



KEYWORDS: *Abraded groove – Cicatrice – Finger mark – Natural rock mark – Australia*

COPYING THE DREAMTIME: ANTHROPIC MARKS IN EARLY ABORIGINAL AUSTRALIA

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Abstract. Replication of natural rock formations in rock art or body decoration by Australian Aboriginal rock artists is described in this paper, with a particular focus on the Victoria River region of the Northern Territory. There the Wardaman people have provided explanations for the rationale and function of both rock paintings and petroglyphs, such as circles and abraded grooves. Attention is also drawn to the only ethnographic evidence yet found in Australia for the production of cupules, where rock dust arising from pounding a rock surface is believed to be the life essence of the Totemic Being metamorphosed into that formation. Thus in this case cupules were not the desired end result but merely an incidental by-product of an increase ceremony.

In this paper I wish to focus on Australia's earliest rock art and to explore the 'why' of archaic rock art — its function and the processes of its development. In the hope that it will yield some insights into pre-Historic rock art in other parts of the world, a case study is here presented from the 'Top End' of the Northern Territory of Australia, where rock art is a living tradition and Aboriginal informants can explain its origin, function and at least its contemporary meaning.

Australia is one of the very few places in the world where the role and rationale for rock art is still understood, yet even in Australia there are now only a few regions where one may meet Aborigines who still produce petroglyphs or paint or retouch rockshelter walls. Whilst well aware of the dangers of far-flung ethnographic analogy, I feel some insights can be gained from living people where there is direct historical and geographical continuity from past to present. One such community is the Wardaman group of the Victoria River district west of the town of Katherine in the Northern Territory (Fig. 1). Rock art still plays a meaningful role in this contemporary group, whose parents or grandparents were hunter-gatherers, and who sixty years ago camped in the rockshelters whose walls they or their ancestors decorated.

I have carried out five seasons of fieldwork in Wardaman country between 1988 and 1992, funded by the American organisation Earthwatch (Flood et al. 1992). The country west of Katherine contains outcrops of soft sandstone with many rockshelters. These have thousands of paintings and petroglyphs or engravings on their walls, and there are also a few open-air petroglyph sites on rock slabs or pavements. In the region we have been studying, the



Figure 1. Map of Wardaman country in the Victoria River district, Northern Territory.

present tribal territory of the Wardaman, we have recorded more than 200 rock art sites containing some 50 000 individual marks. This ongoing project involves recording

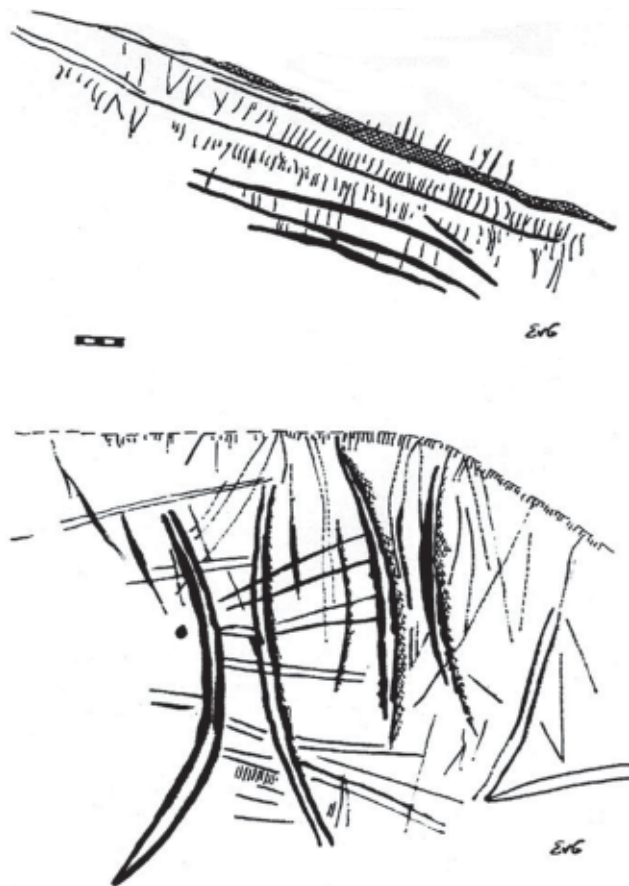


Figure 2. Deep abraded grooves, the long ones in curved pairs, in Gordol-ya rockshelter, Victoria River district. The scale is in centimetres. (Drawing by Eliza van Gerbig, traced from photograph by J. Flood.)

mythology and oral traditions as well as more traditional rock art recording and archaeological excavation, in which several archaeological colleagues have been involved, notably Dr Bruno David. This work has been published elsewhere, and here I wish to focus only on the role and function of rock art in this example of a traditional hunter-gatherer society.

Pounded rims:

‘We make marks to bring out the power in the rock’

In Australian Aboriginal society there is a widespread concept that one can achieve a desired result by marking the rock by hammering or rubbing. In Wardaman country in a group of art sites in an outcrop known as Jigaigarn on the property of Innesvale, which has recently become Aboriginal land, a massive boulder lies balanced on a tiny base on the skyline of a low escarpment. This spectacular balancing rock is said by traditional owner Ngamunugarri to have been placed there by creation ancestor *Gordol*, the owl. A large rockshelter below this contains many petroglyphs and paintings, dominated by the huge striped figure of *Gordol* with what appears to be an egg behind him. (The floor of part of this site [*Gordol-ya* = place of the owl] was excavated by Jackie Collins in 1991, and charcoal from 11

centimetres above the base of the occupational deposit gave an age of $10\,060 \pm 110$ BP (Beta 68163) (Flood and David 1994; David et al. 1995).

At this site I asked our Aboriginal informants the reason for the many short abraded grooves — lines rubbed on the rock ledges and on the rims of rock slabs, and also for the pounding marks where the edges of the rockshelter walls had been hammered with a stone. The answer in both cases was the same: ‘It is to bring out the power in the rock’. The rock of a significant site such as this *Gordol-ya* rockshelter is imbued with the presence of an Ancestral Being, and the power can be released by rubbing the rock (Fig. 2). This is often done as a private act, but similar marks can be made in the course of clan rituals.

For Wardaman people there is no such thing as a ‘natural’ phenomenon or occurrence, everything has a cause. Thus when someone fell ill it was believed to be because they had inadvertently kicked a sacred rock, gathered ochre from a forbidden place, or looked too long at a sacred painting.

‘We cut Old Man Rock to make him bleed’

Ancestral Beings are believed to retain control of all power and functions such as maintaining an adequate food supply and the continuity of the seasons and the human race. Performance of rituals such as rain-making or food-increase ceremonies is believed to activate or release the inherent power of the Creative Spirits. Rituals are religious enactments prescribed by tradition, and through ritual action individuals believe that they contact the supernatural world.

Some (but relatively few) rituals involve making marks on rock, such as the rain-making ceremonies at Yiwarrlarlay, the Lightning Brothers site on Delamere, where there is an imposing rock outcrop called Ngalanjarri, the Rain Dreaming, which bears a host of natural, small, vertical cracks or fissures on its walls. The whole large rock is a dreaming site, together with all the abraded grooves on it. (The rock tower of Ngalanjarri is not a rockshelter, and bears no paintings.) It is prohibited to climb on the top of this rock, or to make fresh abraded grooves on it, and it is emphasised that none of the existing grooves are made by people, but are considered Dreaming (*buwarraja*), items of pre-given significance inscribed in the landscape. Kulumput, ‘the most knowledgeable authority on Wardaman legends and ceremonies’ in the 1950s described the abraded grooves as ‘rain cuts’, and said that ‘the old fashion way for making rain was to cut the Old Man Rain to make him bleed ... The rain-making ceremony involved singing and dancing and then each man present cut a groove in the rock to make the Old Man bleed and bring rain’ (Arndt 1962: 171).

Abraded grooves and hand stencils:

‘That mark means I was here’

Grooves were also rubbed as a gesture to record a visit to a site. At Yiwarrlarlay, only a few hundred metres away from the Rain Dreaming Rock, the senior traditional owner (Nonomarran) pointed out the abraded groove which she had made there as a child when camping in the rockshelter during the wet season. Another groove was made by her

son to record his visit to Yiwarrlarlay in 1978. Likewise, two Aboriginal youths each made a groove on a boulder adjacent to the rock painting site of Murning at Yingalarri in 1989.

The easiest type of mark to make on rock in Wardaman country is an abraded groove, for the sandstone is very soft and a groove can be rubbed in less than a minute by means of friction from a sharp narrow-edged stone, bone or stick. Most grooves are narrow, straight and often in pairs; they vary in length from two to more than twenty centimetres.

This type of 'gestural art' is common, and abraded grooves have a very wide distribution in time and space. (Rosenfeld [1993] has developed a useful division of rock art into 'gestural' and 'referential' types.) In soft sandstone a tool is needed to make the groove but on the soft *Mondmilch* (moonmilk) of the walls of limestone caves such as Koonalda, the Mount Gambler sites or New Guinea 2, similar grooves or 'digital flutings' have been made with fingers alone (Wright 1971; Bednarik 1986a, 1990 etc.).

In rockshelters in many regions such as the Kimberley, hand stencils seem to perform the same function, and are widely found throughout the continent. Hand stencils are still used in northern Australia in the ethnographic present as a record of an individual's visit to a site, and it seems likely that in the distant past they fulfilled a similar role. For example hand stencils have been found in Pleistocene contexts dating to more than 10 000 years in remote, dark parts of three limestone caves in south-west Tasmania (McGowan et al. 1993).

'We have no need to count'

Some rock art sites, particularly in western Victoria and other regions in south-eastern Australia, contain long rows of short vertical painted lines usually termed 'tally marks'. These have occasionally been said by modern Aboriginal informants to be a tally of the number of people attending a ceremony or the number of days or moons they had been at a site or the like (Layton 1992: 145–6). They may equally well reflect gestural marks made by people visiting the site, in the same way that abraded grooves or hand stencils are made in the ethnographic present, for in general counting is a concept alien to Australian Aboriginal traditional society. All Australian Aboriginal languages lack any complex system of numbers. The only numbers which exist in most Aboriginal languages are 'one', 'two', 'several' and 'many'; some languages also have 'three', but this is often a compound form, and greater numbers are extremely rare (Dixon 1980: 107–8).

The lack of a numerical system reflects the absence of any need for numbers in traditional hunter-gatherer society. If on occasion it was necessary to indicate, say, the number of days to some planned ceremonial event, this would be done by holding up the relevant number of fingers or by pointing at different points on the palm of the hand, in other words by a type of sign language. Such sign language was traditionally communicated to other distant groups by means of message sticks, bearing transverse notches to tell the number of days till the planned event. There is no indication that keeping lunar or other calendars was part of

Aboriginal culture, and no evidence for 'archaeoastronomy' has been found, but there is a rich mythology concerning sun, moon, stars, the milky way and other celestial phenomena. In all Aboriginal languages there are separate terms for the sun, which is invariably represented as female — a Dreamtime woman — and the moon, which is usually male and sometimes seen as her husband. The seasons of the year were identified not by keeping account of days or moons, but by the flowering of a particular plant, ripening of a fruit, or the breeding, 'egg time', of a migratory bird. In the Kakadu region of Arnhem Land six seasons were identified in this way.

Cicatrices: 'We copy the Dreaming'

Each time we asked Wardaman people about the function and meaning of abraded grooves, they all answered that the grooves are *maburn*, meaning cicatrices or scars. Nonomarran showed us the vertical cicatrices on the backs of her legs, diagonal lines on the back of her shoulders, and two long transverse ones across her chest just above the waist. Cicatrices are traditionally made on boys undergoing initiation and on female relatives at the same time; some of the Wardaman men had transverse cicatrices across their chests. The reason for the cicatrices was explained when we were looking at the Yiwarrlarlay rain dreaming site. This bears many small vertical non-anthropogenic fissures but also many weathered anthropic abraded grooves. All these grooves were said to be cicatrices made in the Dreaming, and one of our informants commented that 'people copy the Dreaming, and that is why they cicatrise themselves'.

In this case, the same concept of 'copying the Dreaming' was applied to copying both natural, non-anthropogenic vertical grooves and Dreaming anthropic (man-made) marks from the rock onto their own bodies. A key point here is that these Aborigines do not distinguish between anthropic and non-anthropogenic marks; all except ones of obviously very recent origin are classed as *buwarraja* — 'made in the Dreamtime'.

Tracks in the rock — 'he went that way'

Some of the problems in distinguishing anthropic from non-anthropogenic marks arise from pre-Historic artists' use of 'natural' features and marks in their graphic design systems. If a natural feature bears a fortuitous resemblance to a natural object, it is said to be that object.

A classic example of 'copying the Dreaming' was a pair of emu footprints or tracks on the back wall of one rockshelter (Jalijbang 13). The left-hand one is a completely natural arrow-shaped mark, which happens to resemble the footprint of an emu, but beside it a petroglyph of a similar-sized emu track has been engraved, to make a pair (Fig. 3). Our Aboriginal informants did not see any difference between the two tracks, but said they were both 'made in the Dreamtime'.

On another occasion I asked my informant to comment on two large 'bird tracks', one behind the other on a horizontal rock slab in one of the very few open air petroglyph sites in Wardaman country, expecting her to say they



Figure 3. A large pair of emu-like tracks on an engraved wall of a rockshelter (No. 12) at Jalijbang. That on the left is natural, that on the right has been deeply abraded 'to make a pair'.

were emu tracks, but instead I got a totally different reply, 'he went that way'. This underlines how Aborigines use rock art to tell a story, often about the travels of Ancestral Beings across the landscape, and how the direction in which tracks face may be all-important.

In certain other rockshelters we noticed a close correlation between the natural forms of the rock and the motifs engraved at the site. A rockshelter bearing many

non-anthropocentric hand-like marks would have similar motifs resembling human hands or the front paws of kangaroos or wallabies engraved facing in the same direction. (The vast majority of tracks, whether of humans, animals, birds or reptiles, point up the wall of a rockshelter, rather than across or downwards.)

Circles

Wardaman people consistently identified natural circular hollows or holes in the rock as 'women'. Some of these natural but vulva-like hollows were enhanced with short abraded grooves around the rim of the hollow and sometimes one or two vertical grooves inside. Some natural hollows were further developed by being incorporated as the vulva of a painted or engraved female figure (Fig. 4). Other vulvas or rows of vulvas were engraved by abrading a hollow and surrounding it with an oval or circle. They resemble the 'cup and ring' marks known in Britain and other parts of the world, and some of them bear clear traces of red ochre inside, for example in one of the main rockshelters at Garnawala (Fig. 5). Aboriginal people generally identified them as 'women', but on one occasion they became embarrassed and changed the interpretation to 'mussel shells'!

Female figures with breasts were said to be women, those without breasts were interpreted as girls. Females are often shown in the spread legs or copulating position, for which the Wardaman have a special word, *warrala ya-gingin* (= she lies spread-legged). The female figure is more

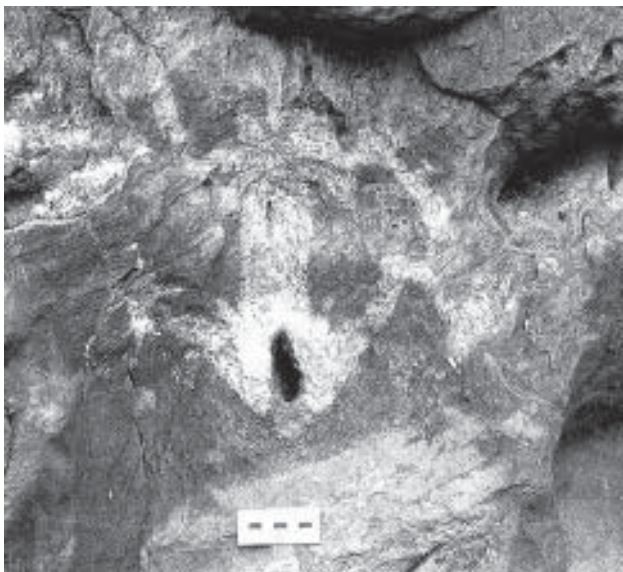


Figure 4. Painting of a female figure utilising natural hole as the vulva in a rockshelter at Yingalarri.

usually shown alone than with a male, and when we obtained the 'story' about such female figures, it almost always involved the woman being punished for a transgression against tribal law by gang rape, a traditional punishment for erring women in both this and most other Australian Aboriginal societies.

In the rock art of Wardaman country, women are shown in three principal roles — as a sexual object in 'love-magic' figures (with prominent breasts and/or vulva), in the copulation position, and giving birth. Elsewhere, however, such as Kakadu in Arnhem Land, women are shown lactating, with large white breasts, as the painter of these figures explained when he painted the wall of the main Nourlangie rockshelter in the 1960s, 'to put the people back into this camping place'.

Interestingly, apart from a few dozen vulva symbols, there are extremely few circles among the 40 000 petroglyphs recorded in Wardaman country, in contrast to their predominance in the rock art of arid central Australia. There are almost no simple ring-like circles or fully pecked 'disks', and concentric circles are virtually confined to one open-air rock pavement. This is a men's sacred site and the circles are part of 'men's business'. Concentric circles also feature in initiation ceremonies in the Victoria River region, huge ones being marked out in the sand on the initiation ground (Fig. 5, by D. Lewis in Rose 1991).

Natural prototypes for petroglyphs

There is a striking resemblance between certain petroglyphs in the Katherine region and some natural geological formations, although in these cases there is no ethnographic evidence for direct replication. Most of the rock art in the Victoria River region is in sandstone rockshelters, but a belt of limestone outcrops near Katherine. Unusual but natural formations such as *Rillenkarren* (solution grooves; Bednarik 1994a) occur on the rocky limestone ridges. Sets of parallel grooves, radial grooves emanating in a star pattern right round the circumference of a natural hollow or deep-cut natural grooves on the edge of limestone boulders are incredibly similar to local petroglyphs (cf. Soleilhavoup 1994: Figs 1, 2, 5 and 6 with Figs 5 and 6 here).

Other petroglyphs in Wardaman country seem to replicate animals' claw marks, but are clearly anthropic marks deliberately produced by human agency (Fig. 7). There are virtually no claw marks in any of these sandstone rockshelters but many similar ones made by mammals in the limestone caves of Kintore and Cutta Cutta near



Figure 5. Vulvas engraved on a boulder in Garnawalla rockshelter 2.

Katherine. Kintore Cave also has occupation and both paintings and engravings in its entrance chamber (Walsh 1964; Mulvaney 1975).

Finger markings and cicatrices

Turning to ethnographic evidence from other parts of Australia, there is a fascinating record and photographs not only of body decoration being made in replication of natural



Figure 6. Natural circle enhanced with small abraded grooves at Yingalarri rockshelter (No. 1), identified as a 'woman' by Wardaman informants.

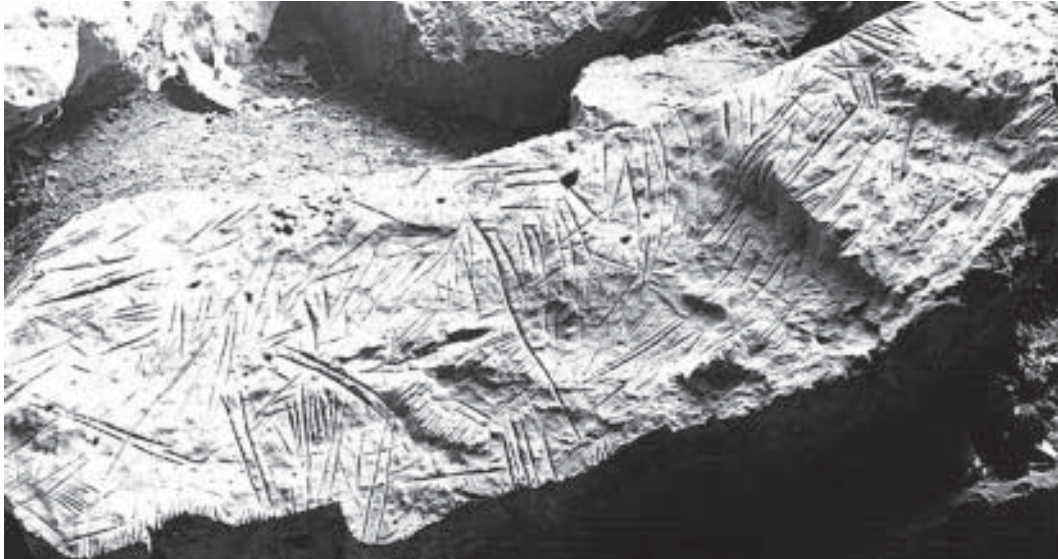


Figure 7. Abraded grooves on a limestone boulder in the entrance chamber of Kintore Cave, near Katherine (photograph by R. Edwards).

parallel grooves in limestone, but also of contemporary digital flutings by Aborigines in Western Australia (Gould 1969; I am indebted to Professor Kevin Sharpe for drawing this to my attention at the Turin 1995 rock art congress). This happened in the course of a ceremony at a sacred waterhole in the Western Desert in the 1960s. On the limestone surface at one side of the small waterhole there is a series of ripples or parallel grooves, which are said to be the chest scars of the two totemic water-snakes who entered the ground here and transformed themselves into the waterhole in the Dreamtime. The oldest man present had earlier drawn a series of parallel lines across his chest with red ochre he had collected, ground up and mixed with the fat of an emu speared during the walk to the site, where he explained that the red ochre lines on his chest represented the chest scars of the water-snake men.

The ceremony involved sweeping clean the limestone shelf, removing black mud from the waterhole, piling it on a metre-high embankment on one side and lifting sacred objects out of the water for inspection. Then one man ground up a large quantity of red ochre, mixed it with water and spread it by hand all round the rock rim of the pool, whilst the other three men started inscribing elaborate serpentine designs with their fingers in the wet mud. Soon the entire surface of the mound facing the waterhole was covered with these finger markings, some vertical and some twisting and turning, which the men said represent the ancestral water-snakes. The waterhole was transformed into a spectacular composition of bright red ochre round its rim, the gleaming white limestone shelf and black finger-marked mud wall. The handiwork was not meant to last; soon wind and weather would deface it, but not the spiritual satisfaction gained by renewing kinship ties with this sacred landmark. The following year the people would return to repeat the ritual.

Cupules

I recently came across the first ethnographic evidence I

have yet found regarding the making of cupules (Flood 1997). In the past the term cupule has been used very loosely, but Breck Parkman in his study of cupule petroglyph occurrences in the American West (1995: 1) has defined a cupule as 'a cup-shaped depression which has been ground or pounded into a rock surface'... They occur on a vertical surface, 'or, if found on a horizontal surface, those depressions having a diameter of 10 cm or less and a depth of 4 cm or less'. In other words, their position, form and/or small size distinguishes them from bedrock mortars or grinding hollows, which are utilitarian by-products of grinding up foodstuffs, ochre or other commodities. Cupules, which used to be called pits or dots in Australia (but cf. Bednarik 1993), are non-utilitarian marks and should be treated as 'rock art'.

Cupules occur in Wardaman rockshelters, usually in vertical panels of several dozen, but they are rare and the Wardaman referred to them as Dreaming marks but could cast no light on their function. In central Australia, however, in the 1940s Mountford recorded and photographed the production of such pounded hollows at an increase site in the Musgrave Ranges in South Australia, south-east of Uluru (Ayers Rock) (1976: 213, Pl. 206). The site is a curiously-eroded large boulder which is believed to be the totemic body of the pink cockatoo woman, Tukulili, who was killed in this creation myth. The cavities in the side of the boulder symbolise the wounds in her body. During the rituals held for the increase of pink cockatoos (*Kakatoe leadbeateri*) and their eggs (an important food) 'the Aborigines pound the floor of the cavity' in the boulder — totemic body of Tukulili — 'with a small stone. This causes the release of the *kuranita* [life essence] of cockatoos with which the boulder is impregnated. This *kuranita*, rising into the air in the form of dust, fertilises the living female cockatoos, causing them to lay more eggs. The small pot-holes [cupules] in the totemic body of Tukulili are caused by the abrasion of the rock during these rituals.'

Mountford (1976: 213) commented: 'Although these

pot-holes [cupules] are well known at other totemic places in central and northern Australia, and possibly elsewhere, this is the first time the writer has been able to find out definitely their function and their means of production.' Mountford (1976: Pls 68, 87, 265, 266, 287, 319, 326, 333, 708 etc.) has also put on record numerous instances of rubbing of rock surfaces to release their life essence in the course of ceremonies to maintain and increase natural resources such as the supply of mistletoe berries, mulga seed or edible tree gum, but in these cases the rubbed surface would not usually be regarded even as gestural 'rock art'.

The usual caveats must of course be added; cupules have different derivations and meanings in different contexts in space and time, and one cannot simply extrapolate from central Australia to the rest of Australia or the world. Nevertheless, this ethnographic evidence adds a new consideration to analysis of petroglyphs, the concept that the rock dust arising from the abrasion, incision or pounding of the rock may have been far more significant than the end product of the process.

The belief that rock dust arising from pounding a rock surface contains the life essence of the Totemic Being who has been metamorphosed into that formation could explain both the battering of the rims of ledges in rockshelters and caves and the hundreds of cupules found on vertical walls in some rockshelters without any other forms of petroglyphs present (e.g. in the Kimberley; in Arnhem Land cf. Edwards 1979: Pl. 40). In these instances, cupules are a form of gestural rock art, where it was the action involved that was important and the mark left behind was just the incidental by-product. In other cases, the same type of small cup-shaped hollow is a referential type of petroglyph, for example, one of a clutch of eggs between the legs of an emu (cf. Layton 1992: 155; Stirling 1896: 126; Flood 1995: Pl. 20).

A hypothesis worth testing in Australia is that the different forms of gestural markings such as cupules, abraded grooves, hand stencils or digital flutings are determined by the nature and relative softness of the rock surface and by subsequent taphonomic processes rather than by cultural differences.

Conclusions

Finger fluting on soft surfaces and the replication in rock art or body decoration of natural parallel grooves, circles or other natural rock formations seem to be activities which have been part of Aboriginal Australian culture for a very long time, perhaps thirty millennia or more. The finger flutings in Koonalda Cave beneath the Nullarbor Plain in South Australia have been shown by the work of Gallus and Wright to exceed 20 000 BP, and two dates of around 30 000 BP have been obtained on charcoal associated with human presence in that site (Wright 1971; Gallus 1971, 1977, 1986; Bednarik 1986a, 1990).

Copying of natural phenomena by rock artists is a well-established phenomenon in Australia and elsewhere. The research of Robert Bednarik has graphically demonstrated that:

Contemporary hunter-gatherer societies often incorporate

natural features in their mythologies because the features resemble particular objects, with the result that images are recognised in natural formations ... Mere cognisance of signs (scratch marks, foot prints, animal behaviour etc.) must at some stage have been followed by the ability to reproduce or imitate them, and in due course by the capacity to contrive the original; here, then, are conceived signs, an evolved mode of nonverbal communication (Bednarik 1986a: 44-5).

The concept that the development of conscious mark-making was a reaction to the visual stimuli of natural marks and phenomena has been put forward by Anati (1981), Bahn (1986), Bednarik (1986a, 1986b), Faulstich (1986) and others. Features of archaic art such as cupules, pairedness, circles and long parallel railway-like lines all have natural prototypes.

A particularly strong case has been made that animal claw marks in caves may have been the factor that initially prompted finger markings (Bednarik 1986b: 169). Paul Bahn (1986) agrees that 'claw marks on cave walls are the most likely source of inspiration for many of the digital figures', and points out that 'in the most recent work on this topic in Europe, the Delluc (1983) have investigated the figures in La Croze à Gontran, and found that while some marks were made with fingers, others seem to be neither finger nor claw marks but man-made imitations of claw marks'. The majority of the prominent European claw marks in caves were made by cave bears, animals entirely absent from Australia, but some of Australia's large kangaroos and extinct carnivores such as the 'marsupial lion' (*Thylacoleo carnifex*) have left many similar deep parallel scratches in some Australian limestone caves (Bednarik 1994a). Bednarik has made a special study of these marks and comments on 'how very numerous they are at Mount Gambier and how frequently they occur together with anthropic wall markings' (1986b: 169).

It is interesting that the earliest known forms of Australian rock art are petroglyphs on open-air rock pavements of non-figurative motifs, such as ovals, lines, nested arcs and circles. Bednarik (1994b: 175) has proposed a three-phase development in Australian rock art from non-iconic to iconic art, and has suggested that in Australia a convention of non-iconic art persisted for tens of thousands of years. Its recent phases include tracks, i.e. two-dimensional phenomena that need not be converted from three-dimensional object. Fully iconic graphic systems appear to have been introduced in the late Pleistocene. The latter involve 'abstraction of a three-dimensional object to a two-dimensional iconic image', usually known in Australia as the silhouette style (Layton 1992). In contrast John Clegg believes that tracks were part of the archaic linear tradition from the beginning rather than a later addition (pers. comm. at the Turin conference). Only time, and many more dates on petroglyphs will tell us who is correct on this question.

The suggestion that much hunter-gatherer rock art, particularly archaic non-figurative rock art, replicates natural forms is not new, but is strengthened, I think, by the ethnographic evidence from Australia, which boasts the longest continuing art tradition in the world. The dangers

of ethnographic analogies are well known, but in the case of Australia they are minimised because of the well-documented conservatism and stability of Aboriginal society. Significant changes did of course occur, but changes in both the natural environment and Aboriginal culture seem to have been far less drastic than in the Northern Hemisphere.

Acknowledgments

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REFERENCES

- ANATI, E. 1981. The origins of art. *Museum* 33: 200–10.
- ARNDT, W. 1962. The interpretation of the Delamere lightning painting and rock engravings. *Oceania* 32: 163–77.
- BAHN, P. G. 1986. Comment on Bednarik 1986a. *Rock Art Research* 3: 54–5.
- BEDNARIK, R. G. 1986a. Parietal finger markings in Europe and Australia. *Rock Art Research* 3: 30–61.
- BEDNARIK, R. G. 1986b. Reply to comments on 1986a. *Rock Art Research* 3: 162–70.
- BEDNARIK, R. G. 1990. The cave petroglyphs of Australia. *Australian Aboriginal Studies* 1990(2): 64–8.
- BEDNARIK, R. G. 1993. About cupules. *Rock Art Research* 10: 138–9.
- BEDNARIK, R. G. 1994a. The discrimination of rock markings. *Rock Art Research* 11: 23–44.
- BEDNARIK, R. G. 1994b. Art origins. *Anthropos* 89: 169–80.
- BRECK PARKMAN, E. 1995. California Dreamin': cupule petroglyph occurrences in the American West. In J. Steinbring (ed.), *Rock art studies in the Americas*, pp 1–12. Oxbow Monograph 45, Oxford.
- DAVID, B., J. COLLINS, B. BARKER, J. FLOOD and R. GUNN 1995. Archaeological research in Wardaman country, Northern Territory: the Lightning Brothers Project 1990–1 field seasons. *Australian Archaeology* 41: 1–8.
- DELLUC, B. and G. DELLUC 1983. La Croze à Gontran, grotte ornée aux Eyzies-de-Tayac (Dordogne). *Ars Praehistorica* 2: 13–48.
- DIXON, R. M. W. 1980. *The languages of Australia*. Cambridge University Press, Melbourne.
- EDWARDS, R. 1979. *Australian Aboriginal art. The art of the Alligator Rivers region, Northern Territory*. Australian Institute of Aboriginal Studies, Canberra.
- FAULSTICH, P. 1986. Comment on Bednarik 1986a. *Rock Art Research* 3: 161–2.
- FLOOD, J., 1995. *Archaeology of the Dreamtime*. Sydney, Angus and Robertson (imprint of Harper Collins). Third edition.
- FLOOD, J. 1997. *Rock art of the Dreamtime*. Angus and Robertson (an imprint of Harper Collins), Sydney.
- FLOOD, J., B. DAVID and R. FROST 1992. Dreaming into art: Aboriginal interpretations of rock engravings, Yingalarri, Northern Territory (Australia). In M. J. Morwood and D. R. Hobbs (eds), *Rock art and ethnography*, pp. 33–38. Occasional AURA Publications 5, Australian Rock Art Research Association, Melbourne.
- FLOOD, J. and B. DAVID 1994. Traditional systems of encoding meaning in Wardaman rock art, Northern Territory, Australia. *The Artefact* 17: 6–22.
- GALLUS, A. 1971. Results of the exploration of Koonalda Cave, 1956–68. In R. V. S. Wright (ed.), *Archaeology of the Gallus site, Koonalda Cave*, pp. 87–133. Australian Institute of Aboriginal Studies 26, Canberra.
- GALLUS, A. 1977. Schematisation and symboling. In P. J. Ucko (ed.), *Form in indigenous art*, pp. 370–386. Australian Institute of Aboriginal Studies, Canberra.
- GALLUS, A. 1986. Comment on Bednarik 1986a. *Rock Art Research* 3: 56–9.
- GOULD, R. A. 1969. *Yiwara: foragers of the Australian desert*. London-Sydney, Collins.
- LAYTON, R. 1992. *Australian rock art. A new synthesis*. Cambridge University Press, Cambridge.
- MCGOWAN, A., R. SHREEVE, H. BROLSMA and C. HUGHES 1993. Photogrammetric recording of Pleistocene cave paintings in southwest Tasmania. In M. A. Smith, M. Spriggs and B. Fankhauser (eds), *Sahul in review: Pleistocene archaeology in Australia, New Guinea and Island Melanesia*, pp. 225–232. Department of Prehistory, Australian National University, Canberra.
- MOUNTFORD, C. P. 1976. *Nomads of the Australian desert*. Rigby, Adelaide.
- MULVANEY, D. J. 1975. *The prehistory of Australia*. Penguin, Melbourne.
- ROSE, D. B. 1991. *Hidden histories*. Aboriginal Studies Press, Canberra.
- ROSENFELD, A. 1993. A review of the evidence for the emergence of rock art in Australia. In M. A. Smith, M. Spriggs and B. Fankhauser (eds), *Sahul in review: Pleistocene archaeology in Australia, New Guinea and Island Melanesia*, pp. 71–80. Australian National University, Canberra.
- SOLEILHAVOUP, F. X. 1994. Art rupestre et processus géomorphologiques élémentaires. *Rock Art Research* 11: 122–4.
- STIRLING, E. C. 1896. *Report on the work of the Horn Scientific Expedition to central Australia, part IV - anthropology*. Dulau, London; Melville, Mullen and Slade, Melbourne.
- WALSH, W. P. 1964. Unexplained markings in Kintore and Cutta Cutta Caves, Northern Territory, Australia. *Helixite* 2(3): 83–91.
- WRIGHT, R. V. S. (ed.) 1971. *Archaeology of the Gallus site, Koonalda Cave*. Australian Institute of Aboriginal Studies, Canberra.