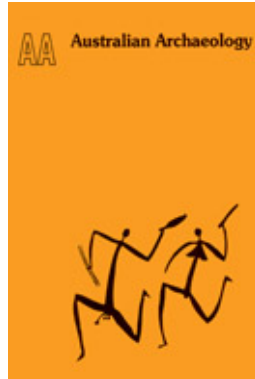


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RESULTS OF THE JORDAN RIVER MIDDEN EXCAVATION

Lisa Gaffney and Jim Stockton

The Jordan River Midden (JRM1) is a large shell midden situated on the west bank of the Jordan River approximately 17km NNW of Hobart (Derwent Sheet 8312, Grid Reference 215680, T.A.S.I. Card 441). It is 37km from the mouth of the Derwent River (Fig.1).

The lower Jordan River cuts through Jurassic dolerite on the eastern bank and Tertiary basalt on the western bank. Several quarry sites have been reported within a 6.5km radius of JRM1 (Sutherland 1972:35,43,45).

METHODOLOGY

During the excavation two adjoining pits were dug each measuring 1m square. In the NW corner of Pit 2 a 40cm x 20cm section was left pedestalled in the corner and called Pit 3. From Pit 3 samples were taken at the completion of the excavation for whole sample analysis. A 5cm deep disturbed surface layer (Spit 1) was removed and thereafter spit layers were dug in 5cm depths as no stratigraphic change was apparent during excavation. The cultural deposit measured 35cm in depth and rested on a brown rocky soil.

Charcoal samples for C14 were collected from the top (SUA1112) and bottom (SUA1113) of the cultural material. Shell samples were taken from Pit 2 for analysis by sieving all the midden material extracted from each spit through with a 6.3mm sieve with a representative sample retained for analysis.

Whole samples were collected from Pit 3 for a geomorphological investigation of the proportions of the different components in the midden and a shell analysis similar to the analysis in Pit 2.

ARTEFACT ANALYSIS

A total of seven artefacts were recovered from the excavation of JRM1. The sources of materials have not been traced as the sample is too small to be used statistically but all are of different source materials. However, it is significant to note that, within the sample, all but one of the artefacts are re-edging flakes.

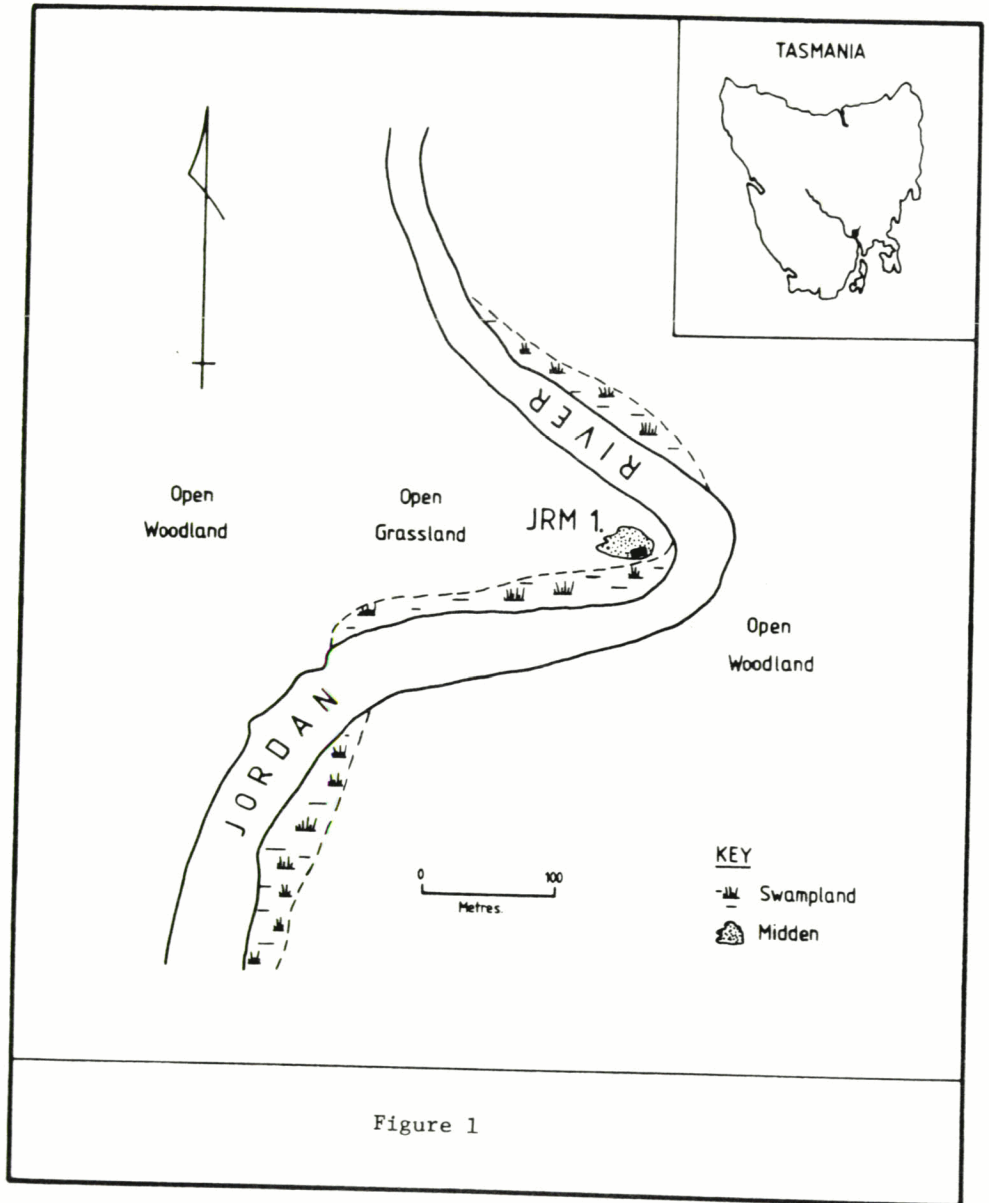


Table 1: Type and texture of artefacts in JRm1

	Grain size of stone	
	Coarse	Fine
Re-edging flake	1	5
Unutilised		1*

* possibly a broken flake
- not dealt with in analysis.

Of the six re-edging flakes, five show small retouching signs, two with scalar retouch and three with abrupt retouch, with the sixth showing large flaking. The re-edging flakes have use wear consistent with use as scrapers, i.e. the edge was dulled. Instead of discarding the blunted implement, it was rejuvenated by detaching a flake which removed the worn edge and produced a fresh margin for working. The artefacts are consistent with the simple Tasmanian stone technology and its reliance on scraping tools.

Even though the sample of artefacts found in the midden is small, it seems possible to generalise that implements were reworked rather than discarded at this midden site. In fact one medium-size flake from Spit 4 shows two, possibly three phases of use. Firstly, there is medium-sized flaking along one margin which appears to have been used briefly as a scraper margin. Secondly, the scraper was rotated and a new margin was used for scraping. This eventually produced a margin with scalar retouch and use bruising. The flake was then removed in the process of re-edging the working margin of the scraper. After detachment of this re-edging flake a series of six minute chips were removed along a sharp margin. The six minute chips were probably deliberate retouch but it is not possible to be certain as the flake was subsequently rolled and worn. The rolled nature of this artefact suggests that it lay on the surface for a considerable period. For this to occur would require a time gap in the build-up of the cultural deposit.

WHOLE SAMPLE ANALYSIS

The aim was to employ techniques to isolate fractions of sand, shell and charcoal in consecutive spit layers which may have yielded indicators to the environmental conditions prevailing at the time of deposition. For instance, an increase in the sand fraction in one or more spits may indicate a build-up in sand deposits resulting from transportation either by wind or water. It is possible to determine the method of transportation and this will reflect changing environmental conditions.

This analysis showed that a 'rest phase' or lapse occurred in the utilisation of resources at JRm1. This resulted in a decrease in the percentage of the shell fraction component in Spit 4. Interestingly, it was at this time that a startling change occurred in the dominant mussel shellfish eaten.

SHELL ANALYSIS

The shell samples from each spit were sorted into three categories - the common mud oyster Ostrea angasi, Mytilus edulis planulatus, Xenostrobus securis.

Table 2: Minimum numbers and percentages of minimum numbers of mussel samples in Pits 2 and 3

Pit 2							
Min no.	<u>Mytilus</u>	7	22	24	77	32	7
	<u>Xenostrobus</u>	402	756	573	44	11	2
%Min no.	<u>Mytilus</u>	1.7%	2.8%	4.0%	63.6%	74.4%	77.8%
	<u>Xenostrobus</u>	98.3%	97.2%	96.0%	36.4%	25.6%	22.2%
Pit 3							
Min no.	<u>Mytilus</u>	1.5	2	0.5	20	10	-
	<u>Xenostrobus</u>	120	129	80	1	0.5	-
%Min no.	<u>Mytilus</u>	1.2%	1.5%	0.6%	95.2%	95.2%	-
	<u>Xenostrobus</u>	98.8%	98.5%	99.4%	4.8%	4.8%	-

MINIMUM NUMBERS OF MUSSELS IN PITS 2 AND 3

The minimum numbers for both species of mussel were obtained by counting the number of umbos, and then dividing by two. The corresponding percentages of the minimum numbers of the two mussel species were then calculated for each spit for both pits. The results are shown in Figure 2.

THE HABITATS OF Mytilus edulis planulatus AND Xenostrobus securis AND THE ENVIRONMENT DURING THE OCCUPATIONAL PHASE OF THE MIDDEN

Firstly, M. edulis planulatus is common in southern Australia on sheltered and semi-exposed eastern and southern coasts from Fremantle to New South Wales, often occurring in masses on jetty piling or as dense beds on sandy flats (Wilson and Hodgkin 1967b:176).

Excavation by Vanderwal (1977) at the Shag Bay Rockshelter revealed that M. edulis planulatus comprised the overwhelming shell component - Shag Bay being characteristic of a semi-sheltered, semi-marine environment. However, we would not expect to find this species in the upper reaches of an estuary, such as at JRm1, where salinities may be very low and where wide salinity changes may occur. However, at the time when the midden was first occupied, M. edulis planulatus was the dominant shellfish eaten.

Secondly, Xenostrobus securis possesses a wide salinity tolerance, uncommon with any other mytilids, due to certain mechanisms (Wilson 1968:324, 1969:118).

PERCENTAGES OF MINIMUM NUMBER OF MUSSELS

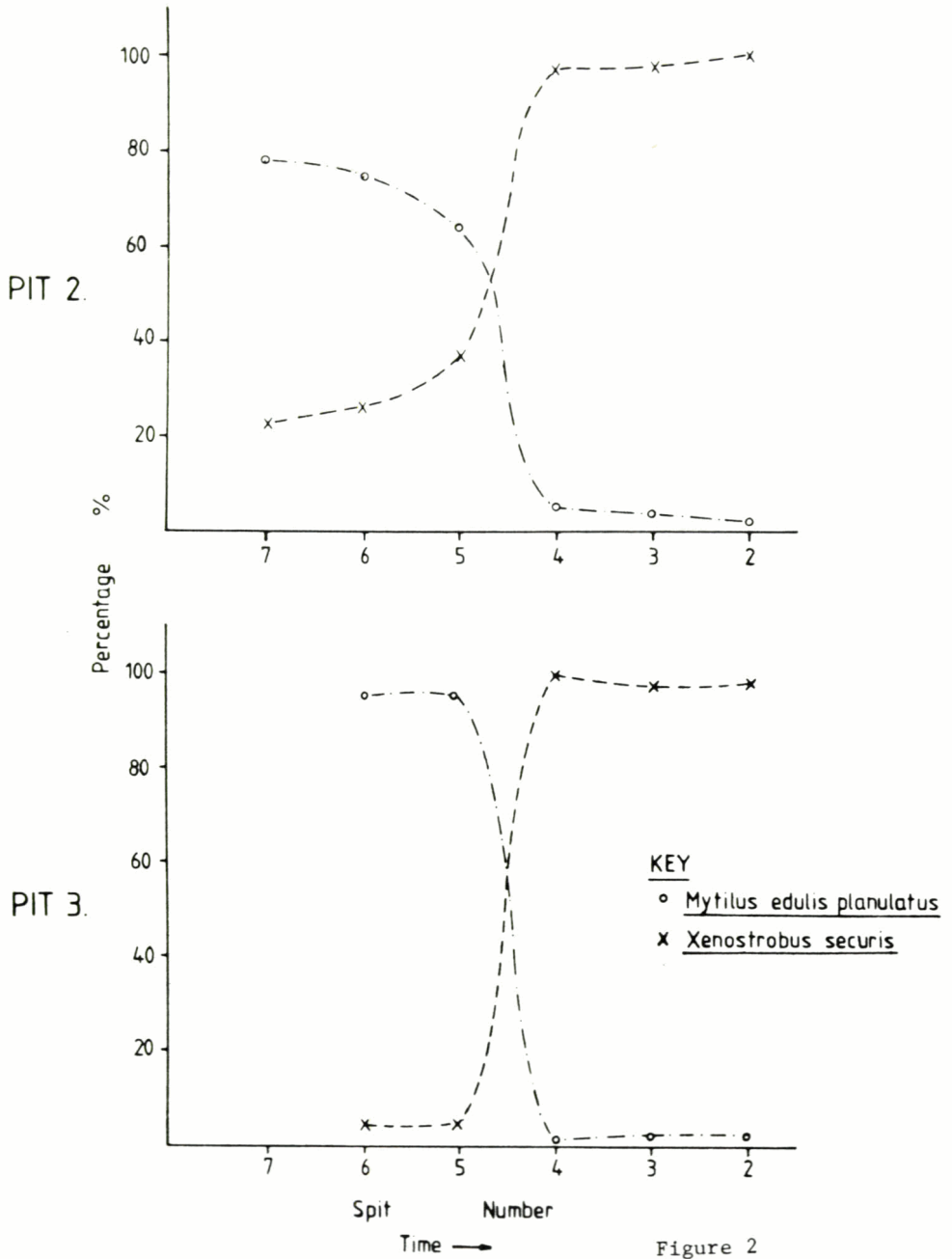


Figure 2

At JRm1 the river is tidal and is affected by an increase in salinity twice a day. Salinity readings taken at the time of the excavation ranged from 5-11.5 parts per thousand Cl on the surface down to 16-24 parts per thousand Cl on the bottom. Taking the surface readings, as this is where the shellfish grow, the salinity was fairly low but well within the range proposed by Wilson.

DISCUSSION

A casual observation of the data suggests that there was a change in the ecology of the river arising from a decreasing salinity of the Jordan River.

We will speculate that Aboriginal man began occupying JRm1 about 6000 years BP. This hypothesis is supported by the radiocarbon dates from similar open midden sites in the Derwent estuary which cluster around this date. We are waiting for top and bottom Cl4 dates from JRm1. An excavation by Sigleo (1975) at an Old Beach site suggests that a relatively continuous phase of Aboriginal occupation had commenced in this area of the lower Derwent Valley by at least 5800 radiocarbon years ago. Basal occupation dated by radiocarbon at Fisher's Hill (Wallace 1979) gave antiquities of 5420±85BP (ANU 1090A Carbonate) and 5890±90BP (ANU 1090B Acid Insoluble Fraction) and at Old Beach (Reber 1965), 5200±110BP (1-324). Radiocarbon dating at Shag Bay Rockshelter (Vanderwal 1977) gave a basal occupation antiquity of 5300±120BP (GaK 5425). Consequently, we need to consider the environmental conditions which prevailed around this time.

Pollen analysis from Lake Tiberias, 35km NNE from JRm1 (Macphail 1975a), suggests that climatic conditions were at an 'optimum' between 8000 and 5000 years BP. This optimum is thought to have been characterised by slightly warmer and moister conditions than the succeeding climate, thus the past may have been more favourable for hunter-gatherer occupation during the mid-Holocene (c.8000 to 3600BP).

Over a period, X. securis populations would have developed in the fresher water resulting from the moister conditions and the marine species would have diminished. However, the freshening of streams during the glacial melt occurred up to three millennia earlier than basal occupation dates of similar open midden sites to JRm1 in the Derwent Estuary and it seems unlikely that this event is related to the time when JRm1 was occupied.

If a change in climatic conditions was to explain a change in the ecological balance of the Jordan, the explanation would need to be a short term one. Macphail (1975b) points out that any such fluctuations of Holocene climate were extremely small and that no major change occurred after the main late glacial early Holocene period.

However, there are two possible short term climatic explanations. Firstly, there could have been an increase in the level of effective precipitation that was sustained over a short period. This would have flushed the river and allowed X. securis to dominate. Secondly, the occupational phase of the midden could have occurred within two main seasons. A dry winter would increase the salinity of the water as precipitation was not effective being stored as snow. If followed by a wet summer together with the snow

SHELL FRACTION IN PIT 3

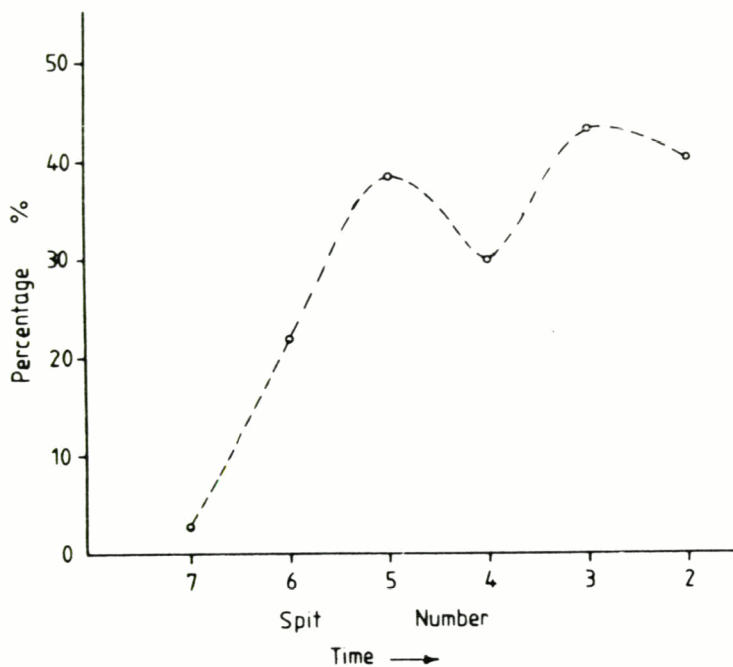


Figure 3

melt, the water would become considerably fresher and hence favour X. securis. However, this argument does not hold because the specimens of the mussel, X. securis were identified as 'old (in the order of 3-4 years) specimens probably living in still estuarine conditions of very low salinity' (Wilson 1978, pers. comm.). Therefore, a seasonal interpretation of the change in the ecology of the river is not adequate. Similarly, a short period of dry and wet weather would not explain the drastic change of the dominant shellfish eaten.

The high density of similar sites in the area, together with the vastness of JRML seems to indicate an area that was revisited occasionally for shellfish exploitation over a period of time, perhaps 1000 years or more. It would not seem feasible to expect the shellfish populations at Jordan River to support an intense, intermittent occupational phase. However, when looking at other evidence for JRML, a different explanation of the change in the ecology of the river may be inferred.

The whole sample analysis demonstrated a marked decrease in the percentage of the shell fraction in Spit 4 (Fig.3). Thus at some time in the deposition a 'rest' phase, or lapse, occurred in the utilisation of resources at JRML.

Simultaneously, Spit 4 marks the changeover in the dominant mussel eaten. Varying environmental conditions over a long period may explain the decrease in the shell fraction in Spit 4 because of the time required in the changeover of mussel populations. It would take a number of years before X. securis would supersede the more marine species and before man could exploit the mussel beds efficiently. The argument, however, lies heavily on speculation.

Recent evidence from Cave Bay on Hunter Island for the arrival of man in Tasmania around 23,000 years ago (Bowdler 1977) and from Old Beach for his presence in southeastern Tasmania during the last glacial (Sigleo and Colhoun 1975) and his disturbance of sandy sites near lakes and estuaries during the middle and late Holocene (Sigleo 1975) suggests that his total environmental impact on the Tasmanian landscape was much greater than has formerly been realised (Colhoun 1975:32). The combined effects of the climatic changes and forest expansion, in the early Holocene, was to cause a decrease in the intensity and erosional efficiency of terrestrial geomorphic processes. The likely action of Aboriginal man using his chief agent, fire, would be to contest the forest encroachment on the open environment into which he had moved during the last Glacial stage. The widespread presence of charcoal in sediments suggests that the extensive firing of scrub and forests, as also recorded by Jones (1968) during the early and middle Holocene was sufficient to maintain high rates of erosion and alluviation in the valleys of eastern Tasmania. If sedimentation occurred in the Jordan, the volume of salt water coming in at the flood tide would be much reduced. This event may have effected a change in the mussel populations.

There could have been a change from sandier to muddier conditions during the middle Holocene. This would be the result of the changing nature of the available substrate by sedimentation. The change in the dominant mussel shellfish available could be explained by this phenomena if M. edulis planulatus and X. securis have different requirements or preferences to substratum. Unfortunately, there is no available evidence on this subject.

Another explanation that could explain a change in the ecology of the river but which has lost impact since first proposed by Davies (1959) is a rise in sea level at around 6000 years BP. The rise in sea level would have increased the salinity and supported the more marine shellfish. Over time, the lowering of the sea level would have decreased the salinity and supported X. securis populations. However, as already described, there is no need to invoke a sea level change to alter the salinity of a river.

Finally, could the Aborigines have selected the tastier M. edulis planulatus (Rodgers 1978, pers. comm.) in preference to X. securis and when the tastier mussel was depleted X. securis was eaten? It is not feasible to say this since the two species clearly inhabit different environments and have not been described together in other Aboriginal sites in the Derwent Estuary.

CONCLUSION

The aim of the excavation was to develop a cultural and environmental sequence to tie in with information available from the Derwent Estuary and the east coast of Tasmania. The major contribution of information came from the shell analysis. However, the results are probably specific to the estuarine Jordan, rather than the Derwent as a whole.

Mussels, most definitely, were the main attraction at this midden site. No animal or fish bone was found and thus JRMI can be seen as an extreme example of the east coast pattern of intensive single resource utilisation similar to the Shag Bay rock shelter (Vanderwal 1977:168).

Implements were reworked rather than discarded and the high density of shallow sites surveyed in the vicinity of JRMI seems to indicate that the area of Jordan River, as with other midden sites excavated in the Derwent Estuary, supported recurrent but transient occupations, which is interpreted as a locational nomadism. Culturally then, the economic organisation of JRMI fits in with the east coast nomadic pattern outlined by Lourandos (1968:41).

The minimum number count of the mussel, X. securis, in Pit 2 was approximately 2000. The occurrence of this species in the deposit is of major significance in two ways. Firstly, it has not been found in any other middens excavated in the Derwent Estuary and secondly, the species is characteristic of upper estuarine situations where salinities may be very low, whereas the two species expected to be found (M. edulis planulatus and O. angasi) are characteristic of sheltered semi-marine habitats. The drastic change in the dominant mussel shellfish eaten from M. edulis planulatus to X. securis between Spit 5 and 4 seems to indicate an alteration in the ecology of the river.

The main arguments presented explaining a change in the dominant mussel shellfish eaten at JRMI include changing climatic conditions, sea level alterations, human selection and geomorphic processes. From the evidence available, it seems that the most probable explanation involves the changing nature of a river caused by erosion resulting in alluviation and an alternation of the substratum.

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