A cache of tulas from the Boulia district, western Queensland

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Abstract

The excavation and analysis of fifty stone artefacts found in a prehistoric pit on Mucklandama Creek, in western Queensland is described. These artefacts provide information on the manufacture of tulas and on the differentiation of unused and exhausted tulas. It is argued that the feature recovered from Mucklandama Creek is a cache of unused tulas destined for barter. A radiocarbon date demonstrates that the cache is less than 1000 years old. A review of data from other parts of Australia reveals that similar caches are a recent phenomenon. It is suggested that the appearance of such caches may be related to an intensification of trade and settlement restructuring in the late Holocene.

Structural change in prehistoric Australian hunter-gatherer society, often discussed as 'intensification', has been identified primarily on the basis of variation in the quantities of prehistoric activities (cf. Ross 1985; Hiscock 1986). Additional archaeological indicators of social change are alterations to the complexity of exchange systems and resource-management strategies (Lourandos 1985). The former process is manifested in the establishment and development of trading networks and the latter in techniques of resource procurement and storage. This paper investigates the antiquity and purpose of one form of prehistoric activity, creating caches of stone artefacts. Caching involves storing objects underground by concealing them in holes. I suggest that in Australia certain types of caches may be indicative of resource storage associated with extensive exchange systems. Consequently the archaeological identification of these features may provide one measure of 'intensification'.

In this paper I describe archaeological material from a site in western Queensland, and interpret this material as a prehistoric cache. The cache consists of fifty stone artefacts placed in a pit which was then filled in, demonstrating that it was not merely storage but the added security inherent in caching which was desired. It is argued that the cache represents the storage of items destined for barter, and that caches of this kind may contribute to an understanding of trading networks in Australia. An assessment of the form, context, and antiquity of other caches of stone artefacts in Australia indicates that the conclusion may be widely applicable.

This proposition is consistent with the findings of anthropological research into numerous hunter-gatherer groups. Caching behaviour is well documented amongst hunter-gatherers. Although the investment of labour in the expectation of a delayed return,

reflected in the storage of goods, has not traditionally been expected of hunters and gatherers it is in fact common (Ingold 1983; Testart 1982; Gould 1980:105; Binford 1983:144, 258, 270-273, 346). Practical storage, in which processed items are preserved by being placed in contexts which enhance the likelihood of their preservation, is frequently a solution to problems of activity scheduling (Ingold 1983:557). These problems arise from seasonal changes in the availability of raw materials and from the non-concurrence of production and exchange. As one form of storage, caching fulfills not only the role of insurance against social and environmental fluctuations but, because it involves hiding the stored objects from the view of others, also allows the accumulation of material goods. Testart (1982) points out that where there are communal caches the control of access to the goods may become an important social mechanism for establishing power structures. In highly nomadic groups individuals who cache material may possess the items without constantly carrying them. Thus prehistoric storage may be related to the congregation of people, the encouragement of sedentism, the development of widespread exchange systems, and the existence and development of social inequalities (Testart 1982:528; Ingold 1983:554). If archaeological caches indicate these social processes then they may provide a means of testing models of socioeconomic change such as those proposed by Lourandos (1983, 1985).

Archaeologically, caches provide further information because they sometimes contain artefacts in a form which was rarely discarded and are therefore unavailable for study in other contexts (cf. Phillips 1987). Caches of stone artefacts in particular often reveal stages of manufacture which are otherwise invisible to the archaeologist (e.g. Morse 1971b; Lintz 1978). Contemporaneity and functional relationship of objects cached together is also revealed (e.g. Morse 1971a and 1971b; Shock and Bass 1966). Furthermore, caching can provide an archaeological record of the size, morphology and quantity of artefacts carried or traded across the landscape, and of the favoured locations for storage (e.g. Holmes 1993). By assessing the amount of potential use-life left in the cached artefacts archaeologists have inferred whether the caches were meant to be temporary or permanent (e.g. Morse 1971a vs 1971b). Artefacts with a large potential use-life are often cached as large bundles in contexts where they can be easily recovered whereas artefacts with a small potential use of life are often found in graves, supporting the temporary/permanent division. In this way a detailed analysis of cache contents may provide indications of the role of those caches in prehistoric groups.

A similar range of data was obtained from the cache of tulas described here, discovered along

Figure 1. Location of site M6.

Mucklandama Creek in western Queensland. Detailed analysis of the recovered artefacts permits a description of the processes of stoneworking and the point at which tulas were traded. Consequently it is possible to hypothesise whether other caches of stone artefacts in Australia were likely to have been intended for further use and/or trading.

Mucklandama Creek 6

Mucklandama Creek is a seasonal stream running eastward from high land to the Burke River (Fig. 1). The creek consists of deeply incised braided channels on the southern side of a broad alluvial plain. Immediately to the west and southwest there is an undulating plateau containing extensive silcrete outcrops. With the exception of tree-lined tributaries of Mucklandama Creek the landscape to the south and west is comprised largely of bare gibber surfaces. To the northeast the flood plain is covered with

Mitchell grass.

Mucklandama Creek 6 (BG:A10) is an open site located on the eastern bank of the main channel, approximately 1km upstream from the junction of Fort William Creek (see Fig. 1). The site, consisting of a scatter of chipped stone artefacts, 67 grindstone fragments and eight hearths, extends over an area $140 \times 68\text{m}$. Densities of artefacts varied between 6/sqm and 0.25/sqm, averaging 0.7/sqm. On the basis of these figures it is estimated that approximately 5000 artefacts exist on the ground surface.

The vast majority (91%) of chipped artefacts were made of silicified siltstone. Silcrete and volcanic materials were each used in 3% of artefacts. Approximately 2% of the assemblage was quartz and a little under 1% a distinctive white chalcedony. Of these materials only silcrete outcrops locally and all other nearby sites have large proportions of silcrete. Siltstone outcrops nearby but is generally not in a silicified form. Silicified siltstone outcrops extensively in the de Little Range to the north, near the headwaters of Mucklandama Creek, and may be available near the site in river gravels. Since no nodules of workable size were found in the adjacent channels of Mucklandama Creek, it is equally likely that silicified siltstone was being transported from outcrops 20-30km away. The sources of the quartz and the volcanic materials are not known precisely, but it is certain that the chalcedony has been transported to the site. White chalcedony is available only in outcrops of Noranside Limestone, the nearest occurrence of which is at Scardale Homestead, 5km to the north.

The transportation of stone materials over these distances may account for the relatively high proportions of retouched flakes at Mucklandama Creek 6 compared to other sites in the region. At this site approximately 720 specimens, 15% of the chipped stone assemblage, were retouched flakes. Of these retouched flakes the majority, 417 (57.9%), are tulas. It is tulas which are of particular interest here, since in the course of detailed site recording four half-buried tulas were found within 3cm of each other. These proved to be the uppermost artefacts in a large cache of tulas.

The Pit

Excavations revealed the dimensions and shape of the pit dug for the cache. A $50\text{cm} \times 50\text{cm}$ square surrounding the pit was excavated to an average depth of almost 16cm. The pit itself was excavated in two spits, and the surrounding deposit removed in three spits. Table 1 lists the size of each of these spits and the quantity of sediment retrieved. All sediment was sieved through 2mm mesh. Figure 2, a section running north-south through the square, shows the position of these spits in relation to the pit. Sediment was a compact reddish brown (5YR4/6) silt with a pH of 8.0. Towards the base of the excavation more compact and vesiculated silt, resembling termite mound, was encountered. Although the excavation reached only 16cm in depth steel survey pegs driven a further 15cm into the unexcavated sediment at the base of spit 5 demonstrated that there were no concentrations of artefacts at greater depth.

	Average depth below surface (cm)	Estimated volume (cm ³)	Weight of sediment (kg)	Tulas	Other Retouched Flakes	Flakes	Total artefacts	Tula density (per m ³)	Artefact density (per m ³)
1	0-4	760	1.3	15	3	7	25	19,737	32,895
2	4-8.5	440	0.7	18	4	3	25	40,909	56,818
3	0-3.8	8740	17.3	1	1	32*	34	114	3,661
4	3.8-10.0	15060	21.7	0	0	7*	7	0	465
5	10.0-15.5	13750	19.7	0	0	0	0	0	0

Table 1. Size and content of spits in square 1, Mucklandama Creek 6. *:all specimens recovered in sieves and less than 0.5cm²

No change in soil colour or compactness was noted at the margins of the pit, which was defined by the extent of artefacts. The pit had a maximum width of 18cm and a maximum depth of 11.5cm. In plan it was roughly oval; in section it was distinctly assymetrical, with the deepest point being on the steep southern side of the pit (see Figure 2). This shape suggests that the pit was dug by thrusting a digging tool vertically into the ground and then dragging it north and up.

Within this pit were numerous artefacts, either flakes or retouched flakes. These objects had not been tossed haphazardly into the pit, but were neatly stacked. Figure 3, a cross-section of the cache pit, indicates the form of this stacking. Artefacts were placed in the pit horizontally or vertically. On the base and in the northern portion of the pit artefacts were stacked horizontally, whereas those against the steep southern wall were vertical. Horizontal artefacts were invariably positioned with their dorsal surface down. In most instances the specimens stacked vertically were positioned with their distal ends up and their platforms down. This very precise placement

of objects in the pit is best interpreted as an attempt to prevent damage to the artefacts while packing as many as possible into the space. The position of artefacts within the pit also indicates that they were placed there one by one and were not deposited inside a container.

It is hypothesised that the pit was dug, the cache deposited and the pit backfilled within a short space of time. At the time of discovery the pit was distinct, and the artefacts neatly packed and covered with sediment. There were no signs of sediment slumping into a partly empty pit, nor was there any mound of dirt adjacent to the pit which might indicate that the cache had not been covered.

Dating the Pit

When, in prehistoric times, the pit was dug, it truncated a small lens of charcoal located in the southern portion of the square (see Figure 2). During archaeological excavation this lens of charcoal was revealed when an artefact which rested vertically against the southern wall of the pit was removed.

Figure 2. North-South cross-section through the excavated square showing the relationship of spits (numbered) in the stratigraphy.

Figure 3. Schematic representation of the position of artefacts within the pit.

Viewed from the pit the exposed deposit of charcoal was circular and one centimetre in diameter, reminiscent of a burnt branch or root. This lens of charcoal extended seven centimetres into the wall of the pit and yielded 2.5g of dateable material. This sample gave an age estimate of 1190 ± 120 years bp (Beta — 21518).

On the basis of this radiocarbon determination it can be argued that the lens of charcoal is 800-1600 years old (three standard deviations), and most probably it is slightly more than 1000 years old. This provides a maximum date for the pit but it is likely that the cache is much more recent since approximately 8cm of sediment may have accumulated on top of the charcoal prior to the pit being dug. Thus I confidently conclude that the pit was created less than 1000 years ago, and probably within the last few hundred years.

Excavated artefacts

A total of 91 artefacts were recovered from the excavation. All were made of silicified siltstone. Table 1 lists the number of artefacts in each spit. Vertical changes in the contents of the spits 3-5, those representing the deposit prior to the creation of the pit, provide an indication of site formation processes. No artefacts were recovered from spit 5 and only seven small flakes retained in the sieve were retrieved in spit 4. Many more artefacts were found in spit 3, although the majority were unretouched flakes less than 0.6cm long. This indicates that, with the exception of very small chips, artefactual material is restricted to a zone 0-4cm below the current land surface. It is possible that the small flakes in spit 4 may have moved downward in the deposit. This hypothesis is strengthened by the contrast between the size of surface material and the size classes recovered in spit 3. Over 94% of the artefacts in spit 3 were less than 1cm in length, whereas across the surface of the site less than 8% of artefacts are in that size class. The absence of small artefacts on the surface is most easily accounted for by the greater rate with which they are incorporated into the alluvial sediment.

The major exception to this surficial distribution of artefacts is the extremely high density of material, especially tulas, found within the pit. The large proportion of tulas in the cache suggests that all of the artefacts in the pit are related to their production. This hypothesis can be examined by a detailed analysis of the cache assemblage.

Cache Assemblage

The pit contained fifty cached artefacts. Since all artefacts were flakes or retouched flakes length was consistently measured as percussion length and width as the distance from lateral margins half way along the percussion length. Platform width was measured as the straight line distance between lateral margins across the platform. Platform thickness was the distance across the platform surface from the centre of the ringcrack to the dorsal face. All four of these measures were made in centimetres to the nearest millimetre. 'Overhang removal', the series of small scars on the dorsal face and deriving from the platform often found on tulas (e.g. Mulvaney 1975: figure 8) was recorded as a presence/absence trait. These platform characteristics could be measured on all specimens except two tulas in spit 1 which had had the platforms removed by retouching.

These fifty artefacts were placed into three groups for analysis (Figure 4). *Flakes* were those pieces of stone with positive ringcracks, cones and bulbs but with no indications of retouching (Hiscock 1984: 128-129). *Tulas* were retouched flakes with wide platforms, pronounced bulbs, and retouched onto the dorsal face and at the distal end until only the bulbar portion remained (cf. Roth 1904). *Other Retouched Flakes* were those which, while clearly being retouched flakes, conform to some but not all attributes characteristic of tulas.

I argue that these three groups form a continuum representing different stages in the manufacture of tulas. All of the cached flakes are suitable for manufacture into tulas, having large platforms and pronounced bulbs. Table 2, which provides descriptive statistics for each class of artefact, indicates that the dimensions of flakes and tulas are very similar, with flakes being slightly wider. Shape, as measured by elongation, also shows marked similarities between flakes and tulas found in the pit. Large bulbs and dimensions broadly the same as both flakes and tulas reinforce the view that Other Retouched Flakes are an intermediate class. Other Retouched Flakes differ slightly from tulas in two ways. Firstly on average Other Retouched Flakes show greater elongation, indicating that the removal of the distal portion of the flake was not completed. Secondly, the width of Other Retouched Flakes, while falling within the range of tulas, is on average smaller. This may simply reflect that Other Retouched Flakes remain unfinished because they were not as large as more preferred tulas. Despite these minor differences there is remarkable coincidence in the size and shape of all artefacts in the cache, reinforcing the visual impression that all were part of the tula manufacturing process (see Figure 4).

If the cache consists of several stages of tula production then a number of further observations

Figure 4. Examples of the three classes of artefacts recovered from the cache. Views from left to right are of the dorsal surface, ventral surface, and lateral margin. Top: Flake S670/1/24; middle: Other Retouched Flake S670/2/2; bottom: Tula S670/2/5.

	Tulas	Other Retouched Flakes	Flakes	Total
Percussion length				
mean	3.4	3.3	3.3	3.4
s.d.	0.59	0.88	0.80	0.66
min.	1.8	2.3	2.2	1.8
max	4.6	4.8	5.0	5.0
n.	33	7	10	50
Percussion width				
mean	4.3	4.0	4.5	4.3
s.d.	0.60	0.47	1.33	0.79
min.	3.2	3.3	2.7	2.7
max.	5.9	4.5	6.7	6.7
n	33	7	10	50
Platform width				
mean	3.4	3.2	3.5	3.4
s.d.	0.78	0.80	0.89	0.79
min.	1.8	1.8	2.1	1.8
max.	5.2	4.0	5.4	5.4
n	31	7	10	48
Platform thickness				
mean	0.8	0.9	0.9	0.9
s.d.	0.25	0.34	0.26	0.27
min.	0.5	0.5	0.6	0.5
max.	1.7	1.5	1.3	1.7
n	31	7	10	48
Elongation (L/W)				
mean	0.79	0.84	0.77	0.79
s.d.	0.12	0.18	0.19	0.15
min.	0.56	0.64	0.49	0.49
max	1.01	1.07	1.07	1.07
n	33	7	10	50

Table 2. Descriptive statistics of cached artefacts. Measurements in cm unless indicated.

follow. For example, overhang removal was absent on Flakes, but occurs on 43% of Other Retouched Flakes and on 53% of tulas. Thus it can be concluded that 'overhang removal' is in fact a form of retouching which thins the flake at the platform end and takes place at the same time as other initial shaping retouch. Such a conclusion is in agreement with Roth's (1904:17) description of tula manufacture in the Boulia region. Specimen S670/1/11 (Queensland Museum Register number) from the cache, which has signs of battering on the dorsal face from being rested on an anvil, also conforms to Roth's (1904:17) observation.

One issue in which Roth's ethnographic account differs from the archaeological findings is in the shape of flakes selected for retouching into tulas. He depicts the flakes as distinctly longer than wide, with an elongation index approximately 1.5 (Roth 1904 Figure 25), and with bulbs covering only half the ventral surface. Flakes from the cache, however, were much closer in shape to the finished tula form, and would have required little trimming. Maximum elongation of cached flakes was 1.07, and the bulb invariably occupied at least three-quarters of the ventral surface. This departure from Roth's observation implies very careful and stringent selection of flakes by the knapper(s) who deposited the cache.

An implication of these conclusions is that the artefacts in the cache have not been used as adzes and may be completely unused. This hypothesis could be conclusively tested by usewear analysis, a subject outside the scope of this paper, but can also

be examined by a comparison between the cached tulas and other tulas found on the surface of the same site.

Comparison of cached and surface assemblages

In a 40m × 50m area surrounding the excavation a total of 106 retouched flakes was recorded. Fifty-eight of these were unbroken tulas, of silicified siltstone, which could be compared to the specimens from the cache. Table 3 gives descriptive statistics for both populations and reveals that they are essentially the same except that the surface specimens are distinctly more reduced. Width and thickness are virtually identical and, as these dimensions do not change during resharpening, indicate that the size of the prepared but unused tulas was the same in both cases. Maximum values of percussion length are nearly the same in the two samples, supporting the inference that both sets of tulas were initially the same size. In contrast the average percussion length of surface tulas was less than half that of those cached, indicating that the distal end of many specimens had been extensively retouched. Most of these surface tulas have the characteristic 'slug' form in which the retouched distal portion truncates the pronounced bulb. Repeated knapping of the distal end, but not the other three sides, has also lowered the mean elongation of surface tulas (Table 3). Indeed, this elongation index can be used as a measure of the extent of reduction, since resharpening of the tulas decreases only the percussion length, thereby inexorably lowering the value of the elongation index. Thus the extent of reduction of the two

	Surface	Cache
Percussion length		
mean	1.4	3.4
s.d.	0.65	0.59
min.	0.3	1.8
max.	4.4	4.6
n	58	33
Percussion width		
mean	3.7	4.0
s.d.	0.69	0.60
min.	2.3	3.2
max.	6.3	5.9
n	58	33
Platform width		
mean	3.3	3.4
s.d.	0.70	0.78
min.	1.7	1.8
max.	4.9	5.2
n	58	31
Platform thickness		
mean	0.9	0.8
s.d.	0.24	0.25
min.	0.2	0.5
max.	1.3	1.7
n	58	31
Elongation (L/W)		
mean	0.37	0.79
s.d.	0.16	0.12
min.	0.09	0.56
max.	1.04	1.01
n	52	33

Table 3. Comparison between surface and cached Tulas. Measurements in cm unless indicated.

Figure 5. Elongation of cached and surface tulas at M6. (Fine stipple: cached tulas; coarse stipple: surface tulas).

assemblages can be shown diagrammatically by comparing the frequency of elongation values (Figure 5) despite a small overlap Figure 5 shows that virtually all of the tulas found on the surface were more reduced than those in the cache.

If it is the case that surface tulas are more intensively used and resharpened than the cache specimens then they should show a higher frequency of the platform thinning. This prediction is formulated from the observation that in the early stages of manufacture, as represented by the cache, this characteristic became more common with greater reduction. Continuation of this trend in the later phase of tula reduction would produce even greater numbers with the platform thinned in this way. Of the 56 surface specimens which retained platforms, 37 (66%) had platform thinning, a distinct increase over the frequency amongst cached tulas and conforming to expectations. Furthermore the surface assemblage itself provides evidence that platform thinning becomes more frequent with reduction. Table 4 shows that amongst tulas from the surface platform thinning becomes increasingly more frequent as length decreases. These data support the proposition that artefacts in the cache have been prepared but not used. This conclusion raises the intriguing question of why the prehistoric knapper(s) expended so much effort only to bury the products.

Tulas, pituri, ochre and axes

The tula cache on Mucklandama Creek is probably an archaeological manifestation of trade along the Cape York — South Australian Route (McCarthy 1939:101). Extensive exchange systems linked the Lake Eyre region to the Leichhardt — Selwyn Range prior to European disruption (Roth 1897, 1904; Horne and Aiston 1924:34, 104, 130; Mulvaney 1976; McBryde 1987; Watson 1983). At the end of the last century the Boulia District was a major ceremonial and trade centre through which goods from the north, west and south flowed. Roth (1897:134-5) documents the resident Pitta-Pitta acting as middlemen for the exchange of items which were available in one of the surrounding regions but not in others.

From groups in the Lake Eyre basin to the south the Pitta-Pitta obtained pituri, ochre, grindstones and other goods; they traded these items to groups in the north in return for objects which were otherwise unavailable, such as stone axes, baler and pearl shell. Eventually goods from the north were passed further south.

In addition to benefitting directly from the procurement of these 'exotic' objects this trade also encouraged and facilitated the bartering of finished artefacts even though the raw materials needed to make them may have been available in neighbouring areas. Of particular interest in this context is the exchange of tulas. Referring to composite adzes, in which tulas are hafted onto a wooden handle with resin, Roth (1904:20) wrote:

As far as my investigations have led me, this completed implement never formed an article of exchange or barter: on the other hand, there was always a traffic going on with the "pot-lids" in the prepared state, i.e., ready for fixation ...

North-east of Lake Eyre, Aiston (1928:127) discovered a string bag containing unused tulas, perhaps destined for trade. Roth (1904:20) observed flaked artefacts being transported in dilly-bags throughout western Queensland and McCarthy (1977:254) suggests that trade in such parcels of tulas was widespread in that region. There are no precise records of bartering with tulas at Boulia, although Roth (1904:20) observed a parcel of tulas being carried southwards along the nearby Georgina River. Nevertheless, this item appears to have been widely traded and Roth (1897:102, 135) records the Pitta-Pitta exchanging both chipped stone artefacts of undescribed type and the spinifex resin by which they could be hafted. Thus at the time of European contact parcels of shaped but unused tulas were an important item in the western Queensland trading system.

The suggestion that the cached tulas from Mucklandama Creek 6 were part of this exchange is based on several lines of evidence. It has already been demonstrated that the buried tulas are suitable for this bartering, being shaped but unused. The site from which they come is near to Boulia and on the known path of Pitta-Pitta travelling north to trade with the Kalkadoons at Buckingham Downs (Roth 1897:102, 134-5). Furthermore the cache's recent date is close in time to the ethnographic observations of a trade system. Added to this is the unusual quantity and context of the cached tulas. Although estimates vary, it is likely that only 20-23 tulas would have been used per person per year (Gould 1977:165).

Thinning	Length (cm)			Total
	0-1	1.1-2.0	>2.0	
Absent	1	15	3	19
Present	13	22	4	39
Total	14	37	7	58

Table 4. Frequency of platform thinning compared to Tula length for surface material $\chi^2 = 8.72585$; degrees of freedom = 3; significance level = 0.05.

Hence the cache represents in excess of two year's supply of tulas for a single individual. Framed in these terms the need to hide a valuable collection of objects may partly account for their placement in the pit. Replacement siltstone could have been readily obtained from quarries in the northeast. Therefore there would seem to be no purpose in preparing, transporting and storing the cached assemblage except in special circumstances. Such circumstances would include that the artefacts were to be required all at once, and perhaps at short notice, rather than one at the time over a long period. These conditions are precisely those which exist for objects intended for trade. A number of tulas would have to be prepared and brought to a location near to the site of the intended exchange. Since bartering took place discontinuously the objects would need to be stockpiled in a safe place until the market conditions were favourable and trading partners arrived. In the flat countryside surrounding Boulia, caching material in pits along river banks would be an effective means of storing the goods. If suitable trading conditions never arose, if the owner died, or if the location of the stockpile was forgotten then the objects would remain buried. This scenario is a sufficient and parsimonious explanation of the caching of tulas at Mucklandama Creek 6.

Identifying and interpreting caches

The Mucklandama Creek cache can now serve as a control against which other caches may be compared. Since caching behaviour in prehistoric Australia has rarely been discussed, it is profitable to review the literature on archaeological finds of cached stone artefacts, especially tulas. I present first a definition of 'cache' since loose usage of the term by archaeologists has hitherto detracted from its usefulness.

Although 'cache' has occasionally been used as a synonym for 'storage' (e.g. Jochim 1979, Potts 1984) the former term is more properly restricted to the storage of objects underground in holes which are either artificial (such as pits) or natural (such as in the ground, crevices or rock ledges of caves). As Dobson (1985:7) points out, the concept of a 'cache' involves not only that the items are stored in a location other than their place of use, but also that they are concealed. Furthermore, since caching is a form of purposive storage, implying that the objects are being accumulated for future use, we must be careful to distinguish the phenomenon from discard. This distinction may be difficult to apply archaeologically. Even if cached objects were originally intended to be retrieved and reused, those which are discovered by archaeologists were not recovered. Furthermore, objects in ritual contexts, designed to be used by the dead or by spirits, must technically be considered caches. Morwood (1984:550) suggests that in Australia there are numerous examples of this form of caching, in which the objects were never meant to be recovered by those who deposited them. In view of these difficulties, the following discussion employs underground storage and concealment to define this form of behaviour; proof of intended future use is not required.

There are claims, both ethnographic and archaeological, for caches of stone artefacts in Australia. Many of the ethnographic records seem to be clear-cut instances of caching. For example Howitt (1878:304) records stone artefacts being buried in sand, as does Aiston (1928:124).

Some of the archaeological claims for caching are rather more debateable. Tindale and Noone (1941) describe 74 flint artefacts found on coastal dunes in South Australia and, implying that they were cached, interpret them as a 'hoard or trade parcel'. This designation seems unwarranted. Although the artefacts were clustered in a small area, no stratigraphic evidence demonstrated that the material had ever been buried or concealed by prehistoric people. Added to this, only two of the artefacts were retouched, the remainder being broken or complete flakes. No associated cores or hammerstones were found. Since the flint crops out nearby it is equally likely that this collection is a knapping floor at which stoneworkers reduced unwanted bulk from a core which was then carried away. Similarly the Cape Cassini Hoard reported from Kangaroo Island can be interpreted as a workshop rather than a cache (Cooper 1960:488).

Also dubious are some claims for *in situ* caches of stone artefacts recovered from excavations. At Native Well 1 in central Queensland, Morwood (1979:202-203; 1981:35; 1984:550) has argued that evidence for caching was found within the stratified deposit. This hypothesis was based upon two observations. First, most grindstone fragments were found on the scree slope outside the cave. Only a broken muller and a complete grindstone were recovered from inside the cave, and these had been placed against the rear wall. Morwood (1981:35) concluded that this pattern reflects '... the disposal of broken, non-functional grindstones outside the shelter, and the caching of valued, functional implements within the shelter'. Second, a large core, also found up against the rear wall of the shelter, was in association with charcoal yielding an age estimate of 6190 ± 100 bp (ANU 2001). Morwood (1978:23; 1981:35) argued that because cores have been cached in shelters and tunnels above the ground surface in the same outcrop this mid-Holocene core was also probably cached. Clearly neither of these propositions withstand critical evaluation. No stratigraphic evidence indicated that the subsurface grindstones or cores had been hidden from view by burying, and unlike the above-ground caches they were not placed in tunnels. Indeed, the three items have simply been thrown or placed against the rear wall. This may constitute storage but it most certainly does not constitute caching. It is equally likely, perhaps more so, that these large objects were tossed out of the way against the shelter wall. Removing relatively large objects from highly used areas is a behaviour pattern well documented in both contemporary and prehistoric Australia (Jones 1980; Beaton 1977:60; O'Connell 1977). At Native Well 1 the dumping of material outside the cave demonstrates that similar activities occurred here, so why should it be surprising that occasionally, instead of tossing material outside the shelter, the occupants threw material to some disused back portion? However, I must caution against using

Morwood's grindstone data in this way, since a re-examination of the items (housed in the Queensland Museum) showed many to be unground. For example, of the 45 'grindstone' fragments from square C9, outside the shelter, only seven have any evidence of grinding. Hence the contrast between the interior and exterior of the shelter is overstated by Morwood (1981) and the hypothesised value of grindstones discarded inside must be decreased proportionately. Finally, the frequent and indisputable caches above ground surface at Native Well 1 stands in strong contrast with the lack of evidence from excavations at that site. If the above-ground caches are recent, then the absence of prehistoric caches in the stratified deposit suggests that caching behaviour at Native Well 1 was uncommon until the recent past. There is no support at this site for claims of a high antiquity for caches of stone artefacts in Australia (cf. Morwood 1984).

More convincing are the three caches of tulas reported from the sand dune country west of Lake Torrens in South Australia (Hewitt 1976). The Lake Hanson Hoard consisted of 105 artefacts neatly placed in a pile at the crest of a deflating dune (Hewitt 1976:20). No stratigraphic evidence was found of the collection having been placed in the pit, but Hewitt (1976:34) argues that the context of the material suggests that it had been buried and was only recently exposed by erosion. The majority of these artefacts (60/105) are tulas, and a further 9 are unretouched flakes suitable for manufacturing into tulas (Hewitt 1976:20-29). Many of these tulas were apparently shaped but unused, with the retouch surrounding but not encroaching onto the bulb. Hewitt (1976:20) describes six tulas as partly reduced and a further three as fully exhausted slugs. The remainder, some 51 tulas, show little or no reduction after initial shaping. Thus the Lake Hanson cache contains a similar number of unreduced tulas to the cache on Mucklandama Creek. The other two purported caches which were found in the same region are similar in that they consist of concentrations of tulas over half a square metre. In both cases there is no evidence of the material being stored underground or hidden from sight. Nevertheless, these two collections, like the Lake Hanson Hoard, appear to be piles of unused tulas which may have been caches before the deflation of the surrounding sediments. Since some of the stone material on which these tulas were made came from distant regions, and the sites are located near the ethnographically recorded boundaries of tribal territories, Hewitt (1976:34, 48-49) argues that the caches probably represent stored trade parcels. This hypothesis was strengthened by the finding of a baler shell pendent near to the Lake Hanson cache (Hewitt 1976:50).

Other instances reported by Morwood (1984, Morwood and Gibson 1984) are unquestionably caches, but the purpose of storage at one of the sites may be reinterpreted in the light of the findings reported here. At Mt Inglis in the Central Highlands of Queensland objects were found hidden on a ledge in a sandstone shelter (Morwood 1984:451). Amongst a wide variety of material culture items were a number of stone artefacts contained in a cylindrical bag made of possum skin. Morwood (1984:551)

concludes that because no skeletal material was associated, the cache was a temporary one and was meant for later re-use. Nevertheless, as Morwood (1984:550-1) has detailed, the range of items found in this cache are typical of the permanent caches which often accompany human remains elsewhere in the region. Since the possum skin bag contained tulas it is possible to assess the potential for their re-use by comparing the assemblage with that from Mucklandama Creek 6.

I have examined the 34 artefacts recovered from the possum skin bag and my descriptions differ slightly from those of Morwood (1984). One of the artefacts (S181/66) reported as a tula is actually a step-terminated flake which has had the platform removed by striking the ventral surface and taking flakes off the dorsal face. Since the retouched margin of this specimen truncates the bulb it resembles a tula although technically it is not one. Two other retouched flakes are, however, chert tulas manufactured in a similar way to those at Mucklandama Creek 6 (measurements in Table 5). Both specimens are highly reduced, with short percussion lengths and low elongation indices. In comparison to the material at Mucklandama Creek 6 these two tulas fit well with the most reduced of the surface specimens, indicating that they are at the end of their use-life and not in any condition for later reuse. This impression of extensive reduction on the two Mt Inglis cache tulas is reinforced by the fact that both of them have platform thinning 'overhang removal'. The 31 unretouched flakes show extensive shattering of thin edges and are equally unsuitable for most functions. Thus the morphology of the stone artefacts in the Mount Inglis cache suggest that they were not intended for further use. It can, therefore, be inferred that the Mount Inglis cache was stored permanently, perhaps for ritual reasons.

Conclusion

The cache of tulas found at Mucklandama Creek is one of the few reported, and the only cache of stone artefacts in Australia radiometrically dated. Stratigraphic information on the cache pit gives strong indications of how the prehistoric digging was carried out, and the assemblage of artefacts in the pit provides a rare insight into prehistoric stone-working activities by preserving artefacts midway through the processes of manufacture and use. For this reason the cache provides a large sample of unused tulas, something which is a rarity on most sites. Quantification of the contrasts between cached

	S181/62	S181/58
Percussion length	0.4	0.4
Percussion width	1.9	1.4
Platform width	1.2	1.1
Platform thickness	0.2	0.3
Elongation	0.2	0.3

Table 5. Dimensions of Tulas in the Mt Inglis cache (cm and L/W)

and surface tulas on the site also gave greater resolution to the differentiation of unused and exhausted tulas.

Implications of this cache reach far beyond merely aiding technological reconstructions since it is interpreted as a parcel destined for barter in the extensive trading network of western Queensland. Unequivocal caches of unused tulas elsewhere in central Australia can also be interpreted as hidden trade bundles which were being temporarily stored but were never recovered (Hewitt 1976). Clearly distinct are the permanent caches of exhausted tulas reported from the central Queensland Highlands (Morwood 1984). Detailed studies of the form and context of cached stone artefacts may therefore provide information about the existence and nature of prehistoric exchange systems in Australia. Evidence of the storage of artefacts may be employed in this way as an adjunct to the analysis of quarrying and manufacturing sites in reconstruction of exchange (cf. Torrence 1986).

In the literature on caches of stone artefacts, as distinct from grave goods, I found no evidence that this activity occurred prior to the last 1000-2000 years in Australia. It is intriguing to speculate that temporary caches containing many stone artefacts of the same kind and the same extent of reduction are a recent phenomenon, perhaps related to an intensification of trade and settlement restructuring in the late Holocene (cf. Lourandos 1984, Hiscock 1986, Smith 1986). The identification of further sites on which artefact storage is a feature should provide tests of such archaeological theories concerning the manufacture of artefacts and the relationships of trading and storage activities in prehistoric Australia.

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