



Slightly larger than today's elephants, with far longer tusks—up to 16 feet long—mammoth survived arctic temperatures, thanks to extra fat stores and hairy coats. Evidence suggests they existed in large numbers, crossing the tundra in huge herds, searching for food.

BREEDING

Mammoths' many similarities to today's elephants help scientists to guess fairly accurately about mammoth reproduction. Single calves were probably born after a gestating

period of 22 months. Well-developed social systems helped to ensure long periods of post-natal care. Sexual maturity was reached after 10-12 years.

With no tusks or trunk, early prehistoric elephants were more like hippopotomuses than any other modern animal.

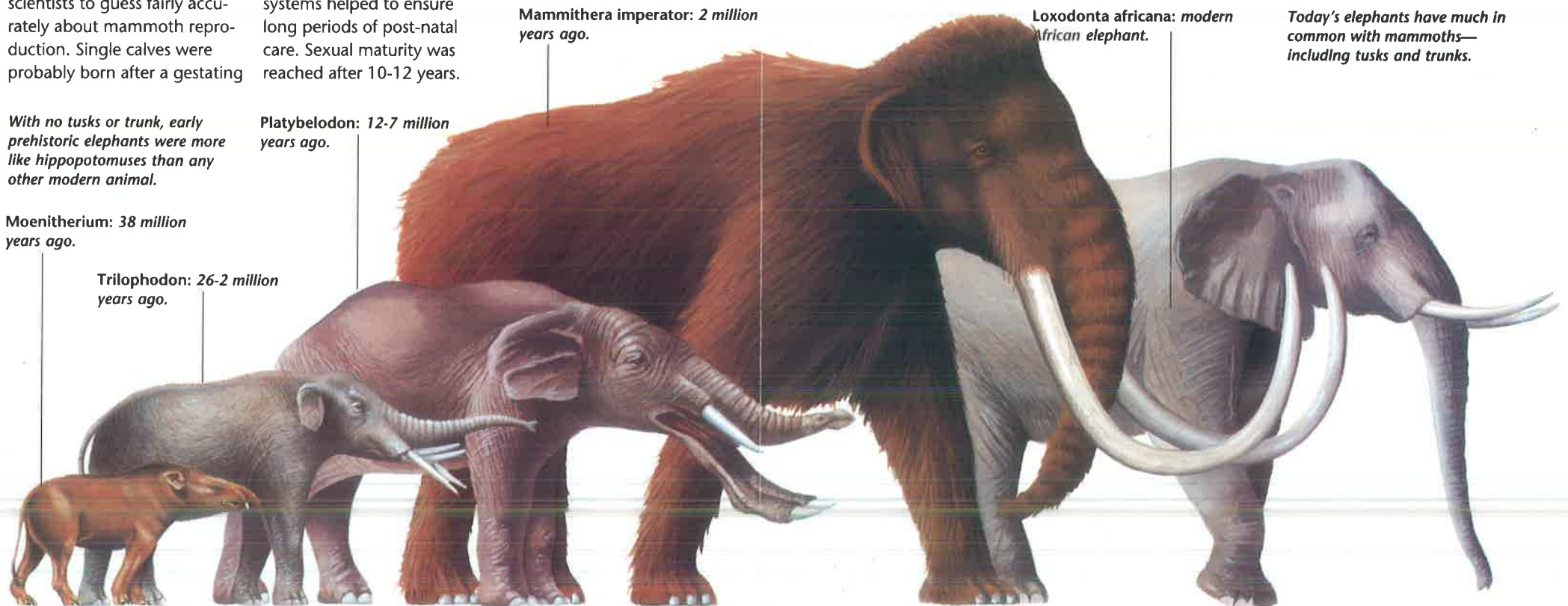
Moenitherium: 38 million years ago.

Trilophodon: 26-2 million years ago.

Platybelodon: 12-7 million years ago.

Mammithera imperator: 2 million years ago.

Loxodonta africana: modern African elephant.



DIET

Mammoths were entirely *herbivorous*, or plant-eating. The remains of hornbeam and hazel plants have been found in the stomach contents of mammoths. Their teeth became well worn from chewing such food. In fact, mammoths' teeth were almost identical to those of today's elephants'.

Mammoths living furthest

north had a more difficult time finding plants to feed on because of the frozen ground. Their fat, which was especially thick around the shoulders, was used as an emergency store of food.

Right: Tooth from a fossilized mammoth. Compare the size against the human hand.



PREDATORS

The enormous size of full-grown mammoths meant that only the most fearless predators would dare to attack them. Man hunted mammoths with spears and axes, putting the carcasses to a variety of uses. After they had eaten the flesh,

they would use the hide for clothing and for stretching over huts, which were often built with the bones and tusks.

The fearsome saber-toothed tiger shared the hairy mammoth's environment and

probably preyed on its young. The tiger could easily have overpowered small mammoth calves. Packs of an early species of dire wolf were probably the only threat to the safety of an adult mammoth besides man.

DID YOU KNOW?

- A few complete specimens of mammoth have been discovered deep-frozen in the ice of the Arctic tundra.
- Guests at a modern scientific banquet were served small portions of mammoth steak, taken from animals frozen for thousands of years.
- Miners in Alaska still find mammoth fossil remains regularly.
- So many remains of the mammoth have been found that there is still a small trade in mammoth ivory in parts of Siberia.
- Because of the cold climate it lived in, the mammoth's ears were much smaller than today's elephants'.

Today's elephants have much in common with mammoths—including tusks and trunks.

PTERANODON

CARD 3

GROUP 7: PREHISTORIC & EXTINCT ANIMALS

ORDER
Pterosauria

FAMILY
Pteranodontidae

GENUS
Pteranodon



The pteranodon—a flying reptile—lived 80 million years ago on the shores of the ocean that once covered much of Kansas.

KEY FACTS



SIZES
Wingspan: 25 ft.
Weight: 35 lb.



BREEDING
Mating: Not known.



LIFESTYLE
Habitat: Coastal areas.
Diet: Fish.
Habit: Believed to have been solitary, but may have paired for life.



RELATED SPECIES
Other members of the order pterosaur (*Pterosauria*) include *Pterodactylus*, *Dimorphodon*, *Rhamphorhynchus*, *Titanopteryx*, and *Quetzalcoatlus*.



First discovery of pteranodon fossils.

RANGE AND ERA OF THE PTERANODON

The only known pteranodon fossils were found in chalk deposits of western Kansas, in the central area of the United States. The pteranodon lived during the Upper Cretaceous Period, about 80 million years ago. The ocean covered much of North America during that time, and the pteranodon was a sea-going creature that lived in coastal areas.

THE PTERANODON & CONTEMPORARY ANIMALS

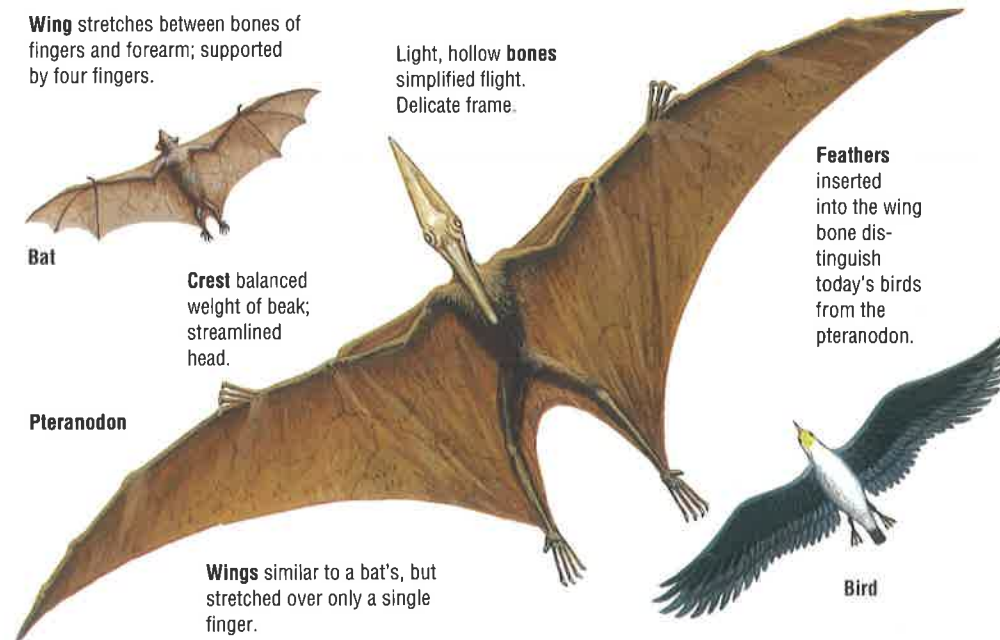
Wing stretches between bones of fingers and forearm; supported by four fingers.

Bat



Light, hollow **bones** simplified flight. Delicate frame.

Pteranodon



Wings similar to a bat's, but stretched over only a single finger.

Feathers inserted into the wing bone distinguish today's birds from the pteranodon.

Bird

The birdlike pteranodon is part of an order of flying reptiles. Animals in this order ranged in size from tiny, sparrowlike creatures to huge, meat-eating dinosaurs. Research may never reveal complete information about the pteranodon.

CHARACTERISTICS

The pteranodon's 23-foot wingspan was out of proportion to the rest of its size: at 33 pounds, the pteranodon's body was about the size of a modern turkey. The wings were so long that they could not be folded completely when the creature was on the ground. Its beak was long and toothless.

A bony horn, called a *crest*, on the back of the pteranodon's head could be twice as long as its skull. The crest balanced the weight of the huge beak and lessened the strain on the dinosaur's neck muscles.

Even though the pteranodon is classified as a reptile, it was warm blooded, and its body

was covered by thick fur. Its wing structure is more similar to a bat's than to a bird's (see back cover).

Like the modern-day bird, though, the pteranodon had hollow bones, which kept its frame light enough for flying. Its skeleton also played an important role for the pteranodon. In addition to breathing through its lungs, the dinosaur obtained supplementary air from pouches that were distributed throughout the hollow bones. These pouches became inflated as it flew.

Unlike today's reptiles, the pteranodon's brain was large and well developed.

BREEDING

Little is known about the breeding habits of the warm-blooded pteranodon. But it is likely that either the young were born live, or they were hatched from eggs.

The young dinosaurs would have depended on the female for warmth and feeding. She

would probably also have taught them to fly. The male would have brought food to the nest for both the mother and the young.

It is reasonable to assume that pteranodons paired for a complete mating and breeding cycle—or even for life.

FOOD & FEEDING

The pteranodon caught fish by gliding above the water, then diving down to snap up a fish near the surface. The dinosaur stored its catch in a throat pouch similar to a pelican's.

One pteranodon *fossil* (preserved form of an animal or plant from an earlier geologic age) was discovered with two complete fish fossils in its pouch.

BEHAVIOR

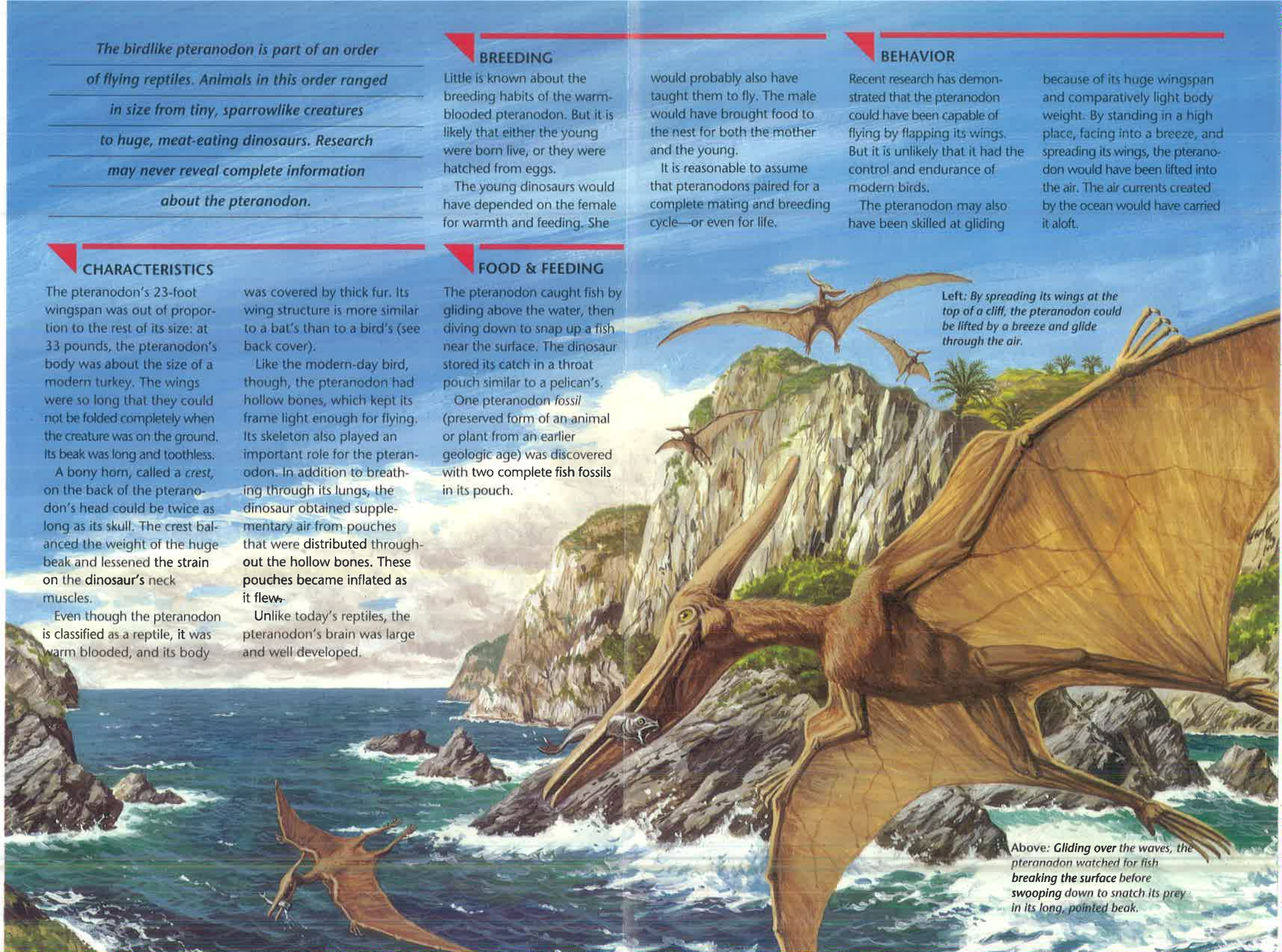
Recent research has demonstrated that the pteranodon could have been capable of flying by flapping its wings. But it is unlikely that it had the control and endurance of modern birds.

The pteranodon may also have been skilled at gliding

because of its huge wingspan and comparatively light body weight. By standing in a high place, facing into a breeze, and spreading its wings, the pteranodon would have been lifted into the air. The air currents created by the ocean would have carried it aloft.

Left: By spreading its wings at the top of a cliff, the pteranodon could be lifted by a breeze and glide through the air.

Above: Gliding over the waves, the pteranodon watched for fish breaking the surface before swooping down to snatch its prey in its long, pointed beak.



APATOSAURUS

GROUP 7: PREHISTORIC & EXTINCT ANIMALS

ORDER
Saurischia

FAMILY
Diplodocidae

GENUS & SPECIES
Apatosaurus apatosaurus



Known also as the thunder lizard because it is thought that the ground must have shaken as it walked, apatosaurus was a plant-eating dinosaur that was longer than a tennis court.

CARD 2

KEY FACTS



SIZES
Height: 15 ft. to shoulder.
Length: 65 ft., head to tip of tail.
Weight: 30 tons.



BREEDING
Mating: Not known, but probably laid several clutches per year.
No. of eggs: 5 per clutch.
Incubation: Not known.



LIFESTYLE
Diet: All vegetation except for the very toughest.
Habit: Not known whether solitary or sociable, but is thought to have been a common species.



RELATED SPECIES
Other sauropods include *Diplodocus*, which, at more than 100 feet, was the longest of all the long-necked browsing dinosaurs. *Brachiosaurus* was the largest, and was three times heavier than apatosaurus.



Location of fossil finds.

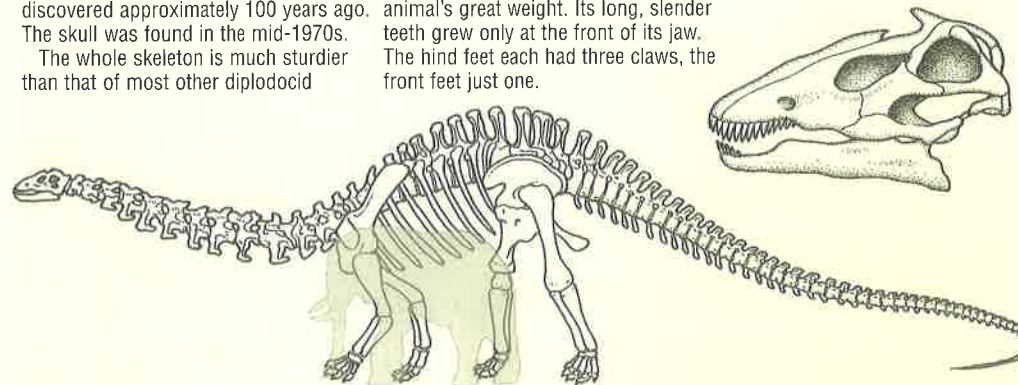
WHERE AND WHEN THEY LIVED

All the fossils of apatosaurus have been found in the western United States in deposits dating from the Jurassic and Cretaceous periods. The Jurassic began some 200 million years ago and was followed by the Cretaceous, which dates from about 136 to 60 million years ago. Apatosaurus probably evolved in the late Jurassic period around 150 million years ago, and died out at the end of the Cretaceous period.

SKELETAL DETAILS OF APATOSAURUS

A full skeleton, except for the skull, was discovered approximately 100 years ago. The skull was found in the mid-1970s. The whole skeleton is much sturdier than that of most other diplodocid

dinosaurs, which accounts for the animal's great weight. Its long, slender teeth grew only at the front of its jaw. The hind feet each had three claws, the front feet just one.



Neck vertebrae: Thicker than in other diplodocids. Large cavities in the structure reduced their weight.



Back vertebrae: Had tall spines to which powerful muscles were attached.



Tail vertebrae: Numbering more than 80, each with bony skids on the underside to protect soft tissues.



Formerly known as brontosaurus, this best-known

dinosaur was renamed apatosaurus, as this was

the first name given to fossils of this species.

It belonged to a group of dinosaurs that all had

extremely long necks and even longer tails.

They are known as diplodocids.

CHARACTERISTICS

Apatosaurus was not the longest of all the dinosaurs, but it was much heavier than many of its relatives. Its huge, thick-set body was supported by four, pillar-like legs. It had a

very small head in proportion to its size. Its nostrils were positioned on the top of its head, above the eyes. Its exceptionally long tail stretched out behind its body.

DIET

The huge apatosaurus was a peaceful plant-eater that browsed on the lush vegetation of its environment. Despite its weak jaws and small, peglike teeth, it ate all but the toughest water plants and ferns. Its long neck enabled it to reach the upper leaves of tall plants.

The plants that the apatosaurus fed on took a long time to digest. One possible explanation of why it grew so big is that it needed a large stomach in which to store its food while it was digesting.

ENEMIES

Despite its size, the apatosaurus fell prey to many larger, meat-eating dinosaurs. Its slowness and small teeth, along with its lack of protective plates and sharp spines, made it easy prey.

The apatosaurus' principle defense was its tail. Controlled by powerful muscles, it was used as an extremely effective whip. The apatosaurus also had a sharp claw on the inside of each front foot which, with the dinosaur standing on its hind legs, could be used as a weapon in an attack.

BREEDING

Several fossilized apatosaurus nests have been found, each containing approximately five eggs. It is likely that it laid several clutches a year.

Apatosaurus was the third-largest land animal ever to have walked the earth.

Apatosaurus' long neck enabled it to reach extremely high vegetation with which to satisfy its enormous appetite. The location of its nostrils—on top of the head above the eyes—is what once led paleontologists to believe these dinosaurs lived mainly submerged in water.

The 12-inch eggs had rough, bumpy shells and were most likely deposited in shallow pits and then covered with soil.

DID YOU KNOW?

- Apatosaurus weighed as much as six elephants.
- Some experts believe that apatosaurus had two brains, one in its head and one in its hips. This configuration would reduce the time needed to send messages from its head to its tail, 65 feet away.
- Apatosaurus may have eaten a half-ton of vegetation daily.
- Apatosaurus was once thought to live in water to support its weight.
- Apatosaurus had warmer blood than smaller dinosaurs.

HABITAT

Apatosaurus lived in a mild climate that had plenty of warm rain and sunshine, providing perfect conditions for flourishing plant life.

For many years, paleontologists (fossil experts) thought that apatosaurus lived in arid areas near bodies of water, such as swamps.

But today, it is believed that it would have gotten stuck in the muddy areas around the water's edges, and the water's weight on its body when submerged would have kept it from breathing.

The tiny head indicates a low intelligence.

As with all dinosaurs and most reptiles, young were hatched from eggs laid by the female.

