

## Science &amp; Environment

## Monstrous fossils 'were armadillos', says DNA evidence

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The beasts' huge tails are thought to have been used for intra-species fighting

An extinct group of giant, armoured animals with spiky, club-shaped tails belongs firmly within the family tree of modern armadillos, according to a study of 12,000-year-old DNA.

The glyptodonts roamed South America for millions of years until the last Ice Age, and some grew as big as cars.

Their physical attributes - notably an impenetrable shell - already placed them as likely cousins of armadillos.

Now, researchers say they are not even a sister group, but a subfamily.

"Glyptodonts should probably be considered a subfamily of gigantic armadillos," said Frederic Delsuc, from the National Centre of Scientific Research (CNRS) and Montpellier University in France.

Dr Delsuc and his colleagues used computer predictions to reconstruct some likely DNA sequences of armadillo ancestors, based on the genes of living species.

They then made RNA "bait" based on these sequences and used it to fish for glyptodont DNA in a tiny, mashed-up sample of shell from a fossil in a Buenos Aires museum.



Oddly, the dwarf pink fairy armadillo is among the glyptodont's closest living relatives

This technique allows scientists to confidently identify real DNA sequences from the ancient target species, without worrying about contaminating genetic material.

Sure enough, the team eventually managed to reconstruct the entire mitochondrial genome - because the computer simulations and bait sequences were mitochondrial DNA - of a glyptodont.

And it was not just any glyptodont; the sample came from *Doedicurus*, one of the most monstrous members of the family. It stretched up to 4m in length and weighed about 1.5 tonnes.

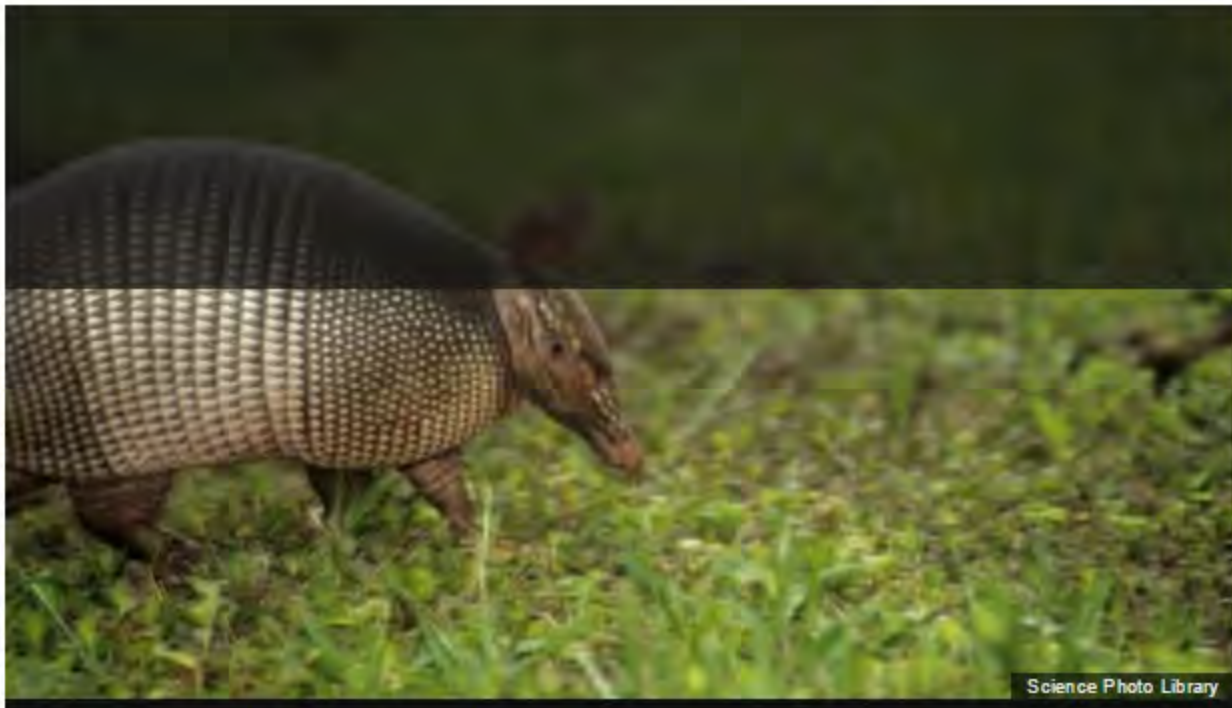


Doedicurus was among the biggest of the lot - illustrated here alongside modern armadillos

These fearsome but vegetarian beasts, the researchers say, got progressively bigger over time until their extinction at the end of the Ice Age 10,000 years ago. That places them in good company, as Pleistocene-epoch South America was also home to elephant-sized ground sloths and giant, sabre-toothed cats.

Most importantly, Dr Delsuc and his colleagues are confident they have resolved the position of the glyptodonts in the tree of life - and they are nestled deep in the "cingulata" order, among myriad branches of armadillos.

"Glyptodonts in fact represent an extinct lineage that likely originated 35 million years ago within the armadillo radiation," said co-author Hendrik Poinar from McMaster University, Canada.



Modern species, like the nine-banded armadillo, have highly articulated shells

One of the main differences between this ancient group and their modern cousins is the glyptodont's huge, dome-shaped shell, which was not articulated like the iconic, layered bands of the armadillo.

The researchers think this single, rounded shield might have evolved alongside the "spectacular increase" in the glyptodonts' size - which also explains why some older members of the family do, in fact, appear to have banded shells.

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