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The cave petroglyphs of Australia

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Abstract. This paper is a brief introduction to the phenomenon of petroglyphs found in limestone caves in Australia. It details the main types of apparently non-utilitarian rock markings found in these caves, and it discusses their chronology and their protection. A representative list of publications is also provided, for a more detailed and comprehensive perusal of this complex and still inadequately explored phenomenon.

Rock art in deep limestone caves is a comparatively rare phenomenon in Australia. There is one such site in Tasmania, with mostly hand stencils (Cosgrove and Jones 1989). At Judds Cavern, radiocarbon dating using Accelerator Mass Spectrometry has been applied to pigment supposedly containing remains of human blood, which yielded two dates of the final Pleistocene/early Holocene (Loy et al. 1990), but the work on which this is based is controversial (Nelson 1993). At five sites on the southern mainland, hand stencils are restricted to the entrance regions of limestone caves: four sites on the Nullarbor Plain (Lane and Richards 1966), and one in the extreme south-west (Morse 1984). There are sporadic occurrences of rock art in the entrances of limestone caves elsewhere, for instance in the Chillagoe region of north Queensland (David and David 1988).

The forty cave petroglyph sites of southern Australia (Table 1) are those considered here as a distinctive type of site. One of their art forms (the finger flutings) is entirely restricted to them and occurs at no other type of site—but it is found in the Palaeolithic cave art of western Europe; another (tool marks on formerly soft limestone surfaces) has probably not survived outside of caves. The Karake style has stylistic similarities with open-air petroglyphs in various parts of Australia, but in the caves it is associated with the traces of several unique behaviour patterns (deep pits and 'alveoli', and subterranean mining of chert or chalcedony). Finally, the shallow engravings occur only at a few of these sites and are probably not site type-specific.

Site type profile

Australian cave petroglyph sites are of a very distinctive type profile, which in various ways separates them from all other forms of rock art. They occur invariably in Tertiary limestone karst regions (with the exception of New Guinea 2 Cave, which is in Devonian metamorphosed limestone); they are restricted to true caves and are often found in permanent darkness; they include only designs devoid of 'figurative' elements (excepting one or two instances of apparently figurative motifs, which may or may not represent objects, and were added comparatively recently); they are rarely associated with occupation evidence, and where it does occur it seems to be restricted to areas close to the entrance and is not necessarily contemporary with the art; the petroglyphs occur usually together with natural wall markings, particularly animal scratches (Bednarik 1980a, 1991a, 1994a); and where more than one 'tradition' or phase of human activity traces occurs at one site, the different traces are frequently separated chronologically by the evidence of geomorphological events (tectonic adjustments, roof falls, subsidences, inundations, speleo-weathering processes or biospheric weathering), the magnitude of which suggests a great separation in time. This last factor, and certain other considerations, have given rise to the view that a large part of this body of art may be of Pleistocene antiquity.

Another aspect relevant to the site type profile is the spatial (but not necessarily chronological) co-occurrence of this art with silica mining evidence, which is among the oldest evidence of this kind in the world. Pleistocene silica mining is known from one cave site each in Hungary and France (Bednarik 1986a; 1990), and from two alluvial sites in Egypt (Vermeersch et al. 1986). In Australia, extensive traces of subterranean silica mining have been located in nine caves, and in six of them they occur close to the petroglyphs described here (Bednarik 1990, 1992a; 1995). We distinguish five basic mining methods at the Australian prehistoric silica mines. Their complexity shows that the technological achievements and resourcefulness of Pleistocene Australians as well as their knowledge of geological phenomena have remained inadequately understood and appreciated by 'prehistorians'

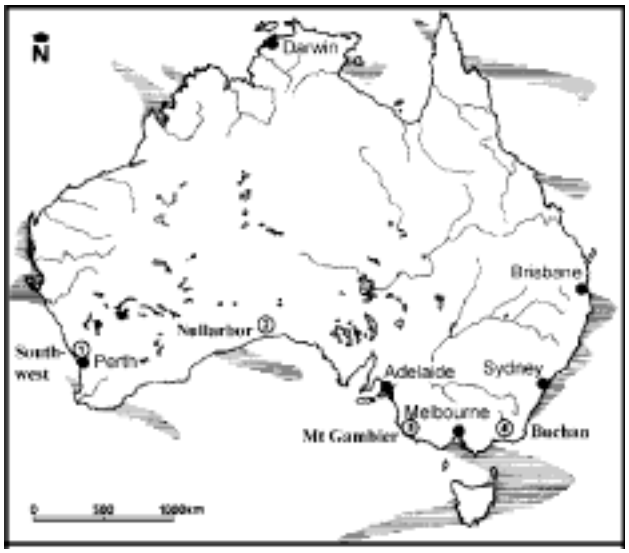

Figure 1. *Map of Australian cave petroglyph regions.*

Description of the art

A *simplified* taxonomy of Australian cave petroglyphs leads to the identification of six basic classes (Table 1):

A. *Finger flutings:* They occur on formerly soft calcite deposits which in all but two sites are of a secondary, i.e. reprecipitated carbonate (moonmilk, *Montmilch* or *Mondmilch*). Consisting of a microscopic, fibre-like lattice of calcite crystals, it can absorb vast amounts of water and can be as soft as snow. These white cave deposits were extensively marked by pre-Historic people (in France, Spain, U.S.A., New Guinea and Australia; Bednarik 2000), and they survived in some cases through desiccation or carbonatisation (Bednarik 1980b, 1999). Only about fifty such sites are known world-wide, and the majority of them occur within 40 km of Mount Gambier in South Australia. The finger flutings are often considered to be among the earliest forms of intentional marks on rock surfaces that have survived to the present.

B. *Karake style:* These petroglyphs are deeply abraded (up to 40 mm deep) and probably often pounded. Motif types are dominated by circles and cell-like arrangements of enclosures. The circles are usually under 50 cm but may range up to about a metre in diameter (Figs 2 and 3), while the panels of mazes may extend over several metres. Motifs also include parallel lines, arcuate designs, 'convergent lines motifs' (including the 'trident' but also with two, four or five 'toes' which are not necessarily connected at the point of convergence), wave lines, circles with internal design (vertical barring or lozenge lattice), and radial and dot arrangements. This motif range has many parallels in other Australian rock arts which are frequently considered to be of Pleistocene age and it is very similar to that of pre-iconic art globally. Several of these sites have provided good evidence for such Pleistocene antiquity.

C. *Tool marks:* There is no indication that these are utilitarian and, in contrast to the Karake motifs which are found on walls only, they are as likely to occur on ceilings. They may form groups of sub-parallel lines or occur as apparently unstructured assemblages, but occasionally they form patterns such as lattices. The tool material used in their production has been identified at two of the sites (Nung-kol and Mandurah Caves), and internal analysis has provided much information about production sequences (Bednarik 1992b).

D. *Deep pits:* Traces of a widespread activity in which a soft rock, such as a cave wall, has been extensively marked by a non-utilitarian but quite specific percussion activity that resulted in large panels of deep gashes, including the highly distinctive, pocket-shaped 'alveoli'. This phenomenon is not restricted to caves and has not been properly examined, described or even recognised at open sites.

E. *Shallow engravings:* They are incised with usually single strokes of a pointed tool, and are frequently responses to earlier designs of which they are sometimes copies. The 'shallow engravings' occur at very few cave sites and are separated from the preceding Karake style by a substantial layer of cutaneous calcite precipitate in Malangine Cave.

F. *Recent petroglyphs:* Occur at only two of the cave sites, and only at the entrances.

Figure 2. *Karake-style circle with internal design, 4 m above floor, Paroong Cave, Mt Gambier.*

Dating and archaeology

It is clear from the superimposition sequence of laminar calcite deposits, which separate art traditions physically, as well as from other evidence, that many finger flutings are substantially older than the Karake petroglyphs, and that the shallow engravings are younger than the Karake tradition. Preliminary dating (the first direct radiometric dating of rock art in the world) has suggested that the shallow engravings are of mid-Holocene age and the deeply carved Karake motifs are at least early Holocene (Bednarik 1984a, 1984b, 1985, 1994b; Frankel 1986) but probably extend well into the Pleistocene. The finger markings are thought to be well in excess of 20 000 years old at Koonalda Cave (Gallus 1986; Bednarik 1986a). The currently oldest,

Figure 3. *G. Aslin with one of the deeply carved Karake-style panels in Karlie-ngoinpool Cave, near Mt Gambier.*

credibly dated rock art in Australia are the Karake-style petroglyphs on the ceiling of Malangine Cave, which if the uranium-thorium date of 28 000 ± 2000 BP (Bednarik 1999, 2001) is correct should be well over 30 000 years old. However, the actual chronology of Australian cave petroglyphs remains largely unresolved. Apart from the clear sequence at some sites of classes A-B-E/F, chronological relationships remain unclear. Class C and D markings may relate to any phase, or to none of the others, but class C has never been observed to precede class A, and there is corroborating evidence (such as past fluctuations in floor level) suggesting that C postdates A. Nevertheless, some of the finger markings are certainly of Holocene age, in fact there are known occurrences of modern finger markings in five Australian caves. In particular, the finger flutings in Prung-kart Cave near Millicent are thought to be of mid-Holocene age, on the basis of laminae-derived radiocarbon dates (Bednarik 1998, 1999). The relative chronological placement of the chert mining remains uncertain, except that at all art sites where it occurs it coincides with finger flutings. But this may still be coincidence, and the mining evidence also occurs at three caves without the finger marks (Bednarik 1992a, 1995).

Some of the Australian cave petroglyph sites have been subjected to detailed archaeological studies: Orchestra Shell Cave (Hallam 1971), Koonalda Cave (Gallus 1971; Wright 1971), Malangine and Koongine Caves (Frankel 1986, 1989) and New Guinea 2 Cave (by P. Ossa). Most of the archaeological data are not directly relevant to the art as the sites were frequented at various times; the art cannot be convincingly related to any of the occupation phases, and may in fact relate to none of them. In some cases the occupation evidence is probably much more recent than the art, e.g. in Orchestra Shell Cave, where the occupation stratum is in a deposit that formed after a floor subsidence occurred, whereas the art antedates the time of that collapse (Bednarik 1978/88).

Figure 4. *Ceiling of Malangine Cave, near Mt Gambier. The reprecipitated limestone lamina visible in upper part of image is exfoliating, revealing numerous petroglyphs predating it. The deposit is close to 30 000 years old, therefore this is the oldest credibly dated rock art in Australia.*

About the sites and their protection

Cave petroglyph sites occur in four distinct clusters across southern Australia, which are probably related to geological factors rather than cultural ones. Three sites are known near Perth (Bednarik 1987/88), one on the Nullarbor Plain (Gallus 1968), thirty-five near Mount Gambier (Aslin and Bednarik 1984a, 1984b, 1984c, 1985; Aslin, Bednarik and Bednarik 1985; Bahn 1987; Bednarik 1980a, 1980b, 1984a, 1984b, 1985, 1986a, 1986b, 1986c, 1987, 1988, 1989a,

Figure 5. *'Fossilised' finger flutings on the ceiling of Yaranda Cave, near Portland, Victoria, over 20 000 years old.*

1989b, 1990, 1993, 1994b) and one near Buchan. Table 1 lists these sites and the types of traces so far found in them. The locations of the site clusters are indicated in Figure 1, but it needs to be considered that certain other karst regions in Australia are also likely to contain cave art. The precise locations of most of the sites remain confidential, for their protection. Especially in the case of the Mount Gambier sites the research team responsible for their study (the Parietal Markings Project) has adopted a policy of effecting visitation control measures before revealing details of the sites to the public, and this has been found to be a most effective preservation measure. Of the thirty-five known cave petroglyph sites near Mount Gambier, only the following have so far been protected effectively: Malangine, Koongine, Paroong and Prung-kart Caves. The protection of Gran Gran Cave has been attempted but remains ineffective, which has resulted in extensive damage. It is to be noted that the cave art is generally more prone to damage and deterioration than rock art at open-air or shelter sites. Not only is it more susceptible to mechanical damage, it is potentially sensitive to biological damage: exhaled carbon dioxide, as well as introduced micro-organisms, algae and spores contribute to its deterioration (Bednarik 1988, 1991b). At the majority of the Mount Gambier sites, visitation is generally restricted to an absolute minimum required for study and documentation, and the duration of visits is limited to allow the speleoclimate to recover from the changes in relative air humidity, ambient temperature and carbon dioxide levels to equilibrium conditions.

One of the more spectacular of the Mount Gambier cave art sites is Paroong Cave. Its deeply carved petroglyphs were threatened by several factors resulting from European modification of the cave hydrology and speleoclimate, as well as by uncontrolled human visitation. The site was subjected to a major study and preservation project which included the re-establishment of conditions resembling those of the pre-European period, as well as the installation of visitor access and restriction facilities (Bednarik 1988, 1991b). The project was partly funded under the Rock Art Protection Program of the then Australian Institute of Aboriginal Studies (Ward and Sullivan 1989).

In the Mount Gambier region our project has resulted in the need to name new rock art sites, for which words of the Buandik language were chosen in every case. We have in fact even renamed a few sites with dull European names and this two-decades-old practice has precipitated a trend elsewhere in Australia. The Aboriginal community of Mount

Figure 6. Deckenkolk *in ceiling of Koongine Cave, containing a single set of finger markings.*

Figure 8. *Boomerang-shaped petroglyph on the ceiling of Ngrang Cave, near Portland.*

Figure 7. *Tool markings on west wall of Koongine Cave, near Mt Gambier.*

Gambier was involved in our project with great enthusiasm in the late 1980s, monitoring and strongly supporting our activities, and providing valuable guidance in matters of research priorities and preservation (Bednarik 1989b).

In addition to some of the Mount Gambier sites, access restriction facilities have also been provided at Koonalda Cave (Nullarbor) and New Guinea 2 Cave (Buchan). Those at the latter site are effective, those at Koonalda are not.

Conclusions

The purpose of this paper is to provide a brief introduction to one of the most unusual forms of rock art in Australia, and to provide a reasonably comprehensive bibliography for further perusal of this subject. The scientific significance of the cave sites, like that of the Palaeolithic 'cave art' sites of Europe, remains inadequately understood. It relates primarily to their potential role in the analysis of the complex, cumulative art assemblages at major rock shelter or pavement sites. Australian archaeology may have succeeded reasonably well in 'reconstructing' a kind of 'prehistory' that describes the ecological history of pre-European peoples in this country—their economic, demographic and technological responses to environmental conditions and changes. It has not dealt with the cultural dynamics of Aboriginal people in a satisfactory way.

For instance, Australian archaeologists have been remarkably aloof even to the most obvious function of rock art, that of a cultural determinant through its relative permanence and, frequently, prominence. Many of the country's major rock art sites may have been in use over tens of thousands of years, by people of very diverse cultural affiliations or conventions, who adopted and often adapted previous rock arts for their graphic traditions. Instead of capitalising on the potential of rock art to illuminate cultural dynamics (ranging from extreme conservatism to stylistic volatility), archaeologists have resorted to a stale 'stylistic' ahistoricism and to extreme forms of naive empiricism (such as subjecting complex art sites to simplistic statistical assessment, under the guise of Eurocentric 'objectivity', as if they represented a single tradition).

There would be various ways of escaping this scientifically irrelevant positivism, one of which is to focus on rock arts in very specific, rarely frequented localities. Deep caves are ideal for this purpose because they may have been entered only during discrete periods, and due to their often unstable tectonic conditions it is sometimes far easier to spatially separate and discern chronological entities in caves than it is in open-site rock art. Thus the main scientific role of cave art is to provide, at least in some instances, 'freeze frame' views of specific traditions, even of specific events. Once identified these may be used in the analytical study of other rock arts, which frequently document not specific traditions, but present us instead with a complex record of responses to rock art, the analysis of which is outside the realm of simplistic archaeology.

This understanding of the significance of Australian cave petroglyphs no doubt determines our priorities in future research. It is clear from the work to date that Australian caves were used at different times, by pre-European peoples with widely differing cultural preoccupations, and subjected to highly specific patterns of activity (see especially Bednarik 1986a). Events of utilisation were often widely separated in time, and next to identifying and interpreting them reliably it is particularly important to secure absolute dating for them. Once this is available it will become possible to probe the extremely complex cognitive and cultural processes determining cultural development in Australia, of which general rock art happens to form only a partial and quite distorted record, and which have so far resisted any attempts to unravel, define, explain or synthesise them. Therefore the cave petroglyphs described here form a key element in the cognitive archaeology of Australia.

NOTE: This is an updated version of a paper first pub-

Figure 9. *Chert mining evidence (see partly removed silica nodules in top of picture) and part of major petroglyph panel on southern wall of main chamber, Karlie-ngoinpool Cave, near Mt Gambier. This cave contains the world's largest concentration of noniconic cave art.*

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