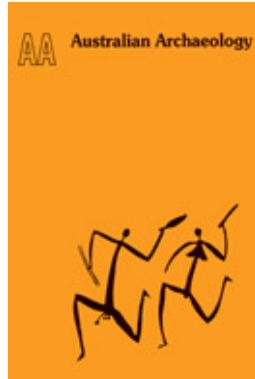


## Australian Archaeology



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PLEISTOCENE ARCHAEOLOGY IN THE FLINDERS RANGE:  
RESEARCH PROSPECTS

R.J. Lampert and P.J. Hughes

INTRODUCTION

Our research in the Flinders Range is aimed at extending northward the earlier work by Lampert (1977, 1979, forthcoming), that was directed mainly towards the prehistory of Kangaroo Island and adjacent parts of the South Australian mainland. In that region the early stone industry is known as the Kartan. Presumably Pleistocene in origin, it is characterised by a predominance of heavy core tools, while steep-edged scrapers made on flakes constitute a relatively minor element compared with early industries found elsewhere in Australia. Because of this difference, the Kartan is seen by Lampert as a regional variant of the Australian core tool and scraper tradition. Claims by Cooper (1943) for the presence of the Kartan industry at widespread sites in the Flinders Range prompted our investigation of the region.

Found on Kangaroo Island and the adjacent mainland only on surface sites, the Kartan has not been directly dated. It must at the very least pre-date the separation of Kangaroo Island from the mainland some 9500 years ago; it seems almost as certainly older than the upper level of Seton Cave (ca. 11,000BP) and is possibly older than the lower level at that site (ca. 16,000BP). Hints of greater antiquity are given by the presence on Kangaroo Island of waisted tools that are similar in some respects to waisted blades found at early sites in New Guinea and as far afield as mainland Southeast Asia; also by the predominance of heavy core tools in the industry when Australian core tool and scraper industries generally show an evolutionary trend towards lighter and more varied tool forms. (The above arguments are developed more fully elsewhere - Lampert 1979 and forthcoming.)

More accurate dating has so far eluded investigation because the industry has never been found in a stratified context. This may be due partly to the nature of the soils on Kangaroo Island, where earlier research was concentrated. Soils on the Kangaroo Island plateau are shallow and have hardly deepened at all during the time that Australia has been occupied by people (cf. Northcote 1946:296). Soils in lower-lying areas, though often deeper and more recent, are rarely dissected to reveal earlier, deeper strata.

In the arid northern Flinders Range however, the Quaternary was a time of much more marked cyclic erosion and deposition. In late Pleistocene times, massive alluvial fans and valley fills, often several metres thick, accumulated at the foot of the range. Between phases of deposition, periods of stability allowed soils to develop on the fans. In some places these early soil horizons have been exposed by downcutting of streams. Some have been dated to within the known time-span of human occupation of Australia. Sand dunes,

built up on the fans at a later stage, also developed palaeosols that have since been exposed by erosion. Phases of alluvial and aeolian deposition, soil formation and dissection have been linked over a wide area of the Flinders Range between Lake Torrens to the west and Lake Frome to the east. The phases of erosion and deposition have been explained as resulting from climatic changes although the mechanisms involved are a matter of debate. The consistency of radiocarbon dates for several morphologically and stratigraphically distinctive deposits and palaeosols supports the view that widespread regional phenomena were involved, whether or not they were due to climatic factors.

Because there are numerous exposures of deposits and palaeosols of the right age, the northern Flinders Range has excellent potential for research into early prehistory. Moreover, the discovery at several sites of large core tools accompanied by, at most, only a few flake tools raises the possibility of the Kartan industry being present here as well as further south (cf. Cooper 1943). The situation thus looks to be a promising one to answer not only questions of Pleistocene occupation of arid environments but those still outstanding about the Kartan, notably its dating and associations.

However, caution is urged in using the preliminary field results described below for two reasons. The stratigraphic, dating and palaeoenvironmental interpretations of the various sediments, palaeosols and landforms have arisen out of geological and geomorphological research aimed primarily at elucidating regional events. Because of this, detailed descriptions of type sections are usually not wholly applicable to the interpretation of specific localities of archaeological interest. The tentative correlations we make below with regional stratigraphy and chronology are put forward as working hypotheses to be tested by future research, in which dating of the sediments and palaeosols within the site areas themselves is seen as essential. Secondly, those industries in which core tools seem to predominate should not be accepted unquestionably as Kartan at this stage. Again we are putting forward a working hypothesis to be tested by better sampling and typological comparisons.

#### RECONNAISSANCES IN 1979

In conjunction with fieldwork elsewhere, three short reconnaissances were made of the region, the first in July by Lampert, the second in October by Lampert and Hughes and the third in December by Hughes and M.E. Sullivan. Several sites of archaeological potential at which future research is planned were discovered (Fig.1). These, and other sites of interest, are described below.

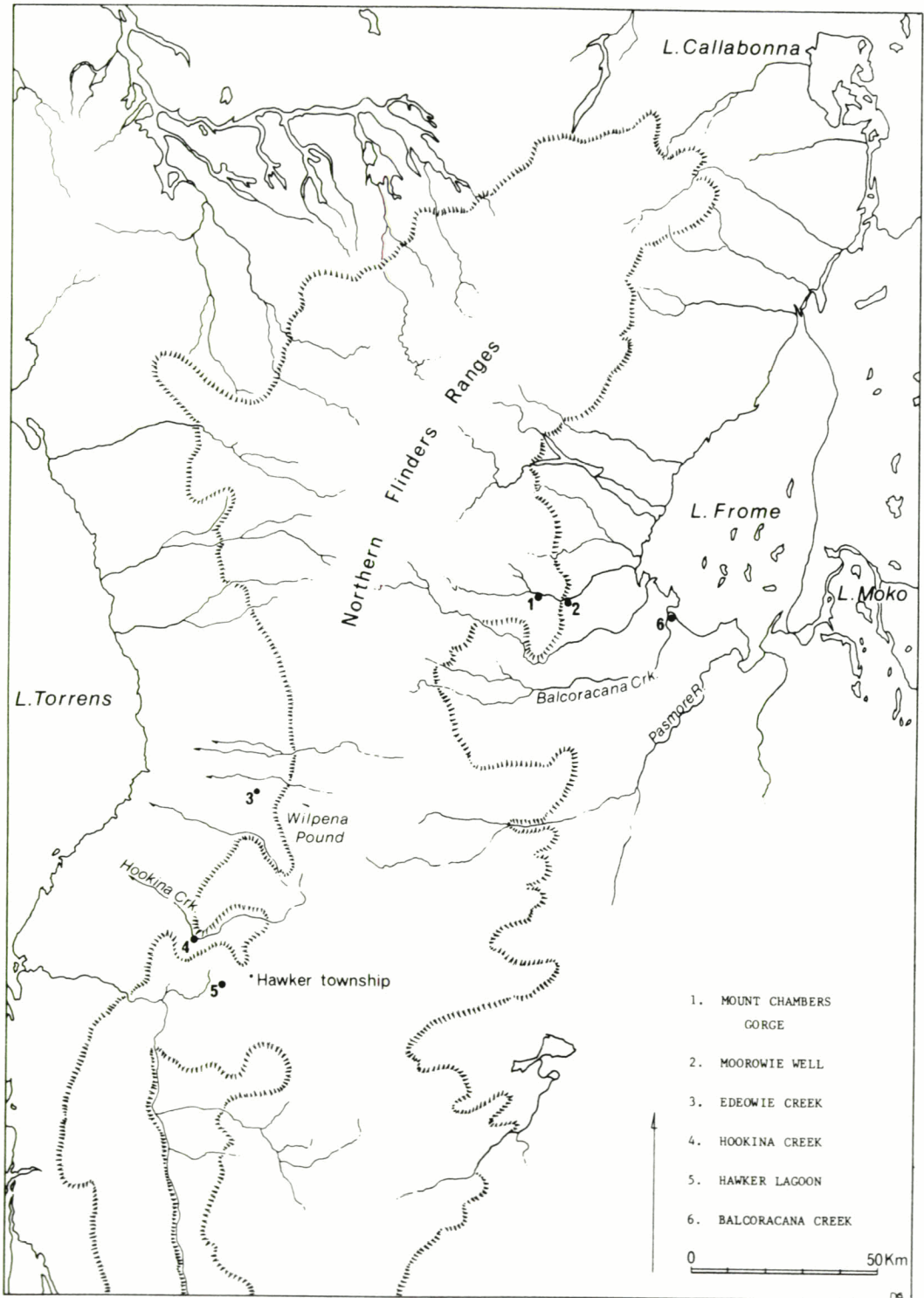


Figure 1

## SURFACE SITES WITH POSSIBLE KARTAN AFFILIATIONS

### Mount Chambers Gorge

This surface site is on slopes above Mount Chambers Creek not far from the well known rock engravings. In two locations about 200m apart a total of 25 core tools, made on blocks of reddish brown quartzite, one trimming flake and six waste flakes were seen. Because this area is sacred to Aborigines further research will involve inspection of the industry in situ, with no collecting or any other disturbance of the site.

### Moorowie Well

This surface site is on a hillslope above the downstream end of Mount Chambers Gorge. Stone tools were found among limestone rocks on the talus slope but not on the surface of the alluvial fan extending downstream of the gorge, which is young. Nine core tools and two waste flakes were found, all made on blocks of reddish brown quartzite. In size and shape they range from heavy horsehoof series tools to smaller and more irregularly shaped blocks.

## OTHER SURFACE SITES

### Edeowie Creek

To the south and west of Edeowie Creek on the western footslopes of the range below Wilpena Pound there are numerous large red dunes. The crests of these dunes have been severely eroded to expose calcareous palaeosols. We examined a number of these exposures and in every case found extensive scatters of artefacts lying on the eroded surfaces. Although we examined many hundreds of these artefacts none were found in or below the palaeosol, nor were any of those on the surface coated with carbonate. We therefore conclude that all this material is a lag deposit derived originally from the overlying loose red sand.

The local stratigraphy can tentatively be linked to the regional sequence proposed by Williams (1973). The dunefield rests on an extensive fan of the Pooraka Formation (see below) and the dunes themselves probably belong to the widespread dune building phase of the Lake Torrens Formation (ca. 20,000-16,000BP). The palaeosol on which the artefacts lie is taken to be equivalent to the Motpena palaeosol (ca. 12,000BP). By this reasoning we take the maximum age of the artefacts to be ca. 20,000-16,000BP.

The industry at these dune sites consists of core and flake tools, with the core tools being at least equalled in number both by flake tools and by multidirectional cores, and greatly exceeded by unmodified flakes. Core tools are of a fairly coarse grained white quartzite while flake tools, multidirectional cores and unmodified flakes are of fine grained siliceous rock such as silcrete, quartzite and chert, all of which are locally available. One burren adze and several other possible non-tula adzes (cf. Lampert 1977) were seen, but such characteristic small tools as the pirri, the

tula and backed blades are notably absent, as are fragments of grindstone.

In combination, the site stratigraphy and tool typology are consistent with a terminal Pleistocene or early Holocene age.

## STRATIFIED SITES

### Hookina Creek

Hookina Creek rises in the Flinders Range to the north of Hawker township. After flowing about 25km southwest it turns northwest to cross the footslopes of the range and to flood out in the sand plain to the east of Lake Torrens. Where it crosses the footslopes, the creek is entrenched up to 10m into a Pleistocene alluvial valley fill. This fill is included by Williams (1973) in the Pooraka Formation, an extensive and thick complex of fans and valley fills that occurs along the entire western margin of the Flinders and Mount Lofty Ranges. Radiocarbon dates indicate that sedimentation began before 38,000BP and continued up to about 30,000BP. A calcareous palaeosol, called the Wilkatana palaeosol and which is commonly up to 2m thick, developed on the Pooraka Formation sometime between 30,000 and 24,000BP.

The remains of extinct marsupials have been recovered from the Pooraka Formation in Hookina Creek and this sedimentary sequence and its contained fauna are currently being studied by D. Williams of Flinders University. The banks of the entrenched 25km section of the creek and its tributaries have been extensively eroded and there is excellent exposure of both the palaeosol and of the underlying sediments.

During our examination of a very small area of the exposed sediments at Hookina Creek a fractured quartzite pebble was seen in the Wilkatana palaeosol about 1m below the present surface of the Pooraka Formation. At least three-quarters embedded and coated all over with flecks of carbonate, the pebble was unquestionably in situ. The quartzite is too coarse to permit easy interpretation of the fracture, but an edge appears to have been formed by removal of two adjacent large flakes. In an undoubted archaeological context it would probably be accepted without question as either a core or a core tool, but given as yet the absence of associated archaeological material and the high antiquity of the deposit (greater than 30,000BP), we feel that further investigation is needed to test its authenticity.

### Hawker Lagoon

The site extends around the margins of a seasonal swamp at the head of a narrow, steep-sided north-south trending valley to the south of Hawker township. Colluvial, alluvial and aeolian deposits surrounding the swamp (which is roughly 1km across and 3km long) have eroded in many places to expose as surface scatters many thousands of stone artefacts.

The stratigraphy and surface morphology of these deposits is complex. Along the western margin of the swamp three main strata are exposed. Unit 1, the uppermost unit, is an irregular sheet of loose pale brown to red sand that is probably very young. Below this is Unit 2, up to 1m thick, which consists of moderately to well indurated red sand with massive tabular sheets of carbonate in the upper 50cm. This red aeolian sand is tentatively correlated with William's (1973) Lake Torrens Formation (20,000 to 16,000BP) and the tabular carbonate palaeosol with the Motpena palaeosol (12,000BP).

The lowest unit, Unit 3, is a weathered clayey sand with some fine gravel and is taken to be colluvium at the toe of one of the many fans that mantle the lower footslopes of the valley. This unit has a well developed palaeosol with abundant carbonate nodules and carbonate encrusted root channels. In all respects Unit 3 and its palaeosol closely resembles the Pooraka Formation (greater than 38,000-ca. 30,000BP) and its associated Wilkatana palaeosol (30,000-24,000BP) as exposed to the west along Hookina Creek and is accordingly tentatively correlated with that sequence.

Along the eastern margin of the swamp the dominant landscape feature is a number of large red dunes with poorly developed tabular carbonate palaeosols exposed near their crests. These dunes, which are equated with Unit 2 on the western side of the valley, also overlie fan deposits but the latter are poorly exposed. The greater development of dunes on the eastern margin of the swamp is consistent with their downward location.

In the main, the stone industry is like that already described for Edeowie Creek with core tools of the horsehoof series, flake tools (scrapers), multidirectional cores and abundant flakes. Only two burren adzes and one geometric microlith were seen among many thousands of pieces of flaked stone, while grindstone fragments appear to be completely absent. As at Edeowie Creek, core tools are on fairly coarse grained quartzite and most flake tools, multidirectional cores and flakes on fine grained siliceous stone.

Unit 1 is not thought to be a reliable provenance because its sands appear to be frequently mobile. In Unit 2, four flakes protruding from a vertical section seemed to be in situ. In Unit 3, a large core tool was found about two-thirds embedded in a horizontal surface. Because it was firmly embedded in hard, carbonate-flecked clayey sand, and because carbonate encrusted its buried surface, the tool was, as far as we could judge, in situ. We had questioned this at first because of the absence of carbonate on the exposed part of the tool. However, during the later examination of several vertical sections through carbonate soil horizons elsewhere, we noted that carbonate was commonly absent from the exposed parts of naturally deposited pebbles even though their buried surfaces were carbonate encrusted. Presumably the exposed surfaces had been coated too but the carbonate was removed by weathering.

The assemblage at Hawker Lagoon appears to be a mixed one derived from the deposition of artefacts during varying ages, as is shown by the in situ examples within soil units 2 and 3. Because of the deeply weathered strata, the core tool in Unit 3 must have reasonable antiquity whether or not the palaeosol in which it lay is the Wilkatana, while the presence of a geometric microlith suggests that the site was occupied also within the past 5000 years. However the bulk of the flaked stone is of the same core tool/flake scraper combination noted at Edeowie Creek, for which a terminal Pleistocene

to early Holocene age was suggested.

#### Balcoracana Creek

The southeast bank of this creek near its mouth has been deeply eroded to expose a complex sequence of Pleistocene and Tertiary sediments. At one point along the bank artefacts lie scattered on an exposed carbonate palaeosol, while a few others rest on loose sand overlying the palaeosol. By comparison of the stratigraphy of the sediments at this site with those at type sections we visited at Lake Moko and Passmore River to the west as described by Callen (Callen and Tedford 1976; Callen, Wasson and Gillespie 1980) we deduce the stratigraphic sequence to be as shown schematically in Figure 2.

The surface on which most of the artefacts lie has formed by erosion of the upper part of the Coonarbine Formation down to a well developed palaeosol which probably formed more than 20,000 years ago. Because many of the artefacts at this site are thickly coated with carbonate, but very little carbonate appears in the sand overlying the palaeosol, these artefacts must almost certainly have eroded from the palaeosol. However, other tools are entirely without carbonate and some lie on loose sand covering the palaeosol, indicating that later artefacts are also present.

In trying to deduce the original stratigraphic position of each piece of stone we have considered two lines of evidence: (a) whether the artefact lies directly on the palaeosol, and (b) whether or not the artefact is coated with carbonate. Counts were made of the principal artefact types without actually collecting the material. This is not a wholly accurate method but is suitable for making an initial appraisal of the site. For each type of artefact the number of examples falling into the four categories is listed in Table 1. Those artefacts listed in column A we believe originated from the palaeosol; those in B are either from the palaeosol or from the more recent sand above; those under C are from the more recent sand; those in D must have been moved up onto the loose sand, perhaps very recently.



Figure 2: Balcoracana Creek: a schematic view of the stratigraphy of the site and the location of the stone artefacts in relation to the stratigraphic units

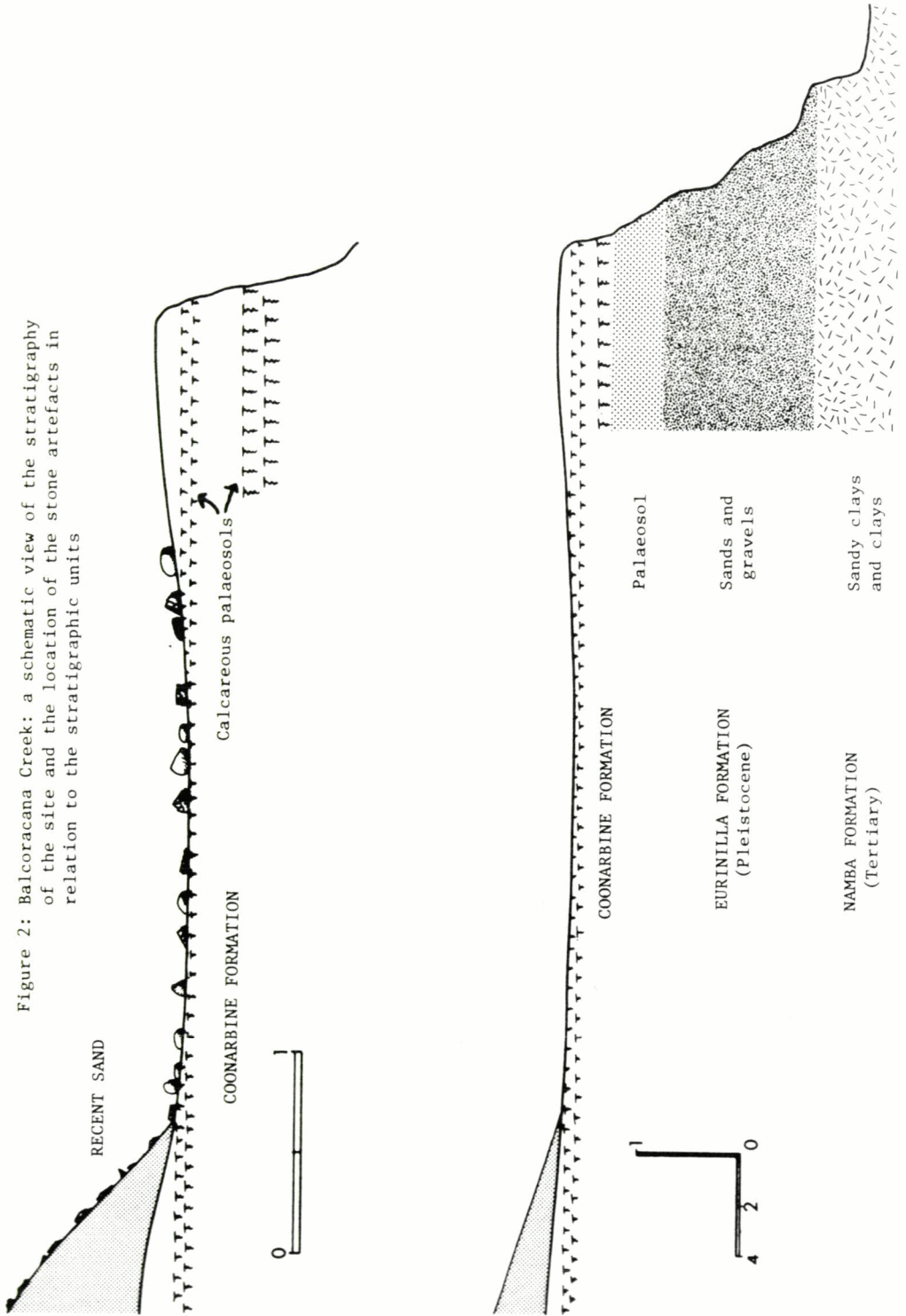


Table 1: Artefact types at Balcoracana Creek

Type of artefact	A		B		C		D	
	On Palaeosol				On sand above			
	With carbonate		Without carbonate		Without carbonate		With carbonate	
Pebble tool	13		1					
Horsehoof core tool	2							
Steep-edged scraper	2		1					
Hammerstone	2							
Pebble (manuport)	18		3		1			2
Flake	9		13		6			
Core	3		3		2			1
Flaked quartz piece	1		many		many			
Tula (slug)					1			
Non-tula adze?			2					

The following points are significant. Of the 16 core tools, carbonate is absent from only one, and all lie directly on the carbonate palaeosol. Similarly, the three steep-edged scrapers all lie on the eroded palaeosol and carbonate is present on two. However, the single tula - a distinctive marker of the small tool tradition - was found on the loose sand well above the palaeosol and had no carbonate adhering to it. Two possible non-tula adzes were found on the palaeosol but without carbonate adhering to them.

Two industrial traditions thus appear to be represented: an early core tool and steep-edged scraper industry dating back to the age of the sandy sediment in which the palaeosol formed and therefore likely to be older than 20,000 years, and a later small tool industry continuing to within the last 5000 years. Among core tool and scraper implements, the predominance of core tools suggests the industry could be related closely to the Kartan. However, the sample is small and has not yet been studied adequately.

## CONCLUSION

In addition to the sites described here, we visited a number of other localities with late Pleistocene deposits or land surfaces exposed where nothing of archaeological interest was found. In many cases this may simply be because of the cursory nature of these visits and these localities might repay more detailed investigation. We have demonstrated that in the northern Flinders Range and along creeks near the shores of Lake Frome there are sites of at least reasonable antiquity, some of which have artefacts in situ in Pleistocene deposits. There is the promise that some sites date back beyond, and in some cases well beyond, 20,000BP and the tools they contain could be a local expression of the Kartan industry. However further investigation is needed to test these tentative conclusions.

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