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Australian Archaeology is the official publication of the Australian Archaeological Association Inc. It is a refereed journal published since 1974. It accepts original articles in all fields of archaeology and other subjects relevant to archaeological research and practice in Australia and nearby areas. Archaeology is defined broadly and covers the prehistoric, historic and contemporary periods in terms of research and cultural heritage management. Material relating to research in biological anthropology, social and cultural anthropology, history, Aboriginal studies, environmental science and other related areas is welcomed, particularly when it relates to current problems and issues in Australian archaeology. Australian Archaeology is published three times a year now with relevant months.

Front Cover: Views of the six shark vertebrae beads recovered from Djawambu, from Wright et al. this issue (Photograph by Michelle C. Langley with permission from the Mirrar people and the Gundjeihmi Aboriginal Corporation)
The archaeology of Ingaanjaulurr rockshelter in Manilkarr Country, Arnhem Land

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ABSTRACT
Archeological excavations at Ingaanjaulurr rockshelter in western Arnhem Land, Northern Territory, have revealed evidence of human settlement on the East Alligator River floodplain from approximately 1000 years ago through to the twentieth century. This short report summarises the results of archaeological excavations at the site, focusing on dated distributions of stone artefacts as the primary recorded occupation. The excavations revealed two main periods of occupation: the earlier from c. 1900 to 1300 cal. BP and the latter from c. 460-300 cal. BP to the proto-historic period. The findings from Ingaanjaulurr broadly correspond to previous palaeo-environmental regional settlement trends, whereby Aboriginal settlement shifted to newly stabilised freshwater environments during the later Holocene period.

Ingaanjaulurr
Ingaanjaulurr is a small rockshelter that is heavily decorated with rock art (both painted and applied beeswax), measuring 10.5 m (east to west) by 3.5 m (north to south) by 1.6 m in maximum height (see May et al. in press for a description of the rock art). The shelter is located in Manilkarr Country, within western Arnhem Land, approximately 9 km south-west of Gunbalanya (Oenpelli) (Figure 1).

Ingaanjaulurr (Figure 2) is the Urrangkulk name (original language of the Nuyngay family and Manilkarr clan) provided by senior traditional owner NaGodok. The name Ingaanjaulurr also applies to the broader area surrounding the rockshelter, as well as a creek located approximately 100 m north of the site. NaGodok (born in c.1943) remembered camping at the site in his youth, being the last of his family to do so, indicating site usage ceased by about 1960. He recalled the site had been used as a short-term camp by people walking between historic 'Europees' settlements, such as Gunbalanya, Mungguburrri and Pine Creek.

During mid-2011, archaeological excavations were conducted at Ingaanjaulurr - followed by excavations at Birrwilkk and Binjarrak rockshelters - as part of community-led doctoral research by the lead author (Shine 2014). Each of these sites is located in Manilkarr Country, a clan estate that extends to both sides of the East Alligator River (into both western Arnhem Land and Kakadu National Park).

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Stratigraphy and chronology

Three homogeneous Stratigraphic Units (SUs), consisting of a series of brown sands, were recorded in Square 1; three homogeneous units of sand were also recorded in Square 2 but, as inferred from (or implied by) the dating evidence (Table 1), these units are of different antiquity and are not the direct equivalent of those in Square 1. The homogeneous nature of the sediments from both squares was later confirmed in the laboratory through particle size analysis (PSA) on collected samples (Figure 4). Minor biogenic disturbance from insects and roots was recorded in both squares. The low ceiling of the rockshelter protects the site from disturbance by larger animals, such as cattle and buffalo, which were historically common in the wider region (Cole 1975). However, post-depositional disturbance of the shelter's surface from other animals, such as pigs, goannas or termites cannot be discounted, with two small dormant termite mounds noted at the time of excavation.

A total of 12 pieces of charcoal from Ingaanjawurr were AMS radiocarbon dated to establish a chronology of cultural activity (as exhibited by peaks in the quantities of stone artefacts) (see Table 1 for all dates). With two exceptions, the radiocarbon dates are in good chronostratigraphic order, with the sequences for both squares clearly demonstrated through the acquisition of multiple dates.

In Square 1, three samples of charcoal (from XU6, XU11 and XU14) were collected in situ, while the others were recovered from the sieved fraction. The radiocarbon dates provide a good chronostratigraphic sequence with the exception of a minor inversion between XU6 and XU11 in Square 1 (Table 1). The inversion probably represents old, residual charcoal in XU6 (WK-33537) given that underlying dates are in chronostratigraphic sequence. The basal date for Square 1 of 9,762-9,543 cal. BP (WK-33539) from XU34 (the basal SU) may be anomalously old and potentially derived from older sediments underlying the rock fall encountered at the base of the square.

In Square 2, five radiocarbon dates were obtained on charcoal identified in the sieved fraction and only one, in XU21, from charcoal observed in situ. A single anachronistic date was recorded in Square 2 from XU33 (WK-33534), which probably represents intrusive, younger charcoal entering the square, most probably through post-depositional disturbance. However, the other five dates provide a robust chronology indicating two main periods of deposition: between XU39 and at least XU21, c.1870-1730 cal. BP to 1370-1300 cal. BP, and, from at least XU13 to the surface, c. 420 cal. BP to the proto-historic period.

The radiocarbon dating for both squares suggests two periods of intense site usage: an initial occupation dating to c. 1,900-1,300 cal. BP (WK-31821,
Table 1. Radiocarbon dates on charcoal from Ingaanjaluwr (Squares 1 to 2).

<table>
<thead>
<tr>
<th>Laboratory code</th>
<th>XI</th>
<th>Square</th>
<th>Depth below ground (cm)</th>
<th>Sample collected</th>
<th>ΔR (%)</th>
<th>Radiocarbon Age (BP)</th>
<th>Calibrated Age (95.4% Probability) of Cal BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wk-33537</td>
<td>6</td>
<td>1</td>
<td>13</td>
<td>In situ</td>
<td>-27.4 ± 0.2</td>
<td>411 ± 26</td>
<td>516-436 (87.5%)</td>
</tr>
<tr>
<td>Wk-35041</td>
<td>11</td>
<td>1</td>
<td>23</td>
<td>In situ</td>
<td>-25.02 ± 0.2</td>
<td>333 ± 35</td>
<td>310-720 (51.9%)</td>
</tr>
<tr>
<td>Wk-31822</td>
<td>14</td>
<td>1</td>
<td>24</td>
<td>In situ</td>
<td>-25.7 ± 0.2</td>
<td>296 ± 25</td>
<td>187-149 (-35.1%)</td>
</tr>
<tr>
<td>Wk-33538</td>
<td>26</td>
<td>1</td>
<td>51</td>
<td>From sieved fraction</td>
<td>-24.8 ± 0.2</td>
<td>301 ± 25</td>
<td>430-444 (19.1%)</td>
</tr>
<tr>
<td>Wk-33539</td>
<td>31</td>
<td>1</td>
<td>62</td>
<td>From sieved fraction</td>
<td>-28.2 ± 0.2</td>
<td>1635 ± 25</td>
<td>1699-1495 (76.9%)</td>
</tr>
<tr>
<td>Wk-33539</td>
<td>34</td>
<td>1</td>
<td>64</td>
<td>From sieved fraction</td>
<td>-25.5 ± 0.2</td>
<td>8500 ± 39</td>
<td>9750-9753 (0.0%)</td>
</tr>
<tr>
<td>Wk-33535</td>
<td>5</td>
<td></td>
<td></td>
<td>From sieved fraction</td>
<td>-34.0 ± 0.2</td>
<td>17 ± 5</td>
<td>284-244 (16.4%)</td>
</tr>
<tr>
<td>Wk-33533</td>
<td>13</td>
<td>2</td>
<td>24</td>
<td>From sieved fraction</td>
<td>-25.6 ± 0.2</td>
<td>241 ± 25</td>
<td>422-407 (1.9%)</td>
</tr>
<tr>
<td>Wk-31821</td>
<td>21</td>
<td>2</td>
<td>41</td>
<td>In situ</td>
<td>-26.02 ± 0.2</td>
<td>1410 ± 25</td>
<td>1370-1295 (15.4%)</td>
</tr>
<tr>
<td>Wk-33509</td>
<td>28</td>
<td>2</td>
<td>56</td>
<td>From sieved fraction</td>
<td>-25.5 ± 0.2</td>
<td>1833 ± 35</td>
<td>1860-1800 (10.5%)</td>
</tr>
<tr>
<td>Wk-33534</td>
<td>33</td>
<td>2</td>
<td>68</td>
<td>From sieved fraction</td>
<td>-25.9 ± 0.2</td>
<td>237 ± 25</td>
<td>1826-1700 (9.1%)</td>
</tr>
</tbody>
</table>

Wk-35590 and Wk-33536), and a second, primary period of use from c. 460-300 cal. BP (Wk-33538) that increased in intensity towards the protohistoric period.

Cultural materials

Cultural materials recovered during the excavations include 617 stone artefacts, four artefacts produced from European materials (metal × 3 and glass × 1), 3,586.3 g of macrocharcoal (charcoal >2.1 mm), 7,584.0 g of organics recovered through archaeological flotation (organics <2.1 mm and >250 μm), 0.03 g of bone (n = 4), 276.6 g of worked ochre (n = 13), and 44.8 g of unworked ochre (n = 31). Given the paucity of other cultural materials this report focuses on the stone artefacts. Distributions of ochre and their significance to Ingaanjaluwr’s rock art have been discussed elsewhere (May et al. in press).

Stone artefacts

Of the 617 flaked stone artefacts recovered during excavations at Ingaanjaluwr, 133 came from Square 1 and 484 came from Square 2 (Figure 5). Flaked stone artefacts were found throughout the deposit in both squares. Quartzite (60%) is the major material represented in the assemblages, with quartz (31%) common, and chert (7%) and tuffs (3%) less frequent. There are distinct differences between the lithic assemblages inside (Square 1) and outside (Square 2) the drinipile of the rockshelter. The densities of artefacts are radically different, with artefact abundance in Square 2 being more than three times greater than that from Square 1. Furthermore, the frequencies of materials are statistically different in the two squares χ² = 0.545, 0.05 < p < 0.0001, as quartz is the main material within the rockshelter (Square 1) and quartzite the dominant material outside the rockshelter (Square 2). Since the age of assemblages in both squares is broadly similar, the different material compositions appear to indicate a spatial differentiation of activities at the rockshelter.

Notwithstanding the different records from the two squares, Square 2 was selected as the basis of a chronological study of lithic assemblages, principally because of the larger sample size. The lithic assemblages document two periods of relatively high artefact discard: an earlier phase approximately c. 1,200-3,000 cal. BP from XU19-29 (peaking in XU27) (Wk-33536 and Wk-33821), and a later phase post dating c. 420 cal. BP, XU1-8 (peaking in XU5) (Wk-33533). Within the artefact sequence in Square 2 there is an oscillation between levels in which quartzite is dominant (i.e. more than 50% but often more than 80% of the stone artefacts) and levels where quartz or chert are more common. Within Square 2 there is a weak but positive and statistically
significant link between phases of high artefact discard and quartzite dominance, reflected in correlation statistics ($r = 0.37$, $n = 35$, $p = 0.032$). This pattern might indicate pulses of relatively intense occupation superimposed over low levels of human use, with different lithic patterns associated with different intensities of use. This pattern is noteworthy because the combination of low artefact discard rates and low use of quartzite is the dominant one throughout the sequence in Square 1.

Quartz was primarily used for flake production, using both hand-held percussion and bipolar techniques. Quartzite was employed to make unilateral and bifacial points, with eight points/bifacial fragments found in XU1–34. Given the different manufacturing practices associated with quartzite and quartz, the chronological oscillations in discard rates and material proportions are likely to reflect periods of occupation when points were or were not being made on site.

The vertical frequency distribution of lithics corresponds to other lines of evidence, most notably charcoal, reflecting one of the main occupational phases at the site. Macrocharcoal from Square 1 shows a clear spike from XU12–18 (peaking in XU14), c. 460-300 cal. BP (Wk-31822 in XU14) (Figure 5). This charcoal peak in Square 1 is contemporary with a period of increased stone artefact deposition (as outlined) and broadly corresponds to a less defined charcoal peak in Square 2 from XU6–11 (which post-dates c. 420 cal. BP (Wk-35553) in XU13). The correlation between peaks of charcoal and lithics clearly indicates that the former represents in situ anthropogenic (and not landscape) burning. Less distinct and minor peaks in charcoal lower down the profiles of both squares are muted and are not so readily correlated with lithic frequencies. It is probable that increased burning activity did accompany the earlier period of high artefact discard at the site c. 1900-1300 cal. BP. However, evidence of greater burning activity is not readily recorded in the macrocharcoal record, plausibly reflecting poor preservation with age.

Discussion

Excavation data suggest Ingaanjaluwr was used during two primary periods of human activity: (a) an earlier phase from approximately 1300-1900 cal. BP and (b) a later phase commencing c. 460-300 cal. BP, which increased in intensity towards the start of European contact. These periods of rockshelter use are primarily evident through an increase in lithics and were separated by a period of low level site use.

Archaeological evidence of Ingaanjaluwr’s early occupation is better demonstrated in Square 2 (due to the greater depth of excavation). Over 44% of the stone artefacts recovered from Square 2 derive from levels (XU19–29) dating to between 1300 and 1870 cal. BP, a time that exhibits a technological emphasis on the manufacture of quartzite points. Peak human occupation at Ingaanjaluwr at this time is interpreted as lending further support to previously proposed regional trends, whereby Aboriginal settlement shifted to exploit new food sources associated with stabilised freshwater environments (e.g. Brockwell et al. 2009:54; Jones 1985; Taçon and Brockwell 1995:676). While the date of this trend is highly variable across the Alligator Rivers region (Clark and Guppy 1988:665; Hincock 1999:91) occupation of floodplain sites, such as Ingaanjaluwr, is thought to have increased from approximately 2000 to 1500 years ago (Allen 1987;1, 1989:92; Allen and Barton 1989; Brockwell et al. 2011:1).

The rapid organic degradation at Ingaanjaluwr, as a result of extremely acidic soils (pH range of 2.7-3.4), has contributed to a virtual absence of faunal material. This makes it difficult to interpret how the environment surrounding the rockshelter was exploited and thus the early phase of occupation cannot be definitively linked to Aboriginal exploitation of freshwater environments. Future macro- and microfossil analysis of the archaeobotanical remains may shed light on human-environment interactions at Ingaanjaluwr during this early phase of occupation.

The primary episode of site use, as identified by the archaeological results, post-dates 460 cal. BP and incorporates the proto-historic period (May et al. in press). Distributions of stone artefacts and macrocharcoal all peak during this period. Over 56% of the stone artefacts recovered from Square 1 and 33% of the stone artefacts from Square 2 post-date c. 310 cal. BP and c. 420 cal. BP, respectively. Increased flaking at Ingaanjaluwr at this time reflects a technological emphasis on the manufacture of quartzite points. Later site use extended into the European contact period, when Aboriginal histories tell us the site was used as a short-term camp on journeys between early historic settlements. Much of the rock art at the site, both painted and pelean, is likely to relate to this later period of site use.

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