EXCAVATIONS AT RAINBOW CAVE AND WANDERER'S CAVE: TWO ROCKSHELTERS IN THE CARNARVON RANGE, QUEENSLAND.

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INTRODUCTION

If the state of Queensland can be said to have true "uplands", then they are to be found in the southern and central region of the state in that place Archibald Meston (1895) called the "Home of the Rivers" (Figure 1). There, some 400km inland from Australia's eastern coast and some 600km south of the Tropic of Capricorn, the uplifted and heavily weathered Triassic sandstones form a conspicuous link in the north-south trending mountains collectively referred to as "The Great Dividing Range". These ancient sandstones seldom rise above 650m elevation, and never more than the prominence of Black Alley Peak (Mt. Ackland) at 1,000m. Rather, the range here achieves its mass and character by being broad and ruggedly dissected. Plateaus and mesas with sharp precipitous cliffs commingle with alluvial flats, seasonal creeks and the headwaters of several important rivers such as the Dawson, Warrego, Maranoa and Barcoo.

One important characteristic of the "Home of the Rivers" sandstones is their propensity for weathering to rockshelters and caves. Innumerable such features exist, and many bear the marks of Aboriginal painting and engraving (Morwood 1976, 1978, 1979; Quinnell (1976); Walsh 1988, but only few are known to preserve archaeological sediments within their confines. One such site, Kenniff Cave (Mulvaney and Joyce 1965) produced the first certain Pleistocene date for humans in Australia. In 1975, some 10 years after Mulvaney's pioneer excavation in the uplands, I tested a number of other sites in the uplands. Two of these, both rockshelters, are reported below.

The two sites, Rainbow Cave and Wanderer's Cave, are located 6km from each other and are found in similar environmental settings. Excavations at these sites were conducted to broaden the prehistory of the uplands, which had been described by Mulvaney and Joyce's (1965) excavations at Kenniff Cave and The Tombs in the Chesterton Range, some 45km to the north and west (Figure 1). In order to describe the occupation histories of the sites and to facilitate comparison to Mulvaney and Joyce's excavations, three kinds of information were sought:

1. A collection of material culture items, which I expected to be comprised mainly of stone artefacts.

2. Direct evidence of the resident group's pattern of subsistence. I expected these data would most likely be preserved as marsupial bone remains.

3. Sufficient organic material to radiometrically date the stone material and any food remains which might have been preserved.

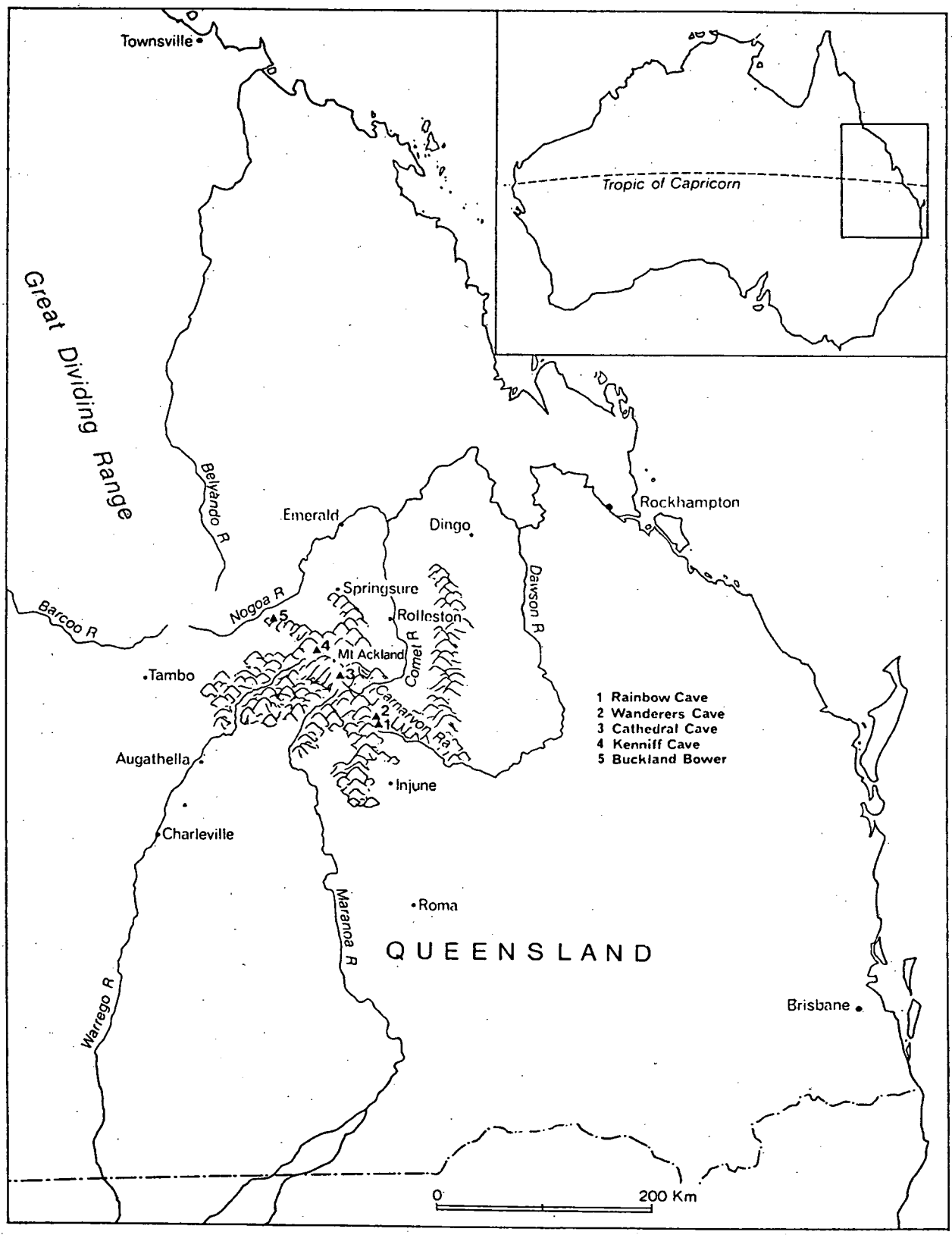


Figure 1. Map of Home of the Rivers.

RAINBOW CAVE: THE SITE AND SURROUNDS

Rainbow Cave is a rockshelter site located in the Carnarvon Range on "Wallaroo" Station, about 60km north of Injune (Figure 1). The Carnarvons are part of the eastern fall of the Great Dividing Range. Rainwater shed by the local landforms is captured by the Comet and Dawson River systems.

The vegetation around Rainbow Cave is mixed forest. On the steep eastern slopes thick vine scrubs are found. The cycad Macrozamia moorei is abundant in the area but is patchily distributed on fairly gentle slopes (to ca. 30^{o}), and seems to do well in a colluvial and stony soil under a spotted-gum canopy where there is little shrub growth. The densest patches of Macrozamia seem to occur on southerly and westerly exposures. Large marsupials which range in the immediate vicinity include red-shouldered, swamp, whip-tail and rock wallabies, wallaroo and grey kangaroo.

The shelter site is a weathered feature of a remnant mesa. Situated on the backbone of the Carnarvon Range, it lies at about 650m above mean sea level. It overlooks both the Arcadia Valley, some 325m below and to the east, and the Expedition Range in the eastern distance. The site has a north-easterly exposure and receives warming morning sunlight in the winter months.

Because the site is a weathered feature of the highest part of the range, steep colluvial slopes fall away to the eastern and western sides of the mesa. The only reasonable access to the site is from its northern end where a saddle connects the landform to the spine of the range.

It is axiomatic that archaeological sites, at least habitation sites, are found near fresh water sources. Rainbow Cave is an exception to this rule. In what are "good years" the nearest water can probably be had from small rockhole catchments, or may have been dug from pits in small creeks which now carry water only in heavy rainfall periods, and then only for a short time. The nearest of these potential sources is 1km away to the east and south-west but the distance is a very poor indication of the true effort required to get water. The walk down the 250m of elevation to the potential water sources is either direct and very steep or circuitous and extended by twice the distance. The atmosphere of the shelter is a very dry one even without the fires that must have been numerous during periods of occupation. The attractions of the site must be seen as outweighing the severe inconvenience of difficult water access.

The shelter itself is a long but fairly narrow niche in the horizontally bedded sandstone (Figure 2, Plate 1). The back wall is continuous with the ceiling and together they give a high and gently arched superstructure above the shelter floor. The sandstone of the wall-ceiling is a cream coloured, mixed-texture rock with occasional bands of pea-sized pebbles stratified within beds of sandy sediments. Some oxidized elements are bedded in the wall sediments and form broad coloured bands high up the wall which give the site its local name. Well beneath these natural coloured bands in the rock, and spread across most of the length of the shelter, are rock art engravings and stencils of body parts and implements. One such implement, a hafted steel axe, presumably dates the latest use of the shelter by Aborigines to about the mid-nineteenth century.

Plate 1. Rainbow Cave.

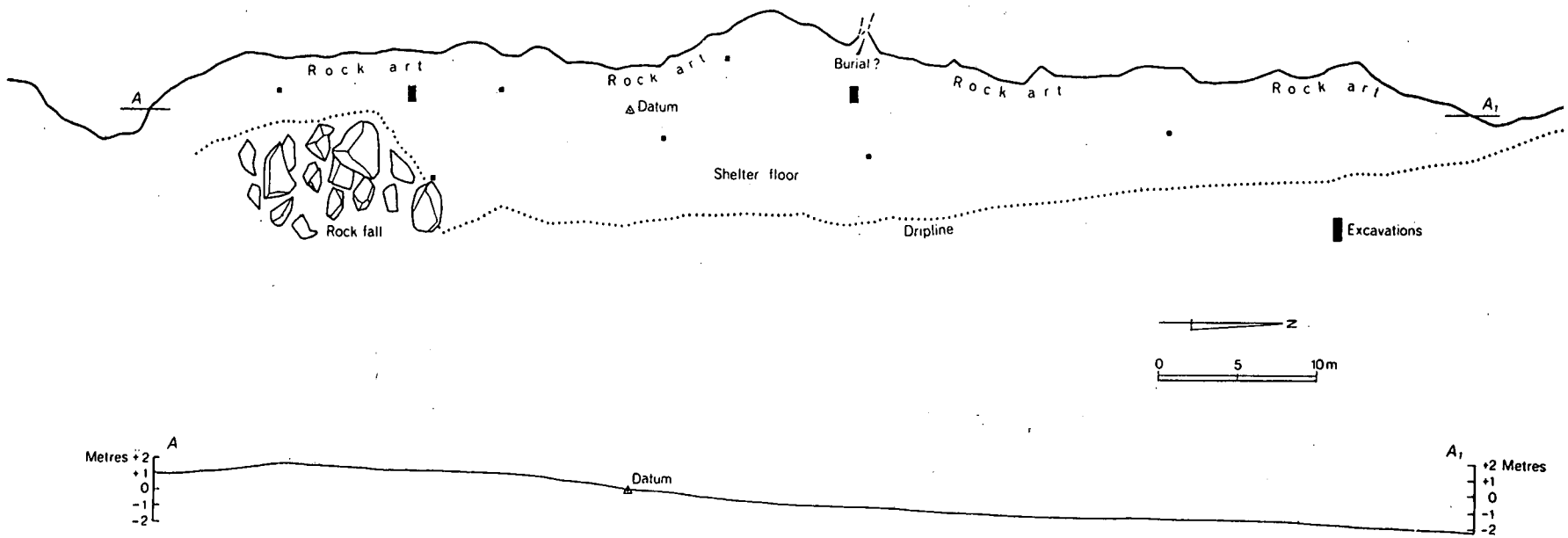


Figure 2. Rainbow Cave Floor Plan.

The floor of the shelter, defined by the dripline and the shelter walls, is about 500m^2 in area. The floor is about 83m long at the baseline (Figure 2) and is typically 6m wide over most of its length. There is a gentle slope to the floor which falls about 3m from the south to the north end. The dripline marks the maximum vertical overhang (25m) of the shelter ceiling. The dripline runs north-south, and along its course are some large roof-fall accumulations. There is tree growth some 2-3m east of the dripline The colluvial slope to the east of the dripline is so steep that there is no apron of deposit outside the shelter mouth, as is the usual case in rockshelter sites.

Because the shelter is a product of cavernous weathering, the floor deposit is derived in part from the products of the decomposition of the bedded sandstone walls and ceilings. This decomposition is a slow process. Comparatively little of the shelter exfoliation has occurred as composite sandstone fragments and although a few such blocks have fallen from the ceiling, the great bulk of roof-fall is produced in the form of individual quartz sand grains and finer clast materials which erode out as individual particles. A 1m x 1.5m folding table, set up during excavation under the overhang, collected about 50 grains of ceiling sand during a working day. Because the shelter has eroded from near the top of the mesa there is very little land mass above or around the shelter that is not part of the shelter's superstructure. Therefore, the deposit which comprises the shelter floor must be derived from ceiling exfoliation (i.e. roof-fall), plus whatever animal and human products might have been incorporated into the deposit.

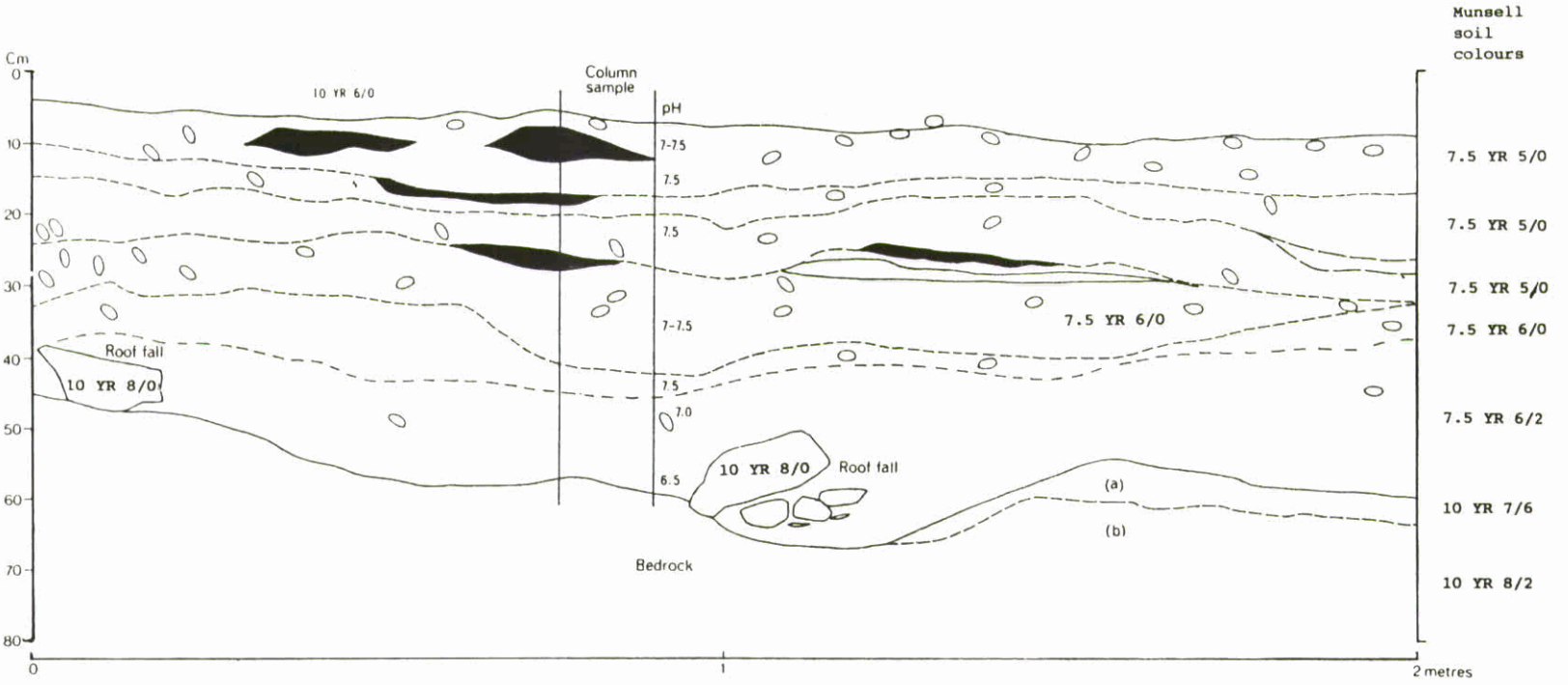
Surface inspection of floor deposit indicated that the sediments contained stone artefacts, animal bone, Macrozamia seeds and seed-shells in a matrix of sand, burned wood, and ash. The surface was uncompacted. Walking on the unconsolidated sands produced turbation to ca. 3cm. At the dripline the surface sands were much coarser than elsewhere on the shelter floor, suggesting that the finer sedimentary material had been transported away, probably north and east.

DEPOSIT AND EXCAVATION

To map the shelter, I established a datum point by driving a scrounged Ford Model "T" axle into the deposit (see Figure 2). It was left in the deposit. A base line was struck 10^{o} west of magnetic north.

The deposit in the shelter was sampled by the excavation of two 1m x 2m units. The south-east corner of one excavation unit was located at 14m north and 1m west of datum (14N-1W), the other was placed with its north-east corner at 14m south and 1m west (14S-1W) of datum. Several soundings measuring 0.25m square were located at 34N-1E, 15N-2.5E, 6N-3W, 1N-2W, 8S-1W, 22S-1W. The coordinates locate the corner of the pit nearest datum (Figure 2). A column sample was taken from the south wall of 14S-1W.

Both units were excavated in arbitrary 5cm levels, each level being removed using trowels and brushes. The deposit was unconsolidated and extremely dry. Faunal material and flaked stone were left in situ on the floor of each 5cm excavation level and their distribution plotted on graph paper before removal. Very small fragments of bone and stone were recovered by sieving the matrix through screen with a maximum diagonal aperture of 3mm.



Deposit: unconsolidated sand throughout except for ash lens and occasional concreted roof-fall

Macrozamia shells, half or larger

(a) rotten bedrock

(b) solid bedrock

Dotted lines describe vague and very slight changes in sediment colour

Figure 3. Rainbow Cave Section, Unit 14S-1W.

Once the first unit (14S-1W) had been excavated, I expected to be able to identify sedimentary depositional horizons in the section and be guided by these in further excavation. However, even in section the only reasonably clear colour or texture differences in the deposit were those which defined the edges of ash lenses. Only very vague vertical changes in sediment colour could be seen. These are indicated by dotted lines in Figure 3 which only artificially partition shades of dark grey sediments (Plate 2). Ash lenses appeared very light grey in colour and contrasted strongly with the general sediment matrix which was a consistent medium to dark grey colour. The colour of the pure decomposed sandstone component of the sediment, judging from both the colour of the sterile layer at the bottom of the deposit and that of the shelter walls and ceilings, would vary from a light yellow to creamy white. These colours were overwhelmed in the shelter floor sediment by the high proportion of minute burned wood fragments and ash. This subject is discussed further when the results of the column sample are presented below.

Plate 2. Rainbow Cave occupation deposit.

One basal radiocarbon date for the site was obtained. A date of 3600 ± 100 years bp (ANU-1521) was returned for a burned wood sample taken from 40cm below the surface in unit 14N-1W. The burned wood sample comes from sediments which contained both stone flakes and Macrozamia seed shells. This date is taken as an approximation of the first Aboriginal use of the shelter.

Excavated Material[1]

The stone artefact material occurred in the frequency of about 230 flakes per cubic metre. Frequencies and distributions of stone tools are given in Table 1. The numbers within the types are small, but the collection as a whole could be characterized as a fine chisel and

scraper industry which has been considerably reduced by flaking such that the average weight of flakes was 5.8g.

Table 1. Rainbow Cave Stone Tool Distribution.

STRATA	Side	Disc	Notch	End	Core	Amorph.	Burren	Tula	Very Fine Scrapers	Backed Blades	Ground Stone	Waste
14S-1W												
0-5 cm	1	0	2	1	0	2	0	1	6	0	1	142
5-10	1	0	0	0	0	0	1	0	1	0	0	54
10-15	0	0	0	0	0	0	0	0	1	0	0	14
15-20	0	0	0	0	0	0	0	0	0	1	0	18
20-25	1	0	0	0	0	2	0	0	1	1	0	15
25-30	1	1	0	0	0	0	0	0	5	0	1	50
30-35	0	0	0	0	0	0	0	0	2	0	0	23
35-40	0	0	0	0	0	0	0	0	2	0	1	4
45-50	0	0	0	0	0	0	0	0	0	0	0	1
50-55	0	0	0	0	0	0	0	0	0	0	0	0
14N-1W												
0-5 cm	0	0	1	0	0	1	0	0	0	0	0	6
5-10	0	0	0	0	0	0	0	0	0	0	1	8
10-15	0	0	0	0	0	0	0	0	0	0	0	13
15-20	0	0	0	0	0	0	0	0	0	0	1	17
20-25	0	0	0	0	0	0	0	0	0	0	2	23
25-30	0	0	0	0	0	0	0	0	0	0	0	8
30-35	1	0	0	0	0	0	0	0	2	0	0	74
35-40	0	0	0	0	0	0	0	0	0	0	0	29
40-45	0	0	0	0	0	0	0	0	0	0	0	2
45-50	0	0	0	0	0	0	0	0	0	1	1	2
50-55	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	5	1	3	1	0	5	1	1	20	3	7	517

The only backed blade found in unit 14N-1W came from the lowest level. The backed blade was the nearest stone artefact to the radiocarbon sample. No evidence of burrowing or other non-human disturbance was seen. The siliceous stone material included a broad range of various grained rocks including silicified wood, chalcedony, silcrete and quartzite. Summing all the stone material from the excavation units and soundings gives a stone tool/waste ratio of 1:7.5.

The deposit contained highly fragmented bone remains. At least three mammal species have been identified; wallaroo (Macropus robustus) rock wallaby (Petrogale sp.), and an unidentifiable species of the genus Macropus.

The most abundant cultural material in this site were the broken shells of the cycad Macrozamia sp. (Plate 3). Seeds were found throughout the sedimentary levels (Figure 3) but the state of preservation of the fragments varied with depth and the degree of carbonization. Only about 50% of the nut shells showed the effects of fire. Some were so highly carbonized as to suggest that they were probbably not burned as a consequence of nut roasting but incidentally after the nut was removed.

Carbonized nut fragments also occurred in the deposit but were rare. Excavation screens filled with about 2kg of the sandy matrix would sieve out dozens to hundreds of Macrozamia shell fragments.

Shells the size of 1/2 nut or larger, by which minimum numbers of nuts might be calculated, were very rare; but the quantity of shell fragments suggest that about 400-500 nuts per cubic metre would be a conservative estimate. The north and south units and the various "sounding" tests all had very similar amounts of broken Macrozamia seed shells, which suggests that the deposit is likely "homogenized" at least in this respect.

The shells of the Macrozamia seeds were broken open, rather than chewed open by marsupials or rats. Shells which do have the clean parallel incised teeth marks of rats can sometimes be seen on the surface or around the site. I have seen no such examples from the excavated shells. The hardness of the shell suggests that an anvil and hammer technology would be associated with the exploitation of the nuts, but no such implements were excavated. If the anvil-hammer combination were stone and occurred in small numbers in the deposit then they could easily have been missed by the excavation. Among the Gidjingali of Arnhem Land, a wooden log and baton served to crack cycad shells (Meehan and Jones in Beaton 1977, Appendix IV). No such wooden implements were seen in the excavation. Some small fragments of Macrozamia leaf were found in small quantities.

Plate 3. Samples of burned and unburned Macrozamia (actual size).

Column Sample

To study the size and material composition of the deposit, a 15cm^2 column was excavated, in 5cm levels, from the south wall of 14S-1W (Figure 3). Each 5cm level was bagged separately and all were returned to Canberra for analysis. In the laboratory each level was treated as a separate sub-sample, and analysed for particle size composition and material constituents. Figure 4 illustrates the steps of the process.

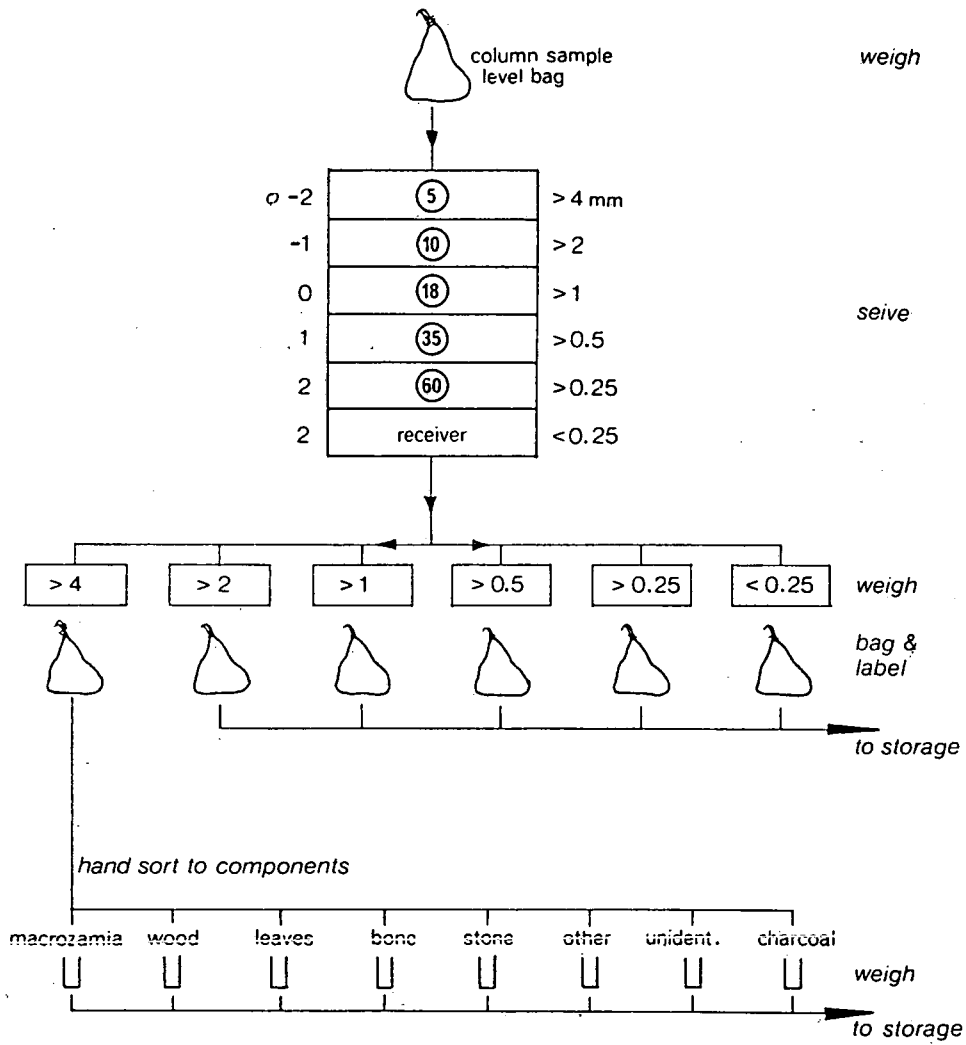


Figure 4. Column sample analysis.

Column Sample: Particle Size

Particle-size fractionating was done with standard Endecott's Test Sieves, which separate several particle sizes within the range 4.0mm to 0.25mm. Each 5cm level of the column sample was placed in the top sieve, and the sieve stack was shaken for 10 minutes using a Duralab sieve shaker. The frequency of various particle sizes is given in Table 2 and depicted in cumulative frequency diagrams in Figure 5. The particle sizes are denoted by their metric mesh sizes as well as by the standard phi scale. The phi designations (based on Folk 1968:25) describe particle size as follows:

Phi Designations	Wentworth Size Class	Metric Size
- 2	gravel to pebble	>4.0 mm
- 1	very coarse sand to gravel	4.0-2.0 mm
- 0	coarse to very coarse sand	2.0-1.0 mm
+ 1	coarse to medium sand	1.0-0.5 mm
+ 2	medium to fine sand	0.5-0.25 mm

As shown in Figure 5, these particle sizes are heavily skewed toward the fine end of the spectrum, the fraction less than 0.5mm always accounting for more than 50% of the sediment in each level, and sometimes as much as 75% or more of the sediment. The only trend in particle size is for the coarser fraction to contribute more to the total volume as depth from surface increases. This could reflect either absolute differences in the amount of organic matter being contributed to the sediment (less site use?) or a decay of organic matter through time. Field pH tests using the Raupak soil test kit show that the sediment acidity does increase near the bottom of the 50cm deposit, suggesting that loss of fine particles of organic matter by chemical means is a strong possibility.

Table 2. Rainbow Cave particle size distribution.

	Standard Phi designations	Ø -2	-1	0	1	2	+2
	Total Sample	$\bar{X}$>4mm	$\bar{X}$>2,<4	$\bar{X}$>1,<2	$\bar{X}$>.5,<1	$\bar{X}$>.25,<.5	$\bar{X}$<.25
Sample Name	STD Mesh No.	5	10	18	35	60	
RB 0-5	1890.88	50.70	39.68	74.46	246.21	718.29	761.54
%Total Sample	(100)	(2.68)	(2.09)	(3.93)	(13.02)	(37.98)	(40.27)
RB 5-10	1627.87	42.97	36.47	69.92	248.02	612.18	618.31
%		(2.63)	(2.24)	(4.29)	(15.23)	(37.59)	(37.98)
RB 10-15	1792.42	45.82	45.32	79.00	248.24	629.44	744.61
%		(2.55)	(2.52)	(4.40)	(13.84	(35.11)	(41.54)
RB 15-20	1806.93	63.79	62.86	102.22	271.39	607.65	699.02
%		(3.58)	(3.47)	(5.65)	(14.99)	(33.62)	(38.68)
RB 20-25	1790.43	73.22	62.54	97.84	250.47	563.97	742.39
%		(4.08)	(3.49)	(5.46)	(13.98)	(31.49)	(41.46)
RB 25-30	1826.11	94.87	118.33	138.53	238.49	534.34	701.55
%		(5.19)	(6.47)	(7.58)	(13.06)	(29.26)	(38.41)
RB 30-35	1837.98	107.68	83.40	138.00	262.94	519.87	724.09
%		(5.85)	(4.53)	(7.50)	(14.25)	(28.23)	(39.39)
RB 35-40	1785.06	124.22	86.81	146.87	258.39	495.19	673.58
%		(6.95)	(4.86)	(8.22)	(14.47)	(27.74)	(37.73)
RB 40-45	1832.79	245.67	92.47	18.59	312.16	577.66	586.24
%		(13.40)	(5.04)	(1.01)	(17.03)	(31.51)	(31.98)
RB 45-50	1872.27	35.33	50.64	156.35	365.23	724.67	540.04
%		(1.88)	(2.70)	(8.35)	(19.50)	(38.70)	(28.84)

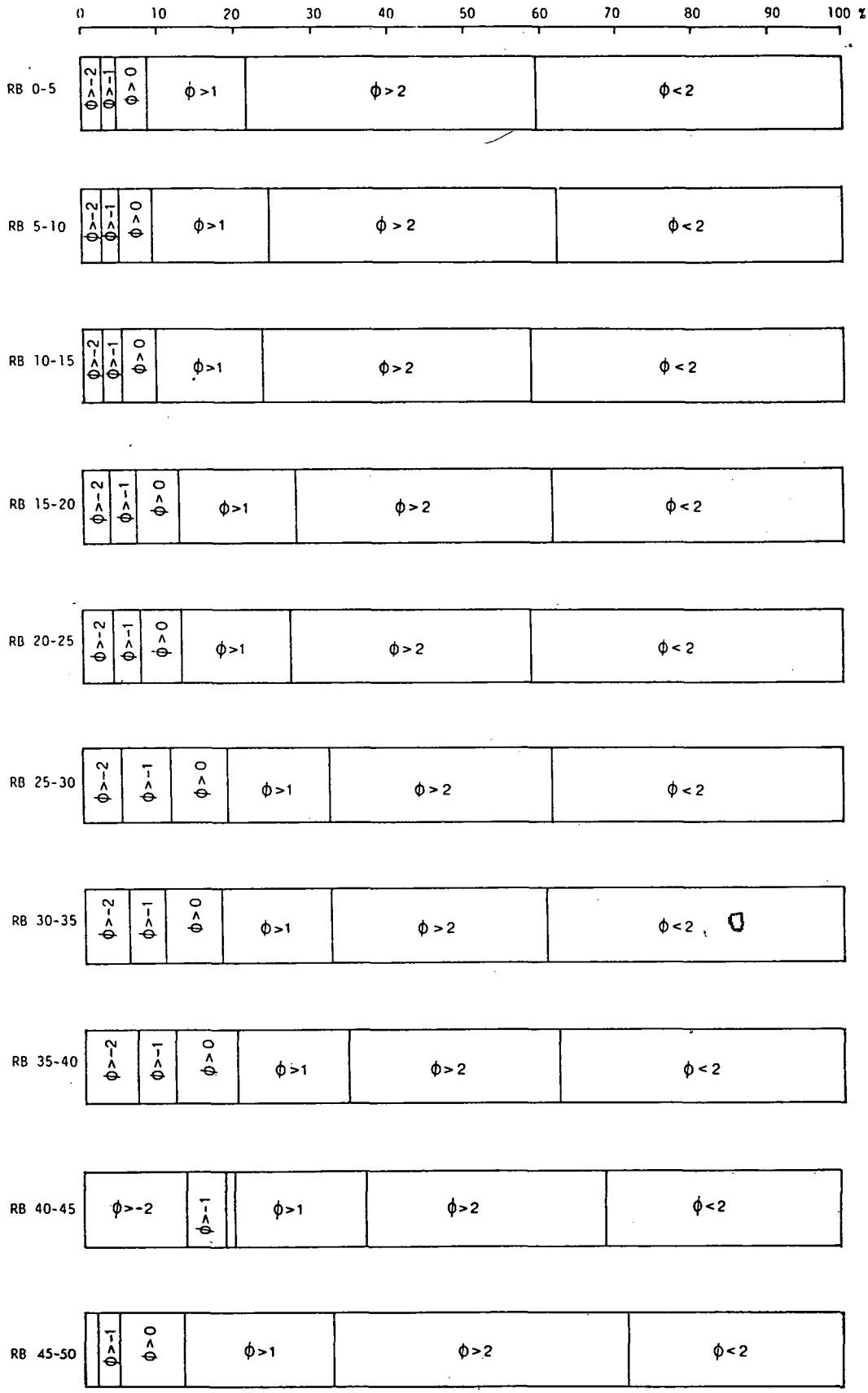


Figure 5. Rainbow Cave particle size distribution, cumulative frequencies.

Silt and clay also occur in the deposit. They are derived from the decomposition of the sandstone where they acted as clastic matter until the rock began to deteriorate into its component parts. The contribution to the deposit of silts and clays has not been quantified, but is thought to be constant at each site because neither site is affected by fluviatile or aeolian deposition. The column sample fractions have been saved if such analysis is required in the future.

Column Sample: Components

The >4.0mm sample fraction of each level was sorted by hand to five kinds of components; Macrozamia shell (unburned only), wood (unburned, including small twigs), leaves, bone (burned and unburned), stone including coarse quartz sand, charcoal (burned wood and heavily burned Macrozamia shell) and unidentified (Table 3).

Table 3. Rainbow Cave column sample components, cumulative frequencies.

Sample Name	Macrozamia	Wood	Leaves	Bone	Stone	Other	Unident.	Charcoal
RB 0-5>4mm (Ø=>-2.0)	0	0	TRACE	.30	15.74	*	TRACE	33.60
" "	*	*	(TRACE)	(.60)	(31.70)	*	(TRACE)	(67.68)
RB 5-10>4mm (Ø>-2.0)	0	0	.10	.44	3.80	*	.20	38.42
" "	*	*	(.23)	(1.02)	(8.84)	*	(.46)	(89.43)
RB 10-15>4mm (Ø>-2.0)	*	*	.01	*	5.16	*	*	40.00
" "	*	*	TRACE	*	(11.42)	*	*	(88.55)
RB 15-20>4mm (Ø>-2.0)	*	*	*	.21	34.87	*	*	28.58
" "	*	*	*	(.32)	(54.77)	*	*	(44.89)
RB 20-25>4mm (Ø>-2.0)	*	*	*	.53	23.13	*	*	49.65
" "	*	*	*	(.72)	(31.55)	*	*	(67.26)
RB 25-30>4mm (Ø>-2.0)	1.19	*	*	.27	60.51	2.65	*	30.25
" "	(1.25)	*	*	(.28)	(63.78)	(2.79)	*	(31.88)
RB 30-35>4mm (Ø>-2.0)	.70	.39	*	*	86.78	*	*	19.79
" "	(.65)	(.36)	*	*	(80.60)	*	*	(18.38)
RB 35-40>4mm (Ø>-2.0)	*	*	*	*	96.67	.28	*	17.80
" "	*	*	*	*	(84.24)	(.24)	*	(15.51)
RB 40-45>4mm (Ø>-2.0)	*	*	*	*	233.53	*	.35	11.16
" "	*	*	*	*	(95.30)	*	(.14)	(4.55)
RB 45-50>4mm (Ø>-2.0)	*	*	*	*	30.88	*	*	4.00
" "	*	*	*	*	(88.53)	*	*	(11.46)

Smaller particle sizes became rapidly more difficult to sort. If particle sizes were correlated with particular components of the deposit then it would be necessary to quantify the components of each particle size sample for each level to obtain a true picture of the sediment components. It does not seem necessary to do so in this instance. The main organic materials in this site, Macrozamia shell and burned wood, both appear to be disintegrated to similar degrees. Where the two components make up over 75% of the >4.0mm fraction of deposit (as in the upper three levels) I believe the fine fractions would give similar results. Where the coarse fraction is over 90% sandstone (as in the lowest level) the finer fractions appear very similar as well.

Two components make up the vast majority of the sediment matrix; stone and charcoal. The stone in the column sample is mostly derived from the sandstone ceiling of the shelter. Subrounded quartz pebbles of about 5-15mm diameter occur in bands in the sandstone. These weather

out of the cliff, along with the smaller sand grains and clastic materials which also fall to the shelter floor and contribute to the deposit. The column sample particle size distribution showed that it is the smaller elements which constitute the great bulk of the deposit. Sorting of the >4.0mm fraction gives a clear picture (Figure 6) that the charcoal contributes the bulk of the coarse matter in the site. Most of the charcoal is made up of small fragments of wood, although burned Macrozamia seed shell is included. Only unburned Macrozamia shells were counted as Macrozamia, and these never accounted for much more than one percent of the total volume by weight. Bone makes up about one percent of the sample by weight.

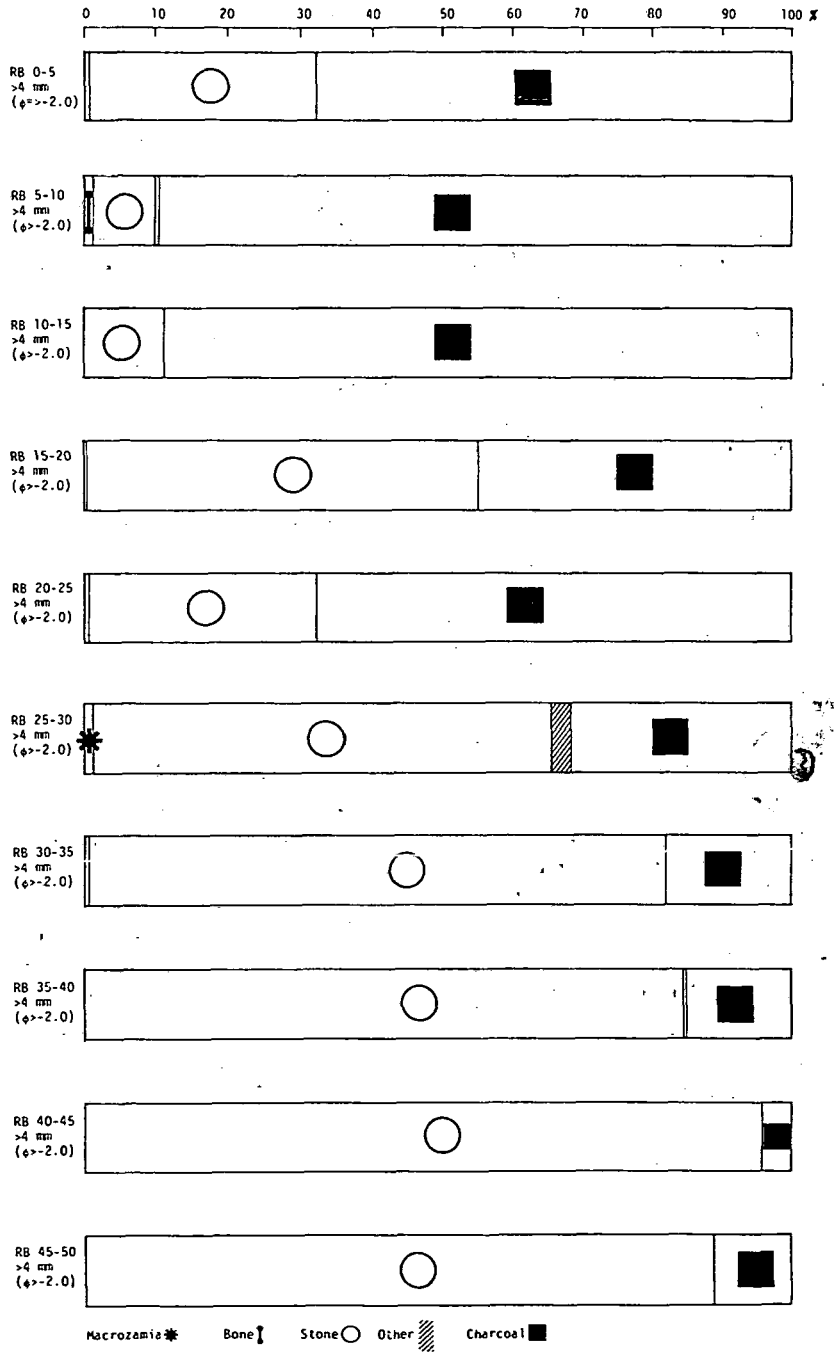


Figure 6. Rainbow Cave column sample components of sizes >4.0mm.

A column sample of this size is perhaps not an ideal one from which to make final statements about the nature of the site deposit, but it provides a useful measure of trends in sediment texture and the relative amounts of various types of food debris. It is noted that because fractions are given as percent by weight, and, because the components differ in volume/weight ratio, some misrepresentation is inherent in the cumulative frequency diagram (Figure 6). The charcoal for instance is much lighter than the quartz pebbles and therefore represents an even larger part of the sample by volume than the figure shows. The same holds true for bone and other organic matter, particularly Macrozamia. When Macrozamia is one percent of the sample by weight it is a visibly significant part of the total volume.

Assuming an equivalent skewing for each sample, the cumulative frequency diagram shows that coarser sediments increase with age and charcoal decreases with age. In a sandstone environment these two observations are most likely part of the same phenomenon. The finer particle matter of the column sample is highly charged with charred wood and organic material. In porous environments where biological and chemical activity is high, the fine material should become a smaller fraction of the deposit relative to coarse inorganic material over time because of oxidation. In the Rainbow Cave column sample, the coarse fraction does increase relative to the finer material with increasing age (Figure 4). This is interpreted as a direct result of the decomposition of organic matter over time.

No gastropod or mollusc shell was seen in the column sample or, for that matter, in the excavation. Small fragments of mammal bone did occur but in very small quantities. The bone is well preserved even if highly fragmented when found in the upper levels. It is very friable in lower levels where the pH becomes acidic. Small pieces of twigs and what appear to be Macrozamia or palm leaf fibres were also noted.

WANDERER'S CAVE: THE SITE AND SURROUNDS

Wanderer's Cave, like Rainbow Cave, is a rockshelter in the Carnarvon Range. The site is 6km north of Rainbow Cave and likewise is located on the spine of the range, situated at 640m above m.s.l. The site sits exactly on the fenceline that marks the northern boundary of "Wallaroo" Station and the southern boundary of "Warrinilla" Station. The fence, now some 70 years old, leads east from a pass in the Carnarvon Range to the mesa landform. The survey of the fenceline may only approximate the European discovery of the site. On the shelter walls Europeans have carved their initials and sometimes inscribed dates as well. The earliest dated inscription at Wanderer's Cave is 1906. Michael Morwood suggests (pers. comm.) that these inscriptions may be attributable to "possumers" who worked these ranges in the early 20th century. The origin of the name "Wanderer's Cave" is obscure.

Just as at Rainbow Cave, the immediate site locality is an area of high rainfall runoff. The drainage pattern collects rainfall and directs it to the Dawson and Comet systems. There are no nearby catchments where rainfall might collect, apart from very limited rock basins. Steep sandstone predominates in the area and the nearest water source to this site would be intermittent pools in Spring Creek, 2km away but 300m lower in elevation. At present, if water is not taken to the site it is a very awkward trip downslope to get some. As was argued for Rainbow Cave, the absence of handy local water is a real problem and this site

too must be considered an anomaly to the typical close association of water sources and habitation.

The vegetation in the vicinity of Wanderer's Cave is varied. The dominant pattern is one of tall and open spotted-gum or ironbark forests. These dominate the gentler slopes and at present are found with a well-grassed carpet which is maintained by frequent burning. The frequent burning practised by graziers in the range county probably discourages the growth of shrub vegetation and the forest areas are generally free of plants in a size range between the trees and grasses. An exception is the "zamia" (Macrozamia moorei) which, according to the graziers, is oblivious to fire. Healthy stands of this species occur near Wanderer's Cave. They are thickly distributed, under a spotted-gum canopy, along the south side of the east-west ridge upon which the site occurs. Elsewhere on this part of the range they occur spottily. Immediately to the west of the site a patch of about 60 Macrozamia grow within 100m of the cave entrance.

The mesa in which the shelter is found is a small remnant peak of the horizontally bedded sandstone. It is small, being about 110m east-west and 15m north-south (Figure 7). From the mesa top, just a few metres above the shelter, broad vistas in all compass directions can be seen. These include the Arcadia Valley and Expedition Range to the east and the precipitous sandstone gorge country of the northern Carnarvon Range.

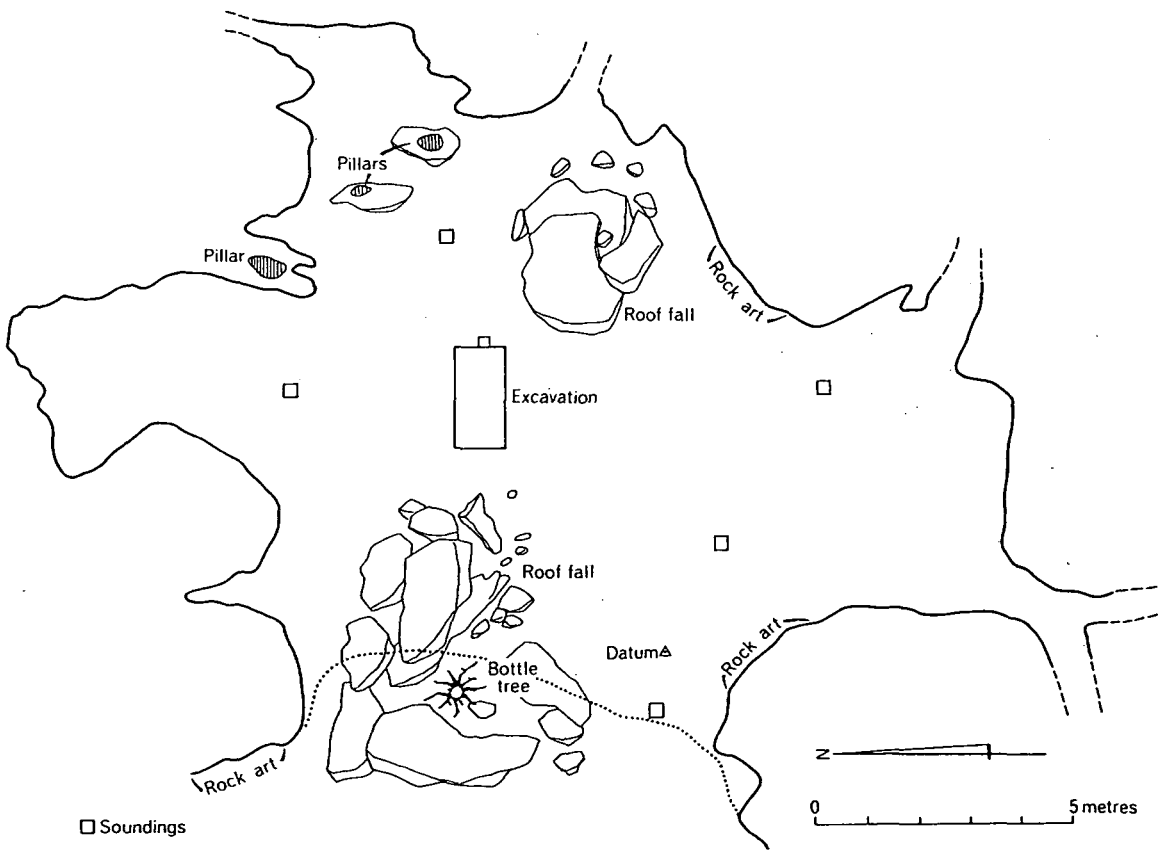


Figure 7. Wanderer's Cave floor plan.

This mesa is not only weathered on its outward surfaces but it is punctuated by tubular weathering canals. Such tubular features may have provided the kind of chink in the mesa's armor which eventually led to the formation of two larger cavities in the mesa, one of which is known as Wanderer's Cave.

Wanderer's cave differs from most weathered sandstone shelters in its gross form. In section (Figure 8) the shelter appears more like a cave than a shelter, due to its dome-shaped ceiling. The largest opening to the shelter/cave faces west, but there are several other small openings in the walls. Only one of these, which exists to the east and is possibly the end of a weathered tube, is large enough for a person to squeeze through. It is presently used nightly by wallabies who come and go through the site. Evidence of many weathering tubes are apparent in the shelter walls and ceiling. Some, the well-preserved ones, have a slick glaze on their surfaces.

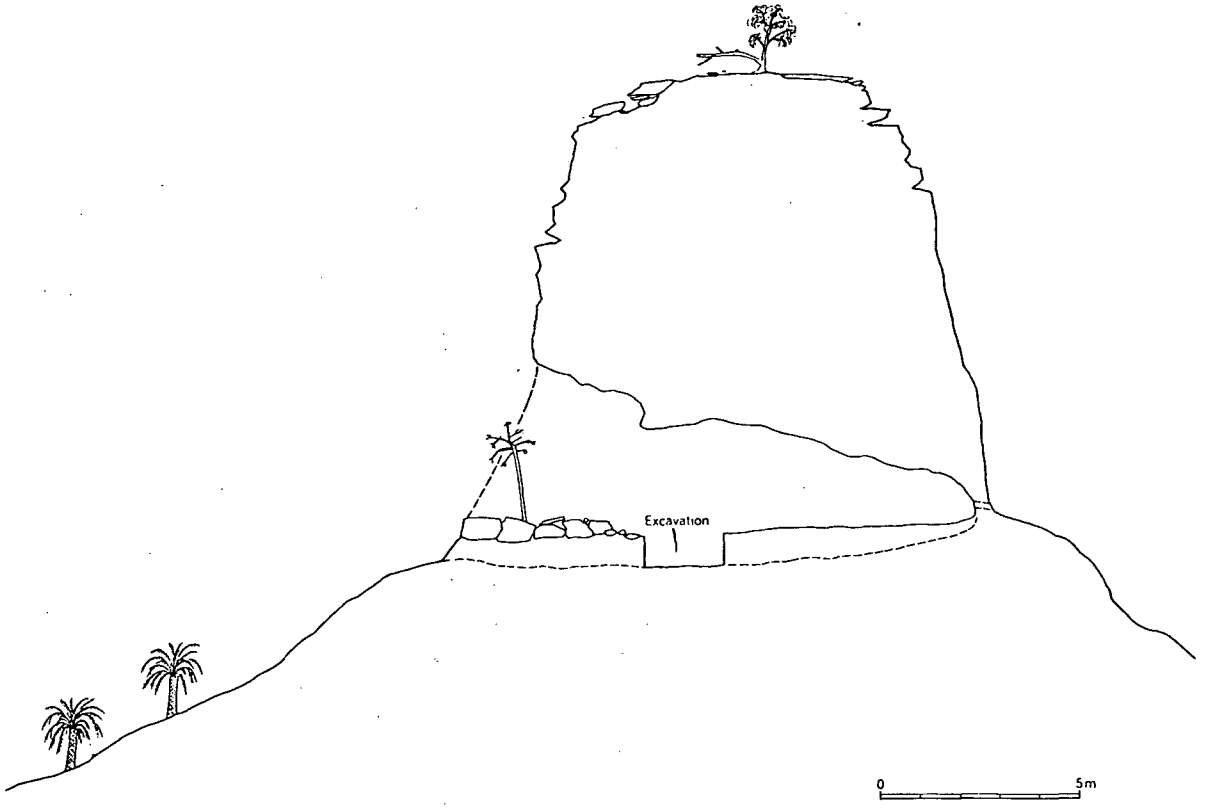


Figure 8. Wanderer's Cave section.

The results of weathering and decomposition of the sandstone have produced some peculiar forms in the remaining sandstone. Inside the shelter, towards the east wall are several smaller domed cavities (Plate 4). Near these are several sandstone pillars that reach from floor to ceiling. I have not seen these in any other sandstone shelters. In shape they are very reminiscent of joined stalactites and stalagmites, well known in limestone caves. In limestone these are products of solution, transport and subsequent redeposition of calcium carbonate and other compounds. In Wanderer's Cave these analogous forms are simply incompletely weathered solid sandstone. At the mouth of the shelter, and again several metres to the west, are roof-fall accumulations. Both predate at least the latest use of the shelter because narrow grooves have been abraded in both block-fall accumulations. These two occurrences are the only evidence of substantial block exfoliation. Block-fall is only a small part of the total evacuation of sandstone which formed the shelter. The remainder has weathered out as uncemented individual quartz grains and clast material.

Plate 4. Wanderer's Cave mouth (top) and interior (bottom).

At the present time, the walls and ceiling of Wanderer's Cave appear to be relatively stable . The ceiling and walls are stained from fire, smoke and ochre. These anthropogenic elements, possibly acting in concert with silica-skin formation (Watchman 1990) may have preserved the physical integrity of the affected shelter surfaces.

Red, white and yellow ochre have been used to stencil objects and body parts on the walls, particularly the south wall. Some stencils of hands and feet occur outside the shelter. There are engraved figures on the walls as well. The most obvious of the engravings are representation of the human female genitalia. Such engravings occur throughout the ranges (Morwood 1979) and have sometimes been called the "cup and ring motif" (Morwood 1976, Plate 2; Quinnell 1977).

Colluvial slopes in the immediate vicinity make access from the west and north rather steep and difficult. Access from the south (along the ridge) and east is easier. If the differences in landform contours and slope steepness were important to the people who used Wanderer's Cave then an approach from the direction of Rainbow Cave would have been the most likely in prehistoric times.

The floor of Wanderer's Cave, as defined by the walls, totals $171m^2$. However, when areas of low ceiling and areas cluttered by roof-fall are subtracted, only about $70m^2$ of useful floor area remain. There is only a very gentle ($3-5^{o}$) slope discernible on the shelter floor, dipping toward the east. Here, the shelter deposit, if disturbed could overflow out of the rim of a weathered tube. There is no colluvial apron below this exit and none would be expected because the slope below is quite steep (30^{o}). There is evidence however that some of the deposit is still being removed from this exit. Fine dust and small Macrozamia shell fragments can be seen just outside the exit; presumably these are by-products of wallaby comings and goings. The only real dripline at the site is a 12-metre-long strip below the overhang at the north entrance to the shelter. Here, the dripline is short and poorly developed, i.e. there is very little land mass above the overhang and this neither produces much alluvium/colluvium nor does its small catchment direct much rainfall toward the dripline below. A young bottle-tree (Brachychiton spp.) grows amid the roof-fall at the dripline. No plants grow on the archaeological deposit itself. Native fig trees (Ficus spp.) cling to the small mesa, particularly on the south and west sides.

Because the shelter floor is entirely over-arched by the ceiling, and because there are no other landforms of greater elevation nearby, the natural sandstone component of the deposit is a product of only two sources, weathering of the inside of the shelter sphere and any sandstone particles introduced through weathered tubes from the matrix of the mesa. The composition of the latter particles would be identical to the weathered roof-fall and indistinguishable in the deposit. I can only guess at the percentage of floor deposit introduced from above the shelter through weathered tubes. The shelter is situated about as high as it could be in the formation and still have a roof. The sandstone above the shelter is only about 4m thick and I imagine that decomposed sandstone products which might not accurately be called roof-fall would be negligible, though possibly representing as much as five percent of the deposit. Therefore, I expect the deposit to reflect virtually only roof-fall, plus the remains of human activity and animal products.

DEPOSIT AND EXCAVATION

On visual inspection the surface of the shelter deposit appeared darker and richer in ash and burned wood than did the surface at Rainbow Cave. It was extraordinarily dry and also as light if not lighter in texture than the Rainbow Cave deposit; any raised dust remained in suspension for many minutes. The burned wood of the surface was the most impressive feature of the floor deposit. This charcoal was highly fragmented, the largest pieces being only a few square centimetres. Almost no unburned wood was seen, the few fragments that were seen being small twigs which could have been introduced into the deposit in any number of ways.

The second most obvious feature of the surface of the deposit was the very numerous broken shells of Macrozamia nuts. As at Rainbow Cave they were broken open, not chewed open by animals. Here too, the seed shells were burned, some lightly, and some almost completely carbonized. Some small stone flakes and a few bone fragments were noted. In short, the surface of the shelter had the same kind of material seen at Rainbow Cave, except the deposit at Wanderer's Cave, appeared darker and the material better preserved.

The shelter deposit was sampled by a single 1m x 2m pit, five soundings (0.25m^2 each) and one column sample, taken from the east wall of the excavation pit (Figure 9). A site datum was established by driving a length of steel pipe into the deposit below an "X" which was seen on the south wall, next to the inscription of the name, "L. Maiden". A grid system, oriented on magnetic north was laid out. The nearest corner of the excavation unit to datum was 3m north and 4m east (3N-4E). The soundings were located at 1S-2E, 3S-5E, ON-1W, 4N-8E and 7N-5E (Figure 7). The co-ordinates locate the corners of the pits nearest to datum.

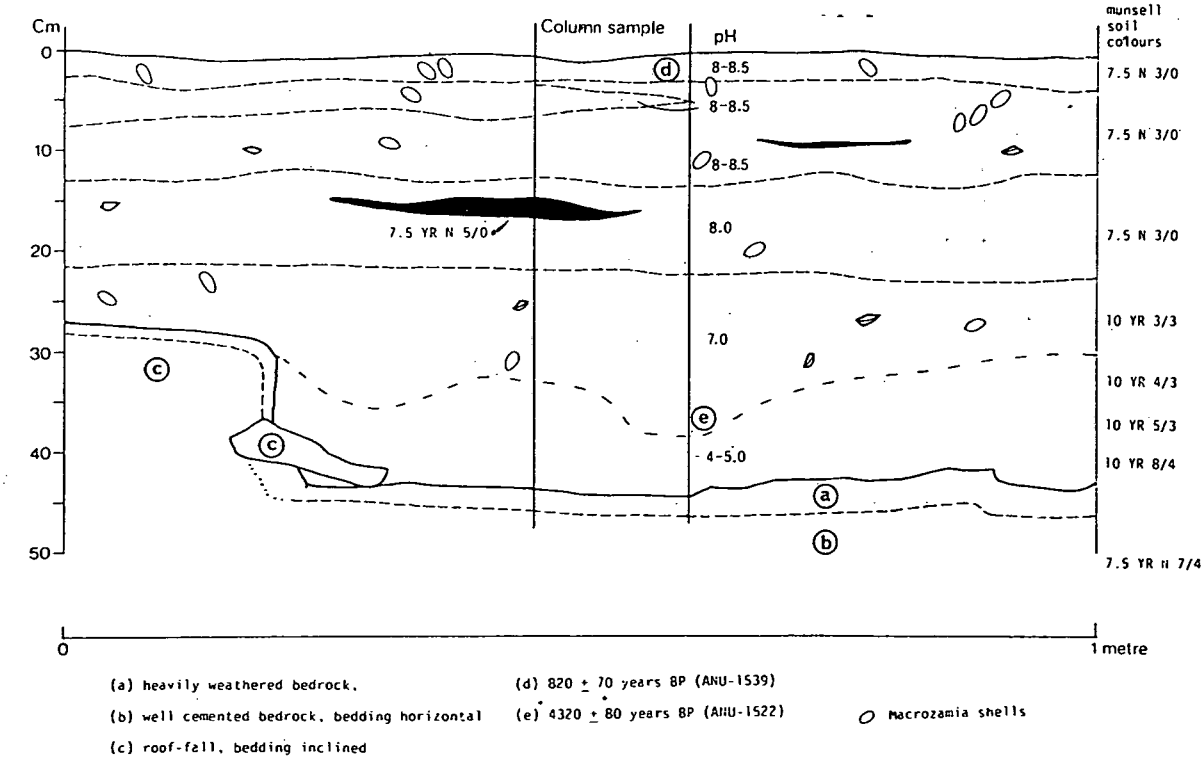


Figure 9. Wanderer's Cave section

Excavations were done in 5cm arbitrary levels. No differences in sediment texture, colour or composition could be seen which would clearly differentiate discrete occupation horizons or broadly different depositional phases. The only features of the deposit whose outlines could be traced were ash lenses and these could only be defined with any confidence in section. The colour of the sediment varied from dark grey to very dark-grey. The smaller soundings in the deposit gave no indication of significant spatial variation in the character of the deposit, judging by its colour, texture and material composition.

All the excavated deposit was sieved through 3mm square mesh screens. The excavated matrix of the deposit was similar in many respects to that of nearby Rainbow Cave. The stratigraphic deposit, like the surface sediments, was very dry. The colour of the deposit was virtually uniform, except for the light grey ash lenses. Excavation of the deposit was hampered by two problems, frequent caveins and accidental disturbance of the loose matrix by hand, foot, notebook, etc. The deposit was little better consolidated than dry beach sands. No moisture or chemical agents bound the matrix together. Gravity, and the confines of the shelter walls seemed to be the only physical properties that kept it in place. As at Rainbow Cave, the fine dry matrix poured straight through the sieves leaving behind a very few stone flakes and a lot of burned Macrozamia seed shells. The deposit in Wanderer's Cave is never more than 50cm deep and often the depth is much less. Table 4 gives depth to sterile of the five soundings.

A burned wood sample taken from the lowest level in 3N-4E (Figure 9) returned a radiocarbon date of 4320±80 bp (ANU-1552). Burned wood and Macrozamia fragments from the top of the 5-10cm level dated 820±70 bp (ANU-1539).

Table 4. Wanderer's Cave: sounding depths.

UNIT	DEPTH
1S - 2E	30 cm
3S - 5E	18 cm
ON - 1W	36 cm
4N - 8E	19 cm
7N - 5E	16 cm

Excavated Materials[2]

Stone flakes and flake tools occurred in small numbers. All are made of reasonably fine-grained silicious rocks like those of Rainbow Cave. There were 31 flake tools and 266 waste flakes recovered from the excavation. The distribution is given in Table 5. The ratio of tool to waste was 1:8.5. The tool and waste numbers per m^3 of deposit were 43 and 360 respectively. The tools found in the site included seven side scrapers, two end scrapers, one broken scraper, one backed blade, two chisels (one tula, one burren), three fragments of ground stone and 15 "very fine scrapers". Two of the flake tools which had evidence of hafting gum still preserved were a burren chisel and one "very fine scraper" (Plate 5).

The single backed blade was found in the middle of the uppermost level. A radiocarbon date of 820±70 bp (ANU-1539) was obtained for a burned wood sample taken from 4cm below the backed blade. I would

caution against interpreting the backed blade as being necessarily deposited sometime later than that date because the deposit is extremely light and subject to vertical disturbance of at least 10cm, and there were no unambiguous sedimentary laminae which would suggest stratigraphic integrity of the deposit near the surface.

Table 5. Wanderer's Cave: stone artefact distribution.

	LARGE SCRAPERS						CHISELS					
Strata	Side	Disc	Notch	End	Core	Amorph	Burren	Tula	Very Fine Scrapers	Backed Blades	Ground Stones	Waste
3N-4E												
0-5 cm	6	0	0	2	0	0	0	0	2	1	1	4
5-10	0	0	0	0	0	0	0	0	3	0	0	35
10-15	0	0	0	0	0	1	1	1	2	0	2	31
15-20	0	0	0	0	0	0	0	0	0	0	0	31
20-25	1	0	0	0	0	0	0	0	6	0	0	61
25-30	0	0	0	0	0	0	0	0	1	0	0	35
30-35	0	0	0	0	0	0	0	0	0	0	0	7
35-40	0	0	0	0	0	0	0	0	1	0	0	29
40-45	0	0	0	0	0	0	0	0	0	0	0	22
45-50	0	0	0	0	0	0	0	0	0	0	0	11
Total	7	0	0	2	0	1	1	1	15	1	3	266

Table 6. Wanderer's cave: mammals found in deposits.

	Depth from Surface (4320 ± 80 BP ANU 1522)								
	0-5 cm	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Macropus robustus (wallaroo)					x					?
Macropus parryi (whiptail wallaby)						x	?			
Macropus sp. (cf. *M. rufogriseus*)									x	
Macropus spp. (kangaroo, wallaby)										x
Thylogale spp. (pademelon)	x									
Wallabia bicolor (swamp wallaby)					x					
Petrogale spp. (rock wallaby)		x	x			x				
Bettongia sp. (rat kangaroo)					x					
Trichosurus sp. (possum)		x	x	x	x				x	
Pseudocheirus peregrinus (ringtail)				x	x					
Schnoinobates sp. (glider)					x					
Perameles nasuta (long-nosed bandicoot)				x						
Isoodon sp. (bandicoot)		x	x							
Dasyurus hallucatus (little northern native cat)		x								

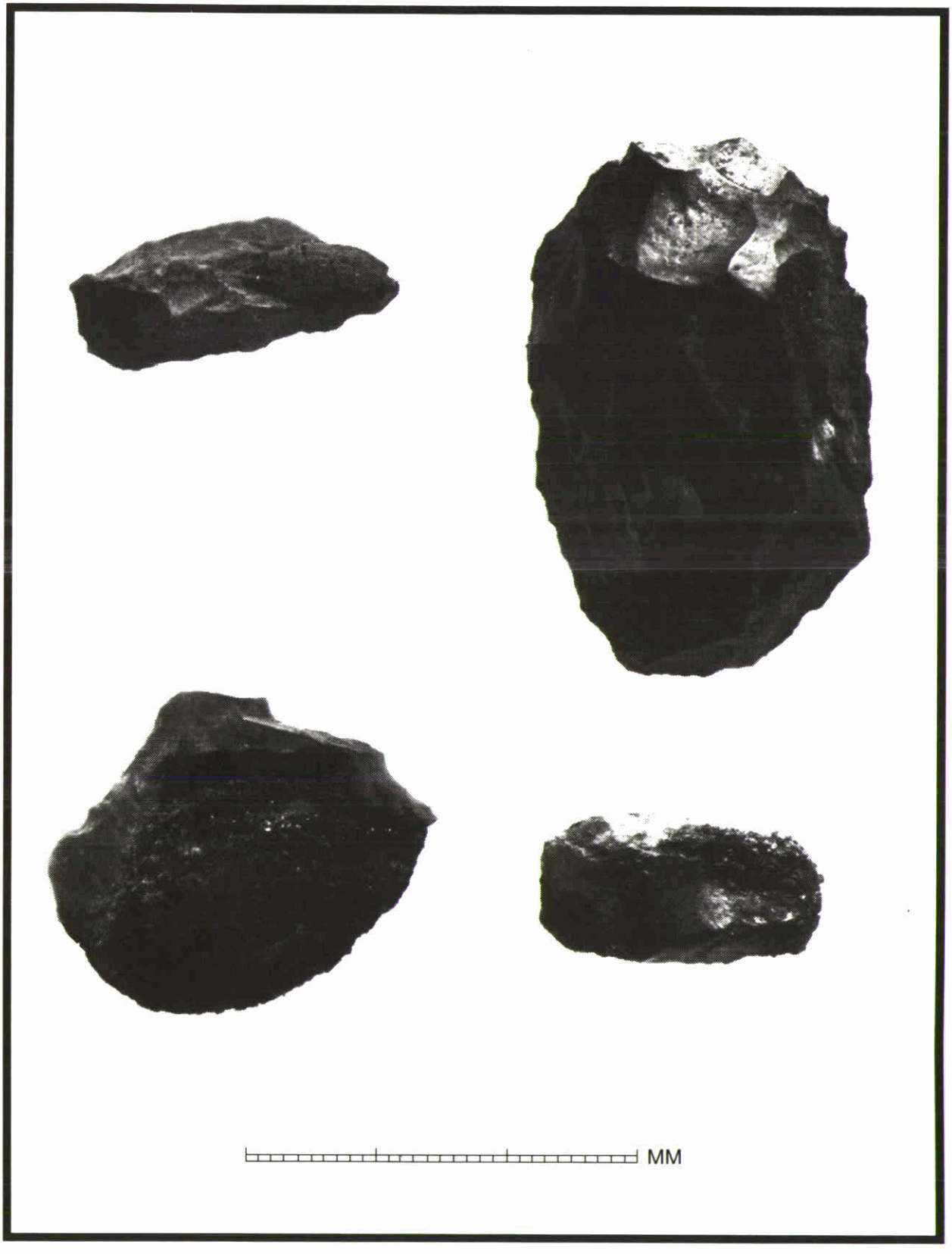


Plate 5. Wanderer's Cave flake tools.

The fauna was much richer than the meagre amount excavated from Rainbow Cave. Table 6 shows the distribution of species in the deposit. The distribution is presented as simple presence/absence. The faunal remains occur mostly as broken and burned post-cranial fragments.

Identification is based for the most part on dentaries and skulls, themselves fragmented. Included in the deposit are the remains of the large wallaroo (Macropus robustus) and the rock-wallaby (Petrogale spp.), both of which are current and common residents of the immediate vicinity of the cave. Tracks seen during the excavation suggest that Petrogale travel across the deposit each night. Wallaroo range throughout the higher elevations of the local landforms. Of the other macropods, the pademelon (Thylogale sp.) is not seen in the area today, but the swamp wallaby (Wallabia bicolor) and the whip-tail wallaby (Wallabia parryi) are very common, and the rat kangaroo (Bettongia sp.) still occurs locally. I have not seen either bandicoot (Perameles sp. or Isoodon sp.) near the site but at least one of these species can be found in the ranges today. Native cats (Dasyurus sp.) are rare but extant in the uplands.

During excavation it was clear that the Macrozamia remains were the most important elements in the deposit. Virtually all seed-shells appeared burned to some extent. Having seen clear effects of fire on at least half of the Rainbow Cave Macrozamia shells, and the high volume of burned wood and burned Macrozamia shells in Wanderer's Cave I presumed that the two facts were related, i.e. Macrozamia nuts were roasted in significant quantity in both sites. Some seed shells, however, were so carbonized that I suspect they were not burned during roasting of the nuts, but were incidentally burned to a high degree some time after the nut had been removed, roasted or not. The condition of seed shells generally suggests that the seeds were roasted in their shells but it is possible that some seeds may have been roasted out of their shells. The seed shells in the excavated deposit appeared evenly distributed and occurred in all parts of the site. If there was a particular area of the site where the density of Macrozamia was significantly higher than in any other, it was not detected in the excavation units. I conclude that within the confines of the shelter there is no area that could be singled out as a Macrozamia dump or processing area. Rather, the entire could be considered such. In this regard I take the contents of the column sample to be a fair reflection of the composition of the deposit.

Column Sample

The column sample was taken from the east wall of 3N-4E (Figure 9). It was the same size as the Rainbow Cave column sample (15 x 15cm) and similarly was excavated and bagged by 5cm levels. It was treated in the laboratory in the same manner as described previously for the Rainbow Cave column sample and using the same apparatus.

Column Sample: Particle Size

The particle size values obtained for each of the nine levels in the deposit are given in Table 7. The results are given both as actual weights and percentages of each particle size within the standard phi classes. The differences within the deposit are more easily seen in Figure 10, where the percentages of the particle sizes for each level are presented as cumulative frequency diagrams. The distribution of particle size does not differ significantly between levels within the deposit, nor is the total picture of a different character than that of the Rainbow Cave deposit. Nor should it be different. Both sites are weathered from almost precisely the same bedding of the sandstone formation and both deposits are of a similar age. At Wanderer's Cave there is only a slight trend for coarser particle sizes to increase in

lower levels, although in the lowest level medium to fine particles slightly increase relative to coarser materials. By the 30-35cm level, some mixing of burned wood-rich occupation debris and sterile suboccupation sand was evident, and the particle size distribution given for the 40-45cm level can be taken as a sample of bedrock plus four percent burned wood fragments.

Table 7. Wanderer's Cave: column sample components, cumulative frequencies.

		Ø>-2	Ø>-1.0	Ø>.0	Ø>1.0	Ø>2.0	Ø<2.0
Sample Name	STD Mesh No.	5	10	18	35	60	
W 0-5	1056.3	69.81	44.24	78.90	185.18	309.25	368.90*
%Total Sample	(100)	(6.60)	(4.14)	(7.46)	(17.53)	(29.27)	(34.92)
W 5-10	458.48	40.50	21.50	34.25	80.29	133.60	148.34*
%	(100)	(8.83)	(4.68)	(7.47)	(17.51)	(29.13)	(32.35)
W 10-15	1048.95	39.31	44.32	86.32	186.18	331.41	361.41*
%	(100)	(3.74)	(4.22)	(8.22)	(17.74)	(31.59)	(34.45)
W 15-20	1200.76	56.41	17.63	88.68	205.14	367.80	435.10*
%	(100)	(4.69)	(3.96)	(7.38)	(17.08)	(30.63)	(36.23)
W 20-25	1093.25	128.73	58.76	91.63	175.56	282.38	356.19*
%	(100)	(11.77)	(5.37)	(8.38)	(16.05)	(25.82)	(32.58)
W 25-30	1104.21	394.03	113.97	111.72	138.85	157.75	187.89*
%	(100)	(35.68)	(10.32)	(10.11)	(12.57)	(14.28)	(17.01)
W 30-35	818.22	276.43	112.23	110.42	108.00	105.00	106.14*
%	(100)	(33.75)	(13.71)	(13.49)	(13.19)	(12.83)	(12.97)
W 35-40	957.82	286.20	139.48	149.47	130.00	133.57	119.10*
%	(100)	(29.88)	(14.56)	(15.60)	(13.57)	(13.94)	(12.43)
W40-45	401.26	37.49	35.34	58.83	86.77	108.71	74.12*
%	(100)	(9.34)	(8.80)	(14.66)	(21.62)	(27.09)	(18.47)

Column Sample: Components

The coarsest fraction (>4.0mm) was hand sorted in the manner as described for Rainbow Cave. For the period of time in which the upper half of the sediment of the shelter was deposited (c. 2000 years) sandstone contributed less than 50% of the sediment. This estimate is by weight, and for the reasons previously stated is a very conservative estimate of the volumetric contribution of dry organic material. Some small amount of bone is also present. Identifiable components are presented in Table 8. Pieces of wood, most likely waste from firewood, occur in small fragments. No attempt has been made to quantify the wood fragments to taxa. Most of it does however appear to be the tough woody parts of Macrozamia leaf. Figure 11 gives a graphic account.

Table 8. Wanderer's Cave: column sample components, cumulative frequencies.

Sample Name	Macrozamia	Wood	Leaves	Bone	Stone	Other*	Unident.	Charcoal
W 0-5>4mm (Ø>-2.0)	19.76	3.28	1.78	.81	5.52	.25	.07	37.80
" "	(28.30)	(4.69)	(2.47)	(1.16)	(7.90)	(.35)	(.10)	(54.14)
W 5-10>4mm (Ø>-2.0)	12.52	.10	.21	*	5.87	*	.08	21.60
" "	(30.91)	(.24)	(.51)	*	(14.49)	*	(.19)	(53.33)
W 10-15>4mm (Ø>-2.0)	1.26	1.34	.01	*	4.76	*	.49	30.83
" "	(3.25)	(3.46)	(.02)	*	(12.30)	*	(1.26)	(79.68)
W 15-20>4mm (Ø>-2.0)	.64	.13	*	2.40	17.49	.10	1.07	32.63
" "	(1.17)	(.23)	*	(4.40)	(32.11)	(.18)	(1.96)	(59.91)
W 20-25>4mm (Ø>-2.0)	1.0	.60	*	4.37	86.75	*	*	35.41
" "	(.78)	(.46)	*	(3.41)	(67.70)	*	*	(27.63)
W 25-30>4mm (Ø>-2.0)	3.70	*	*	1.42	253.38	*	.36	134.08
" "	(.94)	*	*	(.36)	(64.48)	*	(.09)	(34.12)
W 30-35>4mm (Ø>-2.0)	.34	*	*	*	215.74	*	.10	59.25
" "	(.12)	*	*	*	(78.30)	*	(.03)	(21.50)
W 35-40>4mm (Ø>-2.0)	*	*	*	*	274.57	*	*	10.91
" "	*	*	*	*	(96.17)	*	*	(3.82)
W 40-45>4mm (Ø>-2.0	*	*	*	*	36.00	*	*	1.48
" "	*	*	*	*	(96.05)	*	*	(3.94)

* Other: 1 W 0-5 = Wallaby Scat; 1 W 10-15 includes seed; 1 W 15-20 includes insect.

Macrozamia is the most important of the components. The shelter's deposit, perhaps because of its confinement and limited space, appears nowhere to have clear constituent differentiation over its floor area.

Halfway through the deposit, preservation of all organic matter decreases. Well carbonized material suffers less than more easily oxidized unburned organic matter. Even though the coarse burned wood-rich fraction decreases markedly, the sediment retains its very dark colour. This could be a reflection of several processes: 1. that organic particles have been decomposed; 2. that coarser particles were never deposited during times in which the sedimentation occurred; 3. that coarser particles have migrated upwards; or 4. that finer particles have been percolating downwards. I can not precisely estimate the contribution of any or all of these, or state unequivocally that any one never operated. Very likely, there has occurred some vertical displacement of elements in the deposit, and over 4.3 thousand years some biological/chemical decomposition has also been a factor. Certainly the bone in the site is noticeably degraded in lower levels, even though the pH is not dramatically acidic until the lowest levels where bedrock-derived sediment is dominant. There, chemical decomposition or organic matter could account for the loss of organic particles altogether.

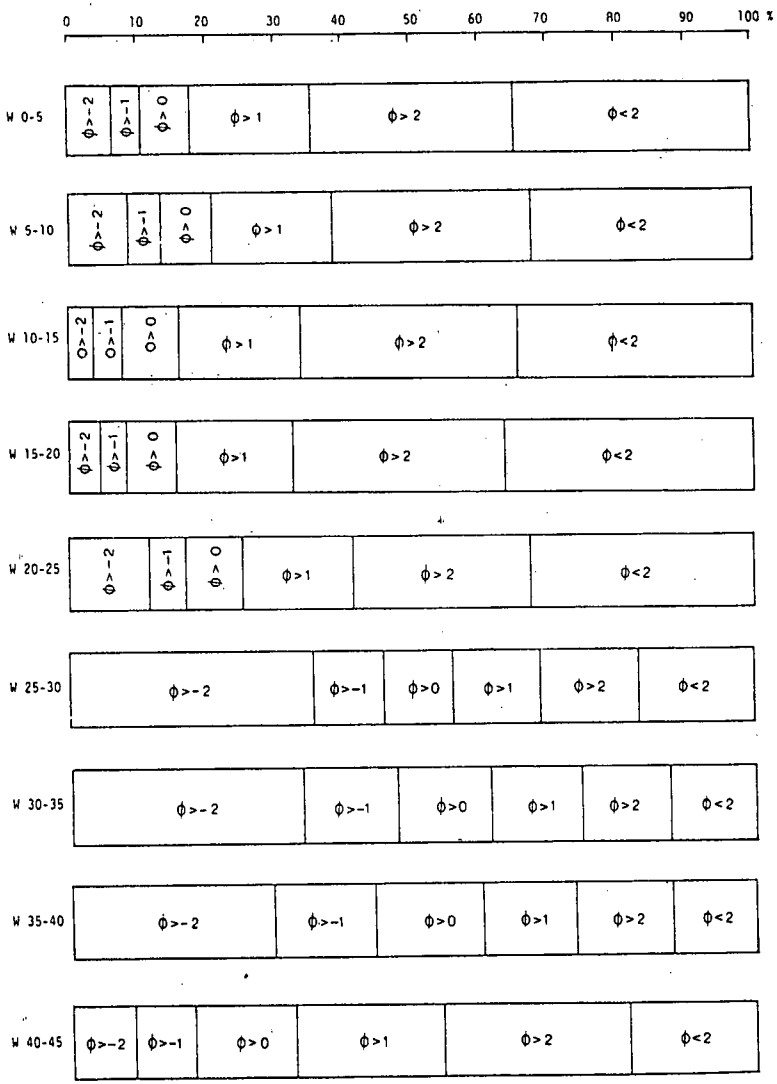


Figure 10. Wanderer's Cave Column Sample Particle Size Components.

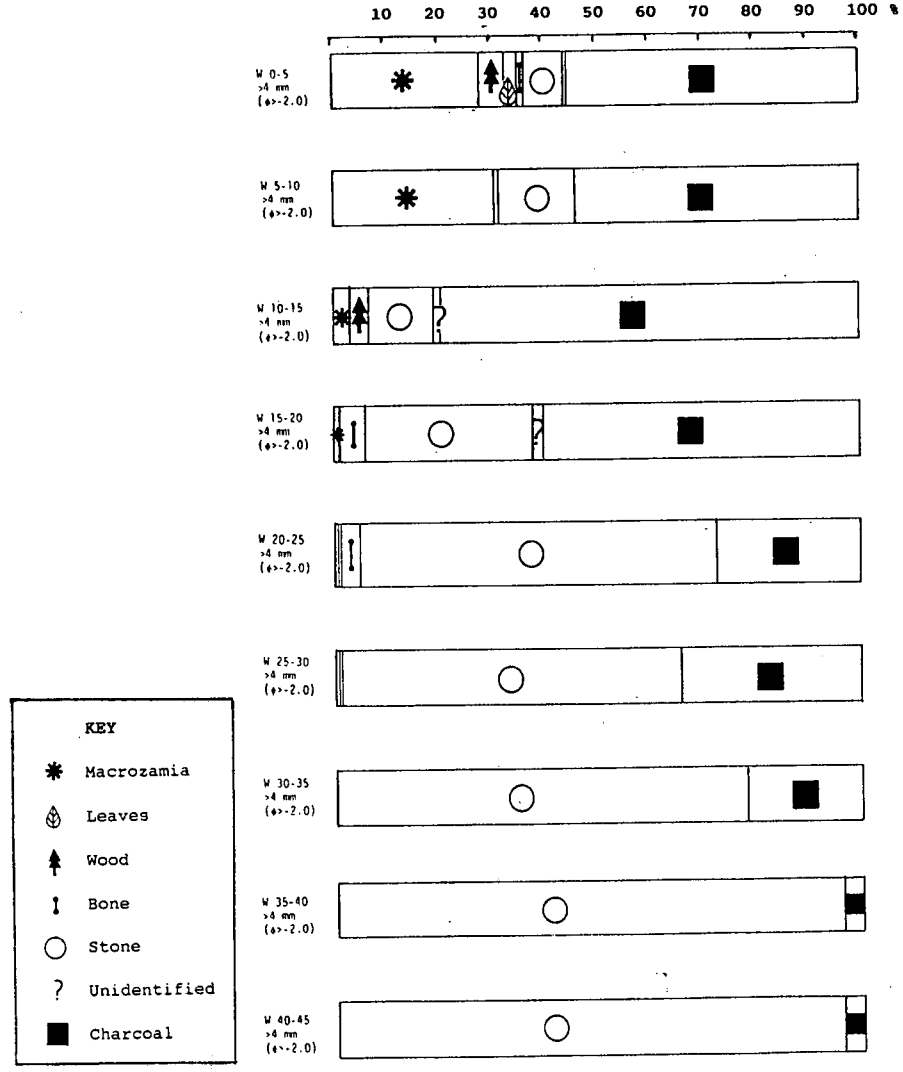


Figure 11. Wanderer's Cave Column Sample Components.

SUMMARY DISCUSSION

Excavations were carried out at two rockshelters in the Carnarvon Range. Earliest occupations date to 3600 years bp at Rainbow Cave and 4300 bp at Wanderer's Cave. Deposits in the two shelters are derived from ceiling exfoliation plus cultural material. The cultural material is made up of flaked stone tools, detritus from stone tool production, and several kinds of organic remains. Flaked stone tools in both sites were made up of a range of small retouched scrapers, but a few chisels and backed blades were found. The backed blades date to the earliest occupation of Rainbow Cave and to some time near the latest occupation of Wanderer's Cave, possibly less than 800 years ago. These results are in general agreement with the distribution of microliths in the Kenniff Cave and The Tombs sequences (Mulvaney and Joyce 1965), and in the uplands excavations of Morwood (1979) who links this pattern (1981:44) to wider patterns of stone tool change in the middle Holocene of Australia. Stone tools were manufactured at both Rainbow Cave and Wanderer's Cave, but they comprise only a small part of the cultural material. Local marsupial fauna was represented in both deposits but only in small quantities. The most abundant of the organic remains in both sites were burned wood and the burned and unburned remains of Macrozamia seeds. These were found throughout both deposits and in amounts which suggest that they were the most important resources used at the sites.

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NB.1. The Rainbow Cave Collection is housed in the Queensland Museum. The accession prefix is S-41-.

NB.2 The Wanderer's Cave collection is housed in the Queensland Museum. The accession prefix is S-42-.

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