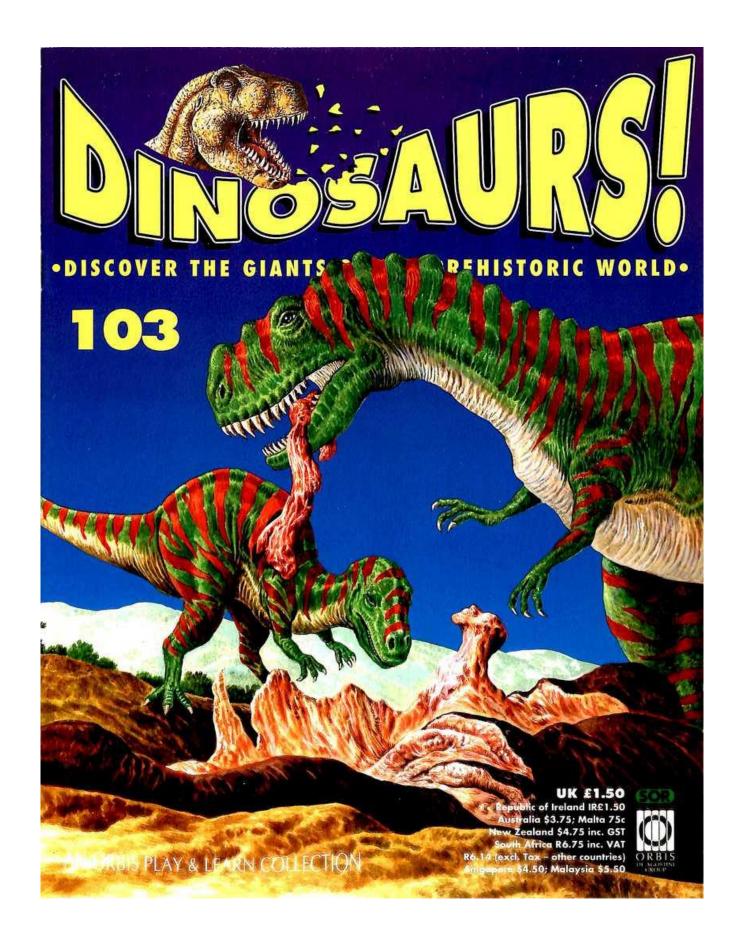
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METRIACANTHOSAURUS

Meat-eating Metriacanthosaurus was a remarkable Jurassic dinosaur with a strange humped back.



nly a few meat-eating dinosaurs have been discovered with spiny back

bones like that of Metriacanthosaurus. The best known ones lived many millions of years after it. They have been named the spinosaurs, or 'spine reptiles'. The most spectacular spinosaur was Spinosaurus, which gave the group its name.

SHORTER SPINES

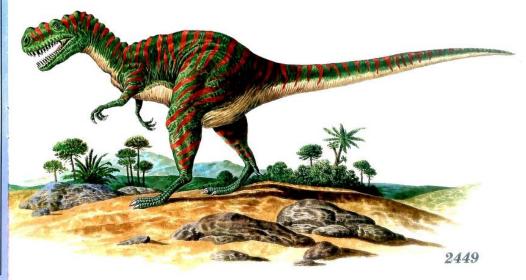
Spinosaurus had a huge, fan-shaped 'sail' on its back. Metriacanthosaurus had a much lower back crest than this. Experts think its shorter spines would have given the dinosaur a slightly humped back.

IN THE BEGINNING

Metriacanthosaurus appeared in the Late Jurassic Period. The spinosaurs lived 30 million years later, in Cretaceous times. Although there has been some debate on the matter, experts do not now think that Metriacanthosaurus was a spinosaur, or even related to this group of dinosaurs.

HIS AND HERS

Scientists are not sure why Metriacanthosaurus had a spiny back. One theory is that it could have been used in courtship. Perhaps a male Metriacanthosaurus had a brilliantly coloured back crest. It could have displayed this eye-catching crest to attract a mate as some birds do today. Or this dinosaur may have used it as a warning display to frighten away a rival male or a threatening predator.





IDENTIKIT

IT'S A FACT

SPINE DETAILS

Experts have calculated that the spines along Metriacanthosaurus' back were about 25cm tall. The spines supporting Spinosaurus' huge fan-shaped sail were much bigger – probably as tall as a man.

MISTAKEN IDENTITY

The first fossil remains of *Metriacanthosaurus* were found in southern England at the beginning of this century. Scientists at first decided the dinosaur must have been a *Megalosaurus*.

was thought to

be related to

Spinosaurus (above). Now it is believed to be

a relative of

Megalosaurus.

NEW NAME

It was not until 1964 that the find was renamed Metriacanthosaurus after experts had spotted some important differences, although the scientists who first studied the Metriacanthosaurus fossils were not completely wrong. It could have been a close relation of Megalosaurus both dinosaurs were carnivores that lived at the same time in what is now England.

CHINESE LOOK-ALIKE

A well-preserved skeleton of a large meat-eating dinosaur with a low back crest, *Yangchuanosaurus*, has now been found in China. CHINESE CONNECTION?

Yangchuanosaurus may have been the same kind of dinosaur as Metriacanthosaurus. The discovery has given scientists a much clearer picture of how the English dinosaur may have looked.

ARMED TO KILL

Metriacanthosaurus had powerful jaws filled with razor-sharp teeth. The big carnivore would have preyed on the planteating dinosaurs of the day. It may have had bold camouflage patterns like today's tigers to help it hide in the undergrowth and ambush its prey.



MONSTER FACTS

- NAME: Metriacanthosaurus (met-ree-a-kanthoh-saw-rus) means 'moderately spined lizard'
- GROUP: dinosaur SIZE: unknown FOOD: meat
- LIVED: about 160 million years ago in the Late Jurassic Period in England

The fierce
predator
Metriacanthosaurus
could tear its prey to
shreds with its sharp teeth.







LAPPARENTOSAURUS

Primitive Lapparentosaurus was one of the first sauropods.



he giant, long-necked sauropods were the largest land animals that ever lived.

These peaceful, plant-eating dinosaurs survived for about 50 million years.

LOOK ALIKE

Experts were excited to find an almost complete fossil skeleton of a young *Lapparentosaurus* in Madagascar. The dinosaur had the same long neck and short snout as the towering sauropod, *Brachiosaurus*. But it lived about 20 million years earlier.

MONSTER FACTS

- NAME: Lapparentosaurus (lap-uh-ren-tuhsaw-rus) means 'Lapparent's lizard'
- GROUP: dinosaur
- SIZE: unknown
- FOOD: plants
- LIVED: about 170 million years ago in the Mid Jurassic Period in Madagascar

FIRST AND LAST

Lapparentosaurus had primitive, flat spines on its backbone. These proved it was a very early sauropod.

2452



LATER LIGHTER

Later sauropods, such as Brachiosaurus, had hollowed-out backbones to make their massive bodies lighter.

HIGH AND LOW

Lapparentosaurus could crane upwards to nip off pine cones and juicy leaves from high branches, or lowered its head to feed on ferns.

EINIOSAURUS

A huge, hooked horn curled down over the nose of this strange-looking, plant-eating dinosaur.



ight at the end of the Age of the Dinosaurs a strange group of plant-eaters flourished.

These were the horned ceratopians. *Einiosaurus* was a member of this group.

HEAD CASE

moved around in

were attacked, the

adults could form

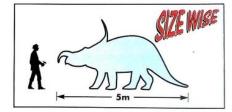
herds. If they

a protective

ring around

their young.

Ceratopians looked very fearsome, but they were peaceful browsers. *Einiosaurus* had a massive head with a sharp, parrotlike beak. Two spikes stuck straight up from a great 'frill' of bone on top of its skull. The snout was protected by a forward-curving horn. These big plant eaters probably



MONSTER FACTS

- NAME: Einiosaurus (eye-knee-oh-saw-rus)
 means'buffalo reptile'
- GROUP: dinosaur
- SIZE: 5m long
- FOOD: plants
- LIVED: about 60 million years ago in the Late
 Cretaceous period in Montana, USA

DEATH BY DROUGHT

The remains of a herd of Einiosaurus has been found in North
America. Experts believe they died of thirst.



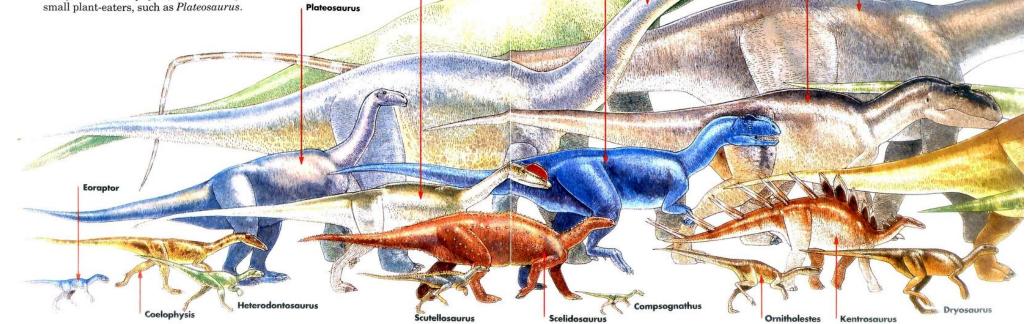
is where the first dinosaurs lived. There were small, agile meat-eaters, such as *Eoraptor* and *Coelophysis*, and relatively



Allosaurus

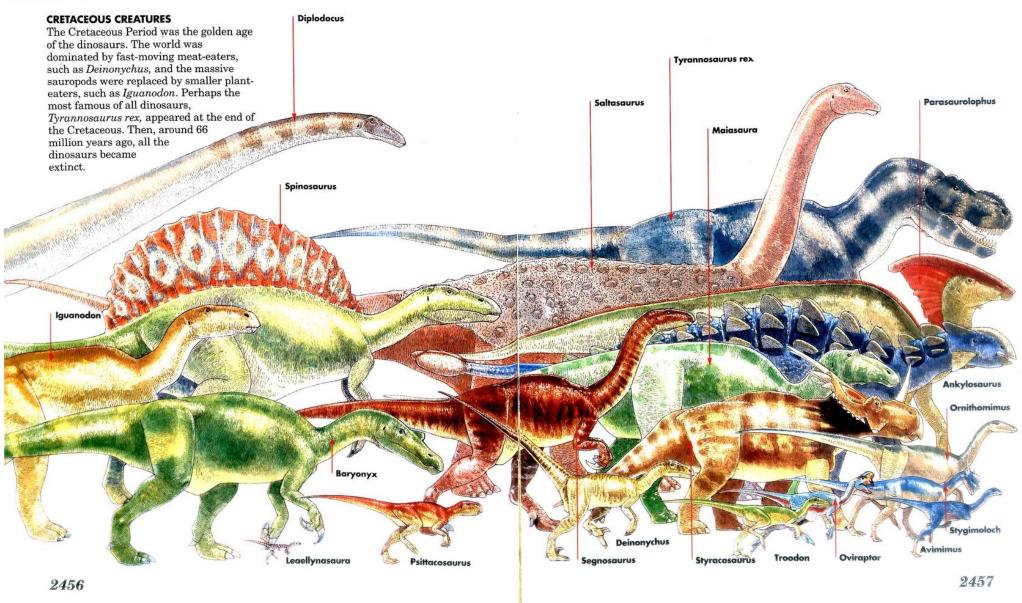
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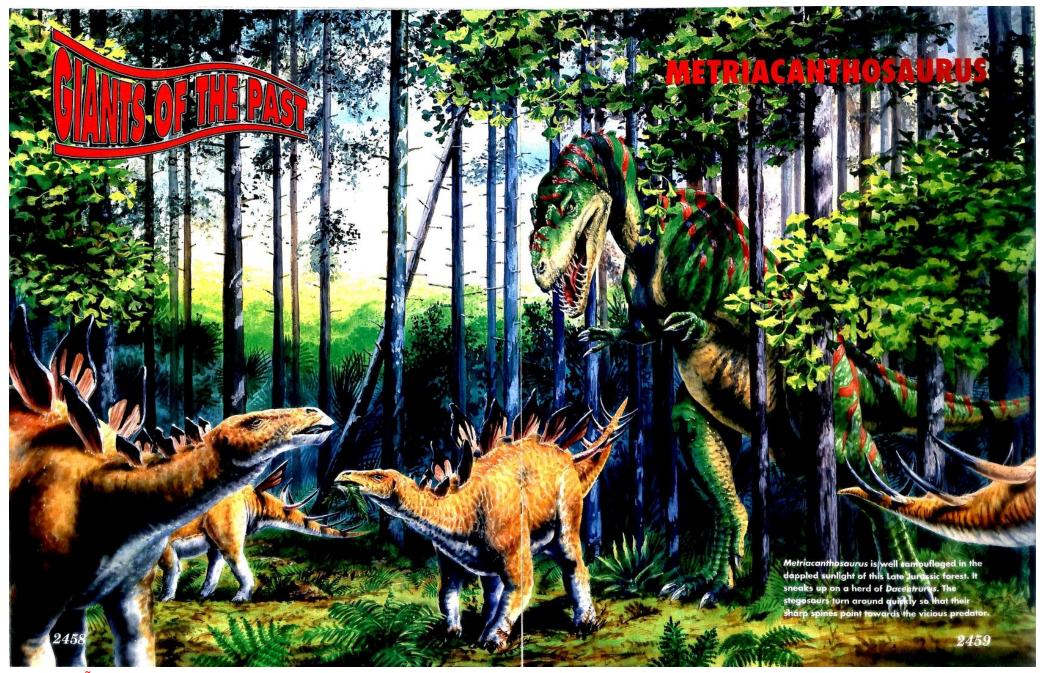








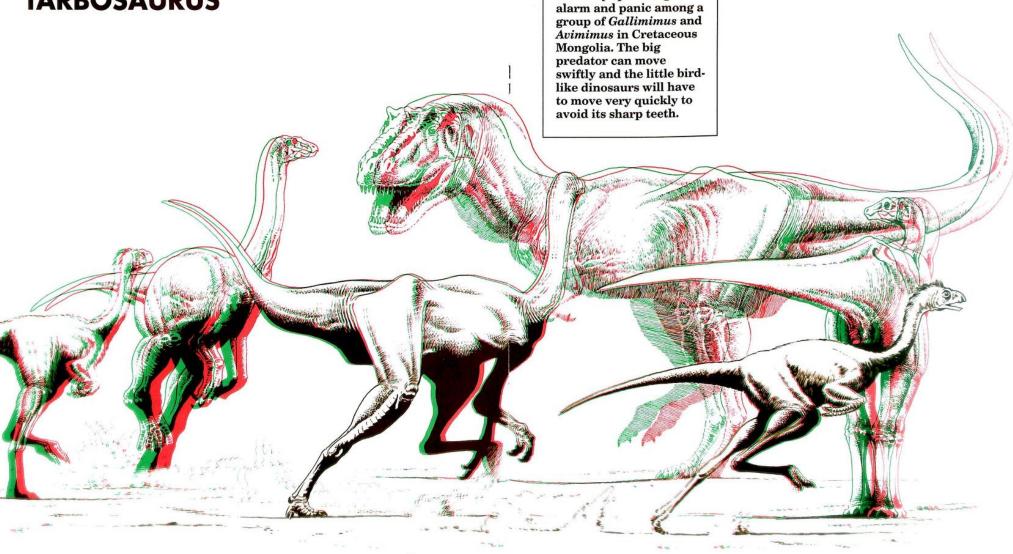




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TARBOSAURUS



Tarbosaurus, the 'alarming dinosaur', is

certainly spreading





Dino finds go global

Until the early part of the 20th century, most dinosaur discoveries were made in Europe and in North America. Then, as worldwide communications improved, palaeontologists looked further afield.

n the 19th century, and even earlier, German scientists had discovered dinosaurs in Europe. Plateosaurus had been discovered in Germany not long after Iguanodon and Megalosaurus had been found in Britain. Then, between 1909 and 1912, the Humboldt University in Berlin sent an expedition deep into German East Africa (now Tanzania) in search of fossils.

AMAZING NEW DINOS

This expedition discovered amazing new dinosaurs, such as *Kentrosaurus* and *Dicraeosaurus*. They also brought back an almost complete *Brachiosaurus* skeleton.

THE FIRST OF MANY

Between 1915 and 1917 Russian scientists found the first dinosaur in China – the duckbill *Mandschurosaurus*. A signal of great discoveries to come.

DESERT HUNT
In 1922 the
American
Museum of Natural
History sent an expedition
into the Gobi Desert, in the
heart of Mongolia. They were not sure
what they were looking for, possibly traces
of the origin of human beings.

EGGS-PEDITIONS

Led by Roy Chapman Andrews, these expeditions (four in all until 1925) came back with a remarkable collection of new dinosaurs, including *Protoceratops*, *Oviraptor* and *Velociraptor*. They also found the first dinosaur eggs to be recognised as such. One of the eggs was sold to raise money for another expedition.

PROSAUROPOD MAN

In the 1920s German scientist Friedrich von Huene was involved in some amazing finds. He discovered a graveyard of *Plateosaurus* near Trossingen in his own country and also found some supposed prosauropods in Brazil.

GOBI AGAIN
After this, things
became quite quiet on the
dinosaur scene until after World
War II. Then, in 1946 and 1948,
the Gobi Desert was investigated
once again. This time a Russian

Tarbosaurus.

INTO CHINA

Into CHINA
In the late 1940s and the 1950s
the Institute of Vertebrate
Palaeontology at Beijing in
China set about exploring the
interior of its country. The first
finds were of Tsintaosaurus and
Mamenchisaurus. Almost a
fifth of the dinosaur
finds in the world to
date have been of
Chinese

dinosaurs.

team found Saurolophus and

JOINT EFFORT

Mongolia was visited

again in the 1960s, this time by joint Polish-Mongolian expeditions led by the palaeontologist Zofia Keilan-Jaworowska. They made some fascinating finds including the skeleton of Tarbosaurus and the giant arms of Deinocheirus.

INDIAN SAUROPOD Dinosaur

remains had been found in India since 1860, but they were mostly just scraps of bone. The most important Indian find took place in 1960 when the remains of the

INDIA JOINED TO MAINLAND

Scientists knew that India had been an island for most of the Age of Dinosaurs, but this find proved that it had still been joined to the mainland at the time the sauropods evolved.

giant sauropod Barapasaurus were found.

A well-preserved skeleton of

Mandschurosaurus (top left) was found by a Russian expedition. It is now in St Petersburg. Saurolophus (above) was also found by a Russian team. The fossilized bones of Barapasaurus (left) were found in a field in India.





NEW IDEAS

2466

The 1970s was a decade of new scientific thinking rather than of the discovery of new fossils. Robert Bakker put forward his theory that dinosaurs had actually been warm-blooded, like birds, rather than coldblooded, like other reptiles.

INSPIRING DISCOVERY

Bakker was inspired by John Ostrom's discovery of Deinonychus in 1964. Now experts began to look at dinosaurs not as slow-moving reptiles, but as creatures

more like birds and mammals.

METEORITE DISASTER

It was in 1973 that Walter Alvarez found a layer of clay at the very top of Cretaceous rocks in Italy. It was full of the element iridium which, Alvarez said, must have come from a meteorite. This sparked off the idea that the dinosaurs died out when a meteorite or comet struck the Earth.

COMPLETELY NEW VIEW

So, many experts began arguing that dinosaurs were warm-blooded, active creatures that only died out because of a cosmic accident. In addition. actual discoveries were beginning to back up this totally new view.

FAMILY LIFE

In 1978 Jack Horner and Robert Makela

made a fascinating discovery in Montana, North America. They found the nests, with complete families, of the duckbill Maiasaura. It now appeared that dinosaurs had a complete social life as well as an active lifestyle.

MORE NEW DINOS

New dinosaurs were still being discovered around the world. In the 1980s South America became fertile ground for dinosaur finds. In 1982 Argentinian

palaeontologists Carlos and Florentino Ameghino and José Bonaparte found the first dinosaurs in the south-east corner Deinonychus (above) was a speedy of the continent. predator with huge, curved toe claws.

DOZENS OF DINOS

Since then more than three dozen new types of dinosaur have been found in South America. These include the earliest dinosaurs so far discovered, such as Staurikosaurus and Eoraptor, as well as some strange sauropods, such as Saltasaurus and Amargasaurus.

PROOF

These finds prove that South America was joined to North America at the beginning and the end of the Mesozoic, but was separated in between.

DINOSAURS DOWN-UNDER

Amargasaurus

(left) was found

in Argentina.

The 1980s also saw a boom in dinosaur finds in Australia. After a scrap of bone was found in 1978, Patricia Vickers-Rich and Thomas Rich of Monash University in Melbourne started searching for dinosaurs. In 1980 they found an extremely rich deposit of all kinds of dinosaurs in a sea cliff in Victoria. At about the same time, the first dinosaur remains were found by Joan Wiffen in North Island, in New Zealand.

COLD-SAUR

These discoveries so far south showed that dinosaurs would have been able to cope with an Antarctic winter, too. This was confirmed in the late 1980s and early 1990s when dinosaur fossils were found on the continent of Antarctica itself.



A VISIT TO JURASSIC PARK?

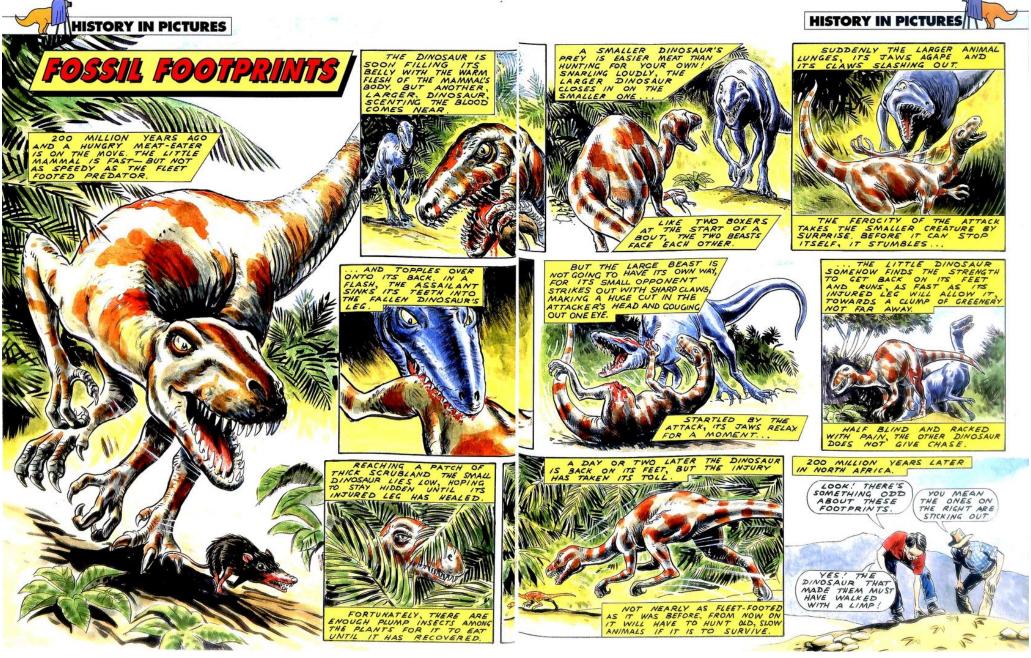
Genetic material, called DNA, has been successfully extracted from a T rex bone in the USA. This will give dinosaur experts lots of exciting new information.

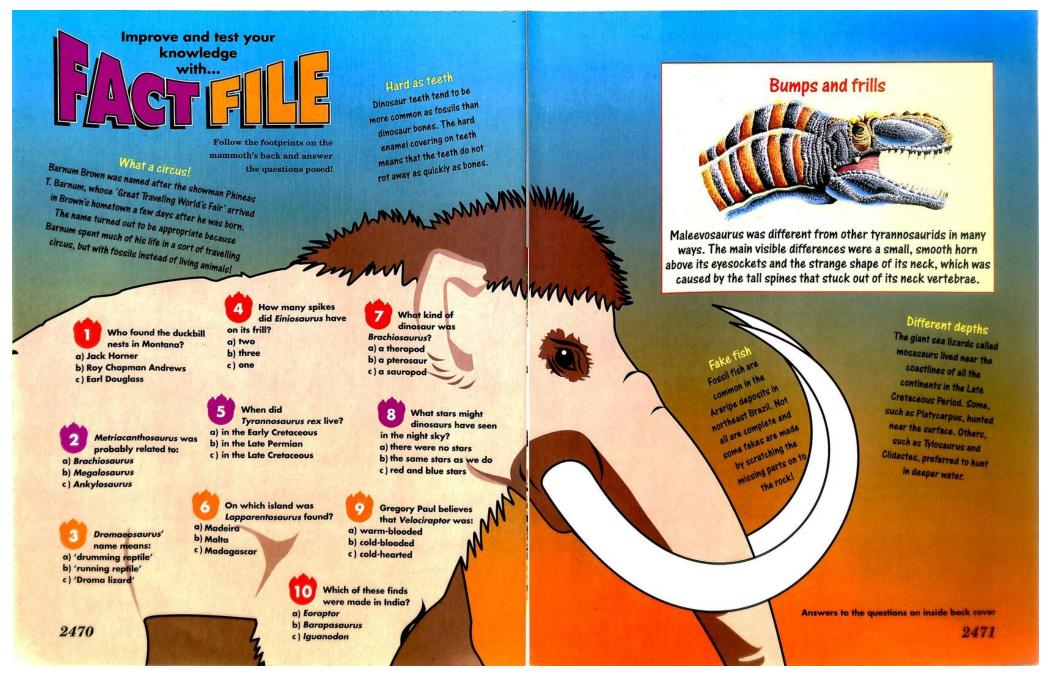
WHAT NEXT?

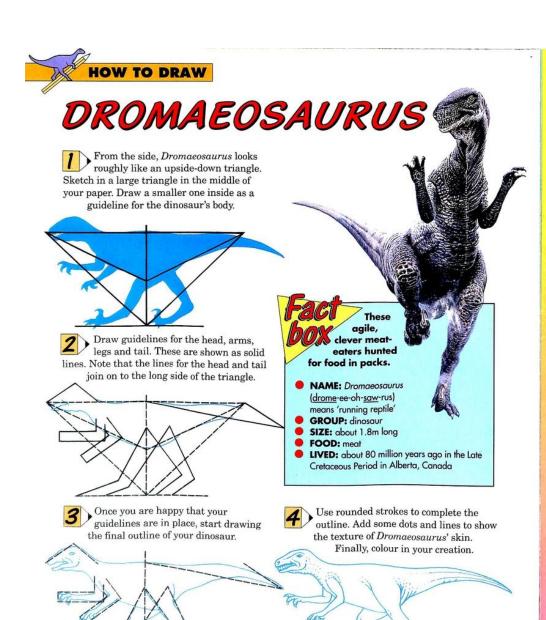
So dinosaurs have now been found on every continent. They could obviously cope with every kind of climatic condition. Each discovery shows us something new about these wonderful creatures. Where will the next major discovery be, and what will it

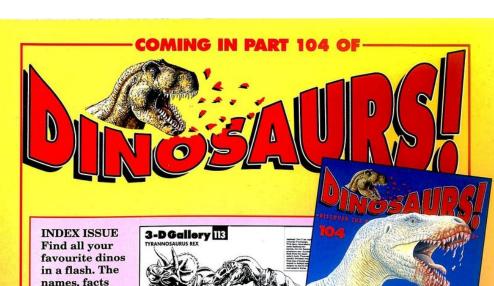
tell us? As a dinosaur expert - what is











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