

Caverns give up huge fossil haul

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An astonishing collection of fossil animals from southern Australia is reported by scientists.

The creatures were found in limestone caves under Nullarbor Plain and date from about 400,000–800,000 years ago.

The palaeontological "treasure trove" includes 23 kangaroo species, eight of which are entirely new to science.

Researchers tell Nature magazine that the caves also yielded a complete specimen of *Thylacoleo carnifex*, an extinct marsupial lion.

It appears the unsuspecting creatures fell to their deaths through pipes in the dusty plain surface that periodically opened and closed over millennia.

Most of the animals were killed instantly but others initially survived the 20m drop only to crawl off into rock piles to die from their injuries or from thirst and starvation.

The preservation of many of the specimens was remarkable, said the Nature paper's lead author, Dr Gavin Prideaux.

All shapes

"To drop down into these caves and see the *Thylacoleo* lying there just as it had died really took my breath away," the Western Australian Museum researcher told the BBC's Science In Action Programme.

Sitting in the darkness next to this skeleton, you really got the sense of the animal collapsing in a heap and taking its last breath. It was quite poignant.

"Everywhere we looked around the boulder piles, we found more and more skeletons of a very wide array of creatures."

In total, 69 vertebrate species have been identified in three chambers the scientists now call the *Thylacoleo* Caves.

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These include mammals, birds and reptiles. The kangaroos range from rat-sized animals to 3m (nearly 10ft) giants.

The team even found an unusual wallaby with large brow ridges.

"When we first glanced at the animal, we thought they were horns; but on closer inspection we realised they must have performed some sort of protective function," Dr Prideaux explained.

"The beast must have been sticking its head into spiny bushes and browsing on leaves."

The 'Ancient Dry'

The scientists' investigations indicate the ancient Nullarbor environment was very similar to that of today – an arid landscape that received little more than 200mm of rainfall a year.

What has changed significantly is the vegetation. Whereas the Thylacoleo Caves' animals would have seen trees on the plain, the modern landscape is covered in a fire-resistant chenopod shrub.

This observation goes to the heart of a key debate in Australian palaeontology, the team believes.

The continent was once home to a remarkable and distinctive collection of giant beasts.

These megafauna, as researchers like to call them, included an immense wombat-like animal (*Diprotodon optatum*) and a 400kg lizard (*Megalania prisca*).

But all – including the marsupial lion – had disappeared by the end of the Pleistocene Epoch (11,500 years ago).

Some scientists think the significant driver behind these extinctions was climate change – large shifts in temperature and precipitation.

But Dr Prideaux and colleagues argue the Thylacoleo Caves' animals give the lie to this explanation because they were already living in an extremely testing environment.

"Because these animals were so well adapted to dry conditions, to say that climate knocked them out just isn't adequate. These animals survived the very worst nature could throw at them, and they came through it," co-author Professor Bert Roberts told BBC News.

"If you look at the last four or five glacial cycles, where the ice ages come and go, the animals certainly suffered but they didn't go extinct – they suffered but survived," the University of Wollongong scientist said.

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This assessment would be consistent with the other favoured extinction theory – extermination by humans, either directly by hunting or indirectly by changing the landscape through burning.