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PLEISTOCENE OCCUPATION OF THE ARID ZONE IN SOUTHEAST AUSTRALIA: RESEARCH PROSPECTS FOR THE COOPER CREEK-STRZELECKI DESERT REGION

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INTRODUCTION

Archaeological evidence for the presence of people in southeastern Australia as early as 40,000 years ago in environments substantially different from the Southeast Asian homeland of the initial colonists of Greater Australia has generated much discussion on when and how this remarkable feat of colonisation took place, and what was the nature and pace of adjustment of the early colonists to this new continent (see for example Bowdler 1976; Jones 1979; White and O'Connell 1979). Tied in with this discussion are questions of whether there was one group of colonists or several (see Thorne 1971, 1977), and to what extent they transformed the landscape through their impact on the fauna, flora and landforming processes.

Archaeological evidence from the Willandra Lakes and Darling Rivers regions clearly demonstrates an early adjustment to an inland freshwater riverine-lacustrine environment but it is unknown whether early settlers penetrated further inland to the now semi-arid and arid interior of the continent.

Apace with archaeological research into the history of Pleistocene occupation of Australia, palaeoenvironmental studies, notably by Bowler and his associates, has advanced to a level where it is now possible to broadly reconstruct with confidence the late Quaternary environmental history of the semi-arid zone in the southeastern part of Australia (see Bowler 1975, 1976; Bowler et al 1976). In contrast, firm palaeoenvironmental evidence for the arid zone has not been readily forthcoming. A number of research projects are under way in the Strzelecki Desert-Lake Frome regions which are likely to remedy this situation over the next few years (see Callen 1980; Wasson 1978; Singh in press); in the meantime the best we can do is to extrapolate from the broad picture reconstructed for the semi-arid zone, and attempt to integrate this with locally derived evidence.

Paraphrasing Bowler (1976:57-59), availability of water is perhaps the most important single element in the complex of factors controlling variation in ecological systems. Therefore evidence of a palaeohydrological kind provides one of the best means of evaluating the stresses that have operated on both people and their environment in late Quaternary time. This is probably more true of the arid zone and its fringes than of any other ecological zone in Australia (see also Mabbutt 1971; Jones and Bowler in press). The following summary of late Quaternary environments in relation to the arid zone is therefore couched in hydrological terms and does not attempt to postulate what geomorphic changes may have taken place.

1. Before about 45,000BP temperature and hydrological regimes were probably very like those of today.

2. From this time the onset of wetter conditions heralded the begining of the last glacial maximum. Conditions remained wet (and cold) until around 26,000BP after which a trend toward aridity set in which accelerated from about 22,000 years onward.

3. From about 18,000 to about 15,000BP was a period of extreme aridity characterised by hot, dry, windy summers alternating with cold and probably dry winters. After 15,000BP the climate began to ameliorate slightly until by about 10,000BP conditions were essentially those of today.

One scenario that has been widely advanced by Quaternary researchers in Australia is that on entering this continent, probably before 50,000BP, people spread and adapted to the continent-wide range of physical environments, except perhaps for the driest parts of the arid core which between about 45,000 and 25,000 was itself probably very much reduced in size (see Bowler 1976:66-7; Jones 1979:455; Jones and Bowler in press). However with the change to marked aridity from say 22,000 years onwards, the now arid zone and its fringes may have dried up to such an extent that it became uninhabitable (Bowler 1976:72-3; Mabbutt 1971:76). With the climatic amelioration after about 15,000BP people not only re-settled these previously extremely arid areas but also colonised, perhaps for the first time, very low rainfall areas such as the Simpson, Strzelecki and Sturt's Stony Deserts.

Others would argue that people never effectively colonised arid parts of the continent until after the last major period of aridity. Bowdler (1976:230-1), for example, has suggested that we look to the period of climatic amelioration after 15,000BP for the emergence of what Gould (1971) has characterised as 'The Australian Desert Culture' It is from around this time that grindstones first appear in dated sites around the southeastern margin of the arid zone, suggesting the beginnings of grass-seed exploitation which was an important component in the economy of most desert Aboriginal groups at the time of European contact. However, a few Pleistocene sites have been reported from the now arid zone of Australia and its immediate fringes even though no one has searched systematically for such sites.

The archaeological remains from two such sites in Western Australia, the Greenough and Murchison Rivers (Fig.1), are thought to date from before 35,000 years although this remains to be conclusively demonstrated (Wyrwoll and Dortch 1978; Merrilees 1968; see also Jones 1979:453). If it is accepted that these age estimates are of the right order, conditions in that part of Western Australia were probably generally wetter than they are today. A putative Aboriginal fireplace near the level of the highest strandline of the now dry Lake Yantara in northwest New South Wales has been dated to around 26,000BP (Dury and Langford-Smith 1970:73). Again wetter conditions than those at present probably prevailed at that time. At Colless Creek in northwestern Queensland test excavations carried out by Phil Hughes and Ken Aplin in a dolomite shelter have revealed a sedimentary sequence rich in stone artefacts, bone and shell which on the basis of geomorphic and preliminary radiocarbon dating evidence is thought to extend back well before 20,000BP. This site

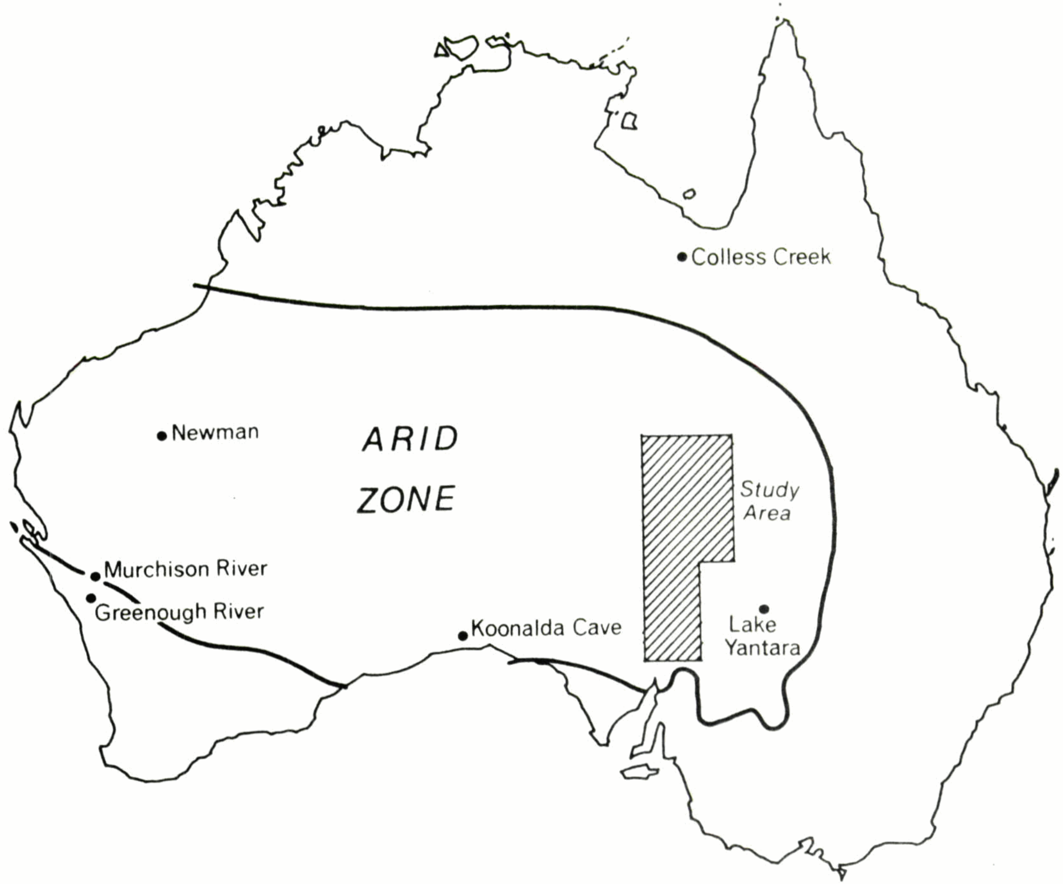
Colless Creek
Newman
ARID
ZONE
Study Area
Murchison River
Greenough River
Koonalda Cave
Lake Yantara

Figure 1

lies within the semi-arid zone but in Pleistocene times the area must have experienced extremes of wet and dry.

Of greater interest are two sites that were in use around 20,000 years ago when conditions were presumably generally drier than today. These are Koonalda Cave on the Nullarbor Plain in South Australia, dating from around 20,000 to 24,000BP (Wright 1973), and a shelter site near Newman in the Pilbara region of Western Australia which has an occupation history extending back at least to 20,000BP (Maynard 1980). The evidence from these sites suggests that the Aboriginal occupants of these regions had already adapted to some extent to life in a truly arid environment.

With these considerations in mind, there are a number of good reasons why the Strzelecki Desert-Cooper Creek area should be a highly suitable place in which to begin systematically seeking evidence for Pleistocene occupation of the now arid zone of the southeastern part of the continent and its immediate semi-arid fringes.

1. The region is adjacent to that part of the semi-arid zone in New South Wales where considerable archaeological and palaeoenvironmental work relevant to this study has already been carried out. It is also adjacent to the Flinders Ranges-Lake Frome area where again relevant research, especially into palaeoenvironments, is now being undertaken.

2. The study area contains a wide range of arid zone environments including sand, stony and riverine desert (after Mabbutt 1968:72). Furthermore the region is one where there has been progressive buildup of aeolian, fluvial and perhaps lacustrine sediments throughout the Quaternary, making it likely that late Pleistocene deposits containing archaeological materials will have been preserved and, because of widespread though patchy fluvial and aeolian erosion, re-exposed.

3. Although the Quaternary history of this region is as yet poorly understood, the indications are that it underwent pronounced environmental changes during the time span of human occupation of this continent. This in turn means that it might prove possible to reconstruct from the archaeological and environmental evidence the patterns of exploitation of, and adaptation to, the changing late Pleistocene landscape.

4. Throughout the late Pleistocene, Cooper Creek would have provided a corridor of at least intermittently well-watered land which would have provided a favourable route for people to have moved along southwest then west from the headwaters of the drainage system. It would also have provided a refuge in times of drought throughout all but the very driest of late Pleistocene times.

5. Finally Bob Wasson, Department of Biogeography and Geomorphology at ANU, is carrying out a comprehensive study of the late Pleistocene geomorphic and environmental history of the region, and it is within the detailed framework which his reconstruction of palaeoenvironments and landscapes hopefully will provide that the archaeological evidence can best be interpreted.

THE STUDY AREA

This region has a very hot dry desert climate with short cool to cold winters and extremely low and unreliable rainfall (Laut *et al.* 1977). There is little variation in climate across the region due to its inland location and the lack of major orographic controls. The rainfall increases slightly to the east and north from around 125mm per annum in the core of the desert to about 160mm at Nappa Merrie in Queensland. Mean annual potential evaporation is extremely high at between 3500 and 4000mm.

The region can be divided into three major environmental zones (Figs 2 and 3) which broadly correspond to the environmental associations described and mapped by Laut *et al.* (1977).

1. The bedrock confined reach of Cooper Creek between Innamincka and Nappa Merrie (the Merninie environmental association (8. 4. 3))

2. The floodout zone of Cooper Creek to the west of Innamincka (the Cooper Creek environmental association (8. 4. 4))

3. The Strzelecki Desert dune field (the Strzelecki Desert environmental association (8. 4. 2)).

Upstream of Innamincka the course of Cooper Creek is structurally controlled in that it flows along the east-west axis of the Cooper Creek syncline. Because of this, the stream is confined within a narrow floodplain by gently undulating gibber plains and low silcrete-capped rises to the north and south. The most characteristic feature of this reach is a series of permanent waterholes, commonly several kilometres long, cut in bedrock and/or alluvium up to 15m thick. Along both banks east-west trending dunes up to 15m high have formed. These dunes have a characteristic clayey sandy core capped with a layer of indurated sand which in turn is capped with loose sand. The history of these dunes is not known, however as they broadly resemble those in the Strzelecki dune field to the west we consider that they have a similar origin and age.

To the west of Innamincka, Cooper Creek periodically floods out into an extensive system of interconnected claypans and interdunal lows (or swales) in the northern part of the Strzelecki dune field. The extent of flooding is illustrated graphically in the satellite image reproduced in Figure 2 wherein the black areas represent water. Most of this area dries out rapidly after flooding; however some of the larger claypans retain fresh water for long periods (for example Coongie Lakes) and there are a number of semi-permanent waterholes along the distributary channels of Cooper Creek itself.

To the south of the floodout zone lies the major part of the Strzelecki Desert, an extensive field of north-south trending longitudinal dunes with numerous small claypans. The Desert is crossed by Strzelecki Creek which, although it floods much less frequently than Cooper Creek, maintains a number of semi-permanent waterholes.

Any reconstruction of what this region was like in late Quaternary times must necessarily be highly speculative. Nevertheless an attempt is made to do just this, if only to set up a working hypothesis on how and where field evidence might best be sought and then interpreted. In doing this we draw not only on the literature and our own field observations but on discussions with Bob Wasson.

The dune field, and alluvium of equivalent and younger age, everywhere rests either directly on Tertiary or older bedrock, including silcrete, or on gypseous sediments thought by Wopfner and Twidale (1967) to be Pleistocene in age but older than 40,000 years. This gypsite is taken to have accumulated on alluvial plains of low gradient under conditions of higher effective rainfall than today which permitted the existence of large freshwater and brackish swamps. Loffler and Sullivan (1979:240) have raised the possibility that the gypsite relates to a late stage in the evolution of their resurrected Lake Dieri. We suspect that the gypsite as defined by Wopfner and Twidale will eventually be shown to be considerably older than 40,000 years and possibly beyond the time span of human occupation of this continent.

The next readily identifiable sedimentary unit is a slightly indurated aeolian sand showing pronounced carbonate segregation. This sand seems to be very sporadically distributed and exposed in the study area but crops out much more extensively to the west where it is interpreted by Wopfner and Twidale (1967:131-2) as being an old dune system which, wherever they are in contact, always underlies the longitudinal dunes. The segregation of the carbonate is taken to have resulted from these ancestral dunes having been covered for a period with dense vegetation, presumably at a time of greater effective rainfall than at present. Such a period of stability and calcareous soil formation might well lie within the 45,000 to 26,000BP wetter period evidenced in the semi-arid fringes of this region.

The sand ridges of the dune field which dominate the present landscape have internal stratigraphies which record dune building episodes as outlined by Wasson (1978). At the simplest level, there appear to be two major components in many of the dunes; a somewhat indurated core of slightly clayey sand and a thin capping of loose sand which may have one or more indurated layers, especially towards its base. The history of these dunes is poorly understood. According to Bob Wasson the dune cores may well have accumulated during the period of extreme aridity from before 22,000BP until after 15,000BP in a manner analogous to the formation of the Zanci unit at Mungo (Bowler 1975). The loose sandy crests are thought to have accumulated in terminal Pleistocene or, more likely, early Holocene times.

What ever their age and palaeoenvironmental significance, with the onset of conditions similar to those of today the dunes largely stabilised and a regime of periodic flooding of Cooper Creek and the accumulation of alluvium in the floodplain, claypans and flood-prone swales was re-established.

Figure 2


Sturt Stony Desert
Sturt Stony Desert
Landsat Imagery
L Maroocutchanie
L Maroocoolcannie
Coongie L
Cartoonganie WH
Karawinnie WH
Sturt Stony Desert
Nappa Merrie
Cooper Ck
Callamurra WH
Innamincka
Queerbidie WH
Moomba
Cooper Ck
JSN
L Murteree
Merty Merty
Strzelecki Ck
L Blanche
Site
0
50 Km
Cobbler Hill

Figure 3

RECONNAISSANCE OF THE STUDY AREA

A reconnaissance of this area was planned by Hughes for late 1979. The main aim of this exercise was to become familiar with arid zone landforms and Pleistocene deposits rather than to systematically begin searching for Pleistocene archaeological sites. In the event this field trip was extended to include the Flinders Ranges-Lake Frome region where Lampert had just commenced a long-term research programme into Pleistocene archaeology. This more wide-ranging reconnaissance was carried out jointly by the authors in October 1979 and the findings for the Flinders Ranges-Lake Frome region are reported on in a separate paper (Lampert and Hughes 1980).

The bedrock confined stretch of Cooper Creek

On Nappa Merrie station in Queensland (Fig.3) on the north side of the creek a number of dunes whose flanks had been eroded by wind and water action to expose their clayey cores and cappings of indurated sand were observed. Several of these exposures were examined closely and others were given a cursory inspection. In all cases the eroded surfaces were littered with stone artefacts made largely from silcrete which everywhere is readily available either in outcrop or from gibbers on the high ground adjacent to the river. Included in the stone artefact scatters were flakes, cores, core tools and tools characteristic of the small tool tradition; also unmodified pieces of stone and hearth stones. Most of this material lay on the exposed indurated sand at the base of the loose sand and on the gently sloping aprons of the clayey cores. Very few pieces of stone were seen in situ in the exposed indurated core of the dunes (see below). However it was not clear whether the artefacts were being let down out of the overlying loose pale brown sand or whether they were originally lying on the surface of the indurated surface sand, that is that they had been deposited before the loose sand had accumulated. In order to resolve this a lm square test excavation was put down in the loose pale brown sandy flank of the easternmost dune we examined which lay about 2km east of the homestead and about 0.5-1.0km back from the river. Here the eroded flanks of the dune were littered with a particularly rich lag of artefacts, including numerous core tools, and the density was estimated to to be at least 10 pieces per square metre. The surface of the loose sand was weakly crusted to a depth of a few millimetres and virtually all of the artefacts recovered came from within or just below the surface crust. In contrast not a single piece was recovered from the buried surface of the indurated sand. From this we conclude that the stone artefacts are coming from the loose red sand, and are being let down by erosion. A similar range of stone artefact types is to be found littering the sandy levees of the stream. We consider that the bulk of this material is Holocene in age and that much of it probably dates from the last 5000 years.

A number of pieces of silcrete, some of them flaked, were seen firmly embedded in the indurated sand lying at the base of the loose sand and over the clayey core. One such flake was seen in the dune mentioned above a few metres away from the site of the excavation. This flake, which was exposed in section and was lying horizontally

3cm below the present surface, is inferred by extrapolation to be *in situ* at least 30cm below the top of the indurated sand. In another dune just east of the South Australian border two pieces of silcrete, one a flake and the other a piece of unmodified rock about 5cm across, were similary seen firmly embedded in the indurated sand. These artefacts must have been incorporated into the dunes after the cores had formed but before the bulk of the loose overlying sand had accumulated. We infer from this that they were dropped after the height of the last period of pronounced aridity and that they are therefore late Pleistocene or early Holocene in age.

On the South Australian side of the border a similar suite of landforms is to be found in which there is a good exposure of older deposits, not only in the dunes but also in the floodplain deposits. Here dunes are more frequent and they occur on both sides of the Creek. On and behind the levee on the north side of Callamurra waterhole, the largest of its kind in the area, are extensive, rich scatters of artefacts such as those described above and again these are presumably Holocene, and mainly late Holocene, in age. Further back from the Creek are dunes like those on Nappa Merrie station and which have commonly been deeply eroded to expose presumed Pleistocene sediments. A number of these exposures were examined but nothing was found definitely *in situ* in Pleistocene contexts. Again the surfaces were liberally littered with more recent artefacts.

In a few places deep gullies have been eroded into the floodplain alluvium and as in places the dunes clearly are younger than much of this alluvium a couple of these sections with presumably Pleistocene sediments exposed were examined carefully for archaeological remains. In one such exposure two silcrete flakes were seen lying horizontally in section 45 and 50cm respectively down into what is taken to be Pleistocene alluvium. These flakes were not as firmly embedded as the flakes seen in the indurated dune sand, but because there was virtually no other stone in the upper levels of the profile nor on the surface on the surface of the floodplain at that point, they could be *in situ*.

At the eastern end of the waterhole where the silcrete capped Eyre Formation abuts the floodplain to the north of the Creek, a shelter has formed beneath the silcrete cap through erosion of the underlying soft pallid zone of the weathered profile (Wopfner and Twidale 1967:125-6). This shelter contains at least 20cm of sandy deposit which may well be deeper beneath fallen block of rock along the lintel. There are silcrete flakes and fragments of shell on the surface, especially along the dripline. As the geology of the region is such that shelters are likely to be extremely rare, this site might repay excavation. In this same locality good quality silcrete crops out profusely and we saw one large outcrop which had been extensively quarried.

The floodout zone of Cooper Creek

This is a vast landscape with a seemingly endless sequence of longitudinal dunes and large claypans with transverse dunes along their northern limits interspersed with tracts of multi-channelled floodplain with the occasional large, semi-permanent waterhole. The only exposures of Pleistocene sediments where in situ archaeological materials might be found are again the eroded flanks of the dunes and the sections cut into the floodplain by the channels of Cooper Creek, especially along waterholes. Numerous exposures of sediment thought to be Pleistocene in age were examined over a wide area but except for a single silcrete flake firmly embedded in the surface of an indurated sand layer above the clayey of a dune, nothing was found. In general this is not surprising because, except around waterholes, very few stone artefacts were seen. Even around large waterholes such as Cartoonganie, Karawinnie and Queerbiddie, surprisingly few artefacts were seen and, except for one site, no bone or shell. The lack of stone, especially around waterholes well out into the floodout zone, may simply be due to the fact that as the nearest sources of stone were the gibber plains of Sturt's Stony Desert, usually tens of kilometres away, stone was not discarded lightly. The present channels of Cooper Creek and their associated waterholes were probably only established once the discharge regime had returned more or less to present conditions and are therefore probably Holocene in age. Most stone tool assemblages contained fragments of grindstone and implements of the small tool tradition.

We visited one area because it is reputed to be rich in archaeological remains. This is Coongie Lakes (Fig.3), the only place in the region where the large claypans retain standing fresh water for long periods after floods. There are in fact three large claypans or lakes in this system; Coongie Lake, Lake Marroocoolcannie to the east and Lake Marroocutchanie to the northeast. According to Mike Steel of Innamincka, when this system is full the water is up to 2m deep and it is only rarely that it dries out completely. At lakefull stage the surface area of water is in the order of 50 sq.km. Longitudinal dunes encroach upon the present shoreline of this system. However its basic shape must be determined by large pans that pre-date the dune field and the possibility that older shoreline features exist, perhaps dating to the period 45,000-26,000BP when the hydrological regime may have been wetter than today, makes this system worth closer investigation.

Because the channels of the northwest branch of Cooper Creek were filled with water we were able to gain access to the shore of Coongie Lake only at one point, where Cooper Creek enters the lake on its western side. At this locality the western shoreline of the lake abuts an eroded dune complex which consists of up to 2m of gypseous clays overlain by up to 3m of layers of indurated pale brown sand and capped with 1-2m of loose pale brown sand. This dune complex, which looks similar to Pleistocene aeolian sediments elsewhere in the region, is being encroached upon from the south by a longitudinal dune of loose red sand up to 15m thick. We briefly inspected this eroded dune complex and more recent sediments and surfaces adjacent to it but found nothing that might conceivably be Pleistocene in age. Much of the surface was littered with a sparse scatter of shell with very small amounts of bone, stone artefacts and flaked bottle glass. All this material is inferred to be very young in age. This stretch of Cooper Creek and the adjacent lake shore look to be rich in plant foods and bird life and its is likely that shellfish and scale fish could also be readily taken. If the amount of archaeological material at this locality is a true reflection of use of these resources, it appears to have been surprisingly low.

Despite the lack of archaeological remains at the one part of Coongie Lakes we were able to visit, the fact that sediments likely to be Pleistocene in age are exposed here suggests that a detailed investigation of the lake system might be worthwhile. However because of the difficult access, extensive field survey could only be carried out if conditions were considerably drier that they were during our visit.

The Strzelecki Desert dunefield

To an even greater extent than in the floodout zone to the north, the only exposures of Pleistocene sediments are the eroded cores of the transverse dunes around the larger claypans and the longitudinal dunes. Over most of this vast dune field only the odd artefact is to be seen, and most of these have presumably come from loose sand mantling the dune cores. On the eroded flanks of the dunes to the east of Strzelecki Creek opposite and north of Merty Merty homestead, scatters of artefacts were seen and in all cases small outcrops of silcrete, some of it suitable for flaking, were found cropping out in the swales.

On the eastern side of the large swale connecting Lake Merteree to Strzelecki Creek, at a point where there is a well developed pan, a large outcrop of good quality silcrete was found. This outcrop had been extensively quarried and the eroded flanks of the large longitudinal dune to the east, and a small dune in the swale to the west, were littered with flaked stone. The exposed gently sloping apron of the indurated clayey core has clearly been lowered by erosion, as evidenced by a network of broad rills and gullies irregularly covering an area about 200m long and 150m wide. About 10,000 square metres of the exposed surface of the core of the dune has been affected in this way and this surface is covered with a scatter of artefacts with a density of about 1 per square metre. This scatter consists largely of unweathered flakes and tools, including tulas made on fine silcrete which is possibly imported. As well, there are a few flakes and unmodified manuports which are distinctly weathered.

In addition 30 pieces of silcrete were found firmly embedded in the core of the dune. Most of these were weathered unmodified manuports but about a quarter were clearly flaked and the flaked surfaces all showed some evidence of weathering or staining. These artefacts all appear to be <u>in situ</u>. The depth to which the core has been eroded is difficult to gauge, but the deepest gullies are more than 1m below the present land surface. It is therefore likely that some of the pieces of silcrete in the surface scatter were originally derived from the core of the dune.

We tentatively conclude that the material in the core of the dune was the deposited as the dune field began to form when the landscape dried up probably sometime before 15,000BP. Clearly the fact that this site is immediately adjacent to a quarry has greatly increased the amount of stone discarded per unit of site use, making the recognition of early if sparse use of the site possible. This site will be re-investigated in detail to determine if the material is in situ, what the characteristics of the industry are and whether the quarried silcrete surface extends beneath the dune.

Such outcrops of silcrete appears to be common in this area. In addition to those mentioned above we saw several along the western edge of Strzelecki Creek around and to the south of Merty Merty homestead and many others are known to Bob Wasson and to personnel at Moomba. Future surveys in this area will concentrate on eroded landscapes in the vicinity of such outcrops.

Earlier in 1979 Bob Wasson had found what he took to be Aboriginal hearths eroding out of a small dune to the north of an interdunal pan well to the west of Merty Merty homestead (site JSN in Fig.3). Silcrete artefacts were scattered over the eroded surface but it was not clear whether any of these were derived from the strata which contained the hearths. Just before we went into the field two preliminary dates on charcoal for this site came available. Both gave a terminal Pleistocene age for the site which indicates that people must have been into the core of the dune field very soon after the period of pronounced aridity and dune formation. We attempted to visit this site but were stopped by wind drift sand which made the track impassible. Clearly the status of this site needs to resolved and another attempt will be made to reach the site in 1980 or 1981.

South of where Strzelecki Creek turns west to join Lake Blanche the dune field gives way to an impressive complex transverse dune or lunette which clearly relates to a former enlarged lake encompassing Lakes Blanche, Callabonna and Frome. This lunette, which is known as Cobbler Hill, is extensively eroded and looks not unlike a larger version of the Lake Mungo lunette in western NSW. The origin and age of this feature is not known, however in 1980 the Department of Biogeography and Geomorphology at ANU intends to begin a major study of it. We made a brief inspection of a couple of exposures but found nothing in situ and the sparse surface scatter of chipped stone contained artefacts characteristic of the small tool tradition and there was nothing to suggest any of this material was other than Holocene in age. However should at least the upper part of this dune complex prove to be sufficiently recent in its formation to fall within the time span of human occupation of this continent, a more detailed survey would be warranted.

FUTURE RESEARCH PROSPECTS

We have found enough archaeological material in situ in Pleistocene deposits to warrant further investigations. However all the indications are that, except for specific types of site locality (for example around silcrete quarries) the density of Pleistocene archaeological remains is extremely low and that the only evidence of Pleistocene occupation will in general be stone artefacts and possibly charcoal from hearths. Furthermore the only extensive exposures of Pleistocene deposits are the indurated clayey cores of dunes and as the dunes probably formed between 20,000 and 14,000 years ago sites older than that are not likely to be found.

Older fluvial and aeolian deposits are apparently exposed more widely along Cooper Creek further to the west (Stirton, Tedford and Miller 1961:40-42) and these could be investigated for possible earlier sites. Cobbler Hill may also prove to be worthwhile investigating closely, but not before more is known of its origin and age.

Of the localities examined to date, the dunes around silcrete outcrops, especially those showing evidence of quarrying, have the greatest promise because the concentration of artefacts per unit of site use is likely to make even very sparse use archaeologically visible. The Coongie Lakes area should also be looked at in more detail as should the alluvial deposits and dunes along the bedrock stretch of Cooper Creek upstream of Innamincka. The latter area is particularly interesting as, like the dunes surrounding silcrete outcrops in the dune field, the density of stone per unit of occupation should be relatively high. The fact that to date stone has only been found in very small amounts in latest Pleistocene to early Holocene contexts in this area where water was presumably always available except in the driest of times suggests that Pleistocene occupation of this part of the arid zone may always have been very sparse.

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BIBLIOGRAPHY

Bowdler. S. 1977. The coastal colonisation of Australia. Pp. 205-46 of J. Allen, J. Golson and R. Jones (eds). Sunda and Sahul: prehistoric studies in Southeast Asia, Melanesia and Australia. London: Academic Press.

Bowler, J.M. 1975. Deglaciation events in southern Australia: their age, nature and palaeoclimatic significance. Bulletin of the Royal Society of New Zealand 13:75-82.

Bowler, J.M. 1976. Recent developments in reconstructing late Quaternary environments in Australia. Pp. 55-77 in R. L. Kirk and A. G. Thorne (eds). The origin of the Australians. Canberra: Australian Institute of Aboriginal Studies.

Bowler, J. M., Hope, G. S., Jennings, J. N., Singh, G. and Walker, D. 1976. Late Quaternary climates of Australia and New Guinea. Quaternary Research 6:359-94.

Callen, R. A. (ed) 1980. Current research in the Lake Frome-Callabonna area, South Australia. Australian Quaternary Newsletter 14:12-24.

Dury, G.H. and Langford-Smith, T. 1970. A Pleistocene camp fire from Lake Yantara, northwestern New South Wales. Search 1: 73.

Gould, R. A. 1971. The archaeologist as ethnographer: a case from the Western Desert of Australia. World Archaeology 3:143-77.

Jones, R. 1979. The fifth continent: problems concerning the human colonisation of Australia. Annual Reviews in Anthropology 1979 8:445-66.

Jones, R. and Bowler, J.M. in press Struggle for the savanna: Northern Australia in ecological and prehistoric perspective In Rhys Jones (ed) Northern Australia: options and implications. School Seminar Series No. 1, RSPacS, Australian National University, Canberra.

Lampert, R. J. and Hughes, P. J. 1980. Pleistocene archaeology in the Flinders Ranges: research prospects. Australian Archaeology in press

Laut, P., Keig, G., Lazarides, E., Loffler, E., Margules, C., Scott, R. M. and Sullivan, M. E. 1977. Environments of South Australia. Province 8 Northern Arid. Canberra: CSIRO, Division of Land Use Research.

Loffler, E. an Sullivan, M. E. 1979. Lake Dieri resurrected: and interpretation using satellite imagery. Zeitschrift fur Geomorphologie 23: 233-42.

Mabbutt, J. A. 1971. The arid zone as a prehistoric environment. Pp. 66-79 in D. J. Mulvaney and J. Golson (eds). Aboriginal Man and environment in Australia. Canberra: ANU Press.

Maynard, Lesley 1980 A Pleistocene date from an occupation deposit in the Pilbara Region, Western Australia. Australian Archaeology 10

Merrilees, D. 1968. Man the destroyer: late Quaternary changes in the Australian marsupial fauna. Journal of the Royal Society of Western Australia 51: 1-24.

Singh, G. in press Late Quaternary pollen records and seasonal palaeoclimates of Lake Frome, Australia. In W.D. Williams (ed) Athalassic salt lakes. Junk, Hague.

Stirton, R. A., Tedford, R. H. and Miller, A. H. 1961. Cenozoic stratigraphy and vetebrate palaeontology of the Tirari Desert, South Australia. Records of the South Australian Museum 14:19-61.

Thorne, A. G. 1971. Mungo and Kow Swamp: morphological variation in Pleistocene Australians. Mankind 8: 85-89.

Thorne, A. G. 1977. Separation or reconciliation ? Biological clues to the development of Australian society. Pp.187-204 in J. Allen, J. Golson and R. Jones (eds). Sunda and Sahul: prehistoric studies in Southeast Asia, Melanesia and Australia. London: Academic Press.

Wasson, R. 1978. Desert dunes - research activities. Australian

Quaternary Newsletter 12:25-6.

White, J. P. and O'Connell. J. F. 1979. Australian prehistory: new aspects of antiquity. Science 203:21-8.

Wopfner, H. and Twidale, C. R. 1967. Geomorphological history of the Lake Eyre Basin. Pp. 118-43 in J.N. Jennings and J.A. Mabbutt (eds). Landform studies from Australia and New Guinea. Canberra: ANU Press.

Wright, R.V.S. (ed) 1973. Archaeology of the Gallus site,Koonalda Cave. Australian Aborigines Studies No. 26, Canberra: Australian Istitute of Aboriginal Studies.

Wyrwoll, K-H, and Dortch, C. E. 1978. Stone artefacts and an associated Diprotodontid mandible from the Greenough River, Western Australia. Search 9: 411-3.