FOSSIL RESEARCH AT VICTORIA CAVE NARACOORTE, SOUTH AUSTRALIA

by

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(Presented by A.W. Lake)

The fossil chamber in the Victoria Cave at Naracoorte was discovered in August 1969 and appears to be one of the richest deposits of Pleistocene marsupial bones yet discovered in Australia. Most of the fossils recovered so far are already known, yet the deposit is still of great scientific importance. To understand why, it is necessary to have some insight into the discipline of vertebrate palaeontology and some knowledge of previous work in this field in Australia.

Vertebrate palaeontology, like every scientific specialization is a search for the answers to certain fundamental questions. These are:

1. *What* are fossils?
2. *When* did a particular fossil live?
3. *How* and *where* did it live?

and 4. *What* is its place in evolution?

Most of the early workers in this field were concerned only with the first question, with morphological systematics or the study and description of fossils. They did not recognise the need for accurate stratigraphic localization, that is, they did not concern themselves with the second question, *when* did the fossils live? One of the major tasks facing vertebrate palaeontologists today is to relocate the classic localities in order that the material collected previously can be allocated to a definite stratigraphic horizon.

A recent example is the work of Allan Barthelomai of the Queensland Museum. He has re-examined the De Vis collection taken from the Darling Downs in the 1890's and has been able to show that this collection actually represents two distinct faunas.

The Wellington Caves in New South Wales have been the source of much of the early marsupial fossil material described by the famous British anatomist, Sir Richard Owen, and although this material forms the basis of our current knowledge of the Pleistocene vertebrate faunas, there has been no serious attempt to elucidate the stratigraphy within these caves.

The work involved in determining the time relationships within a cave deposit is very slow and painstaking and therefore it is not surprising that unprotected deposits have been rapidly exploited.

At Naracoorte we were fortunate that the discovery of the undisturbed fossil deposit was made in a new section of an established tourist cave and is therefore effectively protected from unwitting explorers and over-zealous collectors. This unique situation has enabled us to plan our approach to the excavation in a systematic manner which we hope will allow us to do more than just name the fossils. It should give us some insight into the past ecology of southern Australia.

The deposit is some 250' x 60' x 8' deep – so large that it is unlikely that it will ever be fully exploited. In fact at this stage we are planning to leave half the chamber in its original condition. Our approach so far has been to map and grid the surface of the deposit and excavation has commenced at several grid locations. At one end of the cave a test pit is being dug down to basement rock to give us some insight into the general stratigraphy of the deposit. Core samples have also been taken to further help in this interpretation.

Several techniques are being used to remove the bones. Large and fragile specimens are isolated on a column of earth and encased in a plaster jacket. These are then removed to a surface laboratory for further treatment. Other specimens are treated on site with either shellac or an acrylic. Each specimen is given a number which indicates its position in reference to the grid and its depth in the sediment. Carbon samples, wherever they occur are collected in aluminium foil and suitably catalogued. These will later be used for radio isotope dating of the deposit. All the overburden is run through a sieve to remove the remains of the small animals. Sediment samples are treated with oxidizing acids and examined for their fossil spore content. Because of the high humidity within the cave, all the fossil material is removed to a surface laboratory which has been kindly provided by the South Australian Government Tourist Bureau.

Rather than just give a check list of the animals we have identified, I feel it would be more informative to discuss them in terms of the currently accepted classification of marsupials as proposed by Dr David Ride in 1964. Ride groups the super-families of marsupials into 4 distinct orders, three of which occur in Australia.

Order I The Marsupicarnivora or Marsupial Carnivores

This order is represented in Australia by the super-family *Dasyuroidea* and includes such animals as the Tasmanian Wolf, Tasmanian Devil, native cats and pouched mice. The following members of this group have been identified in the cave deposit:

1. *Thylacinus* (the canine teeth) of the Tasmanian Wolf.
2. *Dasyurus*, the native cat (teeth and skull portion).

and 3. *Antechinus* and *Sininthopsis* (the small pouched mice).

Order II The Paucituberculata

These are South American only.

Order III The Peramelina, represented by the bandicoots, an omnivorous group. The cave deposit has yielded both long nosed bandicoot (*Peramales*, two species) and the short nosed bandicoot (*Isoodon*, one species).

Order IV The Diprotodonta

This is the largest of the Australian orders and includes the family Phalangeridae, possums, cuscus and marsupial lions; Wynyardiidae, an Oligocene fossil from Tasmania; the Vombatidae, the wombats; Diprotodontidae, the large quadrupedal diprotodonts and finally the largest family, Macropodidae, the kangaroos.

Amongst the possums (Phalangeridae) we have identified Pigmy Possums, Gliding Possums and Ring Tailed Possums, but so far there is a surprising absence of the ubiquitous Brush Tail. Also inciuded in this group is the Cave Lion with its unusual tooth structure about which there has been much controversy. The skulls of six of these animals have been discovered so far. Wombat skulls have been found and identified as belonging to the genus *Vombatus*, a smooth nosed wombat.

At present it is thought that there are at least five evolutionary lines within the Diprotodontidae, the largest, and possibly best known, being represented by *Diprotodon australis* from Lake Callabonna in the north east of South Australia. The diprotodontids at Naracoorte are slightly smaller animals (about the size of an ox) represented by the genus *Zygomaturus*. A skull, several jaws, teeth and skeletal elements have been uncovered.

The family Macropodidae is particularly well represented in the Naracoorte deposit. This family can be divided into two groups, the Macropodinae, a line represented by present day kangaroos and the Sthenurinae, an extinct group of short tailed kangaroos. Amongst the Macropodinae we have a large suite of fossils ranging from the small Bettongs or rat kangaroos to the giant grey kangaroos (which appear to be larger than present day greys). Many species of the extinct short-tailed kangaroos (Sthenurines), including both the browsing and grazing forms as well as the giant of all kangaroos, *Procoptodon*, are present in the deposit. Pes and jaw elements of the giant wallaby, *Protemnodon*, have also been identified.

As well as this vast range of living and extinct marsupials, the deposit also contains the remains of lizards, birds and rodents. This particular faunal assemblage, and the fact that it seems at present to lack any members of the genus *Rattus* would indicate that the deposit is considerably older than others previously discovered in the South East of South Australia.

Several theories have been advanced for the origin of the deposit, including such speculation as: it was a den of *Thylacoleo*, or that animals were washed in or that it was a natural animal trap. However, at this stage we have insufficient evidence to support any one hypothesis to the exclusion of others.

Undoubtedly this deposit is scientifically important but of equal importance is the example this project provides. How can we co-operate with Government Departments to conserve for future generations some of the excitement of these discoveries?

The South Australian Government Tourist Bureau is to be highly commended for its enthusiastic support and financial backing of this project. Their interest has led to the establishment of an underground museum of prehistory where the general public can view the discovery and the subsequent excavations at first hand and they have also established, in their new ticket office complex on the Caves Reserve, a large laboratory and museum for the preparation and display of these remarkable fossils.

Furthermore the enthusiastic support of the members of C.E.G.S.A. should not escape comment. It has involved many thousands of hours of painstaking work over the last 18 months, yet the project can still be considered to be in its infancy.

This is only one of the many projects being conducted by C.E.G.S.A. in the Naracoorte Caves Reserve.

DISCUSSION

Q *Did they find a* Thylacoleo *in New England?*

A *Thylacoleos* have been found in many places. As I mentioned they found some in the Wellington Caves.

Q *The one found in New England had three young trapped under it presumably due to a cave collapse in alluvium. Surely it would have stomach contents which would resolve the problem whether it was carnivorous or not.*

A I haven't heard anything about this. If you have any information, please send it to Bob Willis or to C.E.G.S.A. There is a lot of argument to be settled.