Important vertebrate fossils from the palaeontological collections of the Department of Geology and Geophysics, University of Sydney.

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ABSTRACT. A small collection of vertebrate fossils was uncovered during a recent re-organisation of the palaeontological collections of the Department of Geology and Geophysics, University of Sydney. Some of this material is of historical and scientific interest. Fossils from Pleistocene deposits on Clairvauxl Station near Glen Innes were collected by N. Miklouho-Maclay in 1880. A small collection of bones from Wellington Caves may have been made by Edgeworth David in 1900. The Wellington Caves fossils represent taxa of snake, varanid, turtle and bird, previously unknown from that locality. Three small samples of a bone-cave breccia are probably from the Broom Breccia, Wombeyan Caves, and may provide new information on the lithology and petrology of this important site.

INTRODUCTION

In 1992 the palaeontological collections of the Department of Geology and Geophysics, University of Sydney, were relocated and partially catalogued. During this work six drawers of vertebrate fossils were revealed. This material was assembled by the late Jack Mahoney while he was employed in the department.

Most of the vertebrate material in the collections consists of plaster casts and common fossils used for teaching. However some of the fossils were more exceptional, important specimens, but little known. Material from an alluvial deposit in New England, NSW, and from two cave deposits in eastern New South Wales are discussed in this paper. The specimens described, together with some other material, have been transferred to the Australian Museum. The abbreviation SUP precedes specimen numbers in the Sydney University Palaeontology collection.

ORIGIN OF THE MATERIAL

Three principal sources for the vertebrate material in the University Geology Department fossil collections have been identified. Most of the material was collected specifically for the University collections in the latter part of the nineteenth century, and the early 1900s. However some at least evidently was originally in the collections of the Macleay Museum and was transferred to the Department of Geology and Geophysics in the late 1960s by Dr. Peter Stanbury (B. Webby, per. comm.). A third possible source of some vertebrate fossils was collecting by Jack Mahoney, but no documented proof of this has yet been located.

CLAIRVAULX MATERIAL

A small collection of Pleistocene bones (SUP10992, SUP10998, SUP11964, SUP11965, SUP11991 and SUP11992) was found among the fossils in the University collection. This material was distinguished by the handwritten labels that accompanied them, all of which carried the "crossed M's" monogram of Miklouho-Maclay.

Nicholaievich Miklouho-Maclay (1846-1888) was a distinguished nineteenth-century Russian scientist, whose interests included anthropology, zoology and palaeontology. He visited Australia four times between 1878 and 1881 during which he travelled extensively and made significant scientific collections. In late December 1880 he visited 'Clairvaux' station about 7 kms northwest of Glen Innes with the intention of collecting palaeontological and geological specimens. He recorded collecting specimens of Diprotodon australis, Nototherium mitchelli, Phascolomys gigas, Macropus titan and other species (Miklouho-Maclay 1881: 174). He left Clairvaux in early January 1881 (Webster 1984: 244).

Most labels with the Geology Department's specimens identify the locality as 'Clairvaux, New
South Wales', but some refine it as 'Walter's Creek, Clairvaux'. All labels also carried the date - 27 December 1880.

The Clairvaux material was almost certainly acquired by the Department of Geology as part of the transfer of fossils from the Macleay Museum. A subsequent search of the remaining vertebrate collections of the Macleay Museum revealed a substantial quantity of Clairvaux material still in its collection. Unfortunately many of the Macleay Museum's records were destroyed during the First World War, having been given up for pulp salvage (MacIntosh, 1949: 167). Other incidents of the deliberate destruction of Macleay Museum records occurred as recently as the 1950s. Any manifest listing exactly what was transferred from the Macleay Museum to the Geology Department has not been located.

The Clairvaux material has not yet been studied in any detail. However the following species can be identified: Diprotodon optatum, Phascolonus sp. cf. P. gigas, macropodine and sthenurine kangaroos.

This is a typical megafaunal association. There is an absence of smaller elements and species but it is not known if this is a taphonomic or collection bias. The preservation and known locality information suggests that Clairvaux is a fluvial or lacustrine deposit.

Many Pleistocene localities similar to Clairvaux are known from eastern Australia. Clairvaux appears to be a prolific site. Miklouho-Maclay claimed to have collected 160 fossil specimens from the site (Miklouho-Maclay, 1881). All of the collecting information available suggests that the fossils were collected in a single day (27 December, 1880). However it seems more probable that these specimens were actually gathered over the full period of Miklouho-Maclay's stay at Clairvaux, something less than two weeks. Alternatively the collection could have been supplemented by Mr. Gunn, the owner of Clairvaux, giving Miklouho-Maclay specimens that he had picked up on the property before Miklouho-Maclay arrived (in fact one label does record that the specimen was presented by Mr. Gunn). In any event, the collection of more than thirty Diprotodon molars still in the Macleay Museum, as well as numerous other elements suggests a rich deposit.

The quality of the fossils from Clairvaux is particularly impressive. Typically, Pleistocene vertebrate fossils from the Liverpool Plains and similar deposits are crumbly, poorly mineralised and easily destroyed. The preservation of Clairvaux material is more reminiscent of fossils from Bingara in northern New South Wales or the Darling Downs in southern Queensland. These fossils are solid, robust and heavily mineralised.

The probable abundance and robust preservation of fossils from Clairvaux suggests that this deposit should be revisited and re-examined. Clairvaux could be particularly interesting if small fossils, such as rodents, bandicoots and marsupial carnivores, are present.

WELLINGTON CAVES

Among the vertebrate fossils of the University's collection was a small box of bones evidently from a cave deposit. The only identification was a single small label (21mm x 17mm) with a blue border, together with two small labels each bearing a four digit number (1686 and 3607). Two of the labels were loose in the box while the third (1686) was still attached to the proximal end of a mammalian ulna.

The label with the blue border has been partially eaten by silverfish but still clearly reads ".......w Cave, Wellington" written in black ink. It appears that the original description was "New Cave, Wellington". The handwriting does not resemble that of any of the previous curators of the Macleay Museum (W.S. Horning, pers. comm.) so it appears unlikely that these Wellington Caves fossils were part of the 1960s transfer. The style of the border on the label is typical of the period from around 1900 to 1915. This suggests that the fossils were entered directly into the Geology Department's palaeontological collections in the earliest part of this century. However, the blue border on the label is quite distinctive, and no similar label remains on any of the older specimens still in the Department of Geology and Geophysics. Similar labels have been found on some fossil specimens in the Macleay Museum and on some aboriginal stone tools transferred from Geology to the Macleay Museum. Although equivocal, this indicates that the label referred to above was affixed in the Geology Department.

The University of Sydney Palaeontological Collection in the Department of Geology and Geophysics has a unique numbering system that was initiated in 1920 and is still in use today. Within
this system all vertebrate specimens have registration numbers that end in digits from 950 to 999 (e.g. 13957 and 8996 are registration numbers for vertebrate specimens, but 11608 is not). Neither of the two numbers included with the Wellington Caves material ends in digits between 950 and 999, consequently the specimens are either from some collection external to the Geology Department or they are from departmental collections made prior to 1920. There were numerous fossil collections in the Department prior to 1920, however most of these specimens have been renumbered.

But there is no record of any Wellington Caves material being renumbered. Furthermore, in the older catalogues that still exist, there is no record of vertebrate fossils in the collections under the numbers 1686 or 3607. This suggests that the specimens were originally registered in a (reasonably large) collection elsewhere and that they have been subsequently incorporated into the departmental collection.

Thus it appears that the most likely origin of the Wellington Cave specimens currently in the collection of the Department of Geology was from another collection, but not from the Macleay Museum. This conclusion is equivocal.

WHO COLLECTED THE WELLINGTON CAVES MATERIAL?

Because of the poor records associated with the specimen it is not known who collected the material. However, the following scenario is proposed. The catalogue of the geological (i.e. non-fossil) collection of the Department of Geology and Geophysics indicates that Professor Edgeworth David collected an aboriginal stone tool (No. 2870) and some limestone samples (Nos. 137-143) from "30 chains south of Wellington Caves" around 1900. This places David in the right area about the time the vertebrate fossils were likely to have been collected from the recently discovered "New Cave".

David had a strong interest in both palaeontology and caves, as can be noted from his publications (see Branagan, 1973, pp. 135 et seq.), and although he did not publish specifically on Wellington Caves, he wrote a report for Government on Wombeyan Caves (David, 1897). When in the Wellington Caves area it is more than likely that he would have collected some of the abundant and well-known vertebrate fossils. He would have been particularly interested in any newly-found deposits such as those in New Cave (now Gaden Cave).

Such material collected by David would probably have been deposited in either the Department of Geology or the Macleay collections. This is a highly circumstantial, but not illogical scenario. Other than this there is no known simple mechanism by which Wellington fossils would have found their way into either of these collections.

Most of the fossils collected at this period at Wellington were made by the Cave Warden J. Sibbald, who sent his specimens to the Mining Museum (Dawson, 1985), and it seems unlikely that he would have sent any specimens to the University. However there is no known record of Sibbald collecting fossils from New (Gaden) Cave, most collecting having been made there as late as 1954 by L. Marcus (Dawson, op. cit.). These would have been sent to the University of California. Furthermore his collections were clearly much later than the labels with the Sydney University specimens suggest. A possible collector from the University was W.R. Browne, at Wellington in June 1948, according to the Geological catalogue, but again this is much too late; furthermore Browne's interests were dominantly petrological.

A possible link in this story is W.S. Dun who was Palaeontologist to the New South Wales Geological Survey and the Australian Museum, and who lectured part-time at the University from 1897 to 1934. Dun was not averse to carry fossils (even type specimens!) back and forth to the University for his lectures (H. Fletcher, pers. comm.), and although his major interests were in the invertebrates the whole range of the fossil kingdom was covered in his lectures. Perhaps some specimens were thus inadvertently acquired by the University.

LOCALITY INFORMATION

It is obvious that some mixing of the Wellington Caves material has occurred. Judging from the remaining sediment that adheres to these specimens, at least three types of deposits are represented. The two red earth sediment types are both typical of cave deposits. One of these is a poorly consolidated, powdery red earth similar to that of Mitchell's Cave, at Wellington. The second sediment type is a partially consolidated red earth with a high amount of clay and some unusually large inorganic clasts. Such a sediment is not inconsistent with the deposits in Mitchell's Cave, but could also be from Gaden Cave. The third sediment type is a dusty grey/brown sediment with calcite cement. This dusty material (to which the label "1686" is
Such poor record keeping has severely compromised the scientific integrity and use of these and other specimens. An attempt has been made to determine the unknowns, but some of the answers remain equivocal. Miklouho-Maclay is the only known collector to have visited the Clairvaulx site near Glen Innes, and this locality appears to be of greater palaeontological significance than previously realised. The Wellington fossils appear to have come from Gaden Cave, a site where previous collections have been limited, and represent taxa not previously recorded from Wellington. The Wombeyan Caves material belongs to the Broom Breccia, a deposit whose fauna is known in some detail, but its lithology and petrology require further study.

Despite the limitations of these specimens caused by inadequate record keeping, they all provide interesting subjects for further study, and contain new information on the vertebrate palaeontological faunas of New South Wales.

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The problem is complicated by the fact that another cave containing vertebrate fossils was discovered in 1901 (Trickett, 1902). This cave was named shortly after, Gas Pipe Cave (Trickett, 1903), but for a time it was also referred to simply as the “new cave” and it is possible that the present University specimens originated from it.

All told it seems likely that these fossils originated from Wellington early this century and most likely from Gaden Cave, although they may have come from any of the fossil-bearing caves there. It is even possible, though less likely, that the specimens were originally obtained from one or a number of other Australian caves. Because of the poor records and uncertainty as to the origin and history of these specimens they are best provenanced as "Wellington Caves (Gaden Cave)".

The particular specimens in the palaeontological collection of the Department of Geology and Geophysics have not yet been studied in detail, but the Pleistocene fauna of Wellington Caves has received considerable attention (see Dawson, 1985 for a review). In the University collection the following species have been identified: *Thylacelous carnifex*, *Thylacinus cypocephalus*, *Phascolomys* sp. cf. *P. gigas* (including specimens only from the first sediment type), *Vombatidae* or *Lasiorhinus*, *Varanus* sp., rodent and an unidentified turtle. A large snake vertebra is currently being examined by J.Scanlon, and a small collection of bird bones is being studied by W. Bowles. The fauna suggests a Pleistocene age, which is consistent with the age of the better-known faunas from the other Wellington Caves (Dawson, 1985).

**WOMBEYAN CAVES**

Three small blocks (about 5cm across) of a well-consolidated cave breccia were found in the (SUP 13955). They were identified as having come from Wombeyan Caves. There was no further information either on the label or in the collection catalogues. However Ride (1960) mentions that Mahoney collected some samples of the Broom Breccia, and these specimens may be some of that material mentioned by Ride.

All three blocks had numerous bones of small animals through them. The location given on the associated label as Wombeyan Caves is the Broom Breccia (also known as the *Burramys parvus* Breccia), although similar material was found in the nearby Wombeyan Quarries (Hope, 1982).

The Broom Breccia was discovered by Robert Broom (1866-1951), then a medical practitioner in Taralga, who excavated episodically at Wombeyan, apparently when the custodian was away(!). The fossil material was collected around 1894-95 and quickly described (Broom 1895a, 1895b, 1896). After dissolving the matrix, Broom found a rich assortment of bones representing a variety of small animals. Of particular interest was a diprotodontoid with grooved molars that Broom named *Burramys parvus* (Broom, 1895a). This animal was then thought to have been extinct, but the first living specimen was found in 1966.

The Broom Breccia was a small deposit that is almost completely worked out. A few remnants remain on the side of the small surface depression above the xx Cave. Samples removed from the site were usually dissolved in acetic acid to release their vertebrate component. Ride (1960) described the petrology of the breccia and commented that Mahoney collected from the site. The samples in the University collection are similar to those described by Ride and resemble material seen on the site in October 1992. The petrology of the source material is currently being examined by Osborne.

Broom (1896) assessed the age of the breccia as "later Tertiary", and Ride (op. cit.) concluded it was Pleistocene. Wakefield (1972) refined this age to approximately 10 000 years, based on a comparison of the fauna with that of Pyramid Caves in Victoria.

**CONCLUSIONS**

Very interesting vertebrate fossils have recently been found within the palaeontological collection of the University of Sydney. However, because of poor recordkeeping in the past, compounded by deliberate destruction of records, it is difficult to determine many of the important collection details.
Such poor record keeping has severely compromised the scientific integrity and use of these and other specimens. An attempt has been made to determine the unknowns, but some of the answers remain equivocal.

Miklouho-Maclay is the only known collector to have visited the Clairvauux site near Glen Innes, and this locality appears to be of greater palaeontological significance than previously realised. The Wellington fossils appear to have come from Gaden Cave, a site where previous collections have been limited, and represent taxa not previously recorded from Wellington. The Wombeyan Caves material belongs to the Broom Breccia, a deposit whose fauna is known in some detail, but its lithology and petrology require further study.

Despite the limitations of these specimens caused by inadequate record keeping, they all provide interesting subjects for further study, and contain new information on the vertebrate palaeontological faunas of New South Wales.

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Plumbing the Depths: on caves and the men of Geology

MICHAEL SHORTLAND

Abstract: While caves were important geologically at the beginning of the nineteenth century, they also served as cultural artefacts with political significance. Cave dwellers and industries were common at the time, and miners were leaders in moves for political change. The Reverend William Buckland was a central figure in the early study of caves, fossil bones and coprolites, and his interests were related to the environment of underground workingmen rather than to that of the "gentlemen geologists." Mining geology is more significant in the history of geology than has been accepted to date.

Fingal's Cave

The thirteenth of August is an unrecognised red-letter day for cave enthusiasts of all shades and hues, for explorers, dwellers and historians of caves, for speleologists and speleolators. It was on this day in 1772 that Sir Joseph Banks, on his way to Iceland, stopped on the small island of Staffa, off the coast of Scotland, to visit Fingal's Cave. He was the first to describe the cave in an illustrated account which breathed life into Thomas Pennant's otherwise ponderous Tour of Scotland in 1774. Banks' short piece fired the imagination.

Banks was not, of course, the first to venture into a cave; for centuries, people across the world have explored them in search of adventure, discovery, knowledge, inspiration and refuge. To contextualise Banks' report and the subsequent development of cave enthusiasm would require a thorough analysis of themes which I shall only touch upon, but I want to start with Fingal's Cave in considering the lure of caves, and the construction of caves, in Britain during the Golden Age of geology. I shall propose that the Romantics played a key role in manufacturing a particular image of the cave and did so for specific ideological ends. The repercussions of this process of manufacture form the substance of roughly the second half of my paper, in the course of which, via a brief examination of mines and mining, and aspects of the cave work of William Buckland, I shall suggest some new approaches to the history of geology.

I begin by returning to Fingal's Cave, which assuredly was, and remains, quite spectacular. The cave is approximately 40 feet by 70 feet and 200 feet long, and is composed of black and dark brown basalt columns standing on a base of solid, unformed rock [figure 1]. So much for the brute, measurable facts, which do little to capture the experience.

Figure 1. Locality map of vertebrate fossil sites

Figure 2. Position of new cave, Wellington, (Trickett, 1901).

Figure 3. Location of Broom Cave in Wombeyan Caves Reserve.

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