- a) a heavy tail club
 - b) strong teeth
 - c) slashing claws

- 6** *Tuojiangosaurus* was found in:
- a) China
 - b) Portugal
 - c) North America

- 9** The rhinoceros *Juxia* defended itself by:
- a) charging with a horn
 - b) running away quickly
 - c) burrowing in the ground

- 10** The rhynchosaur *Hyperodapedon* feasted on:
- a) other reptiles
 - b) plants
 - c) fish and crabs

1894



Tasty termites!

For a long time, experts thought that prehistoric anteaters only lived in South America. Then a complete skeleton of *Eurotamandua* was

found in Germany. Anteaters carry their young on their backs and use their long tongues to lick up termites and ants.

Coral cruncher

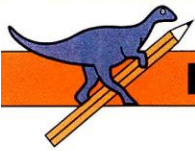
The late Jurassic fish *Gyrodus* had a packed mouthful of teeth. It probably used them to grind up a crunchy diet of coral.

Dino paddles

Some scientists thought that the little dinosaur *Compsognathus* had paddles on its forelimbs and could swim in the sea. The paddles turned out to be just marks on the rock on one of the fossils.

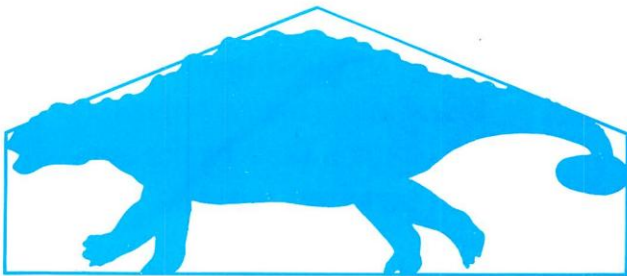
Answers to the questions on inside back cover

1895

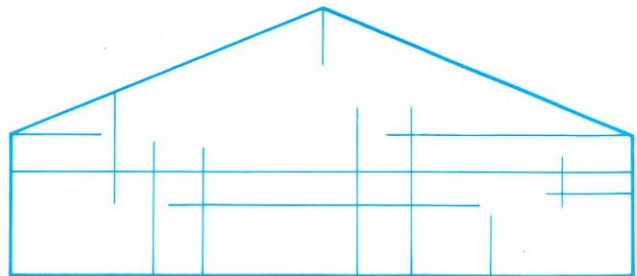


PINACOSAURUS

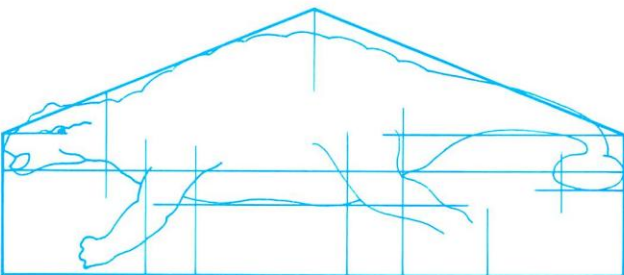
1 First of all, imagine a simple shape that fits the shape of *Pinacosaurus*. The shape that works best is like the side view of a building.



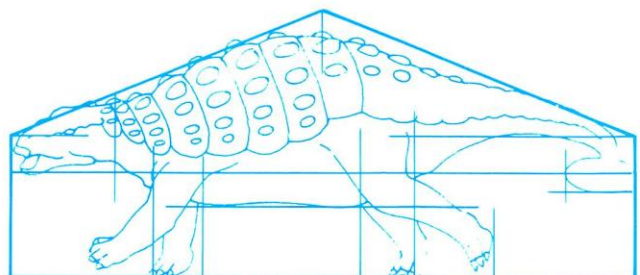
2 Look carefully at your dinosaur and mark lines inside your shape to show the main elements of its body. Mark the head, the legs, tail and the belly.



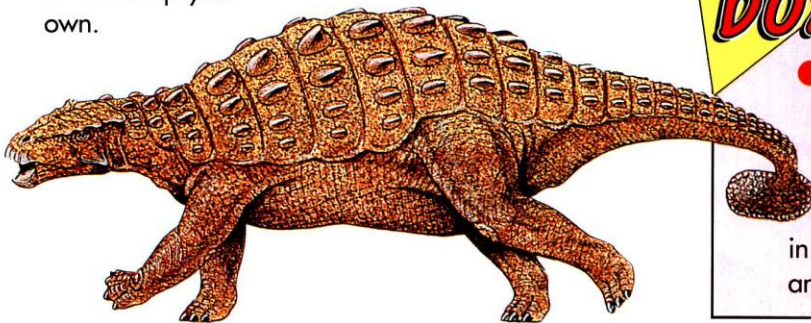
3 Now you can draw in the outline of *Pinacosaurus*. Carefully follow the points you marked in Step 2 and you will find you get an accurate drawing.



4 Now you have a complete outline of *Pinacosaurus*. The next stage is to fill in all the details of the skin, armour and the bony spines on its back.



If you want to colour in your drawing, you can follow the colours we have used or make up your own.



1896

Fact box

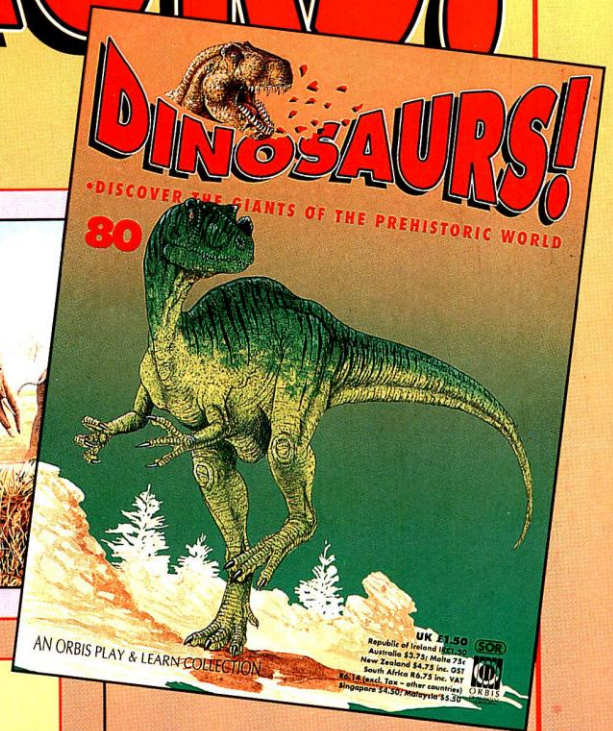
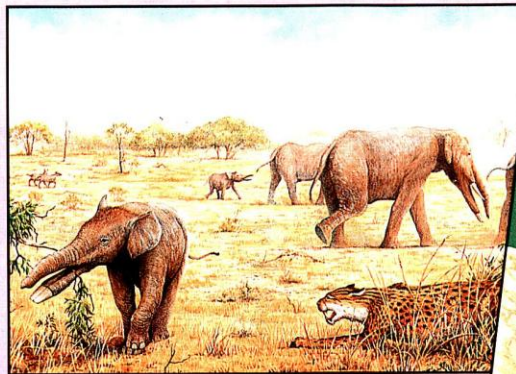
Pinacosaurus was an ankylosaur. It had armour plating and a large tail-club.

- **NAME:** *Pinacosaurus* (pin-ak-oh-saw-rus) means 'plank reptile'
- **SIZE:** Up to 5m long
- **FOOD:** soft, low-growing plants
- **LIVED:** about 80 million years ago in the Late Cretaceous Period in Mongolia and some parts of northern China

COMING IN PART 80 OF

DINOSAURS!

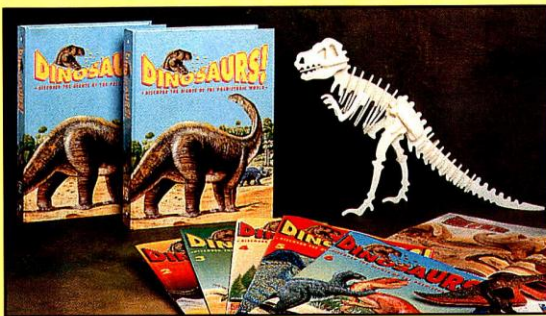
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PLUS

Three fascinating creatures in IDENTIKIT and HISTORY IN PICTURES 3-D GALLERY GIANTS OF THE PAST

PICTURE CREDITS: Front cover: Robin Carter/WLAA. Bruce Coleman/Mr Jules Cowan 1881T; Bruce Coleman/John Murray 1880T; C.M.Dixon 1888CL, 1889TR, 1890-91T, 1890BR; Robert Harding/Jon Gardey 1891BL; Robert Harding/F.Jackson 1891CR; The Natural History Museum, London 1886-87, 1895T. **Artwork:** Robin Boutell/WLAA 1888B Robin Carter/WLAA 1873, 1874T, 1874-75B; Barry Croucher/WLAA 1876; Mike Dorey 1892-93; Edwina Goldstone/WLAA 1877; Philip Hood/WLAA 1878-79; Bob Mathias 1896 T,C; Deidre McHale back cover; John Morris/WLAA 1889 C James Robins 1888-89 TC; Graham Rosewarne 1896BL; Peter David Scott/WLAA 1882-83; Mark Stewart/WLAA 1880-81; Steve White 1884-85.

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

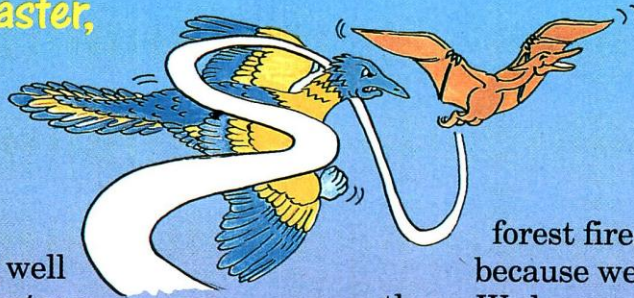


Dr David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT

Which could fly faster, Archaeopteryx or a pterosaur?

Some of the larger pterosaurs, such as *Pteranodon* and *Quetzalcoatlus*, may well have beaten *Archaeopteryx* in a race. But *Pterodactylus* and *Archaeopteryx*, which were about the same size, probably had a similar flying speed. Though my guess would be that *Pterodactylus* would have been a far more acrobatic flyer than *Archaeopteryx*.

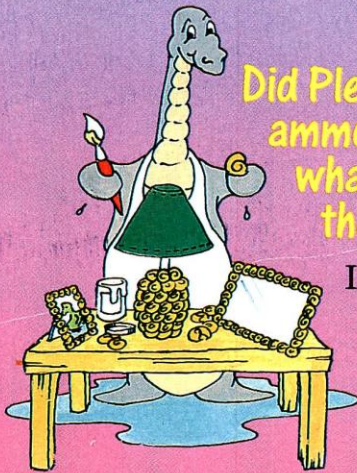


Would there have been forest fires in coal forests?

In most cases, we know there have been forest fires in a particular area because we find deposits of charcoal there. We have not found these deposits in what used to be the coal forests. This does not mean they never happened. During the Carboniferous Period, many of the dense coal forests were found in huge swamps at the mouths of vast rivers. The rivers supplied the water and sediment that made up the swamps. From time to time, the rivers changed course and cut off areas of land that then dried out. The 'dry' areas may well have caught fire if they were struck by lightning, or if hot volcanic ash fell on to them.



Did Plesiosaurus eat ammonites? If so, what happened to the shells?



It is quite likely that *Plesiosaurus* ate ammonites. Marks have been found in ammonite shells that fit the teeth of large marine reptiles. From the reptile's point of view, ammonites were a good source of food – they did not move very fast and, to feed on them, the reptile simply grasped the ammonite by its tentacles and shook vigorously until the animal fell out. The shells were left intact.

