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Native Mammal Remains from Wilgie Mia Aboriginal Ochre Mine: Evidence on the Pre-European Fauna of the Western Arid Zone.

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Abstract

Remains of native mammals were recovered in the course of an archaeological excavation in Wilgie Mia, an Aboriginal ochre mine in the arid upper Murchison region. Almost all the specimens were recovered from loose ochre matrix which had accumulated over approximately the last 1000 years. Most of the bones are probably the remains of owls' prey, a few may have been contributed by humans or dogs; some of the larger species may have died in the mine. The total sample represents about 100 individuals, far too small for any trends in species composition through the deposit to be detected.

Mammals identified included Pig-footed Bandicoot, *Chaeropus ecaudatus;* both species of stick-nest rat, *Leporillus apicalis* and *L. conditor;* and the Long-tailed Hopping-mouse, *Notomys longicaudatus,* all of which are now very rare or extinct in western Australia, and have been recorded from very few localities. The Shark Bay Mouse, *Pseudomys praeconis,* is also recorded from this inland site. The distributions of the species in the fossil fauna are discussed: all are known to occur in arid regions of Australia.

The fauna provides evidence on the original distributions of the mammals before they were affected by European man.

Introduction

An archaeological excavation was made in 1962 in Wilgie Mia, the Aboriginal ochre mine (Western Australian Museum site register No. P1014) in the Weld Range at latitude 26°55'S. longitude 117°42'E. (Figure 1), by a team from the Western Australian Museum under the direction of Dr I.M. Crawford. In addition to artefacts, small numbers of animal bones were recovered from many levels in the deposit.

Before about 1960 very few living mammal specimens had been collected in the upper Murchison region, which has been under pastoral exploitation since the beginning of this century. As a result, much of the native fauna disappeared without being recorded. Since the Wilgie Mia remains include the only recent mammal fossils known from the area they are important in providing evidence on the fauna present before the arrival of European man.

The bones from the deposit were sorted and identified and a rich mammal fauna, including several species not previously known from the area, was found to be represented.

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The specimens have been accessed into the vertebrate palaeontological collections of the Western Australian Museum under the catalogue numbers 73.1.15 to 73.1.252. Other specimens referred to below with numbers prefixed by M (e.g. M8709) are in the modern mammal collection of the Western Australian Museum.

Geomorphology, Climate and Vegetation

The Weld Range is a prominent feature of the upper Murchison region; it forms a watershed between the drainages flowing north into the Murchison River, and south into Lake Austin. It is about 50 km long and consists of two or three straight, steep, parallel ridges with many rock outcrops. The highest point is Gnanagooragoo Peak (formerly Mount Lulworth) which rises some 320 m above the surrounding plain. Wilgie Mia lies about 5 km south-south-west of Gnanagooragoo Peak, near the crest of a ridge on the southern side of the range (Woodward 1914).

The following account of the geology is based mainly upon Ellis (1955) and Jones (1963). The Weld Range is composed principally of greenstones, interlayered with a series of steeply dipping jaspilites. They are probably of Archaean age. The jaspilite beds are banded iron formations, in some cases including iron ore lenses. Wilgie Mia lies in one such lens where the rock consists of thin alternating bands of shale and haematite. The shale has become impregnated with iron oxide to form the red ochre. The country surrounding Weld Range consists largely of the weathering products of Archaean granite, and has very little relief.

The climate of the area is arid (Arnold 1963). Predominantly clear skies cause temperatures to fluctuate widely through both daily and seasonal cycles. In the coolest winter month (July) the mean daily maximum is about 19°C, but ground frost may occur at night; in summer daily maxima are very high, with a January mean maximum of about 37°C. Median annual rainfall is about 200 mm, and most falls between late summer and the end of winter. Sufficient effective rainfall to initiate plant growth occurs on average three times per year, most frequently in early winter. However, the rainfall is generally highly variable, which allows the perennial existence of only those plant species which can withstand periods of several years without sufficient rain to permit growth. The soils of the area are mainly stony soils and shallow red earths (Mabbutt *et al.* 1963). As a result of these climatic and soil factors the vegetation is principally tall shrubland or tall open-shrubland in which the upper storey is usually mulga (*Acacia aneura*) (Mabbutt *et al.* 1963). A low shrub storey is sometimes well developed, and annual forbs appear after rain. Some halophytic communities also occur. Early photographs (e.g. Woodward 1914: figure 39) show that originally tall shrubland extended on to the slopes of the range below Wilgie Mia.

The Site and the Crawford Excavation

The form of Wilgie Mia has been altered by European mining operations. However, its shape and size at the beginning of this century were recorded by Woodward (1914). It consisted of an open first chamber about 20 m across sloping down from the entrance lip to a wall about 14 m high. Leading off from the side of this first chamber was a larger main chamber, the ceiling of which was at a fairly constant height of about 10 m. It sloped down for about 35 m, widening to a back wall about 40 m long. In the walls of both chambers were the entrances to narrow passages made by Aborigines following veins of soft ochre. Mounds of loose material resulting from their mining had accumulated on the floors of the large chambers.

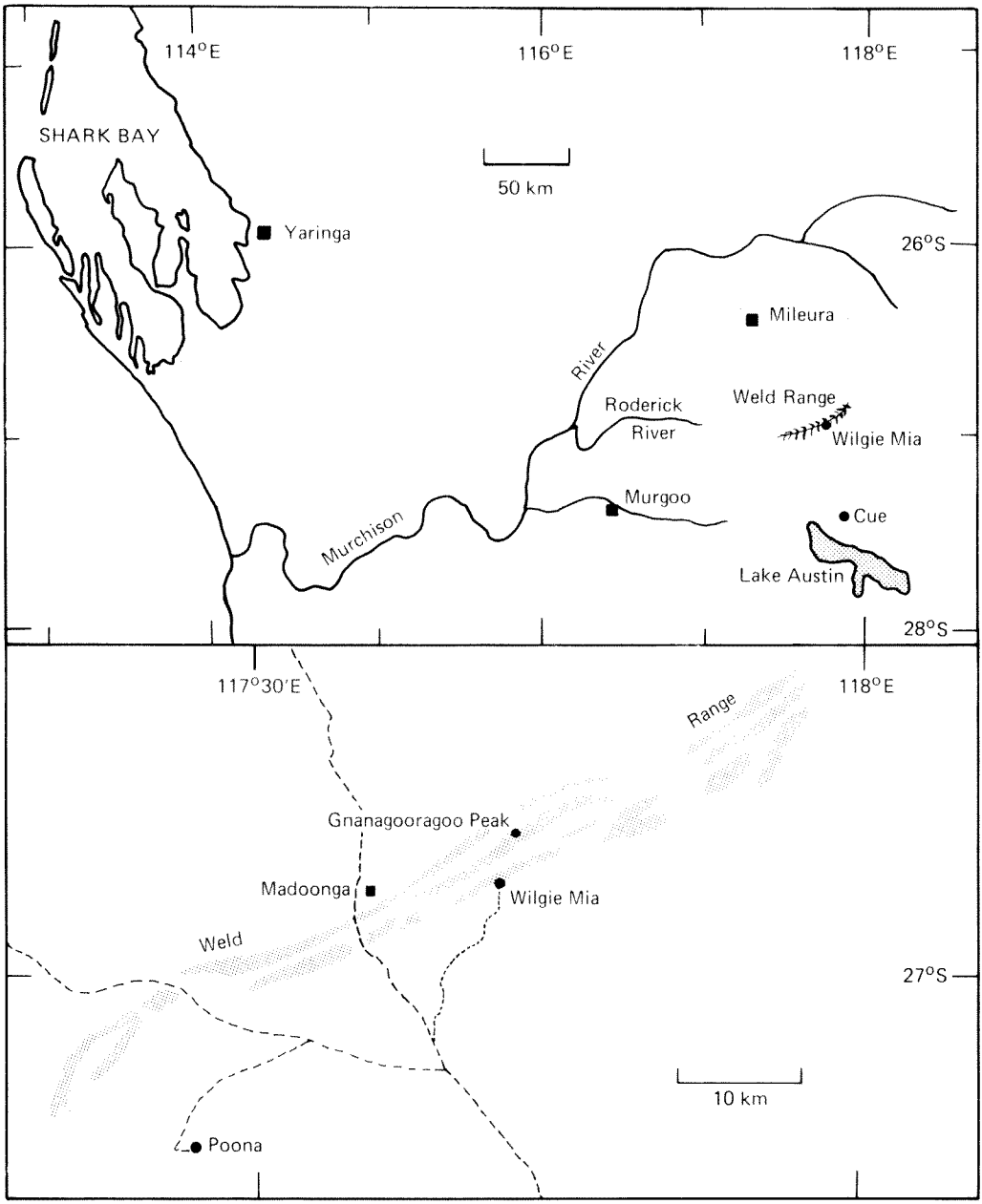

Figure 1 Locality maps.

The following account of the excavation was provided by Crawford (pers. comm.). Before the archaeological excavation was carried out, Europeans mined most of the loose ochre, only leaving pockets in recesses against the walls. It was one such pocket in the north-east wall of the main chamber that was excavated. Figure 2 represents a highly diagrammatic vertical section through the centre of the excavation. The 'talus' was loose ochre which had slumped down the face left by European mining operations. It was cleared from the stratified deposit a short section at a time. Adjacent *in situ* deposit was then excavated using trowels, placed into buckets and screened. The depth of accumulation against the wall was about 3.6 m; this was divided into layers designated 1 to 25 from the top down. A balk of unexcavated deposit was left between the wall and the layers 15 to 25. A pit was then excavated to a depth of about 1.8 m in the deposit between rocks contiguous with the base of the wall accumulation. Layers in the pit were designated 26 to 35. Bone material was only recovered from the wall deposit and the surface of the pit (layer 26); it is extremely well preserved.

Wood from layers 12 and 23 was submitted by Crawford for radiocarbon dating. The respective dates obtained were 560 ± 70 years B.P. (GaK-1769), and 1100 ± 90 years B.P. (Gak-1770). Additional information on the timing of the accumulation is provided by the account of Davidson (1952) of working by Aborigines until 1939. It therefore appears that the whole depth of loose ochre matrix against the wall has accumulated in approximately the last 1000 years. No date is available for material excavated from the pit, but Crawford considers that it probably continues the sequence.

Manner of Accumulation of Bones

Some of the bones recovered from the Wilgie Mia deposit, particularly those of larger species, are fully dissociated and free of remains of soft tissues. Many of the bones of small species, however, are less dissociated and still mixed with dried matted hair in elongated masses. These are almost certainly relatively unaltered owl pellets. It is probable that rapid burial of some material in the dry loose matrix allowed almost ideal preservation with no decay or attack by hair-eating insects. The form of pellets, and the location of the site in the arid zone, are consistent with Barn Owl (*Tyto alba*) as the predator.

Large carnivore scats from two layers were tentatively identified as from *Canis*, and are the basis for the inclusion of this species in the fauna. Humans were certainly working the mine at times. Either could have added bones, particularly of large animals. *Trichosurus vulpecula*, *Petrogale* species, and *Macropus robustus* use caves as daytime shelters, and could have died in Wilgie Mia. Crawford found the mummified carcase of a *T. vulpecula* (M5729) on the surface far into the workings.

Fossil Fauna

Table 1 shows the minimum number of individuals of each mammal taxon recorded from bone bearing layers in the Crawford excavation. Minimum numbers were taken as the highest counts of identified left or right skeletal elements. Post cranial, as well as cranial, material of larger species was identified and counted in the minimum number; it forms the basis of many of the tentative records.

There is indirect evidence of another native mammal having used Wilgie Mia as a day time shelter. A.M. Douglas has identified scat material from Wilgie Mia as that of *Macroderma gigas* (Bridge 1975). There is, however, no evidence on the age of the scats.

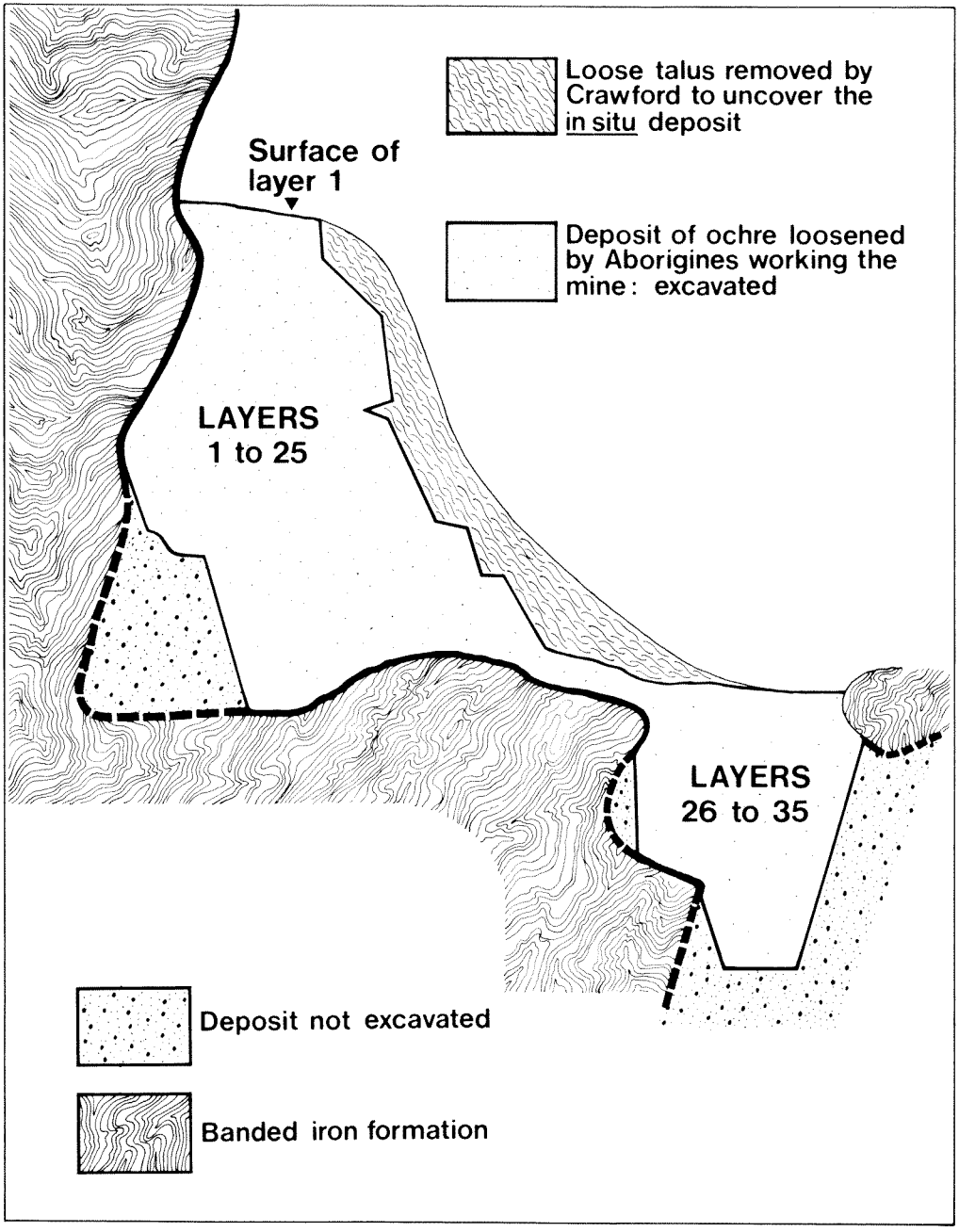

Figure 2 Diagrammatic vertical section through the centre of the Crawford excavation in Wilgie Mia.

Table 1 Minimum numbers of individuals of mammals from the Wilgie Mia excavation.

	Pseudomys nanus	*Pseudomys praeconis*	*Pseudomys hermannsburgensis*	*Leporillus apicalis*	*Leporillus conditor*	*Notomys* sp.	*Notomys longicaudatus*	*Rattus tunneyi*	Muridae indet.	*Canis* sp.	*Dasycercus cristicauda*	*Antechinomys laniger*	*Sminthopsis ooldea*	*Chaeropus ecaudatus*	*Trichosurus vulpecula*	Cf. *Lagorchestes hirsutus*	*Petrogale* sp. cf. *P. lateralis*	*Macropus robustus*	Large macropodine
Surface to base of Layer 3	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Surface talus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.
Layer 2A	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Layer 3	.	.	.	1	.	.	1	.	.	?	.	.	.	?	.	.	.	.	.
Layer 4	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Layer 5	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Talus below 5	.	1	.	?	.	1	.	.	.	.	.	1	.	1	.	.	.	.	.
Layer 6	.	.	.	.	.	.	.	.	1	.	?	.	.	.	.	.	.	.	.
Layer 8	.	.	.	.	.	1	1	?	.	.	.	.	.	.	.	.	.	.	.
Talus below 8	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Layer 9/11	.	3	2	1	.	6	3	8	.	?	3	2	.	1	1	.	.	.	?
Layer 11	.	1	.	.	.	1	.	5	1	.	1	.	.	.	.	.	.	.	.
Layer 12	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Layer 13	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	1	.	.
Layer 14	.	.	.	.	1	.	.	3	.	.	.	.	.	?	.	.	.	.	.
Layer 15	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.	.	.	.	.
Layers 1-16*	.	.	.	.	.	.	.	.	.	.	?	.	.	.	1	.	.	.	.
Layer 17	1	.	.	1	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.
Layer 18	.	.	.	1	.	.	.	2	.	.	.	.	1	.	1	.	.	.	?
Layer 19	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	?
Layer 20	.	.	.	.	.	.	.	1	.	.	1	.	.	?	.	.	.	.	?
Talus below 20	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	?	.
Layer 21	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.
Layer 22	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	?	.	.
Layer 23	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Layer 26	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.

* Section cleaning

? Indicates that remains representing one individual in the layer are tentatively referred to that taxon.

In addition to the mammal remains, bird bones were found in layers 9/11, 11, 12 and 22. In the absence of suitable reference material it was not possible to identify them further.

Discussion

The total number of individuals recorded from the deposit is only about 100. This sample size is far too small to enable trends, or even changes in presence/absence to be detected (see Baynes 1979). The high number of specimens and species in layers 9 to 11 probably reflects either a relatively long undisturbed occupation of the mine by owls, or one or more very good seasons, perhaps following rain from a tropical cyclone. It also suggests that several species in the fairly rich fauna occurred in the area at any one time. The owls probably hunted over the plains surrounding the range: remains of their small prey becoming mixed with those of the large prey of humans or dogs, and of species inhabiting the mine.

Most of the mammal remains from Wilgie Mia are less than 1000 years old. There is no information on changes in the arid zone faunas over that period, and the Wilgie Mia material does not provide any data. The specimens are therefore treated as records contributing to knowledge of the original ranges of the species, i.e. the ranges occupied prior to the arrival of European man.

Native mammals recorded from the Wilgie Mia district during European times are listed in Table 2. The almost complete dissimilarity of this fauna from the Wilgie Mia fossil fauna probably arises in part from different sampling biasses, as well as major local extinction. Remains of bats (five out of the 11 species in Table 2) are not usually common in owl accumulated assemblages, and no bat species is included in the Wilgie Mia fossil fauna, although all those listed in Table 2 are likely to have been present.

With the exception of *Macrotis lagotis*, which is based upon an early record, and is probably now extinct in the upper Murchison, all the species in Table 2 have generally survived well throughout their ranges during European times. Many of those in the Wilgie Mia fauna have not, and now appear to be either completely extinct, or extinct over much of their original ranges. Their presence makes the fossil fauna particularly interesting.

Table 2 Native mammal species collected alive within about 70 km of Wilgie Mia, based upon the modern mammal collection of the W.A. Museum.

Species	Locality closest to Wilgie Mia	Number	Date
Tachyglossus aculeatus	Cue area	M793	1926
Pseudomys hermannsburgensis	12 km SW Mileura homestead	e.g. M18623	1980
Notomys alexis	Poona	e.g. M6180	1964
Nyctophilus geoffroyi	16 km SSE Mileura homestead	e.g. M7547	1966
Chalinolobus gouldii	Madoonga station	M1657	1932
Eptesicus pumilus	Wilgie Mia (several series)	e.g. M5901	1963
Tadarida australis	Mileura homestead	e.g. M8325	1971
Taphozous hilli	Wilgie Mia (several series)	e.g. M3803	1960
Antechinomys laniger	Poona	M6082	1963
Sminthopsis crassicaudata	3 km west of Cue	M6617	1965
Macrotis lagotis	Cue area	e.g. M1129	1929
Macropus robustus	5 km south of Wilgie Mia	M5771	1963
Macropus rufus	4 km south of Wilgie Mia	M5499	1963

Most of the mammal species in the fossil fauna are, or were originally, widespread in the Australian arid zone. For some this distribution is already adequately documented. The Wilgie Mia records lie within the geographic ranges given by Watts and Aslin (1981) for *Pseudomys hermannsburgensis*, and *Notomys alexis* (the species probably represented by the indeterminable '*Notomys* sp.' from the deposit); by Ride (1970) for Dingo (assuming *Canis* is correctly identified in Wilgie Mia); by Archer (1977) for *Antechinomys laniger;* and by Frith and Calaby (1969) for *Macropus robustus*. Four of these five species are included in the modern fauna (Table 2), and Dingo also probably still occurs in the district. The records of all other species in the fossil fauna require discussion. Reference localities are shown in Figure 3 or Figure 1.

Pseudomys nanus was described by Gould (1858) from material collected by John Gilbert on the Victoria Plains. This is still the only locality in south-western Australia from which the species has been recorded as a living animal. The current species concept of *P. nanus* is that due to J.A. Mahoney (Ride 1970: 30), and includes the form occurring in northern Australia formerly known as *P. ferculinus*. The Wilgie Mia record thus lies between the original south-western Australian record and the northern Australian populations. It is significant because it is the first record in the subtropical arid zone of true *P. nanus*. (Before its recognition as a separate species, *Pseudomys desertor* was referred to as *P. nanus*, e.g. Watts and Aslin 1981.)

Pseudomys praeconis was for a long time known only from Shark Bay (e.g. Ride 1970), but its remains have now been recognised in surface cave deposits all along the west coast from Cape Leeuwin (Archer and Baynes 1973) to North West Cape (Kendrick and Porter 1974), although confirmation of the northern records by further material is desirable. The Wilgie Mia records are important because they show that *P. praeconis* was not restricted to near coastal habitats in its original distribution.

Neither species of *Leporillus* has ever been collected alive in Western Australia. Lundelius (1957) reported abundant remains of both species in surface deposits in caves of the Hampton Tableland. The Wilgie Mia records are part of the evidence that the original distributions of both species stretched westward across the southern arid zone to the west coast. *Leporillus apicalis* has been recorded from surface cave deposits in Cape Range, at Shark Bay and near Morawa (Kendrick and Porter 1974). There is also undated fossil *L. apicalis* material (e.g. 74.5.8) from a small cave on Murgoo Station in the middle Murchison. Remains of *Leporillus conditor* are abundant at the surface of deposits around Shark Bay: in sites on the Edel Land peninsula (Baynes 1979) and Dirk Hartog Island (see Burbidge and George 1978) on the western side, and on Yaringa Station (82.7.9) on the eastern side. There is also a specimen of *L. conditor* (67.4.42) from a small cave near Kalgoorlie.

Notomys longicaudatus probably had a very extensive original distribution in the arid zone. It was described by Gould (1844) from material collected for him by John Gilbert near 'Moore's River' (Gould 1863). Gilbert's Moore River locality was immediately north-west of the Victoria Plains, near where New Norcia stands today (Ride 1970: 20, 202). There are two specimens from the same area in the Leiden Museum (Mahoney 1969). In addition there is a modern specimen of *N. longicaudatus* in the Derby collections (Derby No. 412) in the City of Liverpool Museum (see below) from even further south at Toodyay. Kendrick and Porter (1974) reported one large maxilla from a cave deposit in Cape Range which J.A. Mahoney had indentified as possibly *N. longicaudatus* or *N. amplus*. I have re-examined the specimen (71.10.197). It is from an adult animal, but lacks molars and is broken. It retains enough of the zyogomatic plate to show that it is *Notomys*, and its shallow maxillary-premaxillary suture

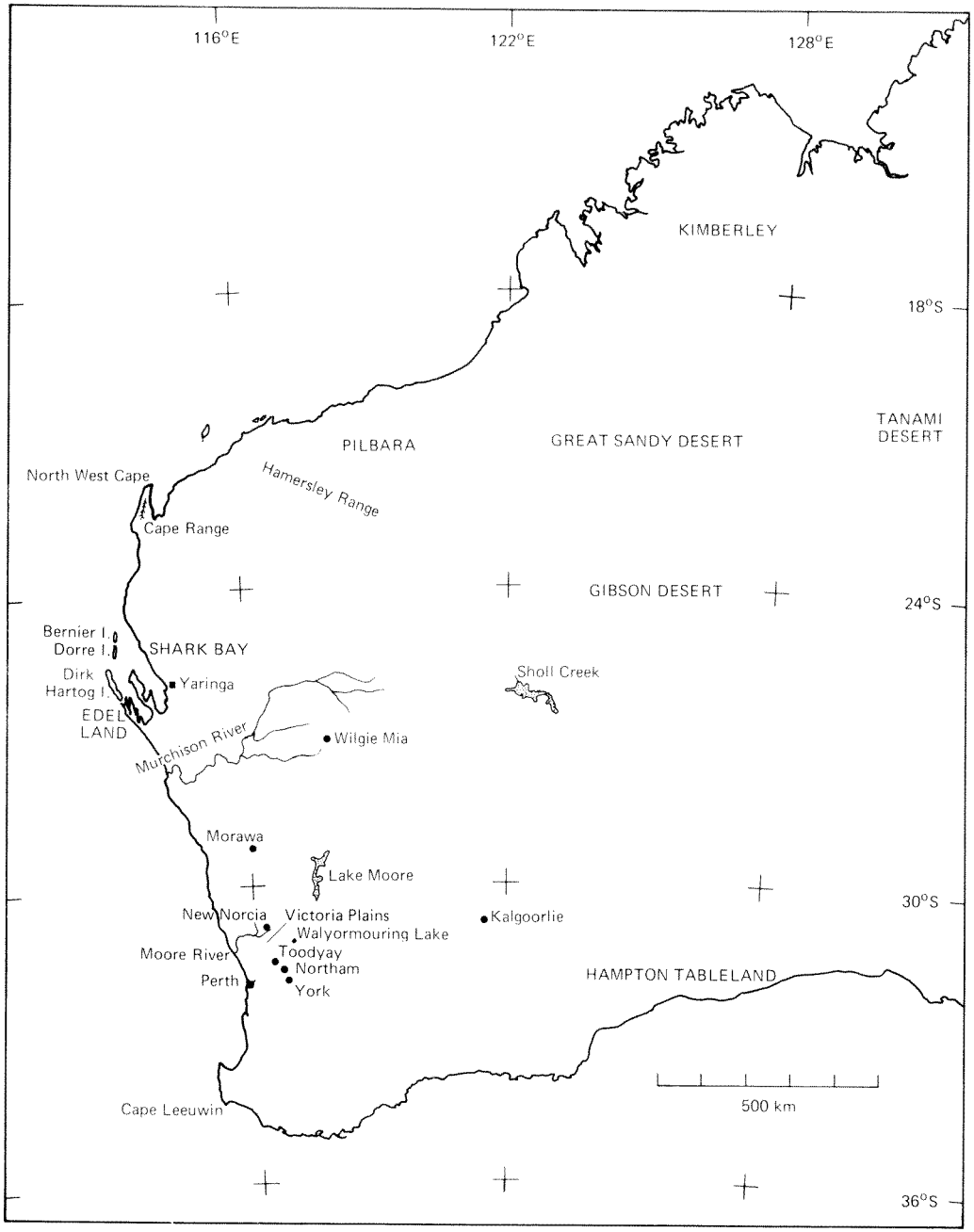

Figure 3 Map showing localities mentioned in the Discussion.

below the anterior edge of the zygomatic plate suggests that it is closer to *N. longicaudatus* than to *N. amplus*, in which this suture is very deep (cf. skull figure in Watts and Aslin 1981). In eastern and central Australia *N. longicaudatus* has been recorded as a living animal from north-western New South Wales and southern and central Northern Territory, and as a recent fossil from the Flinders Ranges (Watts and Aslin 1981), all within the arid zone.

The Wilgie Mia records of *Notomys longicaudatus* thus confirm its original presence in the arid zone of Western Australia. Its fairly high relative abundance in the deposit (six individuals in four layers) suggests that the species' habitat lay close to the Weld Range. Gilbert recorded that the species preferred 'a stiff and clayey soil' as a substrate (Gould 1863). The red earths of the plains around the Weld Range have a fairly high clay content and were probably suitable.

Rattus tunneyi is the most abundant species in the Wilgie Mia deposit. It originally ranged from the eastern to western coasts of mainland Australia, although some details of its distribution within that range are not clear, particularly in southern Australia (Taylor and Horner 1973). In south-western Australia it was collected alive near Perth and on the Victoria Plains (Mahoney 1969), and originally occurred right to the southern end of the west coast (Archer and Baynes 1973). It occurs as a fossil in surface deposits on the mainland at Shark Bay, on both the western side (Baynes 1979) and eastern side on Yaringa Station (82.7.14), and has recently been recorded (e.g. M8709) living on the west coast of the Edel Land peninsula. It was recorded in the fossil fauna from Cape Range (Kendrick and Porter 1974), and is extant on islands along the north-west coast and in Kimberley (Taylor and Horner 1973).

Rattus tunneyi was probably a resident member of the original mammal fauna of the Australian arid zone. It is only known as a living animal in this zone from Alice Springs and Tennant Creek (Parker 1973), where it was collected during or after the Horn Expedition; but this is the only area in the arid zone where the mammal fauna was reasonably well collected before being affected by European man. Brazenor (1936) considered that the central Australian specimens were smaller and had redder coloured pelage than the northern animals, suggesting a clinal situation. He named the central form *R. t. dispar*. However, Taylor and Horner (1973) included *R. t. dispar* in the northern *R. t. tunneyi* on the basis that the characteristics of *R. t. dispar* fall within the variation shown by populations of *R. t. tunneyi*. On the other hand, they allied the south-western populations with *R. t. culmorum* of eastern Australia, and postulated that the south-western population reached that area from the east via a southern migration route. Since the Wilgie Mia records probably represent the western part of an originally continuous arid zone population, there would have been gene flow between the west coast populations and those in northern Australia. The morphological similarity between south-eastern and south-western specimens probably reflects similar morphological response by the populations to high latitude or high rainfall, rather than close relationship.

Dasycercus cristicauda is widespread in the Australian arid zone (Ride 1970). The Western Australian Museum modern mammal collection includes specimens from the eastern Pilbara, e.g. M2745, Great Sandy Desert, e.g. M1497, and eastern Gibson Desert, e.g. M7742. The species is known from the surface of the cave deposits of the Hampton Tableland and west coast north of about latitude 31°S (Lundelius 1957), to Shark Bay (Baynes 1979, 82.7.1). The Wilgie Mia records thus lie in the gap between the modern desert records and the original occurrences along the west coast.

Sminthopsis oolda is restricted to the arid zone (Archer 1981). Archer's distribution map for the species (based upon pre-1977 data) shows the Wilgie Mia fossil specimen as the most westerly record in an arc stretching across the southern Northern Territory and northern South Australia. Wilgie Mia is still the species' known western range limit, but new records (e.g. M18243) have extended the known range northward to the limit of mulga formations, just south of the Hamersley Range. Dunlop and Sawle (1983) have suggested that this mulga line represents the northern limit of *S. ooldea* too.

The *Chaeropus ecaudatus* records from Wilgie Mia represent a substantial extension of range for the species. *C. ecaudatus* is only known to have been collected alive in Western Australia at Walyormouring Lake, some 500 km south of Wilgie Mia, whence it was obtained by John Gilbert (Calaby 1954).

Gilbert (letter No. 10 to Gould of 18 April 1843 [misdated 1842] *in* Wagstaffe and Rutherford 1955) originally wrote of only a single specimen obtained by the expedition to Walyormouring, and an intention to try to procure more; but later, in his notebook (*in* Whittell 1954) Gilbert mentions two specimens from Walyormouring. Gould (letter to Lord Derby of 3 July 1844 *in* Wagstaffe and Rutherford 1954) received two *Chaeropus* from Gilbert. One he sent to the British Museum and the other to Lord Derby for his collection at Knowsley Hall. The locality data with the Gilbert specimen in the British Museum were published as Boorda, Kirltana, W.A. (Thomas 1888). Gilbert's notebook shows that Boorda was the local Aboriginal name for *C. ecaudatus* (Calaby 1954), and Calaby considered that Kirltana was the name of the locality now lost.

The present label on the specimen is in Oldfield Thomas' handwriting (McNamara 1955) and records the locality as 'Boorda 40 mi. N.E. of Kirltana, W.A.' McNamara suggested that Kirltana might mean killed with a boomerang. Interestingly, Gilbert (*in* Wagstaffe and Rutherford 1955) originally stated that his specimen 'was brought from 40 miles N. East of Northam'; though it seems incredible that, however bad the handwriting, 'Northam' could have been rendered as 'Kirltana.'

In the hope of casting further light on the matter I tried to trace the Derby specimen. The Derby collections were bequeathed to the City of Liverpool, and stored in the City of Liverpool Museum. Mr J.I. Harris, the Assistant Keeper of Vertebrate Zoology, kindly searched Derby catalogues and the collection for me in 1973. The first volume of the *Catalogue of the mammals in the Knowsley Museum*, covering Nos 1-350, contains the following entry:

260	*Chaeropus castanotis*, Gray
	Purchased of Mr Gould July 1844
	Habitat Swan River
a	Do Do
	Presented by Capt. Sturt Nov. 1847
	From Australia

Chaeropus castanotis Gray, 1842 is a junior synonym of *C. ecaudatus* (Ogilby, 1838). There appears to be no reason to doubt that number 260 was a second specimen obtained by Gilbert in Western Australia. However, the catalogue entry adds no information on the source locality of the specimen ('Swan River' is almost certainly an abbreviation for Swan

River Colony rather than a precise locality, as Gilbert (*in* Whittell, 1954) noted that Walyormouring marked the western range limit of the species). It is probable that No. 260, like other Gilbert specimens still in the Derby collection, retained Gilbert's original label, but unfortunately neither of the Derby *Chaeropus* can be found. Both appear to have been destroyed when the museum was bombed in 1940.

The Derby catalogue entry for the *Chaeropus ecaudatus* presented by Sturt is interesting, because it suggests that Sturt did obtain the species when exploring central Australia between 1844 and 1846. Ride (1970: 102), presumably unaware of this record, stated that Sturt's account of the natural history of the animal was probably based on another species.

Glauert (1950) quoted a letter from Sanford in the preface to the journal of an expedition led by Austin in 1854, where it is stated that *Chaeropus* was met with in large numbers on the journey. The expedition travelled north past Lake Moore towards Shark Bay and crossed the Roderick River, which is a tributary of the Murchison rising near the Weld Range. No specimens appear to have been preserved from this expedition, so it is difficult to assess the validity of this identification.

Chaeropus has also been recorded from the Hampton Tableland, where its remains are widespread in the many caves of the area (Merrilees 1968). To the east the species has been recorded from the arid zone of South Australia and the Northern Territory (Ride 1970); plus south-western Victoria, near the junction of the Murray and Murrumbidgee Rivers (Wakefield 1966).

Trichosurus vulpecula probably ranged over most of subtropical western Australia before the arrival of European man, wherever there were trees or deep rock clefts to provide day time shelter. The Western Australian Museum modern mammal collection includes only one record from the arid zone: M424 from Sholl Creek; but Spencer (1896: 16) recorded that, at the time of the Horn Expedition, the species was common in the eucalypts marking many creek beds in central Australia. The Wilgie Mia records lie some distance from any others, but confirm the presence of the species in the western arid zone.

Lagorchestes hirsutus was probably originally distributed over much of semi-arid and arid Western Australia, from York, where it was first obtained by John Gilbert (Thomas 1888), to the Great Sandy Desert (e.g. M1471). Extant populations are now only known on Bernier and Dorre Islands in Shark Bay, and in the Tanami Desert in the western Northern Territory (Bolton and Latz 1978). Wilgie Mia lies within this range.

Petrogale lateralis is another widespread species whose original range included much of semi-arid and arid Western Australia. The Weld Range is probably a most suitable habitat for such rock-wallabies.

Conclusion

The fossil mammal fauna from Wilgie Mia suggests that many mammal species were far more wide ranging in the arid zone, before they were affected by European man, than is apparent from records based upon live-caught specimens. Thus the fauna includes not only such species as *Pseudomys hermannsburgensis*, *Antechinomys laniger* and *Macropus robustus*, which are known on the basis of abundant modern records to occur over large proportions of the arid zone, and to have survived well in the face of European colonisation, but also such mammals as *Pseudomys praeconis*, *Leporillus apicalis*, *L. conditor*, *Notomys longicaudatus* and *Chaeropus ecaudatus* which are known from very few localities and are not known to survive anywhere in the arid zone on the mainland.

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