Quaternary Science Reviews 193 (2018) 266–287

Contents lists available at ScienceDirect

Quaternary Science Reviews

journal homepage: www.elsevier.com/locate/quascirev

Murujuga Rockshelter: First evidence for Pleistocene occupation on the Burrup Peninsula

Jo McDonald [a, *], Wendy Reynen [a], Kane Ditchfield [a], Joe Dortch [a], Matthias Leopold [b], Birgitta Stephenson [c], Tom Whitley [a, d], Ingrid Ward [a], Peter Veth [a]

[a] Centre for Rock Art Research and Management, School of Social Sciences, M257, The University of Western Australia, Perth, WA, 6009, Australia
[b] School of Agriculture and Environment, M079, The University of Western Australia, Perth, WA, 6009, Australia
[c] In the Groove Analysis Pty Ltd, 16 Charlane Avenue, Indooroopilly, QLD, 4068, Australia
[d] Anthropological Studies Center, Sonoma State University, 1801 East Cotati Avenue, Building 29, Rohnert Park, CA, 94928, USA

ARTICLE INFO

Article history:
Received 24 October 2017
Received in revised form
17 May 2018
Accepted 2 June 2018

Keywords:
Dampier archipelago
Rock art
Lithic analysis
Pleistocene occupation

ABSTRACT

The Dampier Archipelago (including the Burrup Peninsula), now generally known as Murujuga, is a significant rock art province in north-western Australia which documents the transition of an arid-maritime cultural landscape through time. This archipelago of 42 islands has only existed since the mid-Holocene, when the sea level rose to its current height. Previous excavations across Murujuga have demonstrated Holocene occupation sequences, but the highly weathered rock art depicting extinct fauna and early styles suggests a far greater age for occupation and rock art production. The archaeological record from the Pilbara and Carnarvon bioregions demonstrates human occupation through 50,000 years of environmental change. While the regional prehistory and engraved art suggests that people were producing art here since they first occupied these arid rocky slopes, no clear evidence of Pleistocene occupation has been found across Murujuga, until now. Murujuga Rockshelter (MR1) reveals that occupation of this shelter began late in the Last Glacial Maximum, when the Murujuga Ranges would likely have served as one of a network of Pilbara refugia. In the terminal Pleistocene/Early Holocene, and likely in tandem with the last stages of sea level rise, the proportion of artefacts manufactured on exotic lithologies declines sharply, revealing a changed foraging range and increasing territorial focus in this period of increased demographic packing as the coastline advanced. Abandonment of the site as early as 7000 years ago is indicated, suggesting a changing resource focus to the increasingly proximal coastline. This paper provides the first evidence of how Aboriginal people adapted their Pleistocene procurement strategies in response to significant environmental and landscape changes in Murujuga. This changing logistical strategy provides an explanation for the increased rock art production in the terminal Pleistocene/Early Holocene.

1. Introduction

The estimated one million petroglyphs of the Dampier Archipelago include many thousands of motifs that are highly weathered and include locally extinct fauna, as well as an extensive repertoire of marine-themed rock art. This diachronic evidence for changed art production has prompted speculation that some of the rock art dates back to the first human occupation of the Australian continent from 50 ka (Balme et al., 2009; McDonald and Veth, 2009; Mulvaney, 2015; Veth et al., 2017). Our current project *Murujuga: Dynamics of the Dreaming* – is testing this possibility through archaeological excavations targeting prospective Pleistocene landscapes and deposits across the archipelago. These excavations had the dual aim of dating both Pleistocene occupation deposits and potentially any early rock art that may be uncovered through such excavation.

Previous attempts to date occupation have focused on shell middens which provide detailed stratigraphic sequences, but mostly date to the mid-Holocene (Clune and Harrison, 2009; Vinnicombe, 1987). Rock art has been found in reliable stratigraphic contexts and dated to 3.5 ka (Lorblanchet and Jones, 1980). The oldest dated shell middens (9.5 ka) are on Rosemary Island, at a

* Corresponding author.
E-mail address: jo.mcdonald@uwa.edu.au (J. McDonald).

https://doi.org/10.1016/j.quascirev.2018.06.002
0277-3791/

time when sea levels were c.15 m lower and this place was then a transgressive shoreline and part of the mainland (Bradshaw, 1995; McDonald and Berry, 2016). The archipelago contains very few rock shelters and consequently few protected archaeological deposits and also experiences extremely slow weathering regimes due to the resistant local volcanic geology. Potential and deep archaeological deposits are thus sparse.

This paper details the excavation of the largest known rockshelter on the archipelago; a shelter below a giant granite tor, at the junction with granophyre geology. The sheltered area affords a medium-sized liveable floor area. The site is located within an interior valley 1 km from the current southern shoreline of the Burrup Peninsula, facing towards the solar salt ponds which have been constructed in the shallows between what was Dampier Island and the mainland (Fig. 1). The nearest semi-permanent waterhole is located 400 m distant in an upland valley, but there is a gully adjacent the site which would flow with water after rain. There is no rock art in the immediate vicinity of the rockshelter, but motifs have been recorded less than 100 m upslope in the adjacent gully.

1.1. Formation of the Dampier Archipelago

The Ngarda-Ngarli people of the Dampier Archipelago believe that they have lived here since time immemorial (Mardudhunera Yaburara et al., 2004) and that Ancestral Beings created Murujuga during the Dreaming. Natural features such as the Marntawarrura ("black hills") are said to be stained from the blood of the creative beings, while some petroglyphs are seen to be images left by the ancestral beings (Robinson, 1997:4; Palmer, 1975).

The islands of the Dampier Archipelago represent an inundated coastal plain within the Pilbara bioregion. The archipelago formed when rising sea levels flooded the North West Shelf between 8000 and 6000 years ago. While the archipelago's formation is a relatively recent event, the underlying geology is some of the oldest on earth, formed by Archean volcanic activity more than 2400 million years ago (Pillans and Fifield, 2013, 2014). The striking igneous block structure across the Dampier Archipelago forms numerous ridgelines, valleys, gorges and rocky platforms, which are covered in engraved art, but with very few rockshelters. The Dampier Archipelago's volcanic geology provides a different canvas – and archaeological preservation environment – to the deep occupational history found on offshore Barrow and Montebello Islands (Fig. 1). These islands of the adjacent Carnarvon Bioregion are predominantly Quaternary and Tertiary limestones which provide excellent shelter formation opportunities as well as good preservation of deep-time archaeological and economic sequences (Veth et al., 2007, 2017). The geological differences between these study areas are significant. No rock art has been discovered on Barrow or the Montebello Islands to accompany this deep human time sequence. And until now, no rockshelter excavations on the Dampier Archipelago have provided a deep time sequence for human occupation to accompany the earliest rock art production.

Sea levels were at their lowest – at 130 m lower than today – during the Last Glacial Maximum (LGM). Quantitative estimates of precipitation and temperature levels from local marine core data suggest the period between 33 ka and 20.4 ka represents the driest climatic period in the past 100,000 years (van der Kaars and De Deckker, 2002; see also Slack et al., 2009; Williams et al., 2009: 2410) and that this continued until c. 19 ka (Lewis et al., 2013). At this time regional sea level curves indicate that the coast was 160 km distant (Ward et al., 2013). As the climate warmed, the marine transgression brought the coastline ever closer to what was once the 'Dampier Ranges' (Fig. 2a). By 10,000 years ago the coastline was approaching what is now Rosemary Island (Fig. 2b). A *Terebralia* midden excavated at Wadjuru Rock Pool (Fig. 1) demonstrates the exploitation of mangrove resources at this time (Bradshaw, 1995; McDonald and Berry, 2016), with ongoing work on Rosemary and Enderby Islands by the *Murujuga: Dynamics of the Dreaming* project illustrating that this occupation was part of a complex set of human behaviours which included art production and stone structure construction. Evidence for Pleistocene economies has been recovered from both the Montebello Islands (Veth et al., 2007) and Boodie Cave on Barrow Island, including the earliest dated marine economy at Boodie Cave between c.50 ka – 45 ka and a significant 10-fold broadening of marine and desert terrestrial species after the after Glacial Maximum between 14 and 8 ka (Veth et al., 2017). A significant observation for Murujuga is that the Pleistocene coastline was likely always productive for coastal foragers with evidence for marine economic dietary fauna being registered when the sea is within c. 15 km of occupied sites (Manne and Veth, 2015; Veth et al., 2017). At both Boodie Cave and Wadjuru Pool (McDonald and Berry, 2016) people engaged in broad-spectrum, energy-intensive activities long before the mid-Holocene. Until now, the exposed blocky granophyre landscape of Murujuga has provided little credible evidence from this period.[1]

Continued sea-level rise brought a plethora of new marine resources to the forming Dampier Archipelago. By 7.7 ka, large embayments had formed and a narrow channel separated a 'mega' Rosemary Island from Enderby and the Lewis Islands, which at this time were still connected to the mainland (Fig. 2c). Mangrove forests were extensive at this time due to the changed tidal and sedimentary regime (Morse, 1993; O'Connor, 1999; Semeniuk, 1983; Semeniuk and Wurm, 1987; Veth et al., 2007; Woodroffe et al., 1985). At this time Murujuga Rockshelter was on a peninsula which included Legendre Island. By c. 3.5 ka, the archipelago adopted its present configuration (Fig. 2d).

1.2. Human occupation of Murujuga in the Pleistocene and Holocene

Prior to this work, the only evidence that people had visited Murujuga in the Pleistocene was from a single *Syrinx* shell, dated to 22.5 ka, found wedged between rocks by Lorblanchet (1992) during his excavation at Gum Tree Valley 10 km to the south-west of Murujuga Rockshelter (Fig. 1). The age is a maximum age for transport, which could have occurred well after it was collected from an extant shoreline from this time period. Given the shoreline's distance and the fact that this would have been drowned once sea-levels began to rise at the end of the LGM, it is reasonably assumed that even if this was an heir-loomed shell, it must have been transported to the Murujuga Ranges during the Pleistocene.

Mangrove habitats and hence species abundance in the north-west appear to have declined around 4000 years ago and shell middens reveal that people switched their economic focus to a range of rocky shore, mudflat and sandy beach shellfish (Lorblanchet, 1992; Clune, 2002; Clune and Harrison, 2009). This switch is best exemplified by the change of focus from *Terebralia* species to (predominantly) *Anadara granosa*. Anadara mounds, presumably Mid-Holocene and up to 5 m in height and 300 + m in length, occur on West Intercourse Island (Fig. 1). As yet, none of these mound middens have been excavated. All Burrup shell

[1] Visualizations of possible past environments and shoreline changes are carried out by processing topographic and bathymetric terrain models and sea level rise models (Lambeck et al., 2014; Siddall et al., 2003; Waelbroeck et al., 2002; Yokoyama et al., 2001) in ArcGIS 10.4.1 (ESRI, Inc, 2017), and applying the results to photorealistic scenery-generator software (Terragen 4; Planetside Software, Inc. 2017).