

Large mammals once dined on dinosaurs

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When the dinosaurs ruled the world, the mammals hid in the shadows, daring to grow no bigger than shrew-like insectivores that hunted at night. Or so we thought.

Two stunning new fossils from China have overturned this preconception. Not only did large mammals live alongside their giant reptilian cousins, but some were big and bold enough to go dinosaur hunting.

Named *Repenomamus giganticus* and *Repenomamus robustus*, the sturdily built mammals lived in China about 130 million years ago, around 65 million years before we thought their kind inherited the Earth. At 1 metre long, *R. giganticus* was big enough to hunt small dinosaurs, and a newly discovered fossil of its smaller cousin, *R. robustus*, died with its belly full of young dinosaur.

This totally overturns the notion of dinosaur-age mammals as tiny and nocturnal, says vertebrate palaeontologist Hans-Dieter Sues of the Smithsonian Institution in Washington DC, US. "Apparently some mammals could grow much larger than anyone had thought was possible."

In another role reversal, those comparative mammalian giants may have affected dinosaur evolution by preying on them, adds palaeontologist Anne Weil of Duke University in Durham, North Carolina, US.

Filling niches

Mammals and dinosaurs evolved from different groups of comparable-sized reptiles during the Triassic, which ran from 248 to 206 million years ago. In the conventional picture, dinosaurs filled the niches for large plant-eaters and predators, relegating mammals to the marginal niches that are now home to shrews and rodents. So large mammals could evolve only after the dinosaurs died 65 million years ago.

And while a handful of teeth and other fragmentary remains hinted that a few large mammals may have lived alongside the dinosaurs, little was known about them. No one had found a reasonably complete skeleton of a Cretaceous mammal as large as *R. giganticus*, says Yaoming Hu at the American Museum of Natural History in New York, US.

R. giganticus and the new fossil of *R. robustus* come from an area of China's Lianoning province famed for its feathered dinosaurs. *R. giganticus* was a short-legged but powerful animal with fearsome teeth, similar to a large modern Tasmanian devil or a honey badger. "I wouldn't want it coming after me," Weil told **New Scientist**.

Ground dweller

Its skull measures 16 centimetres long, its body 52 cm, and the preserved part of its tail 36 cm. The beast probably weighed 12 to 14 kilograms. Hu says *R. giganticus*'s legs suggest it was a ground dweller that could dash to catch prey, but not run long distances. *R. robustus* was two-thirds as long and weighed between 4 and 6 kg.

The large sharp front teeth and smaller back teeth of both mammals mark them out as carnivores. Their teeth are not designed for heavy chewing, and the relatively unbroken bones in the stomach of *R. robustus* confirm that it tore chunks from its prey and gulped them down. The bones found in the stomach came from a young psittacosaurus, a common bipedal plant-eater, and evidently the favourite meal of the local carnivores.

Adult psittacosaurus grew to be nearly 2 metres tall, but *R. robustus*'s last meal was just 14 cm long. Modern mammal predators that weigh less than 21.5 kg normally take prey less than half their body mass, so if both species of *Repenomamus* followed suit then adult psittacosaurus would have been safe. Not so the juveniles.

The discovery suggests there is much we have yet to understand about mammal evolution during the Mesozoic era, which spans the Triassic, Jurassic and Cretaceous periods, from 248 to 65 million years ago. "It's very possible that when people start looking for Mesozoic mammals of this size, they will find them." Weil says.

The *Repenomamus* species, however, have no living descendants. They were triconodonts, a poorly understood group of primitive raccoon or opossum-like creatures that diverged from modern mammals during the Mesozoic. Triconodonts have faded from the fossil record by the late Cretaceous, and may have died out before the dinosaurs.

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