5 GLEN EDITH

From Putarti spring an Aboriginal walking route crossed the floodout of Deering creek and led to Welkna rockhole at the northern end of the Glen Edith Hills. From there the track followed the low sandstone hills to the southeast first to Pira rockhole and then to the important waterhole, known as Tjungkupu (cf. Hansen and Hansen 1977:147 tjungkupunya; Kimber 1981:12 Tunka-pungia), at the southern end of the range. Ernest Giles discovered the waterhole here in 1872 and wrote,

> This little spot is indeed an oasis. I had climbed high hills, traversed untold miles of scrub, and gone in all directions to try and pick up the channel of a wretched dry creek, when all of a sudden I stumbled upon a perfect little paradise. (1889:76)

He named the waterhole, Tarn of Auber, and it is under this name that it has entered the historical record. It became an important staging point for subsequent expeditions and was visited by Gosse in 1873, Tietkens in 1889 and the Horn expedition in 1894.

TJUNGKUPU

Tjungkupu now falls within the eastern part of an estate that centres on Murantji. This may be a recent extension of this estate as the behaviour of the putative owners is noticeably circumspect on visits to the tarn. In addition, at least one account of traditional land tenure places Tjungkupu at the common boundary of four estates (see Bagshaw 1983).

Despite these doubts as to the precise status of Tjungkupu in the settlement pattern it is clear that it was an important focal point for use of the surrounding country. Certainly Giles in 1872 commented on the frequency of Aboriginal fires in the area.

> ...the natives were about, burning, burning, ever burning; one would think they were of the fabled salamander race, and lived on fire instead of water. (1889:81)

Although the waterhole at Tjungkupu is not permanent some water is always available from a small soakage at its base.

THE ARCHAEOLOGICAL SITES

The archaeological remains at Tjungkupu provide an opportunity to examine changes in site use in two adjacent sites - one a rockshelter, the other an open campsite. As Tjungkupu is clearly the key to occupation of the surrounding country the pattern of occupation at these sites can be expected to reflect changes in use of the surrounding region.

The tarn is formed in a slot about 3 m wide where a small creek cuts through a sandstone ridge. Under the northern edge of this ridge, stretching for about 300 m are a series of rockshelters with paintings and occupation deposit. Immediately south of the ridge is a small grassy flat also with signs of occupation - consisting of 15-20 millstones, chipped stone artefacts and a grey charcoal-rich soil. This flat is 100 m across and is circumscribed on its eastern and southern sides by other rock outcrops and on its western side by scrub.

The immediate area contains several different plant communities. On the sandstone ridges and outcrops there are native figs (*Ficus platypoda*) and cypress pine (*Callitris columellaris*).

The steeply sloping rock surfaces direct runnoff onto the grassy flat south of the tarn which consequently supports a dense stand of perennial tussock grasses, mainly *Eragrostis eriopoda* - an important seedfood species - and *Aristida inaequiglumis*. Ghost gums (*Eucalyptus papuana*) grow at the junction of the rock sheet and sandy flat and along the creek. Away from the Glen Edith hills the country is spinifex sandplain with parallel dunes and extensive groves of desert oak (*Casuarina decaisneana*).

Rock engravings are possibly the oldest evidence of occupation around the tarn. They can be found on the rock surfaces near the tarn and also in a shelter on the southern edge of the flat. In both cases bird tracks - predominantly emu - and circles are the main motifs. There are clear differences in patination on some panels suggesting an accumulation of art of different ages. The rock surfaces near the tarn also contain smoothly ground patches where seeds have been ground. There are about are about 10-12 of these grinding surfaces. Some are well-defined elongate milling grooves, others are less well worn. In a few cases they are superimposed on engravings almost obliterating the designs. In all cases they are less well patinated than the engravings suggesting that they are more recent in age.

The paintings in the rock shelters include hand stencils, hand prints, tracks and non-figurative motifs, and several polychrome snake motifs. A wide range of colours have been used - red, yellow, purple, white, and black - and the main panels appear to have been over-painted several times.

EXCAVATION OF TJUNGKUPU 1

Tjungkupu 1 is the largest of the rockshelters on the northern side of the ridge (figs. 5.1 and 5.2) and is 30 m east of the waterhole. Its sandy floor is littered with slabs of rock, grindstones, palettes and millstones.

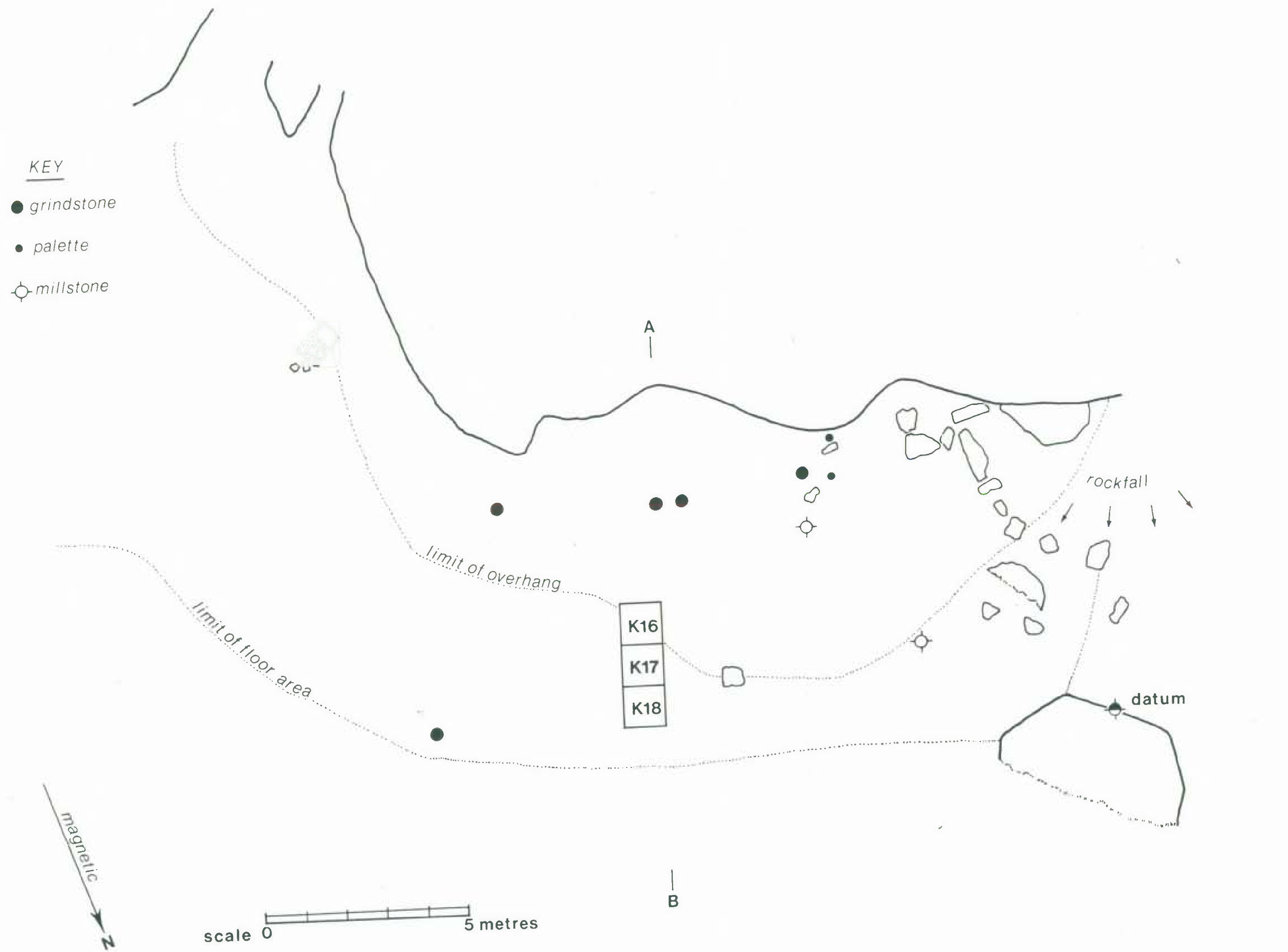
In this rockshelter I excavated three 1 m^2 pits - designated K16-K18 on a nominal site grid. The first of these was laid out on the dripline and reached a depth of 110 cm before its progress was stopped by an increasingly restricted working area. I then extended the trench towards the rear of the shelter by opening pit K16 but this pit came down upon several large rock slabs at 35-66 cm which stopped further excavation. The subsequent excavation of pit K18 allowed both K18 and K17 to be excavated to bedrock at 150 and 139 cm respectively.

I found it necessary to take special precautions to avoid cross-contamination of radiocarbon samples during excavation as the upper part of the deposit was loose and charcoal rich and a strong southeasterly wind blew throughout the excavation. Accordingly I laid tarpaulins on the ground on the windward side of the excavation to control the dust and used a water-spray to moisten and hence stabilise the loose sand around the excavation.

Stratigraphy and chronology.

The deposits at Tjungkupu 1 consist of two layers (fig. 5.3). Layer I is a loosely compacted fine black charcoal-rich sand (Munsell 7.5 YR 2/2, pH 4.0), 40-60 cm thick, which contains the bulk of the occupation debris. The top 10 cm of this layer are lighter in colour (Munsell 10 YR 3/3) and looser than the rest.

Overleaf **Figure 5.1 :** Tjungkupu 1 rockshelter. View looking west, towards the waterhole, May 1985. **Figure 5.2 :** Plan of the shelter showing the location of excavated pits and the distribution of large grindstones and millstones.


KEY
grindstone
palette
millstone
A
rockfall
limit of overhang
K16
K17
K18
datum
limit of floor area
magnetic
N
B
scale 0
5 metres

Layer I has a distinct colour and texture boundary with layer II. The latter consists of subangular sandstone rubble and large rocks in a matrix of fine light brown sand (Munsell 5YR 5/6, pH 4.0). The rubble in this layer becomes more rounded, smaller and more consolidated with depth. The fine sediment matrix in both layers appears identical and consists of approximately 80% fine to very fine sand and 5% silt/clay. There is no evidence to suggest a significant disconformity between the two layers. The deepest of the pits, K17, reached bedrock at a maximum depth of 150 cm.

Table 5.1 illustrates the marked difference in the composition of layer I and II.

Several minor stratigraphic features warrant mention. The first is a thin layer of fine light brown sand, up to 5 mm thick, which covered the surface of the site when I first visited it. This layer built up around and over artefacts sitting on the surface of layer I and probably represents sediment accumulated after occupation of the shelter ceased - around 1920-30. It is interesting to note that our daily activities around the excavation were sufficient to mix this thin sterile layer into the underlying deposit. The second feature is a hearth or oven pit dug into layer I from a level 6 cm below the surface. This feature was not recognised during excavation because the loose sandy nature of the sediment at this point made it difficult to maintain a clean level working surface. It is clearly visible in the section as a pit, 40 cm across by 16 cm deep, infilled with large pieces of charcoal and light brown sand. The relatively high values for charcoal in K16/1 and K16/2 shown in table 5.1 reflect the presence of this feature.

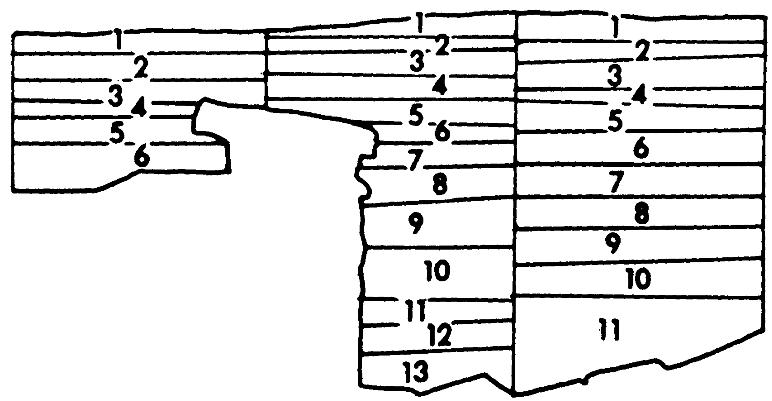
Three radiocarbon samples were submitted from this site (table 5.2). All consist of charcoal pieces recovered from the respective excavation units by flotation.

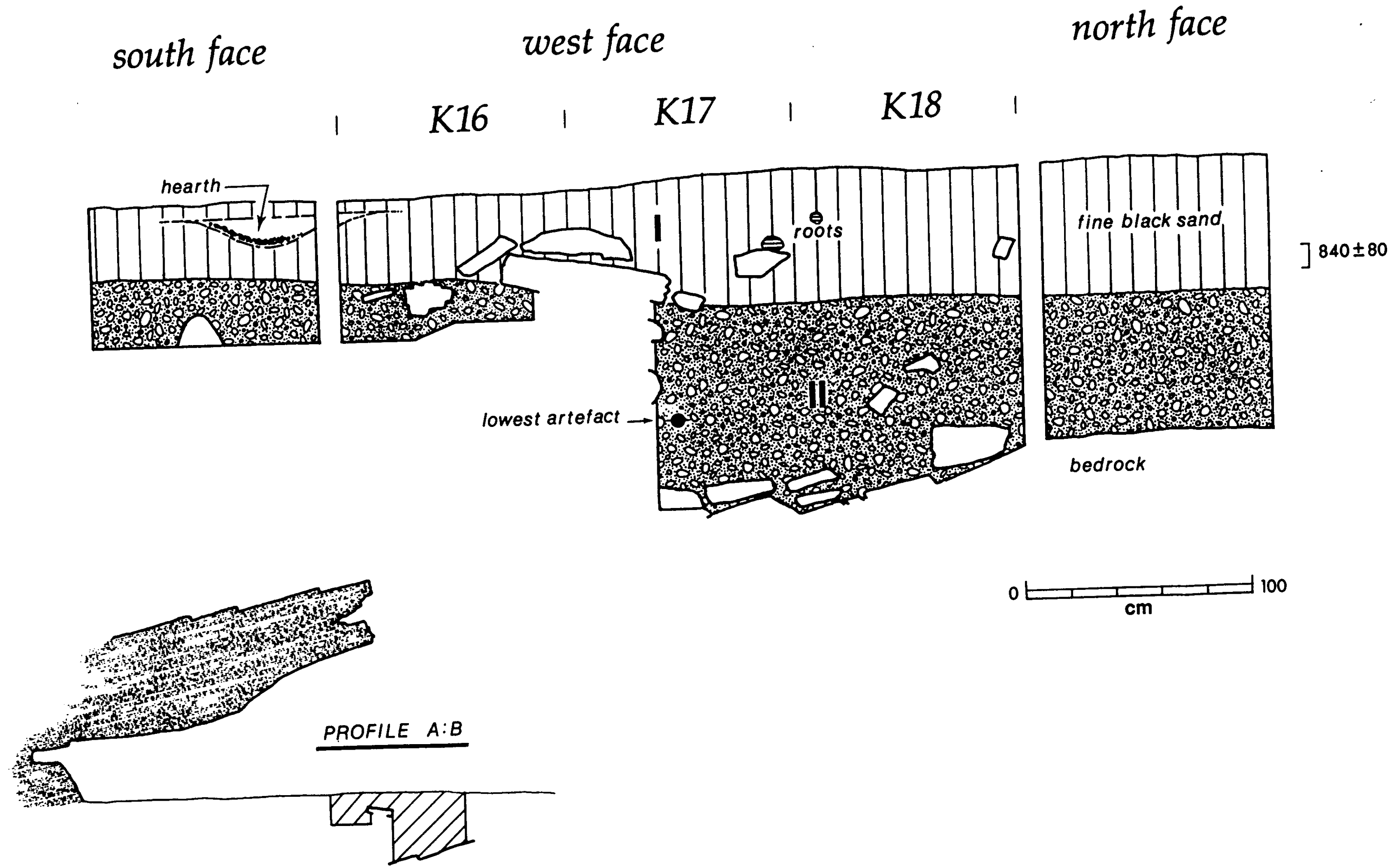
Beta 16303 from K17/6 in the lower part of layer I implies a rate of sediment accumulation of about 51mm/100yr. By extrapolation I estimate that layer I began accumulating about 1040 yrs BP.

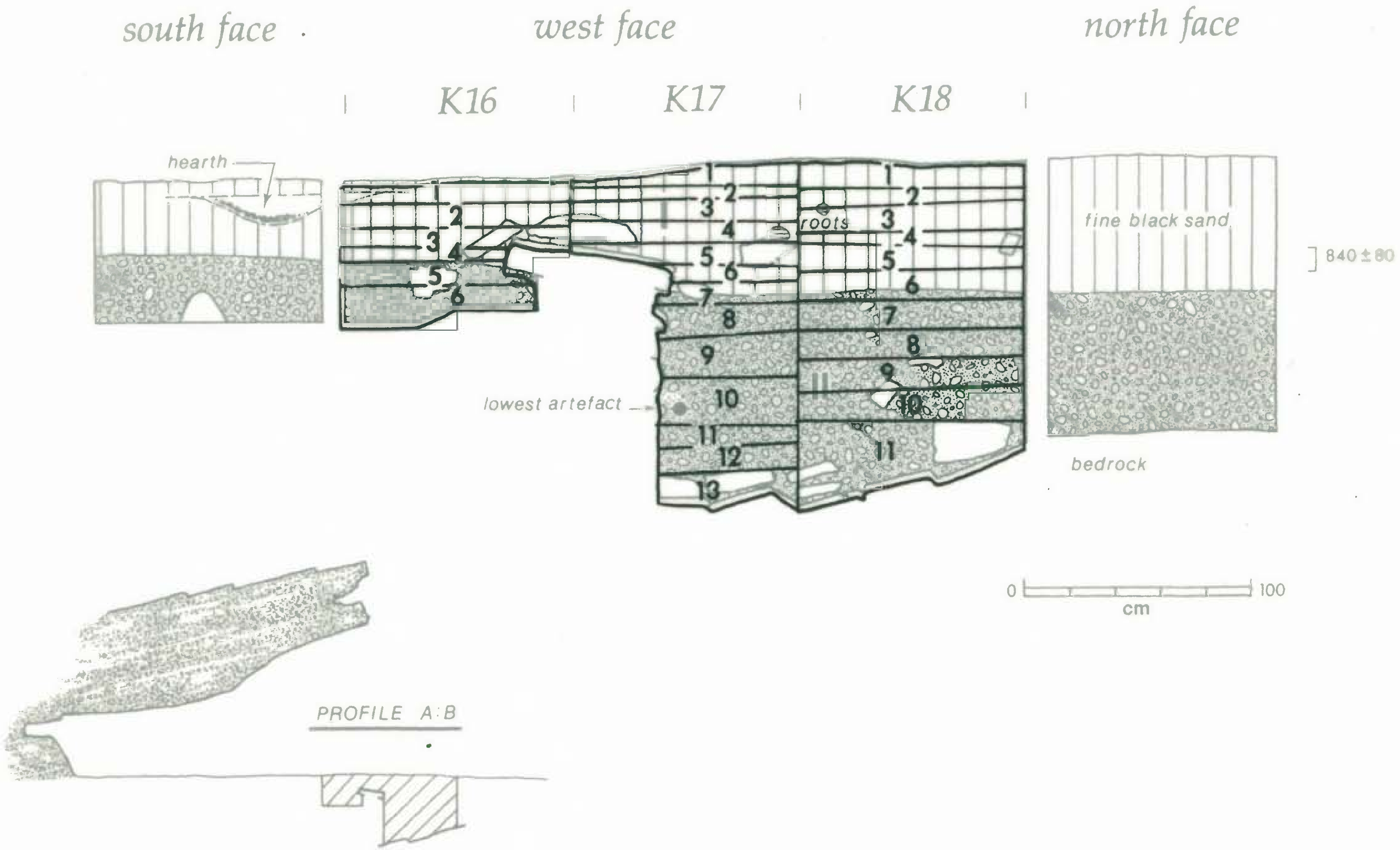
Layer II produced only very small amounts of charcoal and both of the samples submitted from this layer gave anomalously modern results - see table 5.2. It appears that, despite my precautions, the small amount of charcoal in this layer has been diluted by younger windblown material during excavation.

If one were to directly extrapolate from Beta 16303 the basal age of the site would be about 2940 yrs BP. However as layer II probably accumulated more slowly than layer I, I take this to be a minimum estimate of its antiquity. If one assumes that the proportion of rubble in the deposit is a product of variations in the supply of fine sediment we can calculate that layer I accumulated at approximately 2.4 times as fast as layer II. This gives a deposition rate of 21mm/100yr for layer II and a basal age of roughly 5470 yrs BP. While these calculations are speculative the inverse relationship between proportion of rubble and overall rate of deposition holds true for other sites such as Therreyererte (see chapter 9). The rate of accumulation of the rubble layer at Therreyererte, 23mm/100yr, also matches my estimate here.

Overleaf **Figure 5.3 :** Section drawings showing the stratigraphy in the three pits, Tjungkupu 1. the overlay shows the disposition of excavation units.




south face
west face
north face
K16
K17
K18
hearth
roots
fine black sand
840±80
I
II
lowest artefact
bedrock
0
100
cm
PROFILE A:B



south face
west face
north face
K16
K17
K18
hearth
roots
fine black sand
840 ± 80
bedrock
lowest artefact
0
100
cm
PROFILE A:B

Table 5.1 : Composition of the deposits. The terms rocks and rubble are defined in chapter 3. Depths are in cm below site datum.

unit	mean depth cm.	sediment gross wt kg.	rocks no.	rocks wt. g.	charcoal wt. g.	charcoal wt. g/10kg sediment	rubble wt. kg.	rubble %
K16:layer I								
1	68	114.5			3004.2	262.4	8.10	7.1
2	76	107.5			1878.7	174.8	5.60	5.2
3	85	85.2	19	2.6	264.8	31.1	4.60	5.4
4	94	138.4	46	58.3	108.1	7.8	7.60	5.5
5	105	129.0	71	50.6	61.1	4.7	12.60	9.8
K16:layer II								
6	119	155.7	169	82.4	12.6	0.8	18.70	12.0
K17:layer I								
1	64	64.7	3	0.1	579.5	89.6	5.05	7.8
2	70	82.8	4	0.5	933.4	112.7	5.18	6.3
3	77	71.6	3	2.6	675.6	94.5	3.85	5.4
4	86	85.3	40	11.4	267.1	31.3	3.51	4.1
5	95	103.8	74	17.6	76.1	7.3	7.56	7.3
6	104	87.2	107	22.3	8.8	1.0	4.82	5.5
7	113	113.8	86	53.5	4.0	0.4	9.37	8.2
K17:layer II								
8	124	136.4	157	58.7	1.6	0.1	17.70	13.0
9	140	143.5	226	69.8	0.9	0.1	18.70	13.0
10	159	173.8	330	90.9	1.1	0.1	27.30	15.7
11	175	159.0	394	88.7	1.4	0.1	22.80	14.3
12	185	149.9	376	80.7	0.2	-	25.70	17.1
13	199	124.4	378	64.6	0.3	-	24.30	19.5
K18:layer I								
1	66	149.1			296.5	19.9	11.10	7.4
2	75	113.0			541.1	47.9	8.10	7.2
3	84	99.4			646.5	65.0	7.60	7.6
4	92	79.6	36	8.6	223.5	28.1	5.10	6.4
5	101	134.9	95	43.4	37.9	2.8	11.20	8.3
6	113	142.4	146	73.2	6.4	0.4	11.70	8.2
K18:layer II								
7	125	114.3	219	65.1	1.3	0.1	29.80	26.1
8	139	176.7	338	101.9	1.1	0.1	25.30	14.3
9	152	161.6	360	95.8	1.0	0.1	24.30	15.0
10	165	165.0	430	83.7	0.3	-	30.30	18.4
11	182	175.9	385	90.3	0.4	-	36.90	21.0

Table 5.2 : Radiocarbon dates from Tjungkupu 1. Depths are cm below datum. Figures in brackets give depths below surface.

unit	depth cm.	lab. no.	yrs. BP.
layer I			
K17/6	100-109 (38-47)	Beta 16303	840+/-80
layer II			
K16/6	111-127 (47-63)	Beta 19821	230+/-60
K17/11	171-179 (110-118)	Beta 16304	330+/-80

Table 5.3 : Comparative density of chipped stone artefacts in layers I and II.

layer	volume m^3	no. artefacts.	estimated no./m^3
I	1.61	5624	3,493
II	1.78	14	8
Total	3.39	5638	1,663

Charcoal.

The very small amounts of charcoal recovered from layer II may be material blown in during excavation. Even if one discounts the possibility that all of the charcoal from layer II is intrusive it is obvious that most of the charcoal is concentrated in layer I. This layer has over 150 times the density of charcoal as layer II. The strong correlation with the distribution of artefacts and bone suggests that much of this charcoal derives from human use of the shelter.

Chipped stone artefacts.

density

The distribution of chipped stone artefacts is shown in tables 5.3 and 5.4 and in figure 5.4. The concentration of artefacts in layer I and the paucity of material in layer II is striking. Only 14 artefacts were recovered from layer II compared with 5624 from layer I. The lowest artefacts are from K17/11 at mean depth of 114 cm below the surface.

raw material

Fine-grained silcrete is the dominant raw material in this assemblage. Chert and chalcedony are present, in approximately equal proportions, and there are also small amounts of local poorly-silicified sandstone.

Silcrete is widely available in the region although the nearest outcrop to Tjungkupu is not known. The sources of the chert and chalcedony are not known at this stage, although these raw materials are potentially available in the Inindia beds, between Watsons range and Lake Amadeus.

A quantitative analysis of raw material has not been attempted. However silcrete appears to be the most frequently used material throughout the deposit. Small amounts of chalcedony are present in layer II but chert is restricted to layer I. Poorly-silicified sandstone is present in small amounts throughout the assemblage.

size

Table 5.4 shows the mean weight of chipped stone artefacts in each excavation unit. Overall these values are low, less than 5 g, reflecting the presence of large amounts of fine debitage. The values for mean weight are consistent throughout the deposit except for the top part of layer II. Although mean weight is much higher here this appears to be fortuitous as the numbers of artefacts are low and the mean weight has been skewed by individual large artefacts. In K16/6 it reflects the presence of a single core, in K17/8 the presence of a large flake of coarse quartzite and in K18/7 a pebble with one flake removed. In any case it is also worth noting that a corollary of more intensive site use is likely to be an increase in size-sorting and secondary disposal of occupation debris (see chapter 3). Therefore I see no reason for attributing any technological significance to this trend at Tjungkupu 1.

manufacture

Seventeen cores were excavated, only one of these from layer II. These have been reduced either as single or multiple-platform cores or as bifacial cores. The single core from layer II has

Table 5.4 : The distribution of chipped stone artefacts, grindstones and ochre. (6mm sieve fraction).

unit	mean depth cm.	chipped stone artefacts				grindstones		ochre
		no.	wt. g.	wt. g/kg sediment	mean wt. g	no.	wt. g.	wt.g.
K16:layer I								
1	68	522	481.6	4.2	0.9	2	341.5	15.6
2	76	662	381.8	3.6	0.6	4	245.5	0.6
3	85	373	446.7	5.2	1.2	1	126.3	2.5
4	94	229	292.2	2.1	1.3	1	66.1	
5	105	82	431.5	3.3	5.3			
K16:layer II								
6	119	2	106.6	0.7	53.2			
K17:layer I								
1	64	266	294.3	4.5	1.1	4	315.2	
2	70	246	246.1	2.3	1.0	3	26.1	
3	77	291	230.3	3.2	0.8			
4	86	241	619.4	7.3	2.6	1	311.4	9.9
5	95	210	777.3	7.5	3.7			
6	104	88	152.8	1.8	1.7			
7	113	67	151.1	1.3	2.3	1	865.2	
K17:layer II								
8	124	3	68.5	0.5	22.8	1	181.3	
9	140	1	7.6	0.1	7.6			
10	159							
11	175	2	5.9	-	3.0			
12	185							
13	199							
K18:layer I								
1	66	800	1011.3	6.8	1.3	9	1188.9	11.8
2	75	656	671.4	5.9	1.0	3	170.3	0.8
3	84	410	889.1	8.9	2.2	6	164.4	20.2
4	92	186	345.1	4.3	1.9			
5	101	235	538.1	4.0	2.3	2	18.1	
6	113	60	136.8	1.0	2.3			
K18:layer II								
7	125	3	67.6	0.6	22.5			
8	139	3	4.0	-	1.3			
9	152							
10	165							
11	182							

been reduced as a bifacial core. The cores range in weight from 7.8 g. to 291.4 g. Only two, from K17/4 and K18/3, appear to have been discarded when exhausted.

The sample of artefacts from layer II is too small to establish whether there are any differences in flaking techniques between the two layers. However, K16/6-1 - from layer II - is identical to the bifacial cores in the overlying layer. Its provenance in layer II is certain as it was found well within the rubble sealed under larger rocks. Also securely from layer II is a long pointed flake with a narrow striking platform and a dorsal ridge defined by two prior flake scars (K17/8-1). Its presence suggests careful core preparation and good control of knapping.

The distribution of cores across the site shows a tendency to discard these artefacts outside the dripline. Pit K18 produced 10 cores compared with 5 from K17 and 2 from K16.

typology

Tables 5.5 and 5.6 show the distribution of cores, redirecting flakes and retouched artefacts. The assemblage is characteristic of recent Central Australian industries, with backed blades and tula adzes as the main formal artefacts. However it lacks the endscrapers and use-polished flakes that are distinctive elements at sites such as Intirtekwerle (see chapter 7).

backed blades: The 14 backed blades in this assemblage are concentrated in the levels with the highest numbers of artefacts.

Overleaf **Figure 5.4 :** Tjungkupu 1, Pits K16-18. Graphs showing the distribution of chipped stone artefacts and bone, in g. per kg. of sediment; and of charcoal expressed in g. per 10kg. of sediment. Depths are in cm below zero site datum.

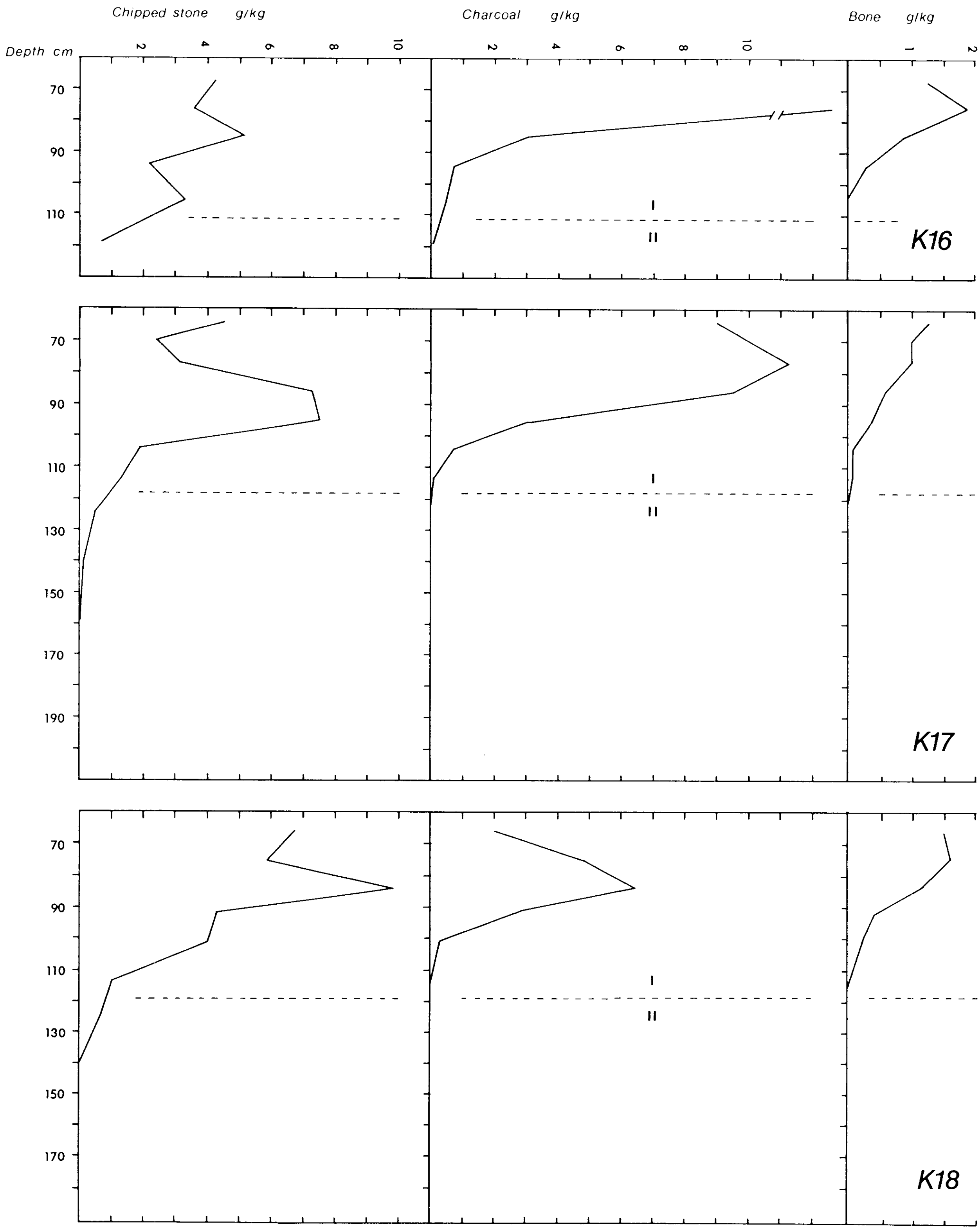

Chipped stone g/kg
Charcoal g/kg
Bone g/kg
Depth cm
2 4 6 8 10
2 4 6 8 10
1 2
70 90 110 130 150 170 190
I
II
K16
K17
K18

Table 5.5 : The distribution of retouched artefacts, cores and redirecting flakes by excavation unit.

unit	backed blades	tula adzes	amorphous retouched	cores	redirecting flakes
K16:layer I					
1	2	1	8		
2	2	3	4		
3	1		2		
4		1	3		
5	1		2	1	
K16:layer II					
6				1	
K17:layer I					
1	1	1	4		
2		2	7		
3	1	2	6		
4		1	2	3	
5	1		7	2	
6			2		
7			1		
K18:layer I					
1	1	4	5	2	1
2	1	2	7	2	
3	1	3	5	3	
4				3	1
5	2		4		1
6					

Table 5.6 : Distribution of retouched artefacts, cores and redirecting flakes by layer. All pits.

layer	backed blades	tula adzes	amorphous retouched	cores	redirecting flakes
I	14	20	68	16	3
II	-	-	1	1	-

They are restricted to layer I and are most common in the top 25 cm of that layer. Six specimens are broken, five transversely snapped as one might expect during manufacture and one longitudinally snapped, perhaps during use. All but two of the backed blades in this assemblage are fully backed. The lowest of the backed blades are from K18/5 at a depth of 41 cm (101 cm below datum).

tula adzes: The 20 specimens are all from layer I, 19 from the top 25 cm of the layer. All are made on chert (11) or chalcedony (9), showing the strong preference for high grade stone that is characteristic of these artefacts. All but one have been worn down to the slug form.

Grindstones.

The excavation produced 38 fragments of grindstone of which six are identifiable as pieces of seedgrinding implements (see tables 5.4, 5.7 and 5.8). All of the seedgrinding implements are from layer I.

The best examples of seedgrinding implements include, K18/1-1 a millstone fragment preserving part of a milling groove, K17/1-1 a muller, and K16/2-1 a small flake from the edge of a muller preserving parts of both ground facets. Only one grindstone, K17/8-2 an amorphous grindstone, was recovered from layer II.

Table 5.4 shows that grindstones, like other large artefacts such as cores, are discarded outside the dripline. Of the grindstones 8 are from K16, 10 from K17 and 20 from K18.

Ground-edge artefacts.

K18/3 produced the sole axe fragment in this assemblage. This is a basalt flake, weighing 5.2 g, with flake scars on its dorsal surface. A smooth ground surface extends across half of this face, with grinding also extending to the tops of the ridges between flake scars.

Ochre.

Small pieces of red and yellow ochre are present in the top 25 cm of layer I. The distribution of ochre is given in table 5.4.

Seeds.

Part of a quondong nut (Santalum acuminatum) was found in K16/3. These nuts were noticed on the surface of the site in places and it is likely that the great mass of charcoal from layer I contains other archaeological specimens.

Egg-shell.

Small pieces of egg-shell are present throughout the top 25 cm of layer I (see table 5.9). Some of this shell is burnt but where it is identifiable its distinctive texture indicates that it is emu egg-shell (Dromaius novaehollandiae).

Bone.

density

Table 5.9 shows that bone is present only in layer I with peak densities in the top 25 cm. The bone is mainly comprised of fragments, less than 20 mm long, of hard compact bone. Some pieces are obviously charred or calcined but the bulk of the bone is more

Table 5.7 : Typology of excavated grindstones. Distribution by excavation unit.

unit	seedgrinders: millstone	seedgrinders: faceted muller	amorphous artefact	undiagnostic fragment	total
K16:layer I					
1		1		1	2
2		1		3	4
3			1		1
4				1	1
5					-
K17:layer I					
1		1		3	4
2				3	3
3					-
4		1			1
5					-
6					-
7			1		1
K17:layer II					
8			1		1
K18:layer I					
1	1		1	7	9
2				3	3
3		1		5	6
4					-
5				2	2
6					

Table 5.8 : The distribution of grindstones by layer. All pits.

layer	seedgrinders	amorphous grindstones	undiagnostic fragments
I	6	3	28
II	-	1	-

Table 5.9 : Distribution of bone and egg-shell in Pits K16-18 (6mm sieve fraction only).

unit	mean depth cm.	bone wt. g.	bone wt. g/kg sediment	eggshell wt. g.
K16:layer I				
1	68	153.5	1.3	2.1
2	76	199.0	1.9	1.8
3	85	76.1	0.9	0.8
4	94	36.2	0.3	
5	105	4.3	-	
K17:layer I				
1	64	83.7	1.3	1.2
2	70	85.8	1.0	1.2
3	77	73.4	1.0	
4	86	50.5	0.6	
5	95	36.5	0.4	
6	104	10.5	0.1	
7	113	9.7	0.1	
K18:layer I				
1	66	218.1	1.5	0.7
2	75	182.7	1.6	0.1
3	84	111.3	1.1	
4	92	34.9	0.4	
5	101	29.4	0.2	
6	113	4.1	-	

like the roasted or baked bone described by Webster (1982:144). The 3mm sieve fraction from layer I contains large amounts of finely fragmented bone but as I have not sorted this from the debitage and sandstone grit no figures are given.

species identification

I have made no attempt at species identification or counts or minimum numbers of individuals. However almost all identifiable fragments in the 6mm fraction are macropod teeth. Of the 54 pieces of tooth, 53 are from medium or large animals such as *Macropus rufus* or *M. robustus* and one from a small macropod.

The 3mm fraction probably contains many identifiable parts of smaller animals. For instance, a check of the 3mm sieve fraction from K18/3 produced a further 23 teeth from small macropods. More surprising however was the absence of the remains of other small animals such as the teeth from bandicoots or rodents, the dentaries of lizards and the distinctive vertebrae of reptiles. While many of these skeletal elements are small enough to pass through 3mm mesh I would have expected that the vertebrae of medium-sized reptiles, such as *Varanus gouldii*, the dentaries of larger reptiles such as *Varanus giganteus*, and the bones of ground birds such as the bustard (*Ardeotis australis*) would be recovered if present.

EXCAVATION OF TJUNGKUPU 2

Tjungkupu 2 consists of the occupation on the sandy flat south of the ridge. Here a dark grey archaeological soil can be traced across the flat with an auger.

On the part of the flat that lies to the east of the creek I established a nominal grid of 2 m squares. One of these, designated J50, was chosen for excavation. Its position - measured from the northeast corner of the pit - is approximately 19 m east of the creek and 20 m south of the edge of the ridge. Zero datum for this excavation is a distinctive emu-track engraving in a shelter on the southern edge of the flat.

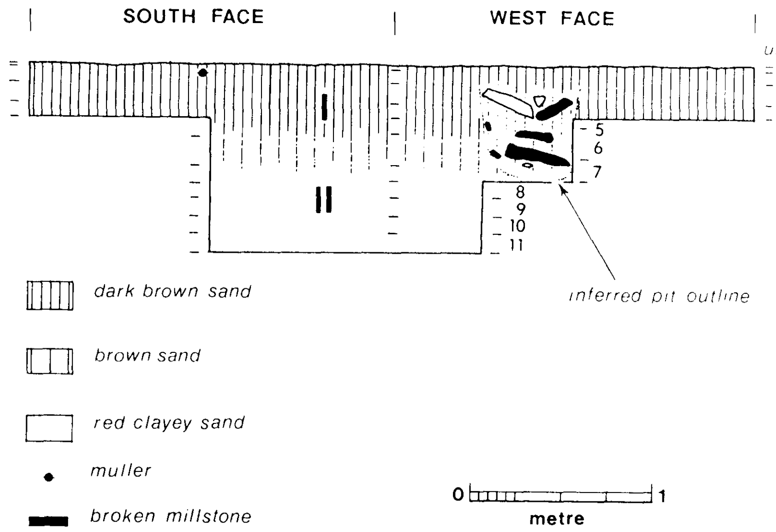
Pit J50 began as a 2 m^2 pit but was reduced to a 1 m^2 pit after 30 cm. The maximum depth reached was 1.05 m.

Stratigraphy and chronology.

The deposits at Tjungkupu 2 (see fig. 5.5) consist of fine compact aeolian sand. The surface layer is a thin band, 10-20 mm thick, of loose red sand. This has an abrupt boundary with the underlying dark brown/grey compact sand (Munsell 5 YR 3/2, pH 4.0). This in turn grades to a brown compact sand (Munsell 5 YR 4/6, pH 4.0) and then to a hard red clayey sand (Munsell 2.5 YR 4/8, pH 4.0). Throughout the deposit there are small numbers of sandstone fragments but there is no discrete rubble stratum as in the shelter. From the nearby creek section I estimate that the sandsheet here is from 2 to 3 m deep.

Table 5.10 illustrates the trends in composition of this deposit. The marked changes in colour are clearly the result of the proportion of charcoal in the deposit. For the purposes of analysis I have grouped units 1-6 together as layer I and units 7-11 as layer II.

Overleaf **Figure 5.5 :** Section drawing showing the stratigraphy in Pit J50, Tjungkupu 2.


SOUTH FACE
WEST FACE
unit
1
2
3
4
5
6
7
8
9
10
11
I
II
inferred pit outline
dark brown sand
brown sand
red clayey sand
muller
broken millstone
0
1
metre

One other stratigraphic feature which lay on the western edge of J50 deserves mention. In J50/3 the excavation first encountered a pile of rocks, including several pieces of a single broken millstone. This continued through to J50/7 where an apparently complete millstone lay face down. Small pieces of very fragmented bone could be seen underneath this artefact. Although no pit outline was visible in the section it was clear from the angle of the slabs that they must have been tipped into a pit. It seems likely therefore that my excavation clipped one end of a shallow pit - possibly a women's grave. However I did not investigate the feature sufficiently to establish this beyond doubt. The relevant Aboriginal people could not be easily contacted to ascertain whether the excavation of this feature could continue. Therefore I left all associated material in situ and ceased to excavate in the immediate area.

Beta-16305 on scattered charcoal from unit 6 (32-49 cm) gave a date of 940+/-70 yrs BP. This suggests that the dark brown sand began to accumulate at about the same time as layer I in the shelter. The rate of accumulation on the open site, 44mm/100yr, is slower than that in the shelter. Using this estimate the base of the excavation in J50 dates to about 2390 yrs BP and the basal age of the sandsheet would be roughly 4500-5000 yrs BP.

The 6 mm sieve fraction.

<u>stone artefacts</u>

The density of chipped stone artefacts shows no clear concentration when calculated as g. per kg. of sediment (see table 5.11). However, the density of artefacts in layer II is far more variable than in layer I. If the density is calculated as no. per

Table 5.10 : Composition of the deposits at Tjungkupu 2. (6mm sieve fraction only). Depths are in cm below ground level.

unit	mean depth cm.	sediment gross wt kg.	charcoal total wt g.	charcoal wt g/100kg. sediment	bone wt. g.	bone wt. g/100kg sediment
1	2	78.1	5.0	6.4	1.2	1.5
2	7	551.6	50.3	9.1	14.5	2.6
3	18	839.9	37.0	4.4	14.5	1.7
4	28	336.9	17.5	5.2	6.8	2.0
5	31	176.8	8.0	4.5	1.7	1.0
6	41	103.8	4.6	4.4	0.5	0.5
7	56	166.2	3.8	2.3	0.1	0.1
8	67	104.3	0.1	0.1	0.1	0.1
9	77	144.1	0.1	0.1		
10	87	105.3	0.1	0.1		
11	97	140.5	0.1	0.1		

Table 5.11 : The distribution of chipped stone artefacts and grindstones in TKP2 Pit J50 (6mm sieve fraction only). Depths are in cm below ground level.

unit	mean depth cm.	chipped stone artefacts no.	wt. g.	wt. g/10kg. sediment	mean wt g.	no/10kg sediment	grindstones no.	wt. g.
1	2	40	45.8	5.9	1.1	5.1	2	5.9
2	7	203	151.5	2.7	0.7	3.7	2	85.8
3	18	184	179.1	2.1	1.0	2.2	4	224.4
4	28	102	83.9	2.5	0.8	3.0	2	31.3
5	31	38	42.1	2.4	1.1	2.1	1	6.1
6	41	44	43.4	4.2	1.0	4.2		
7	56	54	95.0	5.7	1.8	3.2	1	345.8
8	67	3	0.8	0.1	0.3	0.3		
9	77	4	3.9	0.3	1.0	0.3		
10	87	15	37.2	3.5	2.5	1.4		
11	97	28	74.7	5.3	2.7	2.0	1	1399.7

m^3 layer I has about double the overall concentration of artefacts as the underlying layer (see table 5.12).

Fine grained silcrete is the dominant raw material throughout with appreciable amounts of chert and chalcedony only present in units 1-4. The assemblage is too small to usefully comment on flaking techniques except to note that two single platform cores were recovered - one from each layer.

Table 5.13 shows the distribution of retouched artefacts, cores and grindstones. The only specialised artefacts present are 2 tula adze slugs, both of chert and both from layer I. The majority of the grindstones are from layer I. Only 1 seedgrinding implement, a muller from J50/2, can be identified. A backed blade was found on the surface near the excavation.

bone

Table 5.10 shows the distribution of bone. The overall density is very low compared to the rockshelter. Despite this there is a clear concentration of bone in layer I. The only easily identifiable fragments are 11 macropod teeth, from medium sized animals, from units 2-4.

The 3 mm sieve fraction.

As the overall density of occupation debris on the open site is much lower than in the rockshelter it is necessary to look at the 3 mm sieve residue to pick up the change between layers I and II. This is particularly the case for chipped stone artefacts. Thus from table 5.14 it can be seen that the density of fine chipping debitage in layer I is about double that of layer II. Similarly the finely fragmented bone is concentrated in layer I.

Table 5.12 : The comparative density of chipped stone artefacts in layers I and II.

layer	no. artefacts.	volume.	no./m^3
I	611	1.39	440
II	104	0.54	193

Table 5.13 : The distribution by excavation unit of retouched artefacts, cores and grindstones.

unit	tula adze slugs	amorphous retouched artefacts	cores	mullers	amorphous grindstones	undiagnostic grindstone fragments
1		1				2
2	1	1		1		1
3		5	1			4
4	1	1				2
5						1
6						
7					1	
8						
9						
10		1				
11			1		1	
total	2	9	2	1	2	10

Table 5.14 : Composition of the 3 mm sieve fraction.

	sample		chipped stone debitage			bone		
unit	wt. g.	% of 3mm	wt. g.	estimated wt. g. in unit	wt. g/100kg. sediment	wt. g.	estimated wt. g in unit	wt. g/100kg. sediment
1	162.1	100	3.2	3.2	4.09	8.4	8.4	10.75
2	254.2	24	6.5	27.1	4.91	25.0	104.2	18.89
3	283.4	23	6.7	29.1	3.46	28.4	123.5	14.70
4	219.4	44	5.0	11.4	3.38	20.7	47.0	13.95
5	107.7	47	2.5	5.3	3.00	7.4	15.7	8.90
6	126.3	100	2.6	2.6	2.50	4.1	4.1	3.95
7	153.7	51	2.5	4.9	2.95	1.9	3.7	2.24
8	133.6	49	0.7	1.4	1.34	0.2	0.4	0.39
9	291.1	100	1.2	1.2	0.83	0.1	0.1	0.07
10	194.4	100	1.3	1.3	1.23	0.2	0.2	0.19
11	226.8	100	2.3	2.3	1.63	-	-	-

Both the bone and fine chipping debitage reach their highest concentrations in unit 2. Note that the figures in table 5.14 are based upon an examination of 100-300 g. samples from each unit rather than a total sort of the 3 mm fraction.

CHANGES IN SITE USE AT TJUNGKUPU

At Tjungkupu 1 a change in intensity of site use is very marked and is reflected in a wide range of occupational debris - chipped stone debitage, grindstones, bone, charcoal, ochre and egg-shell. Layer II represents a period from about 5470 yrs BP. to 1040 yrs BP during which there are only minimal signs of use of the shelter. In fact the earliest evidence of use is estimated to date to about 3750 yrs BP. From 1040 yrs BP onwards use of the shelter was heavy and the variety and density of remains indicate that it was used as a major camping place. The presence of quondong nuts and of emu egg-shell suggest use of the site at least during September-October. This is the end of the dry season, a time when people are recorded as using sites near major waters. The change from a period of very intermittent occupation to intensive occupation is quite sudden but there are also changes in intensity of use after 1040 yrs BP. For instance the upper 25 cm of layer I, estimated to date from about 490 yrs BP, has peak densities of bone, charcoal, egg-shell, ochre and of number of artefacts. However the pattern is not one of increasingly heavy use from 1040 yrs BP onwards. The density of bone and of chipped stone artefacts actually declines within the last few hundred years.

Tjungkupu 2 registers a similar pattern of change. The sandsheet probably began to accumulate at about 4500-5000 yrs BP, at about the time the shelter began to fill with sand and rubble. There are signs of occupation on the flat from at least 2390 yrs BP - the lowest levels excavated - but the intensity of use increased just before 940 yrs BP and reached a peak from about 680 yrs BP. This period of occupation left a band of occupational debris in the top 30-40 cm of the sandsheet which can be traced across the flat as a diffuse layer of dark grey sand.

The impact of the change on the open site was not as marked as in the shelter. The obvious reason is that human activities were not concentrated upon a small area. Despite this the overall pattern of change is very similar.

The pattern of change at Tjungkupu suggests that the immediate hinterland of this strategic waterhole was not used at ethnohistoric levels until about 1000 yrs ago. Given the presumed importance of the tarn in the annual subsistence round this is only explicable in terms of either changes in the factors determining the distribution or density of the regional population or in terms of local changes in resources at the tarn itself.