

by John Long

When we think of prehistoric times, images of giant woolly mammoths and sabre tooth tigers spring to mind. Yet here in Western Australia, in the last few hundred thousand years, a great variety of giant mammals once roamed the countryside.

Walking with WA giants



The term megafauna generally applies to giant animals (weighing more than 45 kilograms) that became extinct around 50,000 years ago. Many palaeontological sites in Western Australia have already provided us with a general picture of the kinds of creatures that once roamed our forests and open plains. But recent finds of well-preserved skeletons of megafauna from caves on the Nullarbor Plain will provide new insights into the lives and deaths of our ancient megafauna.

Australia's largest land animals, since the demise of the dinosaurs 65 million years ago, lived during the Pleistocene epoch (from 10,000 years ago to 1.75 million years ago). In Western Australia, the prehistoric mammals from the last million years included a variety of these giants, such as the largest monotremes (egg-laying mammals) that ever lived, huge diprotodontoids (extinct diprotodontines and zygomaturines that were the size of rhinos), giant wombats up to 1.5 metres long, huge kangaroos three metres high, leopard-sized predatory marsupial lions, Tasmanian tigers and devils, koalas, possums, and a wide variety of smaller bandicoots, phascogales and rodents.

At the turn of the last century, John Sharp and William Poynton collected fossil mammal bones at a granite soak near Balladonia, on the western edge of the Nullarbor. They gave the specimens to the Western Australian Museum, where Ludwig Glauert described them in 1912. Glauert recorded a number of species of extinct large mammals, such as the huge, lumbering *Diprotodon* and the marsupial lion *Thylacoleo*, which had previously only been known from the eastern half of Australia.

Previous page

Reconstructive illustration of the marsupial lion *Thylacoleo carnifex*.
Illustration – Martin Thompson

Above: Reconstructive illustration of a diprotodontid marsupial.
Illustration – Anne Musser/
Naturefocus.com.au

Right: Skeleton of the short-faced kangaroo, *Sthenurus*.
Photo – Kris Brimmell/WA Museum



EARLY FINDS

However, the first truly significant discoveries of prehistoric mammals in WA were made in 1904, during the construction of a path inside Mammoth Cave, near Margaret River. Five years later, Glauert began to excavate the site and found a great diversity of prehistoric mammals. To his surprise, the number of fossil species far exceeded the number of species of mammals that currently inhabited the region.

Glauert's finds included a giant marsupial, *Zygomaturus trilobus*, which was the size of a small hippo. Recent studies of this animal suggest that it may have lived much like a marsupial version of a hippopotamus, inhabiting swampy regions and feeding on plants. Glauert also discovered the partial skeleton of a monotreme—a giant echidna, which he compared to the living New Guinean form *Zaglossus* and named *Zaglossus hacketti*. This anteater was about a metre long and, to

date, is the largest known monotreme ever discovered.

The fauna of Mammoth Cave was later studied by Duncan Merrilees of the WA Museum. He named two new species of the extinct short-faced kangaroo, *Sthenurus*, from the material found there. The complete fauna provided an accurate representation of the range of animals that lived in south-west environments of WA from about 44,000 to 60,000 years ago, based on recent new dates provided by Richard Roberts of the University of Woolongong. Similar dates obtained from a nearby cave, called Devils' Lair, indicated that human occupation in Western Australia could be traced as far back as 50,000 years (see 'History from the Caves', *LANDSCOPE*, Spring 2001). Some of the giant kangaroo bones found at Mammoth Cave bore notches that appeared to be carved by humans.

The small mammal fauna of Mammoth Cave included a great variety





of species found living in the area in recent times, such as quokkas, woylies, long-nosed bandicoots, bilbies or dalgytes (see also 'Remembering the Dalgyte', *LANDSCOPE*, Summer 2002-03), southern quolls and many varieties of rodents and bats. There were also remains of living marsupial species, such as the koala, that no longer occur naturally in Western Australia.

Many other caves from the Augusta-Margaret River region have yielded remains of fossil mammals; all contributing to the picture of the animal life that once lived in the densely forested habitats of the southwest. But what of the north of the State, and its far east?

MEGAFUNA FROM THE NORTH

Fossils from a range of prehistoric mammals and reptiles were excavated from a dark muddy layer encountered when building a dam at Quanbun Downs Station, near Fitzroy Crossing. These were described by Ludwig Glauert in 1921 and studied in further detail by Tim Flannery in 1984. Flannery concluded that, on the basis of the extinct kangaroo *Macropus pan* being present at Quanbun, these finds must have been much older than any of the other mammals from the cave sites,



Top: Reconstructive illustration of the giant wombat *Phascolonus gigas*.
Illustration – Anne Musser/Naturefocus.com.au

Above: The jaw of *Zygomaturus* sp. found at the Murchison River.
Photo – Kris Brimmell/WA Museum

possibly as old as the Pliocene epoch (1.75–5.3 million years old). The fossils and other material found at Quanbun included remains of the giant wombat *Phascolonus gigas* and the extinct giant wallaby *Protemnodon*. They also contained the teeth of a very large crocodile, which could either be the living saltwater crocodile or an extinct form known as *Pallimnarchus*.

Other isolated finds included bones of *Diprotodon* along the Oakover River in the Pilbara and also south of Karratha near the mouth of the Fortescue River, where a whole skeleton was excavated over two field seasons in 1992–93. Windjana Gorge, in the southern Kimberley, has yielded bones of *Diprotodon*, the teeth of a giant extinct crocodile and scant remains of



the Tasmanian tiger. A set of lower jaws of *Zygomaturus* was also found near the Ord River at Kununurra.

NULLARBOR DISCOVERIES

The Nullarbor Plain is a vast limestone plateau along the State's south-east coast that is riddled with many caves. During the last 30 years, occasional finds of prehistoric

mammals had been made in some of these caves. A mummified thylacine was discovered at Thylacine Hole in 1966. This specimen was dated at 4500 years old and is still the only complete example of the mainland thylacine (with skin colouration and muscle tissue preserved) known to science. A cave near Madura, studied by Professor Ernie Lundelius in the 1970s, yielded

the remains of extinct megafauna. During the 1990s, a cave in the western Nullarbor produced the fossil remains of megafauna, which included a partial skeleton of a marsupial lion, bones of the giant echidna, various extinct forms of sthenurine kangaroos and other animals. But it wasn't until last year that really exciting discoveries—of extremely well-preserved fossil remains of mammals—were made in the region.

In May 2002, members of the Cave Exploration Group of South Australia and the Victorian Speleological Group, headed by Ken Boland, Ray Gibbons, Peter Ackroyd and Paul Devine, used an ultralight aircraft to discover a number of new karst features on the western Nullarbor. Some of these caves contained very well-preserved articulated skeletons of extinct



Above: Dr Gavin Prideaux from Flinders University examining a fossil in a cave in the Nullarbor Plain.

Left: The fossil of the giant kangaroo, *Procoptodon goliah*.
Photos – Clay Bryce/WA Museum

mammals. The cavers notified museum specialists in Victoria and South Australia, who in turn notified palaeontologists at the WA Museum, as the caves were on WA Crown land.

Our expedition, in July 2002, recovered several complete skeletons of the marsupial lion *Thylacoleo carnifex*, skeletons of three species of sthenurine kangaroo, bones of the giant wombat *Phascolonus gigas*, the giant kangaroo *Procoptodon goliath*, extinct species of *Wallabia* and the remains of unidentified species of macropodine kangaroos.

The time that elapses between the initial discovery of such fossils and the actual recovery of the specimens is a crucial period in the preservation of valuable scientific information. In this instance, correct procedures were followed to the letter, enabling uncontaminated skeletal specimens to be collected under sterile conditions for extraction of ancient DNA, and adding to the scientific value of the discovery. It is a credit to the discoverers that this occurred.

IMPORTANCE

The Nullarbor discoveries are immeasurably important. They provide the first complete, articulated skeletons of megafauna from the Pleistocene epoch from anywhere in Australia. Samples are currently being tested for ancient DNA, and the ages of the fossils are being dated using OSL (optical stimulation luminescence) and ESR (electron spin resonance) techniques. It is likely that the unique preservation of the fossil material was the result of a long period of constant dry conditions within the caves, which, in some cases, may have been sealed off shortly after the animals accidentally fell in.

If the *Thylacoleo* skeletons have any trace of ancient DNA left in them, it will be a useful tool to interpret the evolutionary history of the group. There are two main schools of thought about the origin of marsupial lions. Some workers believe that they are closely related to the possums, whereas other scientists think that they evolved from wombat-like ancestors. Ancient DNA in a marsupial lion would enable comparison between these groups, and hopefully resolve the matter once and for all.

Right: The fossil of the marsupial lion *Thylacoleo*.

Below: John Long with the fossil head of the marsupial lion *Thylacoleo*.
Photos – Clay Bryce/WA Museum



Similar debate exists over the lifestyles of the marsupial lion. Some have argued that they must have been skilled tree-climbers, using their powerful opposable thumb hand for pulling themselves up trees, but others think they were too massively built to be comfortable in a tree. As the new material represents the first complete skeleton of *Thylacoleo* ever found, it will enable us to study the bones and try to answer these questions through analysis of the bones' internal structure. However *Thylacoleo* lived, one thing is

for sure—it was a voracious predator. Its teeth bear silent witness to a lifestyle that involved a lot of killing.

Over the coming months, even more information will be gleaned from these important finds and we shall learn more about the lifestyles of the huge, extinct inhabitants of this ancient land.



John Long is Curator of Vertebrate Palaeontology at the Western Australian Museum. He can be contacted by email (john.long@museum.wa.gov.au). John has written or co-written many books on prehistoric animals of Australia including *Dinosaurs of Australia* (Reed Books, 1991, 1993), *The Rise of Fishes* (University of New South Wales Press, 1995), *Dinosaur Dealers* (Allen & Unwin, 2002) and *Prehistoric Mammals of Australia and New Guinea – 100 Million Years of Evolution* (UNSW Press, 2002, coauthored with M Archer, T Flannery and S Hand).

Younger readers may enjoy John's new fiction book *Journey to the Dawn of Time* (Fremantle Arts Centre Press, 2003) which takes the reader back to the ice age world of Australian megafauna.

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Cane toads are poisonous, prolific breeders and are getting closer to the WA border. Hop to page 10.

Once thought to be extinct, Gilbert's potoroo has overcome many obstacles. What is being done to improve its chances of survival? See page 28.



The tuart once typified the coastal strip north and south of Perth. Why should we cherish this majestic tree? See page 16.



Discover some of the prehistoric megafauna that once roamed the State in 'Walking with WA giants' on page 23.



Lichens decorate Lake Muir, near Manjimup, with varying colours and shapes. Turn to page 43 to learn more about these fascinating life forms.

F E A T U R E S

POISON IN PARADISE: CANE TOADS HOP WEST
TONY START AND CHRIS DONE10

CHERISH THE TUARTS
ROBERT POWELL AND BRONWEN KEIGHERY.....16

WALKING WITH WA GIANTS
JOHN LONG.....23

GILBERT'S POTOROO—EIGHT YEARS ON
TONY FRIEND28

BOTANIC GUARDIAN
NEVILLE MARCHANT36

LICHENS—THE POOR LITTLE PEASANTS OF LAKE MUIR NATURE RESERVE
RAY CRANFIELD AND RICHARD ROBINSON43

IN SEARCH OF THE WESTERN FLAT
ANDREW WILLIAMS AND MATTHEW WILLIAMS.....48

R E G U L A R S

BUSH TELEGRAPH.....4

ENDANGERED
WESTERN GROUND PARROT35

URBAN ANTICS
A SAUCERFUL OF SECRETS.....54

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C O V E R

Royal hakea rises above the surrounding heath, straight and column-like. When sunlit from above or below, its unusual large variegated leaves appear to glow like lanterns, so the shrub is also known as the Chinese lantern bush. Among the birds that obtain nectar from its flowers (hidden at the base of the leaves) is the western spinebill.

Royal hakea grows almost exclusively in Fitzgerald River National Park, an area that was reserved on the recommendation of then Government Botanist Charles Gardner (see 'Botanic Guardian' on page 36).

Cover illustration by Philippa Nikulinsky



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