A TECHNOLOGICAL ANALYSIS OF STONE ARTEFACTS FROM YAM CAMP SURFACE SCATTER AND ROCKSHELTER, S.E. CAPE YORK PENINSULA

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INTRODUCTION

Technological analyses of stone artefacts in Australia (e.g. Hiscock 1982; 1984; 1989) and more generally (e.g. Flenniken 1985) have yielded insights into prehistoric human behaviour not obtained by analyses which are more typologically oriented. To a large extent, previous work of this sort in S. E. Cape York Peninsula has been of the latter variety and have emphasized formal descriptions of assemblages over behavioural implications of technological change. Nevertheless, major changes in raw material use and artefact size and range have been demonstrated (Flood and Horsfall 1986; Rosenfeld et al 1981; Wright 1971a). By contrast, this paper targets aspects of two site assemblages in this region which were considered capable of yielding information concerning temporal changes in the way people have used stone for flaking. These aspects include raw material and artefact size and form (see Hiscock 1984).

A technological analysis was undertaken on stone artefact assemblages from an open site, Yam Camp Artefact Scatter, and a stratified site, Yam Camp Rockshelter, both of which are prehistoric Aboriginal sites located to the south and west of Laura, S. E. Cape York Peninsula. The analysis aimed to integrate the open site assemblage with the chronological sequence developed for the locality from the rockshelter and to demonstrate technological change in this sequence. It will also serve to demonstrate that technological analyses may provide a different level of information concerning prehistoric behavioural construction than the more formal kinds of analyses previously carried out in this region which are limited by their underlying assumptions.

THE SITES AND THE ANALYSIS

Yam Camp Artefact Scatter and Yam Camp Rockshelter are both located on Shepherd Creek, a tributary of the Little Laura River, S.E. Cape York Peninsula (Figure 1). The sites are some 350m apart but also differ in elevation by some 75m. This proximity argues for similar accessibility to local sources of stone for flaking. Shepherd Creek contains pebbles of chert, milky quartz and quartzite which have eroded out of Jurassic conglomerates (see Cooktown 1:250,000 Series Geological map). Crystalline quartz also outcrops throughout the Jurassic strata on the talus slopes near the sites. The correspondence of these raw materials in the site deposits suggest that this local source has been exploited throughout the history of their human occupation. No non-local raw materials were present in the assemblages analysed.

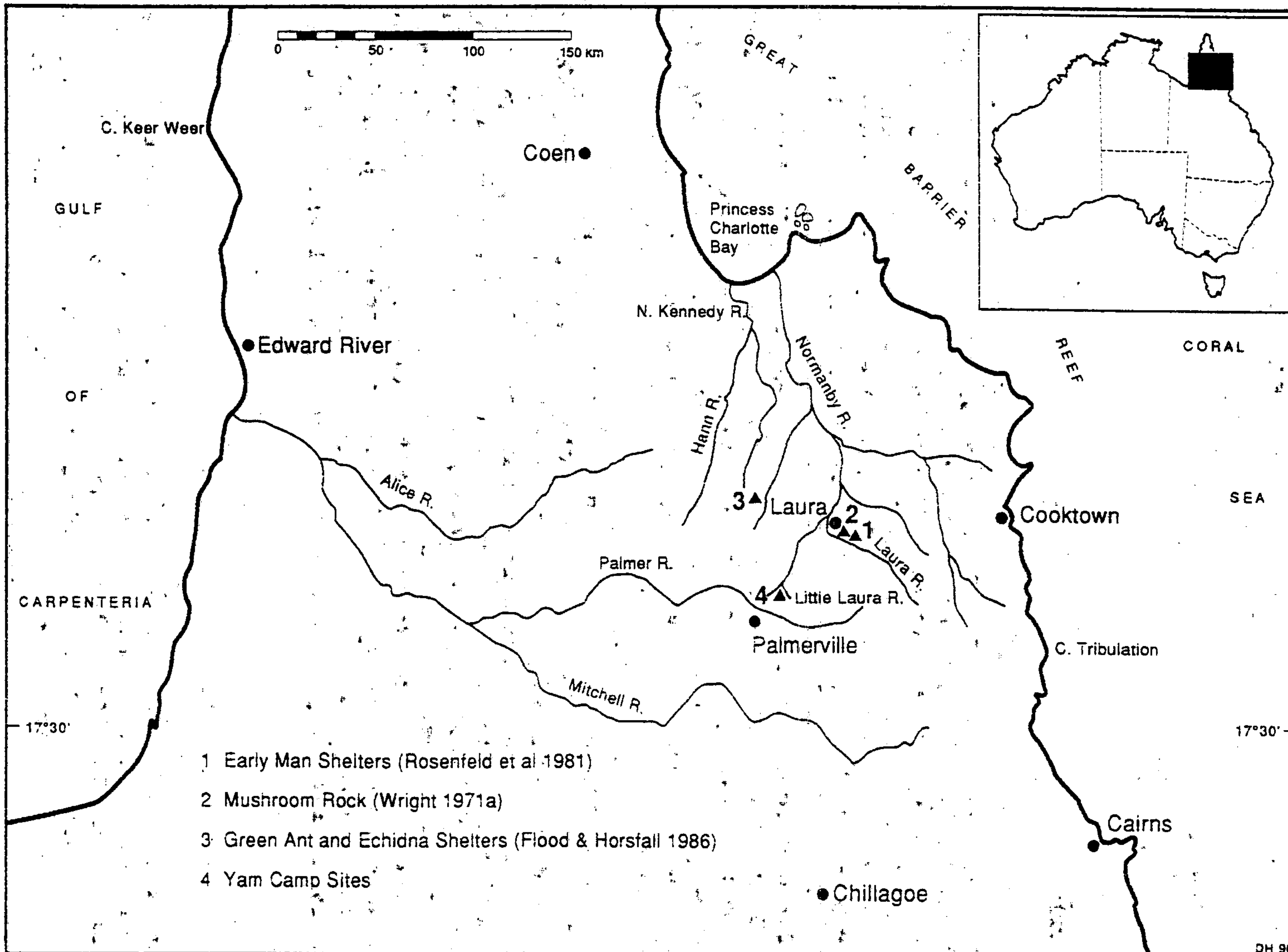

Figure 1. Map showing location of the the Yam Camp and other sites mentioned in the text.

Yam Camp Artefact Scatter

This site is located 75m from Shepherd Creek on an alluvial terrace. It is approximately 5 x 20m in extent, lies on a hard-baked clay-pan surface, and exhibits an average density of seven artefacts per square metre in that part of the site sampled. The locality supports open bloodwood woodland vegetation with 50% tree cover and 15% grass cover, giving good archaeological visibility. Shepherd Creek is a reliable water source with several permanent springs (Percy Tresize pers. comm.).

The site was collected as a sample of open site material for comparison with several rockshelter assemblages excavated during the 1989 field season of a project on the archaeology of art in S.E. Cape York Peninsula (Morwood 1989a). The collecting involved laying out a grid of 1m squares over a 3 x 10m area. The part of the site exhibiting the best visibility and the densest concentration of artefacts was selected for collection. All artefacts within each square were mapped and collected and the raw material for each artefact was recorded on the site plan (Figure 2). Collection yielded a total of 222 artefacts for analysis. It is estimated that 30% of the area of the site, representing 50-60% of the assemblage, was sampled.

Some wind deflation of the site had occurred, along with erosion caused by run-off from the talus slope above. The fact that only two conjoins were found in the collection may suggest that the site has been subject to minimal post-depositional disturbance (i.e. water wash). That two grindstones and retouched artefacts were still present suggests that the site has suffered little from the activities of collectors. From initial impressions, the general nature of the assemblage was one of mostly flakes and flaked pieces, with a small proportion of retouched artefacts and evidence for a small blade technology. Flakes were made mostly from quartz and quartzite, with chert being used mainly for the manufacture of small blades.

Analysis was limited to spatial aspects of this assemblage and involved the isolation of discrete concentrations of artefacts of similar raw material type and reduction technology which might be interpreted as flaking (knapping) floors. As only two conjoins were present in the assemblage, the analysis focused on general reduction technology rather than on specific reduction sequences. On this basis five knapping floors were isolated (Figure 2).

In describing these knapping floors, the number of knapped cobbles was inferred to be directly proportionate to the number of cores recovered. The size of these cobbles was reconstructed from the size of the resulting cores and the number of flakes struck from these. Preparation of cores was held to be related to the presence or absence of such features as overhang removal, platform faceting and heating. Technology of production of flakes from these cores was inferred from features on the flakes and cores themselves (e.g. the bi-polar technique of flake production was inferred from few focalised platforms or pronounced bulbs of percussion of the flakes and crushing at either end of the cores). See Hiscock (1979b, Ch. 2) for a detailed discussion of artefact and core attributes and their relation to reduction technology. Thus, the angle of blows to produce flakes was inferred from noting such variables as presence of erroneous or deviant fracture and bulb prominence (Hiscock 1979b: 37-8).

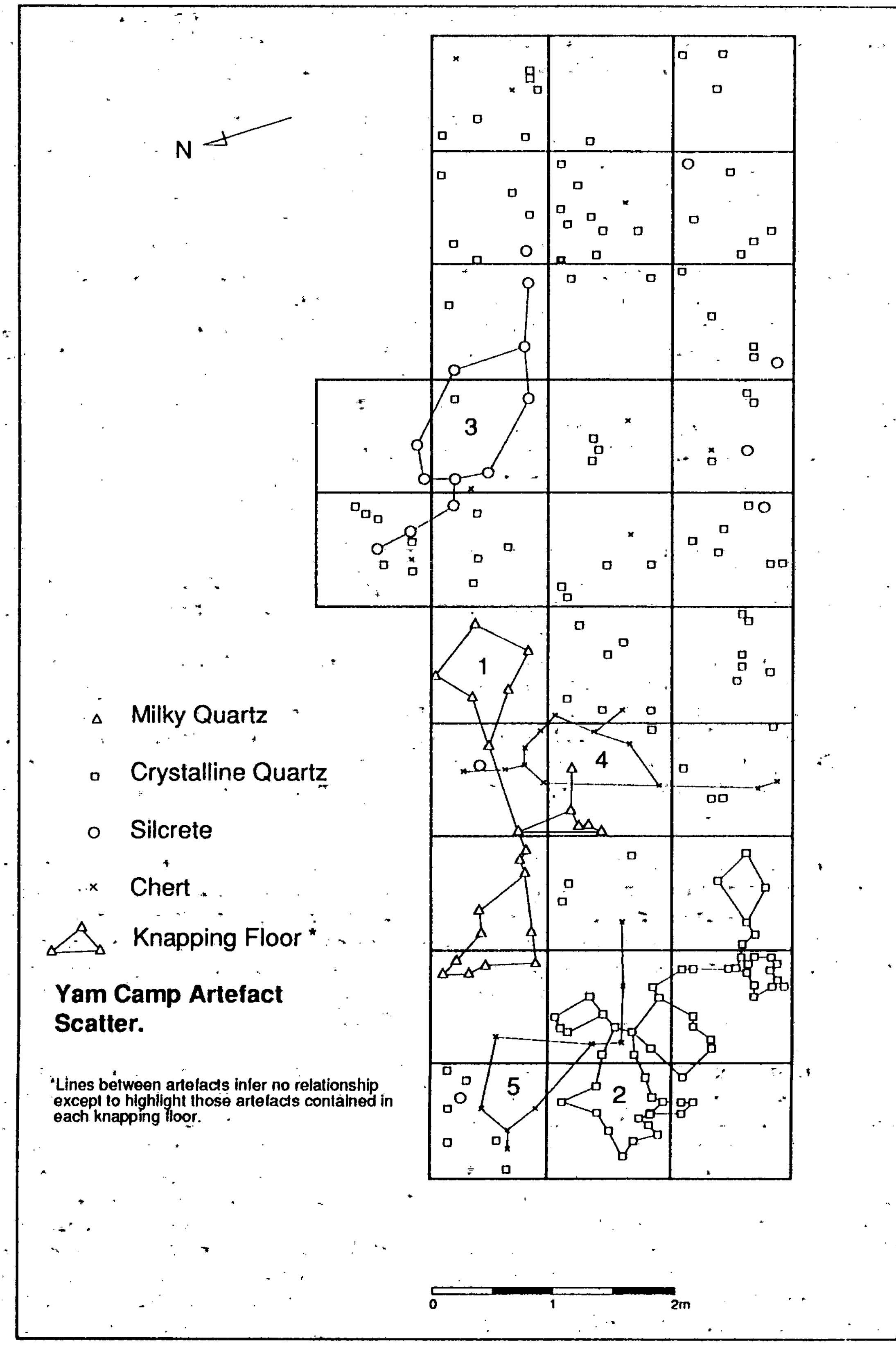

Figure 2. Site plan of the Yam Camp Artefact Scatter showing knapping floors isolated on the basis of spatial association of artefacts of similar raw material type and reduction technology.

Knapping Floor 1.

This knapping floor (Figure 2) comprised debris from the reduction of one milky quartz cobble approximately 80 x 100mm in size. This was split into two cores and the exposed surfaces used as striking platforms. There was no evidence of preparation but a small amount of rotation was evident on these cores. Twenty-one thin, broad flakes (on average 20x30mm) were struck from these cores using the bi-polar technique, producing few focalised platforms, pronounced bulbs of percussion and crushing around the striking platforms. Dorsal cortex was present on 82% of these flakes, perhaps indicating little economy of raw material use if one discounts removal from the site of flakes without cortex.

Knapping Floor 2

This crystalline quartz knapping floor (Figure 2) began with two cobbles (approx. 130 x 140mm in size) being split in two. A pronounced cleavage in this raw material was used to aid the knapping process; flakes were stuck in the preferred direction of fracture. Again these cores showed no evidence of preparation, but exhibited a small amount of rotation. Low-angled blows produced 51 broad, thick flakes and flaked pieces (20 x 50mm on average) with few focalised platforms or pronounced bulbs of percussion and a high proportion of dorsal cortex.

Knapping Floor 3.

This single isolated quartzite knapping floor (Figure 2) was based on the reduction of one coarse-grained cobble approximately 140 x 160mm in size. The cobble was split in half enabling the flat surfaces thus produced to be used as striking platforms. A small amount of overhang removal was evident on these cores. High-angled blows to these produced 10 broad, thin flakes (30 x 50mm [av.] in size). These exhibited broad striking platforms and pronounced bulbs of percussion. Several also exhibited dorsal flake scars and retouch on multiple margins.

Knapping Floor 4.

Knapping Floor 4 (Figure 2) was formed by the reduction of two small chert pebbles approximately 80 x 90mm in size. These were split to produce a flat striking platform. They display overhang removal, suggesting an attempt to increase the efficiency of flaking (i.e. involving less waste of raw material). This fact was also evident on the 11 flakes struck from these cores which were made by high-angled blows which produced focalised platforms and pronounced bulbs of percussion on thin, broad flakes (on average 20 x 30mm in size). Only 38% of these flakes exhibited dorsal cortex. A small proportion also showed retouch on several margins.

Knapping Floor 5

This knapping floor involved the reduction of one small (60x100mm) sub-prismatic chert pebble (Figure 2). Some evidence for a non-bipolar use of an anvil to support the core is indicated by the absence of pronounced bulbs of percussion, a common result of this technique. Knapping produced seven small artefacts (10x30mm av.) defined by Hiscock (1979b:82) as small blades.

It is clear from these results that different knapping strategies and economy of use were employed for different raw materials at this site. Quartz is the most abundant raw material on the site (Table 1) and was knapped using either the bipolar strategy for milky quartz or the split-cobble strategy for crystalline quartz. Quartzite was also knapped using the split-cobble strategy. Chert was knapped using either this strategy or the non-bipolar use of an anvil to support the core for the production of small blades. Preparation was most evident on the chert cores and flakes, possibly pointing to attempts to increase the efficiency of use of this raw material.

Table 1. Comparisons of proportions of raw material content between Yam Camp open site and rockshelter assemblages, based on the three major raw materials represented.

	CHERT	QUARTZ	QUARTZITE
Open Site			
Number	28	172	22
%	13	77	10
Rockshelter (Spits 1-6)			
Number	16	117	16
%	11	79	10
(Spits 7-18)*			
Number	0	14	6
%	0	70	30

* Combined to facilitate analysis.

Yam Camp Rockshelter

Yam Camp Rockshelter is an overhang created by the the fall of a massive sandstone block collapsed from a scarp above the artefact scatter. This large site (24 x 10m) contained rich occupation deposits, 10 areas of grinding, bark burials in sandstone tunnels, paintings and deeply patinated, pecked engravings similar to the main art panel at Early Man Rockshelter (Rosenfeld et. al. 1981).

The site was excavated using the now standard archaeological procedures advocated by Johnson (1979) whereby each $1m^2$ of a 4x1m excavation trench was sub-divided into 500mm quadrants. Excavation was by bucket-spits or stratigraphic units, whichever was appropriate. The locations of all stone artefacts and bones larger than 20-30mm were recorded in three dimensions. The excavation yielded an assemblage of some 3000 artefacts. For the purposes of this analysis, a sample of 226 artefacts was taken from quadrant J5/a. This sample provided a comparable database to that of the open site artefact scatter. It was taken from the deepest section of the trench, this part being the richest in artefactual remains and exhibiting the best preservation of other classes of data such as organic remains.

A conjoin study of artefacts from quadrant J5/a (Huchet, In prep.) demonstrated minimal post-depositional movement of artefactual material within the deposits. The excellent organic preservation and absence of sorting of materials rules out the possibility of disturbance of the deposits by run-off or percolation. The artefactual assemblage comprised large (up to 80x90mm) chunky cores and flakes from the lower levels (Spits 7-18) which date to ~17000B.P. near the basal layer, at a depth of 80cm, and significantly higher numbers of smaller cores, flakes, blades and flaked pieces, produced by both bipolar and non-bipolar techniques, and some ground-edge axe fragments from the upper levels (Spits 1-6) dated to ~1000 b.p. at the base of spit 6 (Morwood 1990) (Table 2). In order of abundance, quartz, quartzite and chert were the major raw materials of this assemblage. The uppermost deposits were also rich in faunal and organic remains.

Table 2. Artefactual content of Yam Camp Rockshelter excavation quadrant J/5a. The dotted line divides levels 1 (Spits 1-6) and 2 (Spits 7-18) between which major technological changes occur.

SPIT	CHARCOAL (gm)	ORGANIC (gm)	BONE (gm)	STONE (gm)	STONE (n)	OCHRE (gm)
1	108.7	26.0	7.7	3.4	20	-
2	82.0	25.1	2.2	7.1	21	-
3	116.9	27.7	2.6	27.0	24	-
4	50.9	12.3	9.2	14.2	48	14.2
5	20.4	17.8	4.8	32.4	42	-
6	10.8	6.7	3.0	27.6	47	-
7	12.0	3.8	0.1	4.6	10	-
8	0.7	3.7	< 0.1	1.1	5	-
9	<0.1	5.7	-	0.1	1	-
10	0.3	5.5	-	-	-	-
11	<0.1	0.9	-	-	-	-
12	1.0	0.8	-	0.2	1	-
13	<0.1	-	-	31.1	4	-
14	0.1	<0.1	-	-	-	-
15	1.8	0.1	-	-	-	-
16	0.1	4.3	0.1	2.4	2	-
17	1.3	0.5	-	-	-	-
18	0.1	0.3	-	0.2	1	-

Analysis of this material aimed at isolating those technological aspects of the sequence capable of demonstrating changes in the way the occupants of the site were using stone resources for flaking. These technological aspects were the same as those isolated in the analysis of the open site assemblage and included changes in raw material use and in artefact size and morphology.

Raw material use was found to be relatively constant throughout the sequence (Figure 3). Quartz was the most frequently exploited raw material, followed by quartzite, then chert. Others such as volcanic and sedimentary materials were exploited less frequently. However, the introduction of chert, at the expense of quartzite, is evident in the upper part of the sequence (i.e. Spits 1-6) (Figure 3 and Table 1).

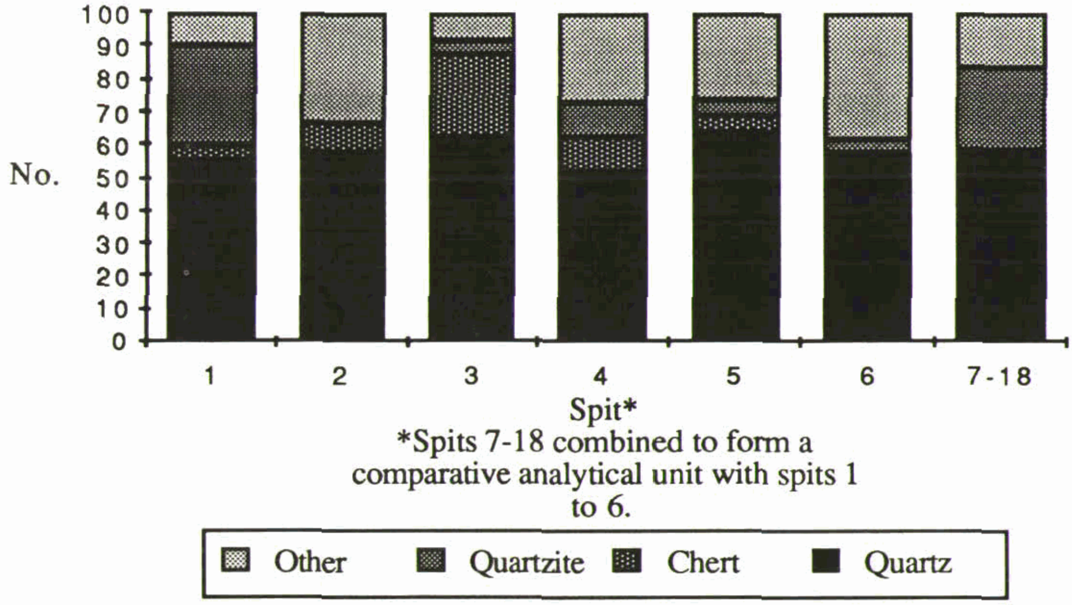

Figure 3. Histogram of the absolute proportions of artefact raw materials from yam Camp Rockshelter excavation quadrant J/5a.

A general trend towards smaller artefact size in all raw materials was also evident in the upper part of the sequence (Figure 4). This is less marked in quartzite artefacts, but is more evident in chert artefacts and, to a lesser degree, in quartz artefacts. This trend is paralleled by the introduction of small blades in the upper part of the sequence (Spits 3 and 5) (Figure 5). Similar trends were identified in the stone artefact sequences at Mushroom Rock Shelter (Wright 1971a), Early Man Rockshelter (Rosenfeld et. al. 1981) and Green Ant and Echidna Rockshelters (Flood and Horsfall 1986), suggesting that the Yam Camp sequence may be part of a regional trend.

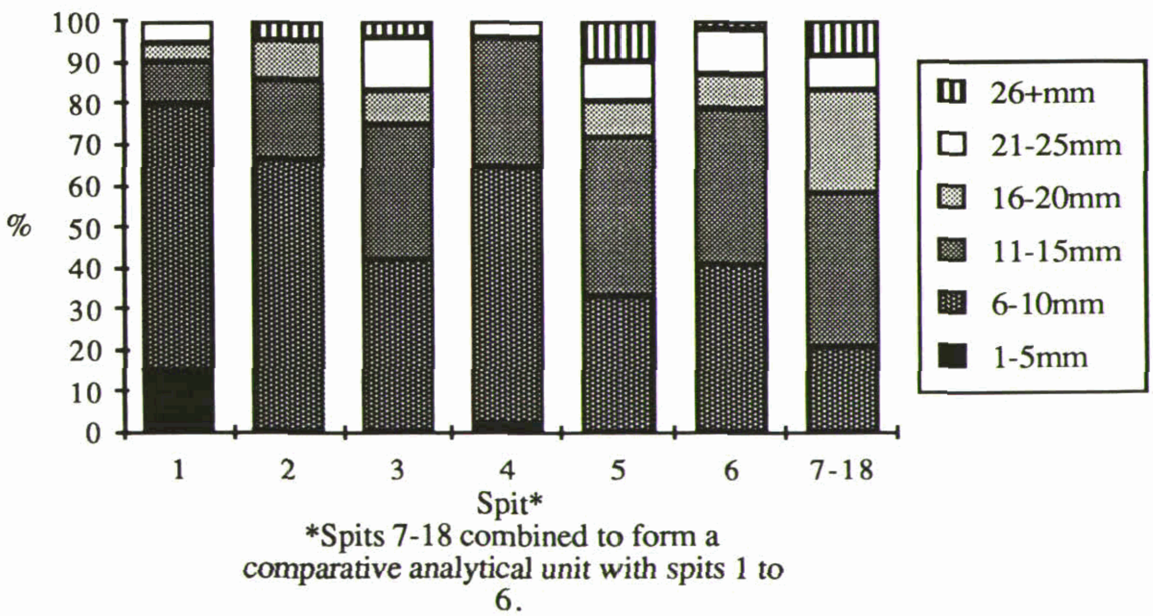

Figure 4. Histogram of the relative proportions of artefact sizes (by percentage) through the Yam Camp Rockshelter J/5a sequence (after Huchet, in Press).

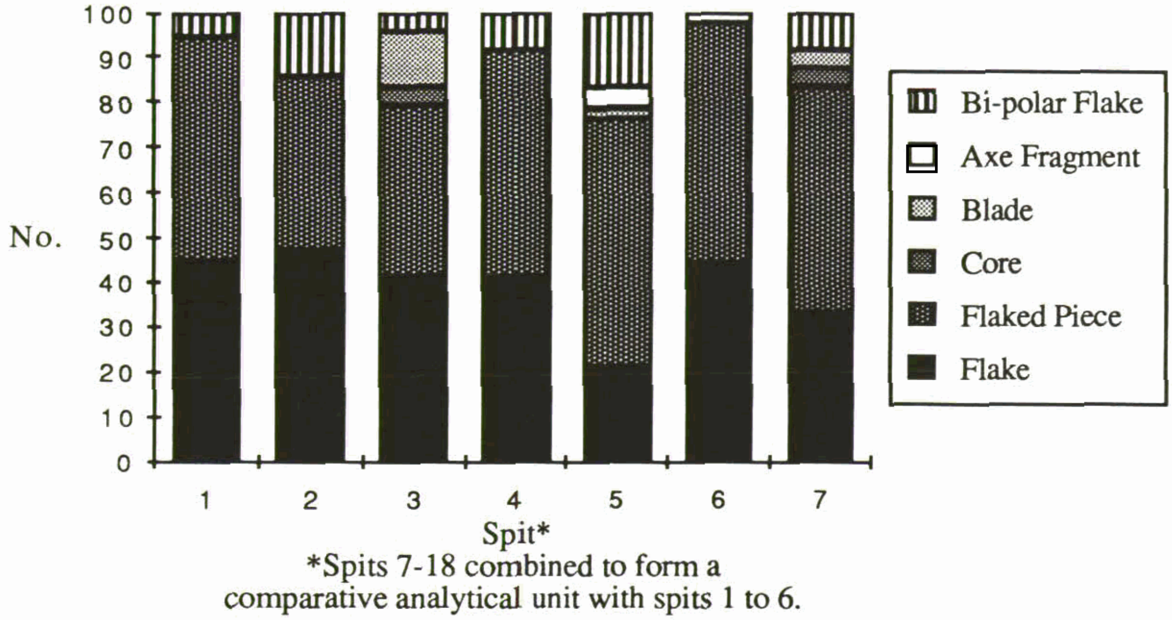

Figure 5. Histogram of the absolute proportions of various artefact classes through the Yam Camp Rockshelter J/5a sequence.

Thus, attributes of the stone artefact assemblage from level 1 (Spits 1-6) of the rockshelter deposits conform closely to those elements of the open site assemblage. Most notably this accordance is observable in the proportions of raw material content and the presence of a similar small blade knapping technology. Two implications are derived from these data:

1. Elements of the open site assemblage can be relatively dated on the basis of the technological attributes noted above. More generally, technological attributes found to be chronologically significant in rockshelter sequences have the potential to relatively date open sites. However, many methodological, environmental, archaeological and cultural factors must be understood and controlled for before such may be achieved accurately and over large areas. See Hiscock (1989) for a full discussion of these factors.

2. The close correspondence in stone artefact technology between an open site and a rockshelter site means that the emphasis by previous investigators of stone artefact assemblages from rockshelters only, has not necessarily biased the reconstruction of the S.E. Cape York prehistoric occupation sequence. Had the technologies in the different types of sites showed marked variation, then, by over-emphasizing technological adaptations represented in one site type, the prehistoric sequence constructed would not be truly representative. However, if - as has been shown in this case - the technologies in the different types of sites are similar, then emphasis on investigation of rockshelter sequences will not unduly affect the accuracy of the resulting prehistoric sequence. This point is also being demonstrated in other areas by other researchers; see for example the work of Hall and Hiscock (1989) in southeast Queensland. It is noted however, that this statement applies only in some respects; it may not hold for prehistoric economic reconstruction.

DISCUSSION

Thus far, interpretation of the archaeological record in the region has been limited owing to the difficulty of integrating data from surface sites into chronological sequences derived from stratified sites. Surface sites have been recorded by researchers such as Lilley (1986), but their full potential for prehistoric reconstruction has not yet been realized. This paper has demonstrated a technological approach by which surface site assemblages may be integrated chronologically with stratified artefactual assemblages and this potential realized.

A similar approach has also been taken by Hiscock (1986; 1989), who advocated this technological approach to analysis and dating of open site assemblages over those typological approaches adopted previously in Australian archaeology. In the latter,

> "...distinctive implement types are employed as temporal markers... A number of researchers have argued that by their very nature, these complex forms of implements may be subject to resharpening and reshaping during their use by prehistoric people and that their distinctive features are not immutable but dependent on the context in which they were discarded (e.g. Flenniken 1985). Accordingly, implement typologies can only form the basis of a dating system when it has been demonstrated that they are robust, in the sense that they are unresponsive to change in function, context or raw material" (Hiscock 1989:115).

Technological approaches to analyzing open site assemblage content as an indicator of antiquity, such as that presented in this paper, have the potential to deal with these issues in several ways. Hiscock (1989:116) argues that any system of open site artefact assemblage analysis and dating must be applicable to a large number of sites in the region for which it is designed. Where these have been subject to the activities of collectors or where artefact "types" are not present or vary between sites, a typological approach will not satisfy this criterion. However, the technological approach taken in this paper has demonstrated that this criterion may be fulfilled without dependence upon the presence or absence of particular artefact types.

It is also clear that temporal markers must be robust in that inferences about the antiquity of open sites are not invalidated by small changes in such factors as site size and location or raw material form. This requires that the analytical system should not be based merely on rare artefact types, as it has been postulated that their distinctive features are not immutable and may depend on these factors. Ideally, the chronological sequence should be defined in terms of quantitative and qualitative differences among a number of variables (Hiscock 1989:116), as is the analysis herein.

Finally, the chronological sequence must measure all phases of technology, not solely the final phase represented by discarded retouched implements (Hiscock 1989:116). By not focusing on the final stage of technology represented by recognizable "types", as would a typological analysis, the variables employed in the analysis of the Yam Camp assemblages allow a fuller description of the entire reduction system present.

CONCLUSION

Previous analyses in the S.E. Cape York Peninsula area have been typological in approach. While these have yielded much information on the antiquity of occupation of the area and have identified major changes in stone artefact range, the results are difficult to interpret specifically with respect to prehistoric human behaviour.

In contrast, technological analyses such as that presented in this paper do not require assumptions about the nature of the assemblage being analysed and can therefore circumvent the difficulties encountered by typological analyses when these assumptions are not justified. Thus, technological analyses offer much potential for elucidating behavioural changes alluded to by the results of more formal analyses in S.E. Cape York Peninsula. Such behavioural changes may then have significance for discussions of some of the more general issues being debated in the literature on Australian prehistory, such as the evidence for late Holocene changes in the Australian prehistoric sequence (Beaton 1985; Lourandos 1985).

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