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Pleistocene Rock Art in Australia

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Abstract. – The occurrence of Pleistocene rock art in Australia is reviewed against the background of historical developments in the age estimation of rock art. Despite errors in interpreting data and the continuing paucity of credibly dated examples, it is apparent that most rock art of the earliest phase has survived as petroglyphs, which is consistent with the rest of the world. The author estimates that a large proportion of Australian petroglyphs are of the Pleistocene, and he points out that this corpus relates exclusively to Mode 3 (Middle Palaeolithic) technological traditions. It therefore follows that, contrary to conventional notions, which see palaeoart traditions commencing with the Aurignacian, there is actually far more surviving "Middle Palaeolithic" rock art in the world than there is "Upper Palaeolithic." The Pleistocene rock art of Australia is very similar to the Middle Palaeolithic or Middle Stone Age petroglyphs of other continents. *[Australia, Pleistocene, rock art, palaeoart, petroglyphs]*

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Introduction

It has long been suspected that rock art of Pleistocene antiquity occurs in Australia, but for much of the 20th century, "conclusive proof" remained elusive. Herbert Basedow (1881–1933), a South Australian geologist and medical practitioner, presented the first cohesive arguments for this proposition (Fig. 1). In commenting on the petroglyphs of the Yunta Springs (Olary district) and Red Gorge (Flinders Ranges) sites in South Australia, he noted that many are found in places where it would now be almost impossible to work, suggesting that major exfoliation of rock mass must have occurred since the designs were made (Basedow 1914). Being familiar with the fossil megafauna found at Lake Collabonna, he further speculated that a large animal track petroglyph could represent the extinct Diprotodon.

Anthropologist, archaeologist, and entomologist Norman Tindale (1900–1993) later also visited Yunta Springs and speculated that images of large bird tracks at Pimba, a site near Woomera, could be indicative of megafauna. He considered a series of such tracks, each about 45 cm long, to be of *Genyornis* (Tindale 1951). Similarly, Edwards (1965: 229) suggested that large macropod tracks on Tiverton Station, also in South Australia, could represent those of *Procoptodon*. Most Australian megafauna had disappeared by around 20,000 years (20 ka) ago, yet similar claims of depictions of extinct species have been made by several others since Basedow's initial suggestion. Mountford (1929; Mountford and Edwards 1962, 1963) thought that a complex maze at the Panaramitee North site near Yunta, depicts the head markings of a saltwater crocodile, a species that has not existed in southern Australia for millions of years. Berndt (1987) subsequently secured an indigenous interpretation of the complex petroglyph, which in fact depicts a "magic object." Mountford and Edwards (1962) also reported marine turtle and saltwater fish images from Panaramitee North and Yunta Springs. More recently there have been suggestions of the depiction of extinct megafauna by Trezise (1993) in Cape York Peninsula and Chaloupka in Arnhem Land (Murray and Chaloupka 1984).

Fig. 1: Herbert Basedow, pioneer of Australian rock art research.

While it is not possible to conclusively exclude the possibility that Pleistocene Australians depicted extinct fauna, the likelihood of this is remote, primarily because we lack any convincing evidence that figurative depiction was used at the time most megafauna still existed. The only extinct Australian animal species whose identification in rock art can reasonably be accepted, at least in a number of clear enough cases, is the *Thylacine*. Its imagery has been reported from the Pilbara and Arnhem Land.[1] Basedow's initial observations concerning geological processes postdating petroglyphs at specific sites, are perhaps more pertinent.

Misconceptions about Age

Determining or estimating the antiquity of rock art is of fundamental importance to archaeology, because without any notion of its age, rock art cannot be linked to archaeology. Mere co-occurrence with archaeological evidence is irrelevant to this issue, so the only testable common variable to link rock art with archaeology is *time*. Unfortunately, age estimation of both petroglyphs and pictograms remains difficult and generally experimental, and overinterpretation or misinterpretation of scientific dating pronouncements is rife.[2] In some cases, previous statements have been misunderstood or even completely inverted, in others the information was misquoted. For instance Maynard (1979: 93) has this to say about rock weathering and repatination:

> Trendall's view (relating to dolerite from Depuch Island), that it takes one million years, seems a little extreme in these circumstances (1964: 88). In a similar situation in the Negev Desert, Iron Age engravings which are approximately 2,500 years old have not repatinated to match the surrounding rock (Edwards 1971: 361).

Maynard confuses or conflates two issues here: that of *weathering front* formation and that of *repatination*. Trendall's findings refer to his view of the depth of the weathering zone or "weathering rind," which is the substrate that has been altered by weathering processes, such as hydration. His estimate was not only correct in terms of order of magnitude, it was even confirmed independently by the more precise work of Černohouz and Solč (1966), whose determinations match those of Trendall (see also Bednarik 1979; 2001b: 216–232; 2007): 5 mm on basalt corresponds to 1.1 Ma in central Europe. Next, Maynard quotes Edwards' citation of a statement originally by Anati, concerning the time taken by the repatination of a petroglyph. Edwards misunderstood Anati's key statement, which was:

> In this region we know of no engraved surface from Style IV-B (Iron Age) to Style VII (recent) with a patination identical to that of the original rock surface. This seems to mean that in this area it took a minimum of 2,500 years to reach an "0" shade, the natural color of the patina on the surface of the rock (Anati 1963: 189).

Edwards misrendered this carefully crafted, precise wording by stating that

> no engravings have re-weathered to match the natural dark rock surface. As some of them are associated with the Iron Age, Anati believes it takes a minimum of 2,500 years for a thin, initial surface patination to form in that region (Edwards 1971: 361).

These misunderstandings are in addition to a previous failed attempt of interpreting Trendall's clear data (Crawford 1964: 50; see Bednarik 1979: 22 for

1 Brandl (1972); Wright (1972); Bednarik (1974).

2 David et al. (1995); Bednarik (1996, 2002b); Watchman (1999).

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correction), and they have led to further misguided views and discussions, such as a debate concerning the effects of groove depth (or, more precisely, distance between groove bottom and weathering front) on repatination rates (see Bednarik 2007: 223).

Several authors incorrectly claimed that Dragovich (1984a, 1984b, 1986) has dated rock art at Eight Mile Creek, near Sturts Meadows, western New South Wales (e.g., Lourandos 1997: 121; Morwood 2002: 133). Dragovich states that her samples were from rock that was not engraved (1984a: 53), and there is in fact no rock art at the site in question. Another example is provided by Loy et al.'s (1990) AMS carbon isotope results from what they claimed was blood haemoglobin at two sites, Judd's Cavern in Tasmania and Laurie Creek in Northern Territory. However, the principal analyst of that team, Earle Nelson, reported having second thoughts about these results and returned to Laurie Creek for more detailed analytical work. He found that the reported pigment layer was in fact naturally precipitated iron oxide of a type frequently occurring on weathered sandstone, and that its organic content comprised no proteinaceous matter, i.e., no blood residue (Nelson 1993). Although Loy (1994) continued to claim that mammalian IgG was present at the sampling site, his view has been refuted by Gillespie's (1997) subsequent research (see also Tuross and Barnes 1996). Loy's insistence that there was organic matter present is not relevant, because practically all rock substrates contain natural organic compounds (Bednarik 1979).

The same issue of the ubiquity of organics in rock surface deposits also led to the many mistaken rock art datings by Dorn, in Australia and elsewhere.[3] Dorn sought to estimate petroglyph ages by analyzing rock varnishes covering the rock art. His sampling in the Olary district of South Australia yielded spectacular results at several sites, ranging up to about 45 ka (Dorn et al. 1992). However, an attempt to duplicate them, using the same analytical methods on the same motifs, produced entirely different results (Watchman 1993). This eventually led to the retraction by Dorn of all his results after a "change of perception" (Dorn 1996a, 1996b, 1997; cf. Beck et al. 1998).

Morwood attempted to provide a maximum age for the petroglyphs on a boulder he excavated in Ken's Cave, Queensland, but his illustration of the stratigraphy (Morwood 1981: Fig. 7) shows that he misinterpreted the section. Clarke (1978) attributed the rock varnish covering many petroglyphs of the Dampier Archipelago in Western Australia to the Last Glacial Maximum, speculating that some motifs might be over 17 ka old. His view was echoed by Lorblanchet (1992) who constructed an elaborate chronology extending more than 18 ka. It was based largely on a single, questionable carbon isotope analysis of a surface seashell, which has no demonstrable relevance to the site's rock art. Based on their repatination, most Dampier petroglyphs are under 4,000 years old (Bednarik 2002a; 2007; 2009: Fig. 9). Recently Ken Mulvaney has revived the notion of Pleistocene rock art at Dampier, but again without presenting refutable data. For instance, the presumed depiction of thylacines (Fig. 2) provides no support; the species survived in Western Australia at least until 3,300 years ago (in Murra-el-elevyn, Partridge 1967; cf. Thylacine Hole, Lowry and Lowry 1967).

McDonald et al. (1990) introduced AMS analysis of Australian rock paintings by applying it to charcoal pigments at Gnatalia Creek and Waterfall Cave in New South Wales. However, the two results from what is clearly a single motif at Gnatalia Creek, taken just a few centimetres apart, differ dramatically (6,085 ± 60 B.P. [AA-5850] and 29,795 ± 420 B.P. [AA-5851]). The most likely explanation for these incompatible results is again that they reflect the open carbon system of the substrate (Bednarik 1979), which questions the integrity of all such carbon isotope results, especially those from non-cave sites.

The supposedly oldest dated rock painting in the world (Morwood 2002: 19, 37, 141) has been reported from Carpenters Gap Shelter 1 (Tangalma), in the Kimberley region of northwestern Australia. In a deposit yielding occupation evidence of up to 40 ka, O'Connor (1995) reports finding a rock slab she considers to bear ochre, but there is no indication that the coating is of anthropic origin. The shelter has experienced considerable water logging, which is more likely to account for the deposition of iron minerals. However, striated or modified haematite does occur in abundance from the time of earliest known occupation of Australia onwards,[4] and from much earlier times in the Old World (Bednarik 1994a).

The perhaps most spectacularly mistaken rock art dating in Australia is that of the Jinmium site in the far west of the Northern Territory (Fullagar et al. 1996). Using TL analysis of sediment, a series of cupules at that site was claimed to date from between 58 and 75 ka ago, and that human occu-

3 Dorn (1983, 1986, 1990, 1992, 1994); Dorn et al. (1992); Dorn and Whitley (1984); Nobbs and Dorn (1988).

4 Jones (1985); Roberts et al. (1990, 1993); Thorne et al. (1999) .

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Fig. 2: Presumed depiction of a thylacine, Murujuga, Dampier Archipelago, Western Australia.

pation of the site began 185 ka B.P. These spectacular numbers exceed the accepted duration of Australia's colonization, but they were the result of a misuse of the dating method (Gibbons 1997; Roberts et al. 1998, 1999).

Less spectacular was the suggestion that one of the red rock paintings in the nearby Kimberley region is in excess of 17,000 years old, based on a single OSL date from a wasp nest (Roberts et al. 1997, 2000), but it is also unlikely to be correct. The motif in question is attributed to the Gwion Gwion tradition, which is believed to be of mid to late Holocene antiquity (range 1,400–4,000 years B.P.; Watchman et al. 1997), and there are considerable difficulties with the interpretation of OSL results (Bednarik 2001b: 133 f.). Recent results by R. Roberts from four sites of the Indian Lower and Middle Palaeolithic are clearly false (Bednarik 2008a: 3), and he attributes this to the assumption that most quartz grains are unsuitable for the method.

There are many more questionable claims, some also involving "portable art" (Dortch 1976, 1979, 1984; corrected in Bednarik 1998b), but it must be emphasized that a great deal of Pleistocene rock art does undoubtedly occur in Australia. However, the question of the possible quantity, nature, and distribution of Australian rock art remains to be discussed in any systematic or comprehensive form. The wide adoption of Maynard's (1979) tripartite model of Australian rock art with its three consecutive developmental phases has hampered the establishment of a chronology as much as the confusions about dating. Essentially, Maynard and others failed to separate site corpora into chronological components, partly because of Maynard's reliance on Edwards' misinterpretation of repatination as noted above. Site corpora were treated as representing single traditions, when in fact several traditions had often contributed to the same site's repertoire. This conflating of the residues of different traditions has rendered it difficult to address the variable of time (Bednarik 2001b, 2002b).

The Occurrence of Pleistocene Rock Art in Australia

The first archaeological and conservative (Holocene) minimum datings of Australian petroglyphs were at Devon Downs (lower Murray river; Hale and Tindale 1930: 208–211), Ingaladdi (Queensland; Mulvaney 1975: 185) and Preminghana (formerly Mt Cameron West; Mulvaney 1975: 170). At Ingaladdi, exfoliated petroglyph fragments were excavated from layers radiocarbon dated to 4,920 ± 100 B.P. (ANU-58) and 6,800 ± 270 B.P. (ANU-60) respectively. The first substantive but still indirect evidence for a Pleistocene antiquity of Australian rock art was secured in Koonalda Cave, on the Nullarbor karst plain (Gallus 1968, 1971, 1977, 1986; Maynard and Edwards 1971). Carbon isotope dates from excavated and surface charcoal samples range roughly from 15 ka to 31 ka, and although none can be directly related to the extensive cave art, circumstantial evidence implies that the cave was not visited in the Holocene. The huge entrance sinkhole renders human access extremely difficult today, and the remains of apparent Pleis-

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tocene torches and the considerable ceiling breakdown succeeding the finger flutings production all imply a Pleistocene antiquity for the human activity traces in the large cave.

Much more secure is the minimum dating of a series of petroglyphs at Early Man shelter, near Laura, Cape York Peninsula (Rosenfeld 1975, 1981, 1991). The sediment covering the lowest examples of rock art at that site was in the order of 13 ka old, which finally established a reasonably unambiguous Pleistocene antiquity for Australian rock art. In the year this finding was published, 1981, the first *direct dating* (Bednarik 2001b: 124) results from rock art were acquired in Malangine Cave, South Australia (Bednarik 1981, 1986). From a sequence of three chronologically discrete traditions separated by speleothem stratigraphy, conservative minimum carbon isotope estimates of the early Holocene were obtained for the second of these temporal units (Bednarik 1981, 1984). However, uranium-thorium analyses of one of the deposits suggested in 1982 how conservative these estimates were: the cave art tradition in question was suggested to be in excess of 28 ka old (Bednarik 1999). It is attributed to the non-figurative "Karake tradition" of cave petroglyphs, which features arrangements resembling petroglyphs found on the other side of Bass Strait, at Northwest Tasmania, e.g., at Preminghana. There they are of unknown antiquity, but were buried c. 1,500 years ago. Tasmania became sundered from the mainland about 12 ka ago, therefore, if the occurrences on both sides of the Strait are culturally connected, the tradition must extend into the Pleistocene. Direct dating via carbon isotope determinations from laminated calcium carbonate reprecipitates has been secured from another of the many cave art sites near Mt Gambier, Prung-kart Cave, but here the rock art was only in excess of 2,500 years old (Bednarik 1998a). Nevertheless, many of the cave art finds of the area can safely be assumed to include Pleistocene elements, as indicated by context. For instance, the finger flutings in Yaranda Cave predate sets of megafaunal claw markings, and substantial speleothems have often been deposited over Australian cave art, or major tectonic changes have occurred since it was executed. Concerning the possible age of Tasmanian cave art, it has been suggested that paintings in Judds Cavern and Ballawine Cave were probably painted before 11 ka ago (Cosgrove and Jones 1989: 100), although this, too, is based on circumstantial evidence only.

Watchman developed the direct dating of rock art by extending it from carbonates to silicas and oxalates, securing the first carbon isotope results from the latter type of accretionary deposits (Watchman 1990). Although his initial determinations were of the Holocene, up to 8880 ± 590 years B.P. (from Kakadu National Park), he also demonstrated repeated earlier paint applications at various sites, sometimes even finding paint residues embedded in mineral skins that showed no trace of pigment on the surface (Watchman 1992). Such stratified accretions on a flake yielded oxalate "dates" ranging up to about 24,600 years from Sandy Creek 2 shelter, near Laura, Cape York Peninsula (Watchman 1993). The nano-stratigraphic sequence from another northern Queensland site, Walkunder Arch Cave, provided comprehensive dating of a finely stratified whewellite and gypsum crusts.[5] In this case, ten carbon dates were secured from laminae measuring a total thickness of only 2.11 mm, but spanning the period from 3,340 ± 60 to 29,700 ± 500 years B.P. All dates were in sequence, and three of them denote painting episodes, ranging in age from about 10 ka to 28 ka.

Microerosion analysis is difficult to apply in Australia, because in contrast to Eurasia, historically dated stone surfaces suitable for local calibration (e.g., monuments, gravestones, inscriptions, or structures) older than about 200 years are not available. However, a cluster of many dated inscriptions was found amidst one of the largest concentrations of petroglyphs, in the eastern Pilbara, and a calibration curve they yielded became available for application to a selection of nearby motifs (Bednarik 2001a, 2002a, 2002c). The two oldest dates of a randomly chosen sample of seven in the Spear Hill / Abydos area were almost 20 ka and 28 ka respectively (Fig. 3). However, it was clear from the relative weathering state that there were significantly older motifs present nearby. Most especially, boulders bearing numerous cupules of clearly greater age were observed, confirming what has been reported by many in Australia (and elsewhere): that the earliest surviving forms of rock art are dominated by this phenomenon (Bednarik 1993, 2008b).

Discussion

In the absence of large-scale dating programs it may be premature to assess the frequency of Pleistocene rock art in Australia. Nevertheless, it is pertinent that there is no plausible evidence, anywhere in the world, of pictograms or rock paintings having survived from the Pleistocene, except

5 Watchman and Hatte (1996); Watchman (2000); Campbell (2000).

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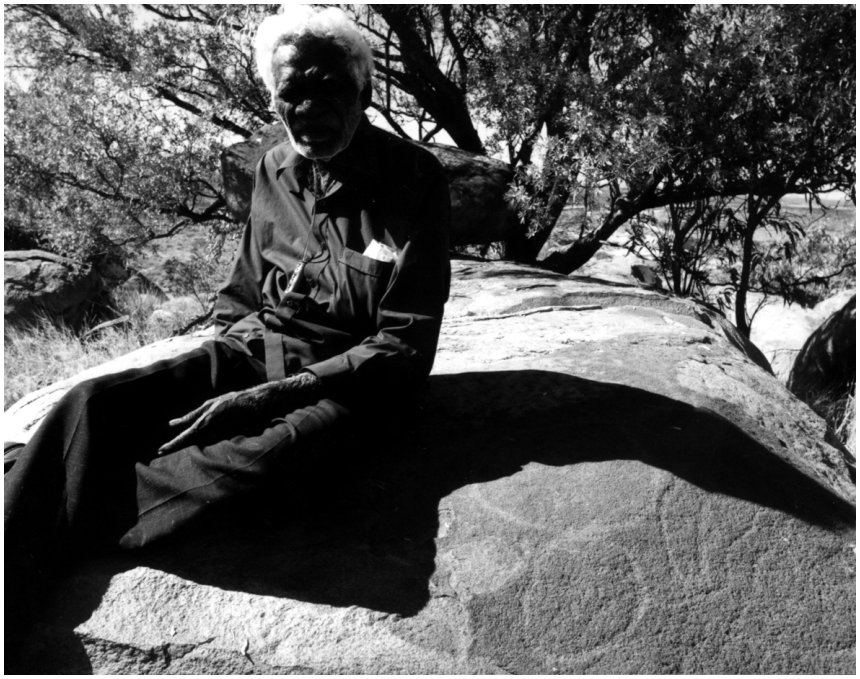

Fig. 3: Traditional custodian Monty Hale requested that the age of the circular petroglyphs he is seated next to be estimated by the author. The rock art, at Woodstock site 65B, Western Australia, is almost 20,000 years old.

in "fluke conditions": under mineral accretions or in deep limestone caves. Petroglyphs, on the other hand, can be much more resistant to weathering processes, and on specific rock types and under certain environmental conditions can easily survive longer at open sites. Taphonomy decrees that this applies especially on very hard rocks and in arid or semiarid regions, and that deeply cut petroglyphs survive longest (Bednarik 1994b). The earliest period seems to be dominated by cupules and linear grooves, followed by circles and circular motifs, sets of parallel grooves, "convergent lines motifs" and other specific "geometric" patterns. This trend is not limited to Australia; it may well be universal. The earliest petroglyphs of Asia, Africa, and Europe are also dominated by cupules, and those of the Americas by cupules and linear grooves (Bednarik 2008b). Indeed, the pattern is so uniform that these genres of petroglyphs seem to define a Mode 3 (Foley and Lahr 1997), or "Middle Palaeolithic / Middle Stone Age" tradition. Australia was initially settled by Middle Palaeolithic seafarers from Asia, who in view of the much earlier presence of this rock art tradition in India (Bednarik et al. 2005) can reasonably be assumed to have imported it with first landfall (Bednarik 1997b; Bednarik and Kuckenburg 1999). The Middle Palaeolithic stone tool technology continues to the mid-Holocene as the "core and scraper tradition" in Australia, and in Tasmania up to European destruction of traditional society just 200 years ago. Therefore, all of Pleistocene rock art in Australia is necessarily of Mode 3 ("Middle Palaeolithic") provenance, as is all rock art in Tasmania. The latter might provide an initial template of what one could expect to find in Middle Palaeolithic rock art traditions. Tasmanian rock art is dominated by cupules, featuring also circular motifs, including the divided circles and circles with internal barring that are so prominent in the "Karake genre" of the caves of Mt Gambier on the mainland (Sims 1977, 2008; Bednarik et al. 2007). It appears certain that "convergent lines motifs," which may resemble bird tracks, are discrete features not intended to depict such tracks.

It is possible to speculate about the extent of Pleistocene rock art in Australia by resorting to the following reasonable assumptions. Deeply hammered, deeply weathered, and deeply patinated non-iconic petroglyphs on particularly erosion-resistant rock are probably of the Pleistocene, as are perhaps most of those found in limestone caves. At open sites these petroglyphs occur usually in arid regions, typically on hard rock types such as granites and other igneous facies that suffer little weathering. At a rough estimate the proportion of motifs that should be expected to fall into this category is 10–15% of the total Australian inventory. Since it is reasonably estimated that there are at least ten million petroglyphs in Australia, it follows

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that over a million petroglyphs could be expected to have survived from the Pleistocene (Bednarik 1997a). This may well be higher than the number of surviving Middle Palaeolithic petroglyphs from the rest of the world (few are known currently, a most notable concentration being that of the southern Kalahari, dating from Fauresmith and MSA times; Beaumont and Bednarik in prep.), and it is certainly significantly higher than the total number of motifs so far reported from presumed Upper Palaeolithic or Mode 4 traditions in the rest of the world (well below 50,000). The latter are almost exclusively a western European phenomenon according to present knowledge – although that proposition also needs to be tested.

However, two fundamental observations follow on from these considerations. Firstly, it has long been assumed that there is almost no Middle Palaeolithic rock art; in fact, there is far more surviving Middle Palaeolithic (or Mode 3) than Upper Palaeolithic rock art in the world. Secondly, whereas there are great variations among the latter traditions, the earlier ones seem to be defined by considerable uniformities across continents. However, it needs to be appreciated that this could well be a sampling issue, attributable to the taphonomy of rock art (Bednarik 1994b). All surviving Mode 3 rock art can be regarded as being of the greatest taphonomic longevity. It should, therefore, logically be seen as a taphonomically determined remnant population, from which the less deterioration-resistant forms have all been culled. In other words, the apparent uniformity of the Mode 3 petroglyphs is to some degree a sampling artefact, in the same sense as the perceived preference of cave locations for the production of Mode 4 rock art is almost certainly a taphonomic effect. All palaeoart samples of the Pleistocene, be they portable or not, must be regarded as remnant populations that have experienced massive taphonomic truncation, in several senses.

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