

SHORT REPORTS

Pleistocene Rockshelters J23 and J24, Mesa J, Pilbara, Western Australia

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Abstract

Two spatially close rockshelters at Mesa J in the Pilbara had relatively deep deposits and large numbers of stone artefacts distributed from top to bottom. The basal archaeological materials have been directly dated as (in the case of J24) or are inferred to be (in the case of J23) late Pleistocene in age. In J24 artefacts continued downwards throughout basal Spit 10, indicating that occupation of the rockshelter began before 27,657 cal BP, possibly thousands of years before. The distribution of stone artefacts and radiocarbon dates in J24 indicates that occupation of the rockshelter continued during the Last Glacial Maximum (LGM), providing further evidence that the Hamersley Plateau provided refuge for Aboriginal people during the cold and arid conditions of the LGM.

Introduction

In the introduction to the recent *Archaeology in Oceania* supplementary volume on 'Pilbara Archaeology' Morse (2009) listed two radiocarbon-dated rockshelters from Mesa J (J23 and J24) which have been described in a consulting report (Hughes and Quartermaine 1992) but never published. The report is, however, commonly cited in the published literature (e.g. Marwick 2009, Slack *et al.* 2009 in the same *Archaeology in Oceania* volume) by those who have access to the only publicly available copy held by the Department of Indigenous Affairs in Perth. The purpose of this paper is to present the details of these sites so they may easily be accessed by other researchers.

One of these sites, J24, had a near-basal Pleistocene radiocarbon date. At the time Hughes and Quartermaine (1992:14) noted that four Pleistocene sites had been found in the Pilbara, despite limited excavation, and suggested that such sites may be common in the inland Pilbara. This has proved to be the case as by 2010 at least 12 inland Pilbara rockshelters with Pleistocene dates had been reported: Cleft Rock Shelter (Marwick 2002a); Djadjiling (Law *et al.* 2010); Juukan 1 (Slack *et al.* 2009); Juukan 2 (Slack *et al.* 2009); Malea (Edwards and Murphy 2003); Manganese Gorge 8 (Veth 1995); Marillana A (Marwick 2002a); Mesa J J24 (Hughes and Quartermaine 1992); Milly's Cave (Marwick 2002a, 2002b); Newman Orebody XXIX (Maynard 1980); Newman Rock Shelter (Brown 1987); and Yirra (Veitch *et al.* 2005). Of these only three, J24, Cleft Rock Shelter and Manganese Gorge 8, have not been described previously in any detail in the published literature. This short report rectifies that situation for J24.

In 1991–1992 the authors undertook archaeological investigations for Robe River Mining in the Mesa J iron ore development area at the western end of the Hamersley Range/Plateau c.20km southwest of Pannawonnicca and 80km inland from the coastline to the northwest (Hughes and Quartermaine 1992). These are the most westerly iron ore deposits in the Pilbara.

The iron ore-bearing Robe Pisolite deposits were formed from valley fills in the flooded ancestral Robe Valley (Robe River Mining 1991:2). The Hamersley Range was uplifted in the early Tertiary, exposing the Brockman and Marra Mamba Iron Formations. As they weathered iron was carried in rivers and streams into the Robe Valley. When flooding occurred the particulate and dissolved iron precipitated around fragments of rock and wood which formed 'seed' nuclei for the formation of the pisolites. Further uplift of the area and a rejuvenation of the drainage system exposed the valley fills to fluvial erosion. In this way the area was dissected leaving the distinctive mesas of iron ore capping Proterozoic bedrock which characterise this landscape.

Mesa J consists of Robe Pisolite up to 50m thick overlying Proterozoic bedrock, the main unit of which is the Marra Mamba Iron Formation consisting of jaspillite, ferruginous and siliceous shale and ferruginous chert (Williams 1968:10). Rockshelters have formed in the Robe Pisolite cropping out in the mesa escarpment through a combination of weathering and roof block-fall. Rates of shelter formation appear to have been very slow and the products of weathering and block-fall probably have been removed from the shelter floor by fluvial processes and by animal scuffage. Most of the shelters have bare rock floors with little or no veneer of gravel or fine sediment.

The Rockshelter Excavations

In an 18km² area of Mesa J, 33 rockshelter archaeological sites were recorded along the mesa scarp. Test excavations were carried out in all shelters which had the following characteristics: a thickness of deposit >100mm when probed with a thin steel peg; sufficient roof height to have allowed previous occupation; and most of the deposit unaffected by water scouring. In total 20 rockshelters met these criteria and were test-excavated (0.25m²) and the material sieved through 5mm and 2mm screens. No artefacts were recovered from the excavations in seven (35%) of these shelters. In another nine (45%) between one and six artefacts were recovered from the deposit. In these 16 archaeologically-sparse shelters the maximum depth of deposit was 630mm (J1, from which no artefacts were recovered) and the average was 353mm. The results suggest a pattern commonly observed throughout the Pilbara, that most rockshelters have just a slight trace of human occupation. In the remaining four shelter deposits (20%) appreciably larger numbers of artefacts

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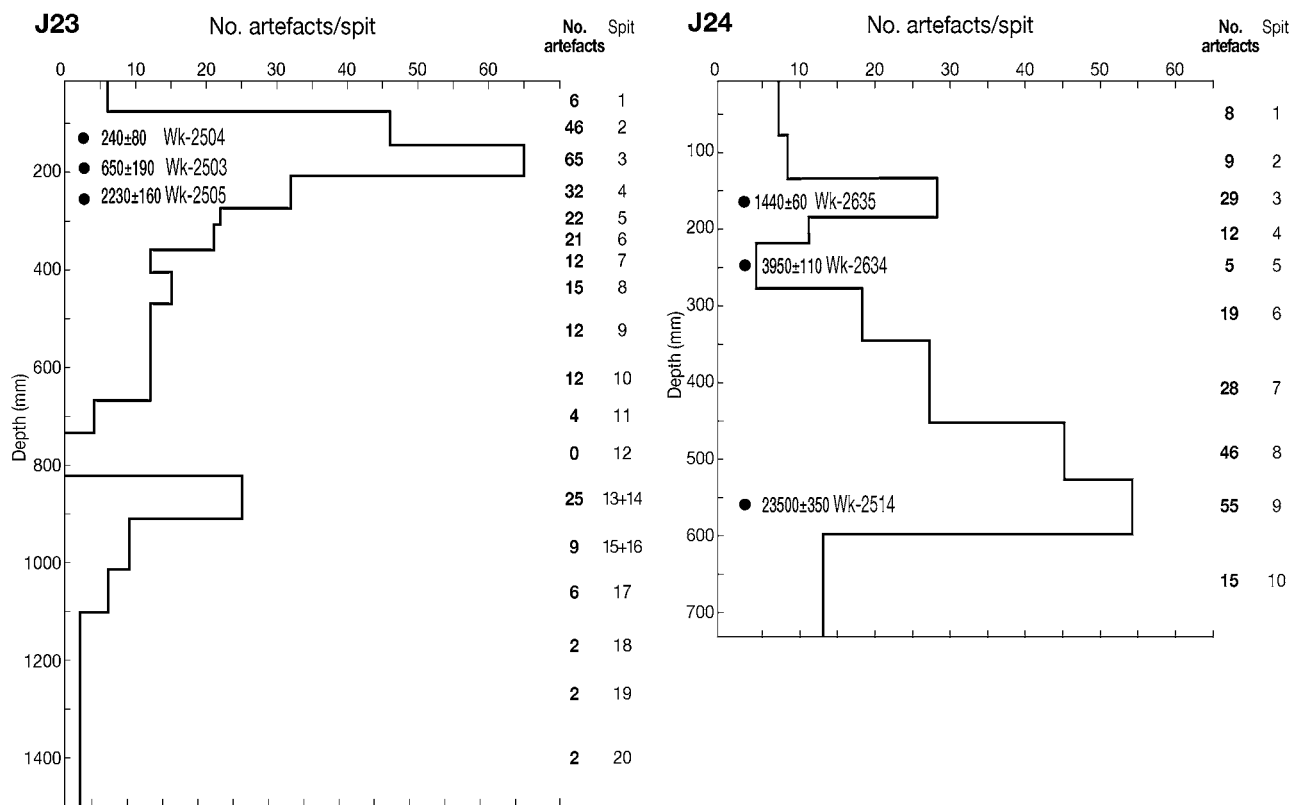


Figure 1 Depth distribution of radiocarbon dates and stone artefacts in rockshelters J23 and J24.

were found (J17, J22, J23 and J24). J23 and J24 were deemed to be the archaeologically most prospective shelters in terms of a combination of numbers of artefacts, depth and intactness of deposit and general attractiveness for habitation, and the excavations were expanded to 1.25m² and 1m² respectively.

Rockshelter Site J23

J23 was deemed to be potentially the most archaeologically promising of all the rockshelters. It was larger and more spacious than any other shelter and it had a relatively level, fine and

apparently deep deposit. It was located on the side of a deep gully near the foot of the slope and about 600m away from the Robe River to the north.

A rear 0.25m² test pit contained only six stone artefacts but the 1m² excavation in the middle of the shelter produced 293 stone artefacts distributed throughout the deposit down to its base at 1480mm (Figure 1). The highest concentrations of artefacts were in the top 150mm of ash- and charcoal-rich deposit. Below that the deposit consisted of reddish-brown silty sand with large amounts of fine gravel and some cobble-sized

Table 1 Radiocarbon determinations for rockshelters J23 and J24 calibrated using the OxCal v4.1 (Bronk Ramsey 2009) and SHCAL04 atmospheric data from McCormac *et al.* (2004), except for Wk-2514 which was beyond the range of SHCAL04 and calibrated with INTCAL09 data from Reimer *et al.* (2009).

Site	Spit	Depth (mm)	Lab. No.	¹⁴ C Age (years BP)	Calibrated Age BP (68.2% probability)	Calibrated Age BP (95.4% probability)
J23	2	80-150	Wk-2504	240±80	320-240 (23.5) 230-39 (30.7) 114-102 (2.6) 96-70 (5.6) 26- to -1 (5.9)	445-362 (11.7) 334 to -3 (83.7)
J23	3	150-200	Wk-2503	650±190	764-457 (68.2)	956-942 (0.3) 937-282 (94.9) 164-157 (0.2)
J23	4	200-250	Wk-2505	2230±160	2347-1986 (66.0) 1978-1970 (1.0) 1960-1950 (1.2)	2702-2634 (2.8) 2616-2581 (1.3) 2573-2560 (0.4) 2546-1820 (90.9)
J24	3	125-175	Wk-2635	1440±60	1356-1262 (68.2)	1400-1178 (95.4)
J24	5	225-275	Wk-2634	3950±110	4510-4485 (4.1) 4440-4152 (64.1)	4788-4762 (1.1) 4626-3979 (94.3)
J24	9	530-580	Wk-2514	23500±350	28644-27909 (68.2)	29301-27657 (95.4)

rocks. Charcoal occurred in the upper part of this reddish-brown deposit to a depth of about 250mm. Three radiocarbon dates were obtained on bulk charcoal samples from the upper part of the deposit. Insufficient charcoal was present below these levels to allow dating (Table 1).

The only diagnostic implement found in the deposit, a tula slug, came from Spit 4 which was dated to 2230 ± 160 BP (Wk-2505). Only one other retouched artefact was recovered, from Spit 13. Six fragments of dolerite with signs of having been used for grinding were found in six different spits – Spits 2, 5, 7, 15/16, 17 and 18. Two kinds of raw material were co-dominant – fine-grained sedimentary rock (39%) and dolerite (38%).

Over half of the artefacts (58%) came from the top five spits or 250mm of deposit which dates to the late Holocene. There was an insufficient spread in the depth of the radiocarbon dates to enable the age of the base of the deposit to be estimated by extrapolation following the methods used by Hughes and Djohadze (1980). The indications are, however, that it was at least early Holocene in age and possibly late Pleistocene, given there is more than 1m of archaeological deposit below the thin late Holocene levels.

Rockshelter Site J24

J24 was on the opposite side of a large gully from J23 and, although less spacious than J23, was also considered to be archaeologically promising. The near-horizontal floor was littered with cobble- and boulder-sized rocks, but the underlying deposit consisted largely of fine gravel in a silty sandy matrix. The 1m² excavation was taken down to bedrock across its entire base. The bedrock floor was comparatively level and the deposit at its deepest point was 720mm. The top 50mm consisted of loose deposit with macropod dung. At the front of the excavation (i.e. in Squares NE and NW closest to the dripline) this surface layer was underlain by reddish-brown deposit. In contrast, further back into the shelter at the rear of Squares SE and SW there were two thick layers rich in ash and charcoal, centred on Spit 3 and Spits 8 and 9 respectively. The lower-most of these layers also contained bone.

Charcoal occurred throughout most of the deposit and three radiocarbon dates were obtained, including one from the lowest level of the deposit which had sufficient charcoal to be dated (Table 1). The Spit 3 and Spit 9 samples were obtained from the ash- and charcoal-rich layers. Spit 9, 530–580mm below the surface, dated to before 27,657 cal BP.

A total of 226 artefacts was recovered from the excavation, and these were distributed throughout the deposit down to bedrock (Figure 1). The upper-most ash- and charcoal-rich layer, centred on Spit 3, had a high concentration of stone artefacts, as did the lower layer which was centred on Spits 8 and 9. These two concentrations of artefacts, however, extended towards the front of the shelter into parts of the deposit where there was virtually no ash, charcoal or bone. A likely explanation for the absence of ash and organic material in the deposit at the front of the shelter is presented below.

No retouched artefacts were found in the excavation. Eleven fragments of dolerite with signs of grinding were found in five of the ten spits, including the top and basal spits. Seven of the 10 pieces came from Spits 9 and 10 (i.e. by association they were late Pleistocene in age, some possibly older than 27,657 cal BP).

Fine-grained sedimentary rock (60%) and dolerite (24%) again were the dominant rock types.

A total of 36 pieces of bone was recovered from the excavated deposit and examined by Alex Baynes (Hughes and Quartermaine 1992:Appendix 4). All of these came from the ash- and charcoal-rich Pleistocene layer described above (28 from Spit 9 and 4 from Spit 8). The only two identifiable bones were a femur from each of Spits 8 and 9. These were both from the Western Chestnut Mouse (*Pseudomysnanus*), which, according to Baynes, occurred in the Pilbara region before European settlement but now appears to be confined to Barrow Island and the Kimberley.

The long-term survival of ash, charcoal and bone in the rear part of the 1m² excavated pit was interpreted to mean that part of the deposit containing organic remains must have remained dry throughout its history, even at times of heavy rain. Organic remains had, however, only survived towards the back of the shelter, whereas high concentrations of stone artefacts associated with the two organic-rich layers occurred right across the excavated area, including towards the dripline. A likely explanation for the absence of organic materials from the front part of the deposit is that they were originally present but that they had since progressively decayed in the presence of moisture. Direct evidence of this was observed while the excavation was in progress when there was a very heavy rainfall event and direct rainfall and runoff along the dripline wetted the deposit inside the shelter as far back as the front part of the excavation.

Discussion

These two spatially close shelters had relatively deep deposits and large numbers of stone artefacts distributed from top to bottom, and the basal archaeological materials have been directly dated as, in the case of J24, or are inferred possibly to be, in the case of J23, late Pleistocene in age. In J24 artefacts occurred throughout the deposit to bedrock at the base of Spit 10 without any sign of a hiatus in artefact discard or sedimentation, indicating that occupation of the rockshelter began before 27,657 years ago, possibly thousands of years before, and continued without major gaps thereafter (Figure 1). In J24 about a third of the artefacts occurred in Spits 9 and 10 which were deposited at the beginning of the LGM, before its peak at about 21,500 cal BP (De Deckker 2001:1). After that time there was a gradual fall off in the concentration of artefacts to the lowest point about 4000 years ago, after which the concentration increased again in the late Holocene. These trends indicate that occupation of the rockshelter continued during the LGM, providing further evidence to that reviewed by Marwick (2002b) and Law *et al.* (2010:70) that the Hamersley Plateau provided refuge for Aboriginal people during the cold and arid conditions of the LGM.

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References

- Bronk Ramsey, C. 2009 Bayesian analysis of radiocarbon dates. *Radiocarbon* 51(1):337-360.
- Brown, S. 1987 *Towards a History of the Hamersley Plateau, Northwest Australia*. Occasional Papers in Prehistory 6. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.
- De Deckker, P. 2001 Late Quaternary cyclic aridity in tropical Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 170:1-9.
- Edwards, K. and A. Murphy 2003 A preliminary report on archaeological investigations at Malea Rockshelter, Pilbara Region, Western Australia. *Australian Archaeology* 56:44-46.
- Hughes, P.J. and V. Djohadze 1980 *Radiocarbon Dates from Archaeological Sites on the South Coast of New South Wales and the Use of Depth/Age Curves*. Occasional Papers in Prehistory 1. Canberra: Department of Prehistory, Research School of Pacific Studies, Australian National University.
- Hughes, P.J. and G. Quartermaine 1992 Investigations of Aboriginal Archaeological Sites in the Mesa J Development Area, Pannawonica. Unpublished report to Robe River Iron Associates, Perth.
- Law, W.B., D.N. Cropper and F. Petchey 2010 Dadjiling Rockshelter: 35,000 ¹⁴C years of Aboriginal occupation in the Pilbara, Western Australia. *Australian Archaeology* 70:68-71.
- Marwick, B. 2002a Inland Pilbara Archaeology: A Study of Variation in Aboriginal Occupation Over Time and Space on the Hamersley Plateau. Unpublished MA thesis, Department of Archaeology, University of Western Australia, Perth.
- Marwick, B. 2002b Milly's Cave: Evidence for human occupation of the inland Pilbara during the Last Glacial Maximum. In S. Ulm, C. Westcott, J. Reid, A. Ross, I. Lilley, J. Prangnell and L. Kirkwood (eds), *Barriers, Borders Boundaries: Proceedings of the 2001 Australian Archaeological Association Annual Conference*, pp.21-33. Tempus 7. Brisbane: Anthropology Museum, University of Queensland.
- Marwick, B. 2009 Change or decay? An interpretation of late Holocene archaeological evidence from the Hamersley Plateau, Western Australia. *Archaeology in Oceania* 44(Supplement):16-22.
- Maynard, L. 1980 A Pleistocene date from an occupation deposit in the Pilbara Region, Western Australia. *Australian Archaeology* 10:3-8.
- McCormac, F.G., A.G. Hogg, P.G. Blackwell, C.E. Buck, T.F.G. Higham and P.J. Reimer 2004 SHCal04 southern hemisphere calibration 0-11.0 cal kyr BP. *Radiocarbon* 46(3):1087-1092.
- Morse, K. 2009 Emerging from the abyss – Archaeology in the Pilbara region of Western Australia. *Archaeology in Oceania* 44(Supplement):1-5.
- Reimer, P.J., M.G.L. Baillie, E. Bard, A. Bayliss, J.W. Beck, P.G. Blackwell, C. Bronk Ramsey, C.E. Buck, G.S. Burr, R.L. Edwards, M. Friedrich, P.M. Grootes, T.P. Guilderson, I. Hajdas, T.J. Heaton, A.G. Hogg, K.A. Hughen, K.F. Kaiser, B. Kromer, F.G. McCormac, S.W. Manning, R.W. Reimer, D.A. Richards, J.R. Southon, S. Talamo, C.S.M. Turney, J. van der Plicht and C.E. Weyhenmeyer 2009 IntCal09 and Marine09 radiocarbon age calibration curves, 0-50,000 years cal BP. *Radiocarbon* 51(4):1111-1150.
- Robe River Mining 1991 *Project Outline 1991*. Perth: Robe River Mining Company Pty Ltd.
- Slack, M., M. Filios and R. Fullagar 2009 Aboriginal settlement during the LGM in Brockman, Pilbara Region, Western Australia. *Archaeology in Oceania* 44(Supplement):32-39.
- Veitch, B., F. Hook, and E. Bradshaw 2005 A note on radiocarbon dates from the Paraburdoo, Mount Brockman and Yandicoogina areas of the Hamersley Plateau, Pilbara, Western Australia. *Australian Archaeology* 50:58-61.
- Veth, P. 1995 Aridity and settlement in northwest Australia. *Antiquity* 69:733-746.
- Williams, I.R. 1968 *Yarraloola, Western Australia: Western Australia Geological Survey 1:250,000 Geological Series Explanatory Notes*. Perth: WA Geological Survey.

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