THE BEASTS THAT TIME FORGOT

65 million years ago, something happened that changed life on Earth. It was an 'extinction event' so severe it wiped out the dominant land animals of the time: the dinosaurs. The era that followed the death of the dinosaurs saw the rise of the mammals: warm-blooded vertebrate animals which give birth to their young. And many of these grew to enormous sizes.

The Cenezoic has lasted over 60 million years. During that time, the continents moved into their present positions, grasslands replaced primeval swamps, ice ages came and went, and mammals became more numerous and diverse. They were also bizarre: some were giants; others looked like the product of strange laboratory experiments - the laboratory being evolution. Although the early mammals eventually became extinct, their descendants became the familiar land animals we see today. And some may live on today, in remote parts of the planet like the Amazon and the Siberian tundra: Bigfoot, the Yeti, the Mapi.

The mammals that survived the extinction even that killed off the dinosaurs were small. This may have been one of the keys to their survival: they could burrow into shelters, survive on very little food, and move to new feeding grounds. There is fossil evidence for some of these survivors: the Leptictids, for example, which were strange, hopping carnivores who not only survived the great extinction but managed to hang on for another several million years before they, in turn, became extinct. Well-preserved fossil Leptictids indicate that they were diggers: using claws to tunnel below ground, where they could well have survived the extinction event.

Nature abhors a vacuum. The extinction opened up ecological niches, causing a burst of evolution, and the small mammals that lived alongside – and succeeded - the dinosaurs, were joined by an explosion of much larger animals.

Giant herbivores

About 52 million years ago, in what is now North America, there appeared a 2,000-kilo herbivore called Uintatherium. Resembling a rhinoceros, Uintatherium was one of the largest animals of its time - up to 4 metres long, with massive limbs supporting an equally massive body. Its equally massive head featured three pairs of bony protrusions, like cut-down horns, and a pair of dagger-like tusks that it probably used for protection. Uintatherium's skull was mostly bone, not brain, so it had very limited intelligence - a quality that probably contributed to its eventual extinction some 36 million years ago.

Uintatherium's cousins, the Brontotheres, were similar thick-skinned, rhino-like herbivores that were up to 2.5 metres tall at the shoulder. Again, they had strange, horn-like structures - the exact purpose of which is unknown - on their snouts. Yet these massive creatures, which browsed in huge herds across Asia and America, had tiny brains no larger than a fist and, like their Uintatherium cousins, died out 30 million years ago.

Even these massive creatures would have been dwarfed by Indricotherium, which roamed the Asian savannah until about 10 million years ago. This herbivore, which stood 8 metres tall from head to toe, is believed to have been the largest land mammal that ever lived: it weighed some 15 tonnes, twice that of today's largest land animal, the African elephant.

Fearsome predators

These herbivores were not the only large mammals of the Cenezoic. They had meat-eating counterparts, like Hyaenadon. This predator, which possessed long, powerful jaws ideal for biting and crushing, appeared about 41 million years ago. At 1.4 metres high at the shoulder and 3 metres in length, Hyaenadon, which weighed up to 500 kilos, was one of the largest land carnivores that ever existed - apart from Andrewsarchus.

This was truly the stuff of nightmares. Andrewsarchus resembled an overgrown wolf: nearly two metres tall at the shoulder, nearly 5 metres long, weighing over 1,000 kilos. Some may have tipped the scales at 2,000 kilos – possibly the largest terrestrial carnivorous mammals that ever existed. Andrewsarchus would have made a formidable adversary. Its huge jaws – among the strongest ever evolved in a land animal - could bite through the largest bones. So it was well-adapted to prey on the giant herbivores.

Early rodents

Though most fossil discoveries of the giant early mammals were made in the 20th and 19th centuries, palaeontologists can still come up with surprise finds. In 2000, a chance discovery unearthed an almost complete skeleton of the world's largest rodent. Phoberomys pattersoni, which probably lived on the banks of Latin American rivers some 8 million years ago, resembles a guinea pig the size of a cow. This curious rodent stood one metre tall, was three metres long - with a tail over a metre long - and weighed in at 700 kilos.

So why are modern rodents so small compared with Phoberomys pattersoni?

Small mammals such as rodents normally escape predators by burrowing underground or running faster than their hunters. But Phoberomys pattersoni was too large to tunnel and too slow to run. It may simply have been too cumbersome to survive.

The same is probably true of the other giant mammals of the early Cenezoic. Creatures like Indricotherium, weighing in at some 15 tonnes, could not have moved very fast. They were at the very limits of size for a land animal, and would have been easy prey for predators. Others, like the rhino-like Uintatherium, with their dagger-like tusks and thick skin, would not have

been so easy. But their size alone meant they were vulnerable to other factors like climate change: animals which need to eat hundreds of kilos of food a day are totally dependent on their food supplies. If grasslands become dust-bowls, those animals are doomed. Competition was another factor.

Even the formidable Andrewsarchus, with its bone-crushing jaws, eventually became extinct, possibly because it was simply too large, needing too much food to sustain itself. Eventually, it was out-competed by smaller, more efficient carnivores - the ancestors of modern wolves, dogs and cats.

Yet another factor was brain size. Typically, the early giant mammals had massive skulls but small brains. They were probably incapable of adapting to new circumstances like changing grazing lands simply because they were too dumb - the original 'boneheads' - and were replaced by later, smarter mammals.

Yet these extraordinary, super-sized creatures managed to survive for millions of years. Even the Brontotheres, with brains no larger than a fist, browsed the plains of the early Cenezoic for nearly 30 million years before they became extinct.

The first horses

The giants - though the most spectacular - were not the only early mammals. They came in all sizes and shapes. Some were evolutionary dead-ends: Palaeotherium, for example, which resembled a small tapir, became extinct 23 million years ago, leaving no trace save their fossil remnants. But others were early species that, over tens of millions of years, would evolve into today's mammals. Eohippus, a herbivore the size of a cat that grazed northern hemisphere grasslands over 50 million years ago, is thought by many scientists to be the ancestor of all modern horses.

Such is the slow pace of evolution that it would take several million more years before the first equine ancestors that actually looked horse-like appeared. One of these was

Merychippus - though just 120 cm tall at the shoulder, it had a long muzzle and neck, ran in herds, and grazed. Merychippus itself gave rise to no fewer than 19 different species of grazers, which, millions of years later, eventually led to the modern horse.

Living alongside early humans

If the early mammals existed alongside the dinosaurs, then their later relatives lived alongside another dominant land species - man. The first hominids appeared about two million years ago; homo sapiens about 500,000 years ago. Many of the strangest of the early mammals were still alive during the early years of man, only becoming extinct in the past several thousand years. Some of them may have been hunted to extinction by the new, large-brained, tool-using, two-legged mammals. And some of them may not be extinct, after all.

The animals that shared the land with the early humans were as strange as their much earlier cousins. According to fossil evidence, Macrauchenia, an early hoofed animal, had what appeared to be a nose like an elephant's trunk superimposed on the body of a goat. Yet this agile, speedy mammal was able to elude predators for some seven million years, only becoming extinct 20,000 years ago - so it may well have been a familiar sight to our distant ancestors.

Another now-extinct early mammal that definitely co-existed with humans was the woolly rhinoceros. Its existence was, in fact, first known from prehistoric cave drawings long before a well-preserved specimen was found in a Polish tar-pit.

The woolly rhinoceros's name comes from the thick fur that allowed it to survive the last Ice Age - it has now been dated as late as 8,000 BC, to the time of the Stone Age. It must have been a formidable adversary for Stone Age hunters: big, powerful, with a 1-metre-long front horn that could easily impale a human.

The woolly rhinoceros is now extinct, probably as a result of climate change - the warming world after the Ice Age favoured its modern, fur-free cousins. But some of the early mammals that lived at the same time as humans may not have followed the woolly rhinoceros into history. They - or creatures very similar to them - may live on in remote places like Amazonia or central Asia, giving rise to the legends of large, unknown beasts.

Take the case of Megatherium, a relative of today's tree sloth, but built on a much larger scale. Megatherium was about the size of an elephant, some six metres long and weighing up to four tonnes. This clumsy, slow-moving ground sloth lived in the Americas until about 12,000 years ago. Megatherium may have been a lumbering herbivore, but modern research has shown the giant mammal was able to defend itself. By rearing up on its hind legs and displaying its dagger-like claws, Megatherium would have been an intimidating adversary - like a bear the size of an elephant.

Modern day myths

Did some of these creatures survive extinction and live on into modern times? Some researchers think the answer is yes. In the 1890s, an

Argentinean adventurer reported an encounter with a large, hairy, unknown mammal. In fact, it was so large that when he shot at it, his bullets appeared to have no effect.

Similar creatures have been described by local people over a wide area of Amazonia. They even have a name for it - the Mapinguari. Witnesses tell of a large, sloth-like creature that, when startled, rears up on its hind legs, shows its large claws and adopts an aggressive stance - just as Megatherium might have done. This may be rural legend, but villagers in areas where the Mapinguari has been reported take the stories seriously enough to avoid the forest at night. At least one zoologist believes the 'Mapi' are, in fact, descendants or relatives of giant sloths like Megatherium.

The average weight of a male human European is about 80 kilos. The largest primate that ever lived makes humans look puny. Gigantopithecus weighed in at 500 kilos and measured 3 metres, two to three times the size of today's gorillas, which it superficially resembles. (in fact, its closest living relatives are orangutans). Gigantopithecus roamed southeast Asia for nearly one million years, before dying out about 100,000 years ago. So it could have co-existed alongside humans, to whom it would have presented an awesome spectacle. Like gorillas, Gigantopithecus was a herbivore, feasting mainly on bamboo - which may have led to its demise as tropical jungle declined through climate change.

But Gigantopithecus may not have died out entirely. Some researchers believe it still exists as the legendary primates known in various places as Bigfoot and the Yeti. Whether that is true or not, Gigantopithecus certainly played one major role in modern times: its fossils were discovered in the 1920s, leading to popular fascination - and a place in cultural history as the basis for King Kong in the 1933 film classic.

Mammoths

Of all the extinct mammals those paths crossed those of humans, the most well-documented and popular are the mammoths. We know they existed alongside humans - our ancestors painted them on cave walls, often showing them being hunted. And complete mammoths have been found beneath the frozen tundra of Siberia. The mammoths were an extraordinarily successful species. They survived for several million years, and were widespread across the planet.

Mammoth remains have been found in Europe, Africa, Asia and north America. Their thick coats allowed them to thrive during the Ice Ages: their population density in Siberia alone has been estimated at 60 mammoths to every 100 square kilometres. Most mammoths were about the same size as today's Indian elephants. But some were much larger: the Imperial Mammoths of California weighed over 8 tons and reached heights of over 4 metres.

Most mammoths died out at the end of the last Ice Age, about ten thousand years ago. No-one knows for sure why they became extinct. It was probably a combination of several factors - a warming Earth; hunting by humans; and disease. Yet some survived into relatively recent times. Remains of smaller versions, called 'dwarf mammoths', have been found on remote islands and dated to just 1,500 BC. And, like Gigantopithecus, there are claims that mammoths may still exist. Reports by Siberian tribesmen suggest that small groups of them may still exist in the vastness of the tundra.

Even if the great mammoths are truly extinct, it may be possible to 'revive' them. It's not beyond the realms of possibility that scientists could create an animal similar to the mammoth. Take DNA from a well-preserved male mammoth corpse, recreate its sperm, and use that to impregnate a female Indian elephant - the mammoth's closest living relative. This would be difficult, to say the least, but some scientists believe it is possible, and far more realistic than trying to recreate a dinosaur. Just recently, in December 2005, researchers managed to complete a section of mammoth DNA called 'mitochondrial DNA', which is passed down the generations via the female line. So re-creating mammoth sperm may not be as outrageous as it sounds.

The early mammals of the Cenezoic - the beasts that time forgot - had as much an impact on their surroundings as the dinosaurs they replaced. Their cousins - the mammals that followed them - are still the dominant animals on land. And if it were possible to create a Cenezoic Park, its inhabitants would be just as bizarre, and fascinating, as the dinosaurs of Jurassic Park.

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