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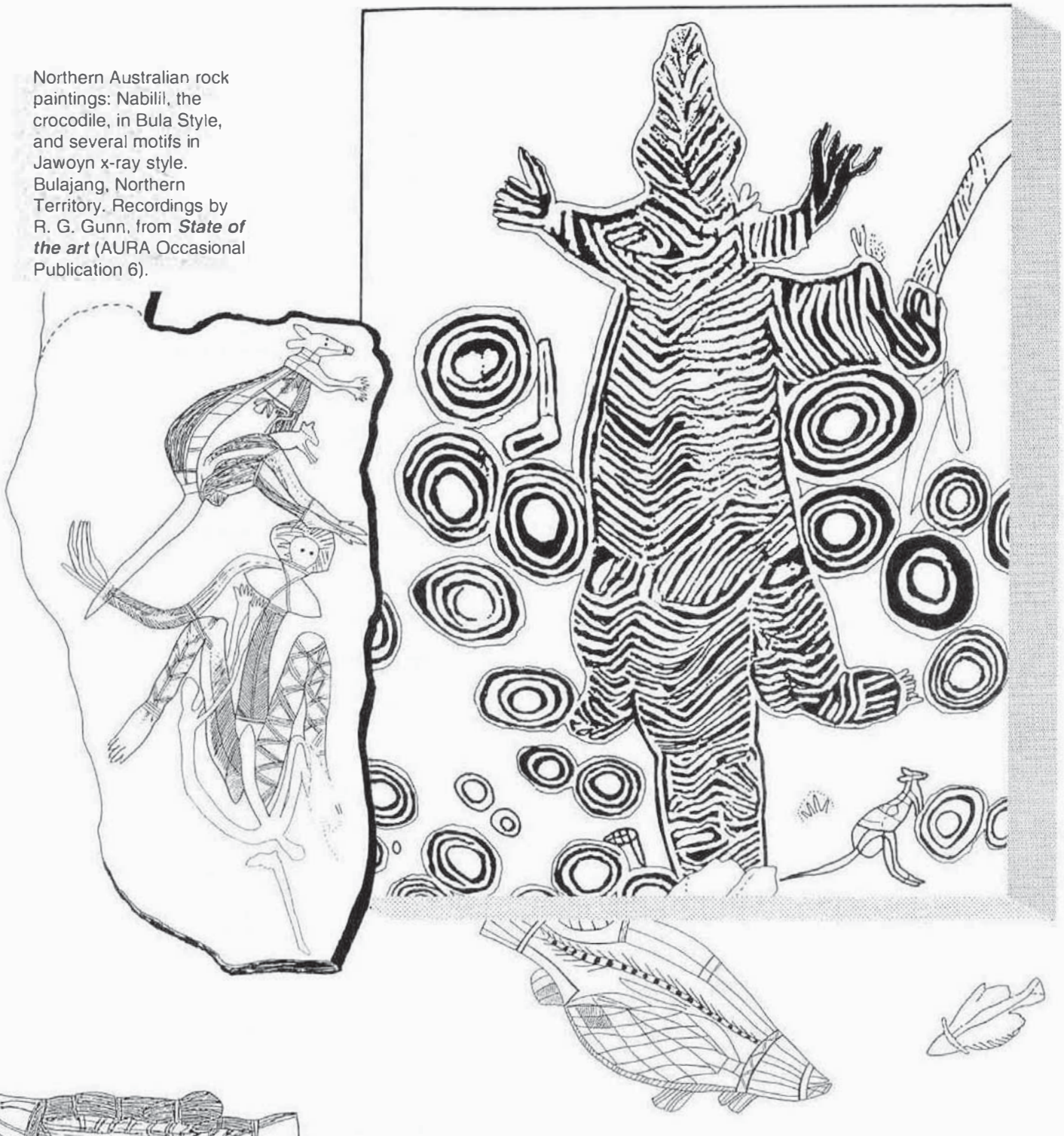
and International Federation of Rock Art Organizations (IFRAO)

ROCK ART RESEARCH

Volume 9, Number 1 MAY 1992



Northern Australian rock paintings: Nabilil, the crocodile, in Bula Style, and several motifs in Jawoyn x-ray style. Bulajang, Northern Territory. Recordings by R. G. Gunn, from ***State of the art*** (AURA Occasional Publication 6).

The journal *Rock Art Research* is devoted to developing theory and methodology for the systematic and rigorous understanding of palaeoart and related phenomena. Emphasis is given to communication across the various disciplines related to the study of global rock art, and to synthesising related subjects around the journal's focus: the surviving externalisations of early world views.

Contributions should be consistent with these general goals. Notes for contributors appear on the inside of the journal's back cover. All major articles submitted will be refereed. While final responsibility for the acceptance or rejection rests with the editor, responsibility for opinions expressed or data introduced is always the author's.

Selected manuscripts will be sent to commentators and their reviews may be published in order to promote scholarly debate, in which case the author will be requested to respond to these comments. In addition to articles reporting original research of significance, the submission of brief reports, conference reports, reviews and bibliographical entries is also invited.

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The Editor
Rock Art Research
P.O. Box 216
Caulfield South, Vic. 3162
Australia

Telephone: Melbourne (03) 523 0549

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The principal objectives of the Australian Rock Art Research Association are to provide a forum for the dissemination of research findings; to promote Aboriginal custodianship of sites externalising traditional Australian culture; to co-ordinate studies concerning the significance, distribution and conservation of rock art, both nationally and with individuals and organisations abroad; and to generally promote awareness and appreciation of Australia's prehistoric cultural heritage.

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The contents of this journal are listed in the *International Current Awareness Services* and in the *International Bibliography of Social Science*.
Major papers are abstracted by international abstracting services.

The recordings on the front page are from the paper 'Bulajang - a reappraisal of the archaeology of an Aboriginal religious cult', by R. G. (ben) Gunn, in: J. McDonald and I. P. Haskovec (eds), ***State of the art: regional rock art studies in Australia and Melanesia***, Occasional AURA Publication No. 6 (see page 73).

aura

KEYWORDS: **Regional rock art - Continuity - Discontinuity - Cape York Peninsula**

'CURIOUS DRAWINGS' AT CAPE YORK PENINSULA

An account of the rock art of the Cape York Peninsula region of north-eastern Australia and an overview of some regional characteristics

Noelene Cole and Bruno David

Abstract: In this paper we attempt to present a brief overview of the recorded rock art of the Cape York Peninsula region and its contexts. Although the heterogeneous nature of previous research has limited the scope of an empirical analysis, preliminary comparisons have been conducted in order to elicit basic patterns in the data. Some continuous features were identified which define a broad regional corpus of rock art. However, the presence of a number of discontinuous elements is compatible with the physical diversity of the Peninsula, its known cultural heterogeneity in recent times, and the lengthy temporal contexts of the art.

Introduction

The earliest European record of rock art in north Queensland is probably King's (1837) reference to the distinctive paintings of Clack Island, Princess Charlotte Bay: '... some curious drawings were observed which deserve to be particularly described' (King 1837: 25).

In 1885 the explorer Palmerston recounted seeing paintings of 'frogs ... some 15 ft high' on the walls of a rainforest cave south of Cairns, and a decade later the government geologist Jack (1895) gave an account of 'cave drawings' near the Mossman and Palmer Rivers. Roth (1904) noted the existence of paintings at 'Cooktown, the Bloomfield, and on the Palmer' and predicted further discoveries on the basis of the number of known sites:

> Rock paintings are met with in many districts throughout North Queensland, and were systematic research to be made would probably be found to be of more common occurrence than is usually supposed (Roth 1902: Bull. 4).

Brief descriptions of rock art in the Torres Straits were included in Haddon's (1904) detailed ethnographies, and the Princess Charlotte Bay paintings continued to receive attention (Davidson 1936; Hale and Tindale 1933, 1934; Roth 1904).

By the 1950s and 1960s, with reports of rock paintings at sites near Cairns and Laura, wider knowledge of an extensive domain of Aboriginal rock art in far north Queensland was emerging. From the 1960s, the survey and recording programs conducted by Percy Trezise gave further impetus to rock art research in Cape York Peninsula (henceforth CYP).

Rock art records for the region have been deposited at the Archaeology Branch, Brisbane (now the Heritage Branch) since 1971, and in recent years much of the archaeological research on CYP has been conducted in the context of Aboriginal rock art. In this report we present an overview of the rock art and its contexts as identified in the collected research, and attempt a synthesis of the information available. Because of the individualistic nature of much of the research and lack of standardisation in methodology it has been difficult to draw the data together. Further difficulties have been created by the fragmentary and unpublished state of the data from some localities.

The region

The area included in this study consists of those parts of Queensland lying east of the Gulf of Carpentaria north of latitude 17° 30' S (Figure 1). This mainly comprises Australia's largest peninsula, Cape York Peninsula, and exhibits a range of topographic, geological, biogeographic and cultural features. To the north the Peninsula is separated from the coast of Papua New Guinea by the shallow waters of the Torres Strait. Southward, the region extends beyond the boundaries of Stanton and Morgan's (1977: 2) Cape York Peninsula biogeographic zone, to encompass sites in the adjacent zones of Einasleigh Uplands and the Wet Tropical Rainforest.

Although the highest mountains in Queensland are located in this region, the Peninsula mainly consists of land of low relief. Isbell (1980) has summarised the geological and geomorphic character of the Peninsula from a number of detailed studies. The most rugged lands are formed in the areas of Proterozoic metamorphics, and Palaeozoic granites and acid volcanics of the eastern coastal range. A series of dissected plateaux arise from the Mesozoic siliceous sandstones which occur between Cooktown and Laura and also near Temple Bay. In the south-east the hilly to mountainous terrain of the Hodgkinson Basin is formed from Middle Palaeozoic greywackes, siltstone and slate. The Chillagoe limestone formation occurs near the western margins of the Hodgkinson Basin. The remainder of the Peninsula consists of lowland areas of level to undulating plains which slope gradually towards the Gulf of Carpentaria in the west. High western islands of the Torres Strait and some offshore islands are a continuation of the coastal range, the Great Divide.

The major river systems are the westward-flowing Mitchell River and eastward-flowing Normanby. A series of short, fast-flowing permanent streams flow from the watersheds of the eastern highlands to the east coast. In the 'dry' season even major streams such as the Normanby

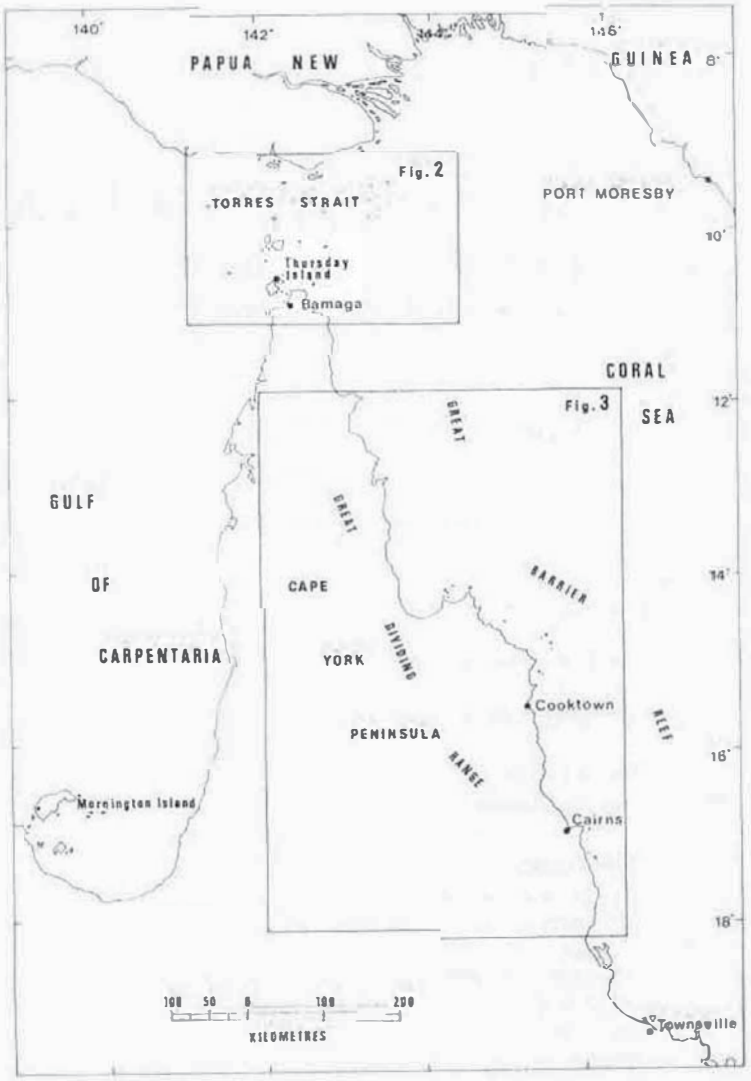
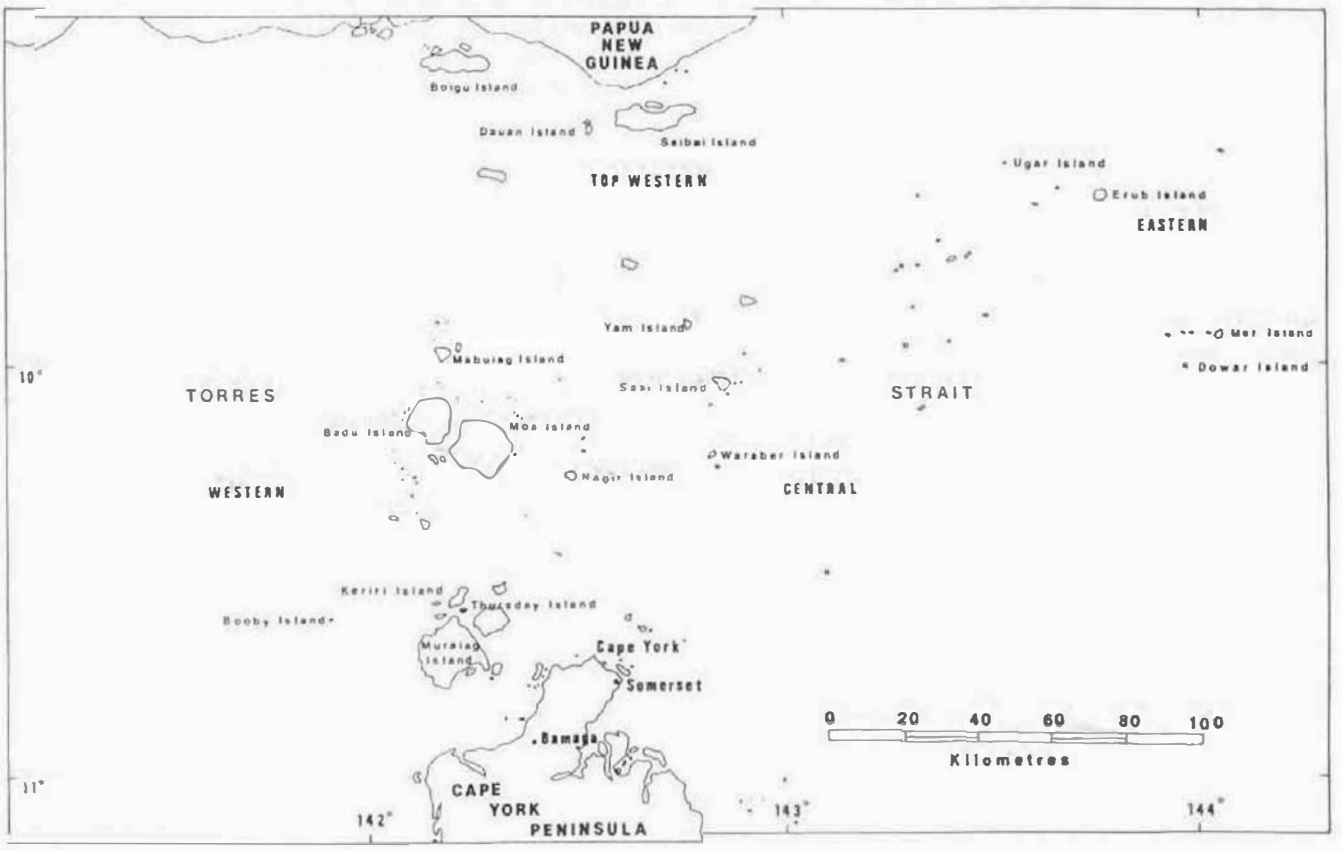


Figure 1. *Study area - location of detailed maps.*

Figure 2 (below). *Cape York and Torres Strait.*



and Mitchell may be reduced to intermittent water holes in their upper reaches.

Far north Queensland has a tropical monsoonal climate with distinct wet (November-March) and dry (April-October) seasons. Coastal areas may receive 2000 mm mean annual rainfall, inland areas such as Chillagoe much less. Vegetation on the Peninsula mainly consists of open forests and woodlands dominated by *Eucalyptus* and *Melaleuca* species, with areas of heathland on the north-east coast. Surviving rainforest of various types occurs along the narrow eastern coastal belt.

Before European settlement, CYP was occupied by a number of different Aboriginal populations whose complex forms of social organisation cannot be explained in terms of the concept of 'tribe' (e.g. see Rigsby 1980a, b; Chase and Sutton 1987). The cultural complexity of the region is partly indicated by its great linguistic diversity: forty-five separate indigenous languages and hundreds of dialects have been identified on CYP (Chase and Sutton 1987). The culture of the Torres Strait Islander people is also characterised by some heterogeneity with well-documented cultural divisions between east and west (e.g. Haddon 1935; Moore 1979).

Aboriginal civilisation was brutally disrupted by European and Asian invasions associated with the goldrushes of the 1870s, and by the subsequent establishment of a pastoral industry and permanent European settlement (see Loos 1978, 1982; Reynolds 1982 for accounts of Aboriginal/European contact history in north Queensland). Whereas in the Peninsula proper many Aboriginal people have had to endure enforced physical and cultural separation from their traditional lands, in the Torres Strait many Islander peoples have continued to live in close association with their cultural sites.

Rock art

The major documented systems of rock art in this region occur in the south-east of CYP. Few sites have been recorded on the mainland to the north of Princess Charlotte Bay, although it is likely that sites also occur in the remoter parts of the north-east. Islands which contain rock art sites occur off the east coast of the Peninsula and in Torres Strait.

In this study we have identified four aggregations of rock art in the context of significant geographical and geological features:

(1) Cape York and the Torres Strait Islands (Fig. 2);
(2) rainforest and rainforest margins (Fig. 3);
(3) Cape York Peninsula sandstones (Fig. 3);
(4) limestone belts (Fig 3).

Rock art within these zones is not homogeneous; within the sandstone and limestone belts it is possible to distinguish specific systems. According to this study it is also likely that the less-studied zones of the remote north and the rainforests and margins also contain separate areas and systems of rock art.

Ethnographic information on rock art in the various CYP areas is fragmentary and the following discussion refers only to technical and design elements of the art. Motif categories used in the following summaries are therefore only 'labels' and are not intended to represent any 'meaning' or symbolic content assigned by the artists, by contemporary Aboriginal and Torres Strait Islander people, or by the authors of this paper. Where possible, the terminology used by various researchers has been standardised.

Cape York and Torres Strait

The western section of the Torres Strait contains a scattering of high continental islands (Jennings 1972) which were part of the mainland Sahul (including CYP) in pre-Holocene times of lower sea-levels. Most of the known rock art sites occur on the igneous rocks of these islands. Only one site is known on the mainland, in an isolated sandstone formation near Cape York, at the 'tip' of the Peninsula (see Fig. 2). Torres Strait sites constitute the most northerly occurrence of rock art in Australia.

Ties in mythology and material culture as well as genetic and linguistic links have been identified between the Islander peoples of western Torres Strait and Aborigines of Cape York (see Beckett 1972; Haddon 1935; Kirk 1972; Moore 1979; McConnell 1936; Thomson 1933; Wurm 1972). Close social contact between Aboriginal people of north-eastern Cape York (the Gudang) and the Kaurareg people of the island of Mulug has been recorded in ethnohistoric times (Moore 1972a, 1979) and cultural divisions between the eastern and the western islands are referred to above. The Torres Strait has attracted considerable research attention as a threshold area between forager-hunter economies of the Australian mainland and agricultural economies of Papua New Guinea (e.g. Golson 1972; Harris 1977, 1979; White 1971). Archaeology of this area has been investigated by Vanderwal (1973), Moore (1972a, 1979) and Rowland (1984), but in these studies little was confirmed of the prehistoric origins of the Torres Strait Islander peoples.

No comprehensive study has been undertaken of Torres Strait rock art. Two painting sites were discussed by Haddon (1904, 1935) and five by Beckett (1963). Specht (1979) included data from seven Torres Strait sites in an analysis of rock art of the western Pacific. The Cape York site (Somerset) has been described by Hawkins (1971, 1973) and by Moore (1972b). Lawrie's (1970) work on legends of Torres Strait includes illustrations of rock art. The Queensland Museum is currently documenting paintings on Booby Island (Coleman 1985; R. Robins pers. comm.). Data from records of twenty-two sites have been used to compile the following account.

Painting sites of the high continental islands of the west are rockshelters (eight sites) or large free-standing boulders (six sites). According to records, the motif range in these painting sites is predominantly figurative, although all sites have poorly preserved and indecipherable motifs. Recurring shapes are dugong, turtle, fish, canoes, and various types of anthropomorphs. Non-figurative 'geometric' motifs appear to occur in only two sites.

Petroglyphs which occur on the basaltic rocks of the eastern islands are quite different in context from those on mainland CYP, which are found mainly within rockshelters. The art at one open site consists of linear shapes of fish, stars and sharks occurring on rock ledges (Teske 1986). Seven petroglyph 'sites' feature single images (human-like faces, a dugong and a circle) carved on boulders lying on the ground (e.g. see Teske n.d., 1987) resembling the 'stones of power' described by Haddon (1935: 360-8). Although these stones appear to be too large to be readily portable, it is possible that some may have been moved from their original situations. They may therefore fit within the category of 'decorated monoliths' which are described by Newton (1979) in the context of Papua New Guinea art.

Table 1 indicates the range of rock art subjects and their distribution in the Torres Strait localities. Anthropomorphs

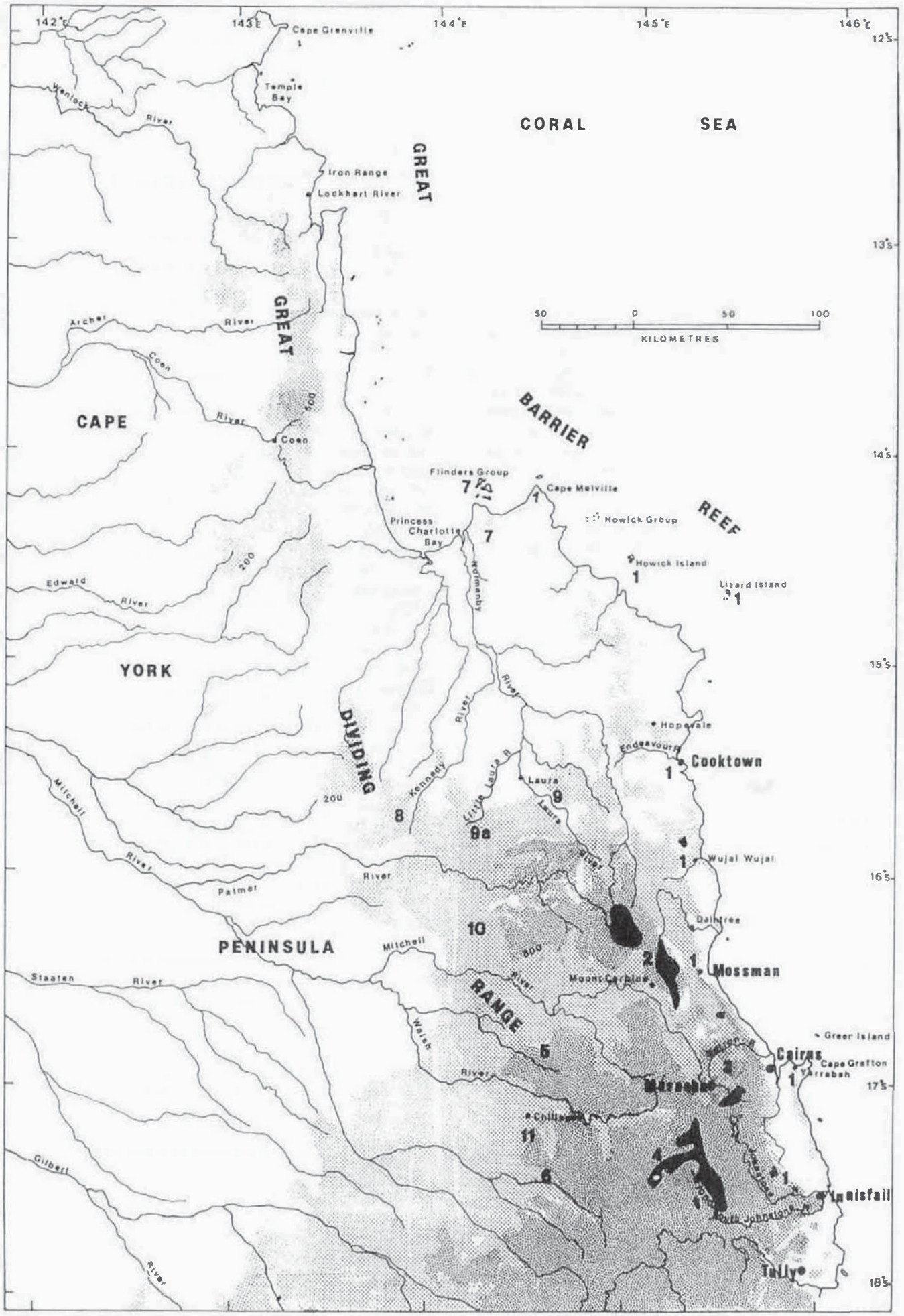


Figure 3. Rock art areas of south-east Cape York Peninsula.
1 Eastern fringes of the rainforest; 2-6 Western fringes of the rainforests (2 Mt Windsor/Mt Carbine Tablelands. 3 Bare Hill. 4 Watsonville/Silver Valley. 5 Featherbed Ranges. 6 Ootan); 7 Princess Charlotte Bay; 8 Koolburra Plateau; 9 Laura area. 9a Jowalbinna; 10 Mitchell Palmer limestones; 11 Chillagoe limestones.

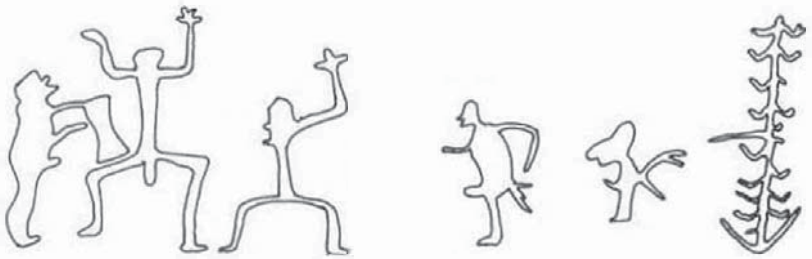
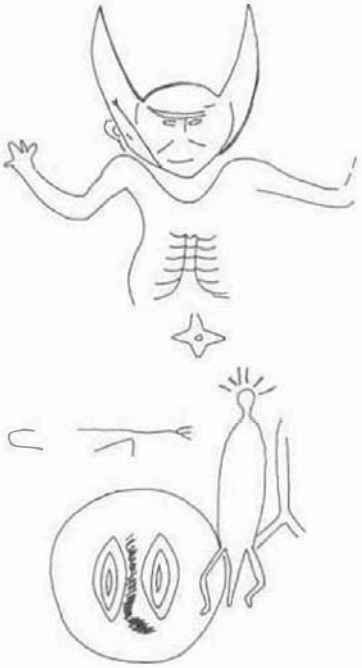


Figure 4. Torres Strait paintings (after Haddon 1904; solid infill).



4b. Torres Strait paintings (after Beckett 1963).

vary in shape and form and naturalistic humans appear to occur in the Cape York site and within the top western group of islands. Records indicate that several sites appear to contain motifs in association. Some overlapping of motif types occurs between petroglyphs of the eastern islands and paintings of the western sites.

The form of paintings may be in solid or in outline; most surviving paintings are in monochrome red, although bichrome figures (red/white) are reported in at least two sites; colours recorded are red, white, pink and black ('charcoal'). Stencils occur in three of the sites, and have been recorded in red and in white.

Motif Type	Western Islands	Top Western	Cape York	Eastern Islands
Marine fauna	4	1	1	1
Canoes	5		1	
Anthropom's	5	1	1	4
Non-figur.	3	1	1	1
Hands	3		1	
Birds	1			
Tracks			1	
Waterspout	1			

Table 1. Frequency of motif types recorded in Torres Strait localities: number of sites containing each motif category. All except 'eastern islands' refer to paintings.

Recorders have noted similarities in motifs of the Cape York and nearby island sites. The marine fauna paintings (e.g. dugong, turtle, fish) in the Cape York site are also similar to paintings depicted in coastal sites of CYP, e.g. Princess Charlotte Bay and sites near Cairns. However, the presence of canoes at Cape York and in island sites is distinctively Melanesian, since these paintings do not occur south of Cape York. Some paintings in more remote island sites are dramatically different from any painted motifs on the Peninsula proper. The profile figures recorded by Haddon (1904) present an obvious departure from common conventions in Aboriginal rock art, and motifs in the top western site are strongly reminiscent of representations in Papuan art. However, interestingly, fairly naturalistic humans in the CYP 'style' also occur in the latter site. Some paintings at Booby Island are reminiscent of items of material culture from the Fly River area of Papua New Guinea.

Sites of the rainforests and rainforest margins

Granite outcrops, and some volcanics, occur in the CYP east coast zone of hilly to mountainous terrain. In this zone, paintings have been recorded on boulders and in overhangs on the western fringes of the rainforest (Horsfall 1987) and on the sea coast and islands. Many sites are in remote and inaccessible locations. Rock surfaces of granite or basalt combined with wet and humid tropical conditions are not conducive to the preservation of paintings, and visits to some of the sites recorded by Seaton (1952a, b) and Tindale (1952) have indicated that many of the motifs discussed here have now disappeared or are barely visible. Horsfall (pers. comm.) has noted the virtual disappearance of motifs at Frog Cave, described by Palmerston in 1885/86. Seaton (1952b: 36) has referred to the practice of repainting sites near Cairns 'to keep the drawings fresh', and it is clear that in the absence of this practice, many paintings have not endured. Current records of rock art sites of this zone may not reflect real distribution since, due to remoteness and/or poor visibility of the art, many sites may be undiscovered or unidentifiable.

A comprehensive study has not been made of this deteriorating body of Aboriginal rock art, and the recording of sites has been sporadic. However, archaeology of the north Queensland rainforest has been investigated by Horsfall (1987); Wright (1971) and Clegg (1977, 1978) have conducted archaeological and rock art investigations in the Bare Hill locality (see below).

Tindale's (1974) map of cultural boundaries indicates the existence of at least twenty different language groups in this coastal and near-coastal zone, suggesting that in cultural terms it is far from homogeneous. In view of the difficulties of compiling an analysis of rainforest sites from limited data, a brief summary of sites precedes a more general overview.

Eastern margins of the rainforest

Sites are scattered along the narrow coastal belt south from Cape Melville (see Fig. 3/1; 3/2) but few still contain decipherable motifs. A 'red snake' is the only motif described in records of sites at C. Melville. Roth (1902: 10 and Plate 15) recorded paintings and white hand stencils in a site on the northern slopes of Mt Cook, near Cooktown, but the site does not exist in current records, and may not have survived. Similarly, sites on the Daintree River said by McConnell (1935: 56) to contain paintings of 'animals,

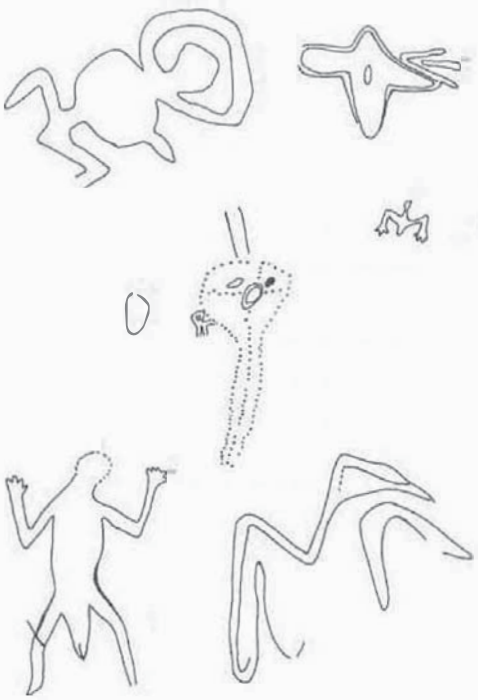


Figure 5. Paintings at Jiyer Cave rainforest site (after Horsfall 1987).

a man with a shield and another with a spear remain unrecorded. Faded and barely visible paintings have been recorded in granite rockshelters on Lizard and Howick Islands, and near Bloomfield and Mossman.

Cape Grafton sites are associated with the Gungandji people of Yarrabah near Cairns, but many paintings described by Seaton (1952a, b) are now largely indecipherable (pers. obs). It seems that some of the latter paintings were repainted in the 1950s by Dudley Bulmer, an Aborigine from Cooktown. Two shield-like motifs in red and in black are still visible at one site (pers. obs.).

Harley (1951) described a remote site in this area which was recorded in detail by one of us (NC) in 1986. Motif types (in monochrome or bichrome) recorded include anthropomorphs, sailing boats and fish, and several which resemble the carved and painted designs on rainforest shields. In the Mulgrave Valley several granite rockshelters contain traces of occupation (pers. obs.) and faded red motifs. Further south, in a basalt zone, Jiyer Cave on the Russell River recorded by Horsfall (1987) contains an unusual black painting with white dotted outline. Frog Cave on the Johnstone, described by Palmerston (1885/86: 169) and recorded by Horsfall (1987), contains extremely faded paintings in red and yellow (Palmerston's 'frogs') and non-figurative motifs. Several rainforest sites with paintings have been discovered recently to the south of this area (R. Hinxman, N. Horsfall pers. comm.).

Western margins of the rainforest

M. David (1989) has recorded three small rockshelters containing art on the lower slopes of the Mt Windsor and Mt Carbine Tablelands, in the Great Dividing Range to the west and south-west of Daintree (see Fig. 3/2). Paintings recorded are red, white or red/white anthropomorphs, a geometric split circle and other non-figurative forms.

Further south, the densest concentration of sites on the Atherton Tableland lies amongst a scree of granite boulders on the steep slopes of Bare Hill near Mareeba (Fig. 3/3). According to Dixon's linguistic map (1977) the area would lie within the lands of the Bulway language speakers. Earliest recordings of Bare Hill (or Bridle Creek) sites were made in the 1940s and early 1950s by Seaton and were discussed by Tindale (1952). Clegg completed detailed recordings of the Bare Hill sites and used these data in comparative and analytical studies (e.g. 1977, 1978).

Painted surfaces at Bare Hill are dominated by a large percentage (56%) of small (30-50 cm) monochrome infilled and bichrome infilled anthropomorphs with characteristically bent legs and arms. Of interest also is the presence of a small number of 'match-stick' figures and some frog-like motifs which may have resembled Palmerston's 'frogs' in the Johnstone River site (see above). Other common motifs include types of animals, including macropod, bird and snake, in solid monochrome or in bichrome red and white, and some tracks. Various non-figurative motifs occur (23.6%), including double arcs, circles and rayed circles. The main colours used are red, although orange, yellow and white are also fairly common. Superimpositions occur and are quite numerous in one site. Some figures in these sites appear to form compositions (Tindale 1952; pers. obs.).

Paintings have been recorded in the Silver Valley/Watsonville area on the western fringes of the Atherton Tableland (Fig. 3/4). Systematic recording has not occurred in this locality although sites were recorded decades ago by D. Seaton (Tindale 1952). Motifs described by Tindale (1952: 25) include a 'man', a 'cassowary and tracks', two shields and a crocodile. Paintings at another Silver Valley site include an 18 m-long snake, an anthropomorph and a barred design.

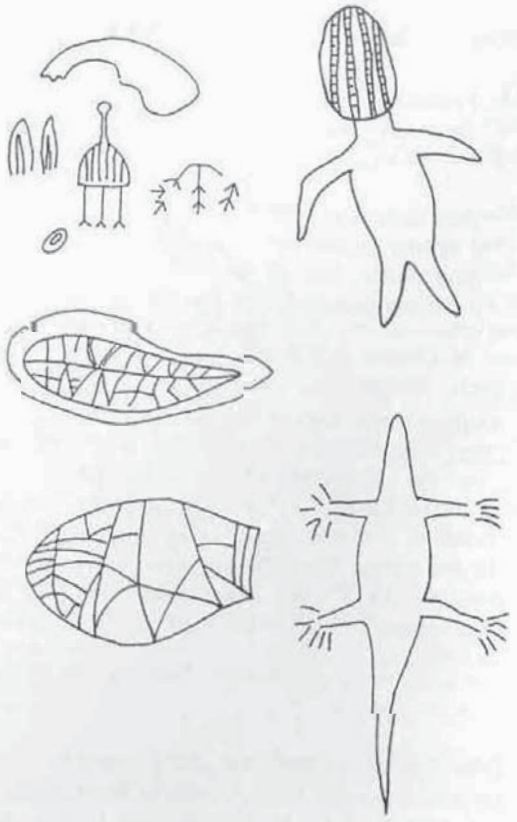


Figure 6. Paintings at Silver Valley and Watsonville (colours not stated; after Tindale 1952).

B. David has recorded four sites in boulder overhangs of the granite country near Ootan, south-east of Chillagoe (Fig. 3/6): 106 paintings were recorded, 87 of which are non-figurative and linear in form, 16 are tracks and three are figurative. The paintings are predominantly monochrome red and resemble those of nearby Chillagoe. Data from Ootan were discussed by David and David (1988) in the context of Chillagoe rock art.

During a preliminary archaeological investigation by David (1988a) of the rugged and uninhabited zone of mountains known as the Featherbed Ranges to the north of Chillagoe (Fig. 3/5) only two art sites were discovered, although many overhangs were visited. In one site an extended linear design in monochrome red was recorded, in the other a monochrome red infilled geometric design. The general absence of sites in this area is believed to reflect their sparseness in the area and low occupational intensities in the past.

A summary

Although sites of the rainforest and margins extend for several hundred kilometres along the Great Divide, they constitute a fairly homogeneous body of rock art in terms of technique, distribution and site geology. Hand stencils have been noted in only two sites and the major surviving technique throughout appears to be painting. Because of the incomplete nature of some records it is difficult to derive accurate numerical data, but it is possible to identify the distribution of decipherable (or once decipherable) motifs (see Table 2). Anthropomorphs and a range of non-figurative shapes occur most frequently. Motif types referred to in records include 'lines', 'suns', 'barred design', 'geometric split circle' and 'mazes', so it is apparent that rainforest sites contain a varied repertoire of non-figurative motifs. Several faunal motifs, e.g. snake, also occur fairly widely. Shields appear to occur only around Cape Grafton and to the west of Cairns. Although figurative motifs seem predominant many types have extremely restricted distribution.

Motif	No. of sites
Anthropomorph	13
Non-figurative (various)	13
Snake	7
Shield	6
Bird	5
Macropod, crocodile, lizard	4
Bird track	3
Stone axe, boomerang, insect, boat, stingray	2
Hand (stencil), boat	2
Eel/catfish, dilly bag, tree	1

***Table 2.** Frequency of motif types (by site) in rock art of the rainforest and margins: from records of sites (n=23) with decipherable motifs.*

A wide range of colours was used in rainforest sites. Red, white, black and yellow are the main colours recorded, although orange and pink also occur. Red is recorded in 19 of 23 sites, white in 10/23, yellow and black each in 5/23. Monochrome paintings are recorded in 20 sites, bichrome in 11 sites, and a variety of form is indicated, including (rarely) dotted infill and outline. Comparison of old and new records suggests that due to poor preservation, the current appearance of many rainforest sites does not truly reflect the variety of colour and form which was once visible in rainforest rock art.

Cape York Peninsula sandstones

The sandstones of the Laura Basin of CYP occupy an area of c. 12 000 km^2 and contain a body of Aboriginal rock art which is considered to be amongst the most extensive and impressive in the world. Fairly well-defined natural features separate the principal rock art areas which have been defined here.

Princess Charlotte Bay and the Flinders Group (PCB)

A submerged extension of the Bathurst Range has formed the Flinders Group of islands which lie up to 21 km from the shores of Princess Charlotte Bay (see Fig. 3/7). Rockshelters on the islands reflect the geology of the Bathurst Range which consists of a low, dissected sandstone plateau. The indigenous people who once occupied the shoreline and adjacent hinterland of Princess Charlotte Bay and some of the islands belonged to a number of different social and linguistic groupings (Rigsby 1980b). They were dispossessed by European settlement associated with marine, pastoral and mining activities in the late nineteenth century. Some of these Aboriginal people and their descendants are now known to reside in a number of north Queensland communities, e.g. at Hope Vale, Wujal Wujal and Coen (Beaton 1985).

Early recordings of PCB rock art have been outlined previously (see Walsh 1988a for a detailed history). Archaeological investigations have been undertaken by Beaton (1985) and Minnegal (1982, 1984). Ethnographic information was recorded by Chase et al. (1975) during a visit to the Flinders Islands with John Flinders who had painted in rockshelters at PCB. Numerous reports on the archaeological significance of the area with particular reference to rock art and its management have been compiled by Walsh (e.g. 1984, 1985, 1988b, c). All known island art sites (32) and a sample on the mainland were recorded in detail during the QNPWS survey (Walsh 1988a). Although analysis of the data from PCB is currently in preparation (G. Walsh, pers. comm.), Grahame Walsh has kindly supplied data to include in this study.

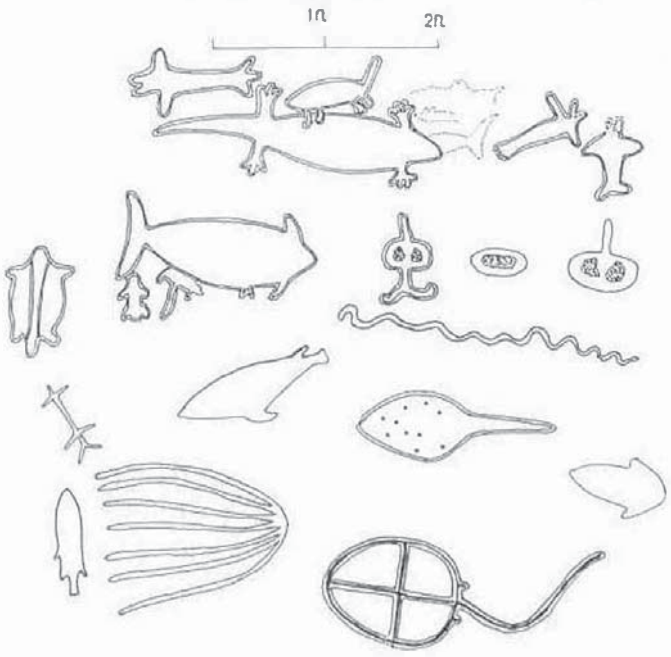


Figure 7. Paintings at PCB (motifs red, white/red; white; black/white; after Hale and Tindale 1934).

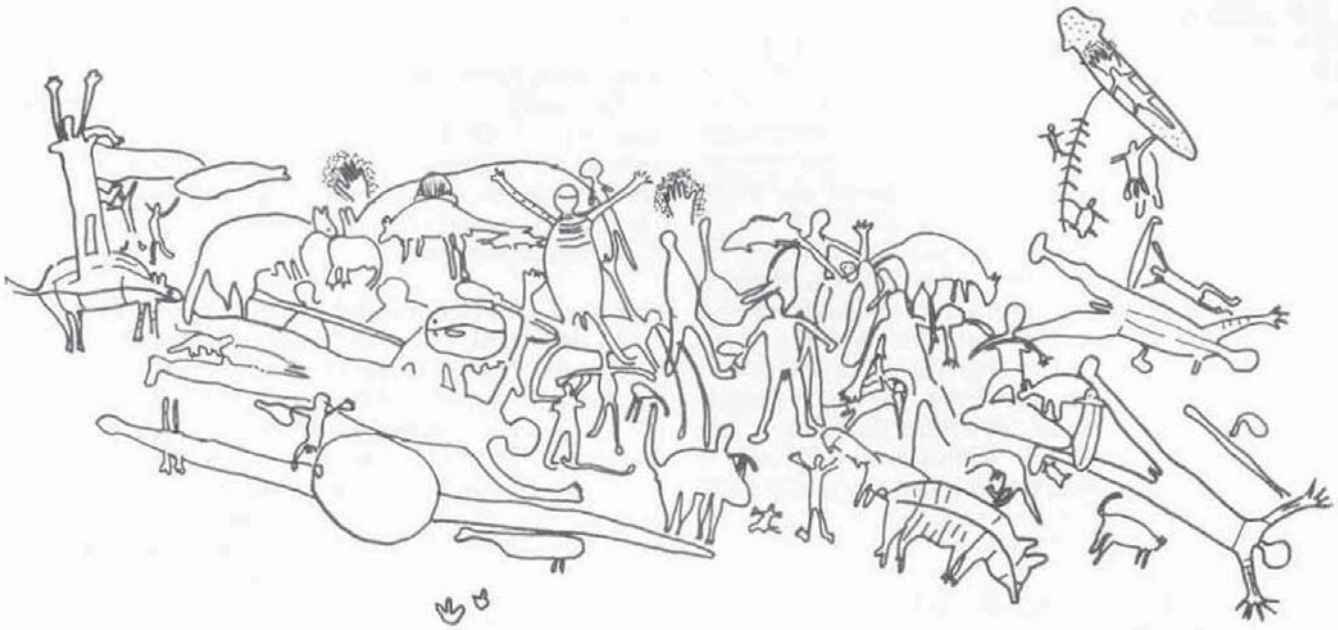


Figure 8. Superimposed paintings at Pig Gallery, Laura (after Trezise 1971: 33).

Rock art occurs within sandstone shelters, both on the mainland and on the islands. Walsh (1988c) refers to the marine orientation of much of the content of this art and the 'almost invariable association of this art with rock-shelters facing the ocean'. Paintings predominate, petroglyphs are absent and stencils are rare. Records indicate that many sites contain >100 paintings, and it is evident that this is an extremely rich and concentrated body of rock art. Motif types recorded on Clack Island by King (1837), Roth (1904) and Walsh (1988c) include marine creatures, zoomorphic forms, implements, frogs and reptiles.

Hale and Tindale (1934) described rock art on Stanley Island (Endaen Shelter) and in mainland shelters at Bathurst Head in some detail. Painted turtle heads and dugong skulls on ledges and in crevices were also described and valuable ethnographic information relating to painting was recorded. The Walmbaria of Flinders Island explained how rock paintings could have 'magical significance': a man could cause an enemy to die by painting the latter's image on rock (Hale and Tindale 1933: 91). Local Aborigines assisted in identifying types of fauna (including *motjala* - moth), tracks, artefacts, human figures and boats. Some faded, apparently older 'drawings' held no meaning for Hale and Tindale's informants. The *motjala* is described by Walsh (1988a: 146) as being the most dominant motif in both island and mainland sites of PCB, along with an unidentified 'elongated torso zoomorphic figure' which is sometimes in association. Walsh (1984) has discerned a change in style in the moth depictions, 800 of which he has recorded. Whereas apparently earlier examples were more carefully executed and in red, more recent motifs are more crudely drawn and in white or bichrome with infill of lines or dots. It seems that the moths had continuing (now unknown) significance through time. Some of the paintings of sailing craft have elaborate internal decoration.

On the mainland Walsh (pers. comm.) has observed motif types, e.g. spirals and circles, which are distinctly different in character from the usual range on the islands, hence the corpus of rock art in the PCB area may not be entirely homogeneous. Walsh's tables (in prep.) indicate that red, orange, mauve, yellow, white and black pigments have been used at PCB, but colours most often used are red and white. Bichrome motifs are common in all PCB localities, but are less frequent in island sites.

Laura

Rock pictures in the 'Laura style' seem to occur throughout the extensive area of dissected sandstone plateaus and rugged escarpments which occur to the west and north-west of Cooktown (see Fig. 3/9; 3/9a). Current research by one of us (NC) includes investigating regional homogeneity and variability, and examining the extent of Laura rock art. The southern limit is the Palmer River, although the 'Mitchell Palmer style', studied by David, may well be a regional variant of the major 'Laura style'. Much of Laura rock art is contained within the Quinkan Aboriginal Reserves, but many sites lie on leasehold land. Although hundreds of sites are on record, it is estimated that thousands of rock art sites lie within the sandstone landscape, often in spectacular and remote situations.

Tindale (1974) concluded that the indigenous people of this area were the Kokojawa and the Kokominni (see also Flood and Horsfall 1986). European occupation following the discovery of gold on the Palmer River in the 1870s was devastating for the Aboriginal people. They were rapidly dispossessed of their land, but not without fierce and courageous resistance (Loos 1978, 1982; Reynolds 1982). A number of Aboriginal families with strong local ties reside in the present township of Laura, and through the Ang-Gnarra Aboriginal Corporation now have control of the Quinkan Reserves.

Detailed recordings of rock art by Trezise and colleagues (see Cole 1990a; Oribin 1977; Woolston 1967) are housed in the archives of the Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra. Archaeological work at Laura was instigated by Wright (1971). Work by Rosenfeld (1981), Rosenfeld et al. (1981), Morwood (1989a, b, 1991), and Morwood and Trezise (1989) has provided a range of data associated with rock art. Palaeoenvironmental, ecological and archaeological methods are incorporated in Dr M. Morwood's on-going project in order to focus on the asso-

ciative patterning of art and its contexts (e.g. Jung 1990; Morwood 1991; Pearson 1990; Stevens 1990). Maynard (1976, 1979) included an analysis of Laura rock art in a synthesis of Australian rock art but the analysis was based on data from very few sites. One of us (NC) completed an intensive recording and analysis of 58 sites in the Jowalbinna locality in 1988 and some of the following data are obtained from this study. A wider regional study in preparation (by NC) is showing that features identified at Jowalbinna are also common to Laura rock art more generally.

Laura sites may consist of small shelters or niches in the rock with a few motifs, or of spacious rockshelters with extensive panels containing hundreds of pictures in various techniques. The Jowalbinna study indicated that painting is the predominant technique, followed by stencilling and then engraving. Small numbers of (dry pigment) drawings occur, and very few hand prints. Although major sites may contain hundreds of pictures, e.g. Magnificent Gallery or Giant Horse, on an average sites contain around 40 pictures (Cole 1990a).

Laura art has a wide variety of painted motif types, around 80% of which resemble the recognisable forms of human beings, animals, plants (usually yams), artefacts, or tracks of animals or humans (Cole 1988). Paintings include some from the 'post-contact' period e.g. Native Policemen, horses, pigs. Most of the figurative motifs are in either human or faunal categories. A wide range of faunal subjects is depicted, apparently selected from types of locally occurring mammals, birds, fish, reptiles and amphibians.

Within the large anthropomorphous category there is immense variation, although general body features are standardised (Cole 1992; Maynard 1976). Some figures with unusual features have been identified as depicting Quinkan spirits by local Aborigines (Trezise 1969, 1971) and their presence gives much of Laura rock art its unique flavour. Depictions of the different faunal types are standardised, with key features such as feet providing identification. Trezise's (e.g. 1971, 1977) classification system includes a number of different species within the general classes of fauna, and Rosenfeld's (1982) detailed analysis of painted mammals has also addressed problems of species differentiation. Trezise (1987a) has suggested the presence of paintings of extinct fauna although some of these identifications have been questioned (e.g. Clegg and Fethney 1988). Stylistic conventions followed in paintings through to the recent post-contact phase include the frontal portrayal of humans, plan view of some faunal figures, e.g. echidna, catfish, tortoise, reptiles, and side view of others, e.g. macropods, dingo, horse, pig and birds. It must be noted that Rosenfeld (1982: 201) perceived 'a more complex and detailed art style' at Laura than in most other bodies classified by Maynard (1979) in the 'Simple Figurative', and work in progress by NC also suggests that the latter classification of Laura paintings is problematic.

Although the primary colour range in paintings is restricted, the overall visual impression of Laura paintings is one of colour and immense variety. Analysis at Jowalbinna (Cole 1988) indicated that red is by far the most frequently used colour, followed by white, and less frequently yellow. Black occurs infrequently. In this study most paintings were found to be monochrome (mainly solid infill), a smaller proportion bichrome and few paintings polychrome. Results of mineralogical analysis (Watchman, Sirois and Cole in press) indicate that Laura pigments appear to have been derived from a range of locally available earth materials.

Paintings may exhibit many combinations of colour and form and a wide range of interior markings. 'Human' figures may be given elaborate 'headdresses', fringed 'belts', marks similar to cicatrice, (Cole 1988; Huchet 1990), or 'pendants'. In major sites which are intensively painted and crowded with pictures there may be scores of superimpositions.

The presence of large, sometimes huge, paintings leads to an overall impression of grand scale at Laura which is in keeping with the large dimensions of many shelters and usable surfaces. However, the size of paintings is variable, and at Jowalbinna, for example, Cole's (1992) detailed analysis of 'human' figures revealed that many are less than 60 cm in height. Researchers have referred to the somewhat static or formal appearance of Laura paintings, but variations in alignment of motifs and the complex nature and placement of superimpositions create a sense of great vitality and depth, in spite of adherence to the usual conventions. Although most motifs appear to lack interaction, others appear to be associated by intentional juxtaposition or superimposition (Cole 1988; Cole and Trezise 1992; Faulstich 1986; Rosenfeld 1982).

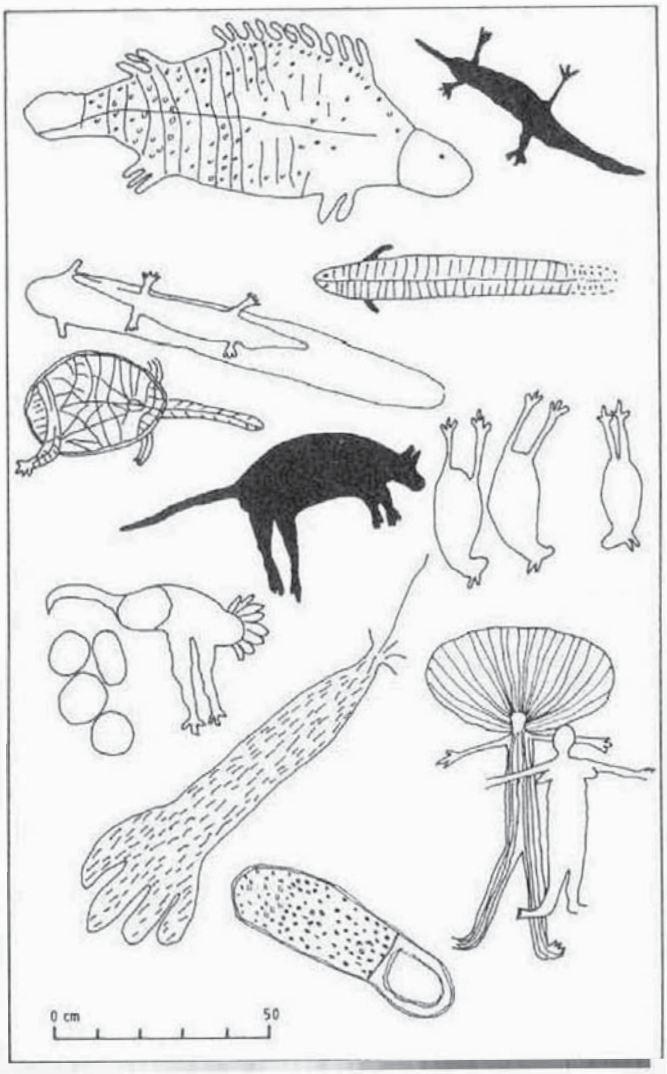


Figure 9. Range of painted subjects at Laura: red, red/white, white. Top: fish, reptiles; middle: tortoise, macropod, flying fox; lower: bird and eggs, yam, dilly bag, anthropomorphous figures.

As in other bodies of rock art, the hand stencil is the most common stencil motif, although a few human feet, artefacts (pre-contact and post-contact) and unidentified objects also occur. The range of colour used in Laura stencils is similar to that used in paintings.

Rosenfeld et al. (1981: 50), in a study of Laura petroglyphs, refer to their very heterogeneous nature in terms of technique, style and degree of patination. The non-figurative repertoire described includes tridents, rectilinear mazes, radiating forms, stars and a variety of circular motifs such as pits, rings and discs, and battered ridges and edges. Rosenfeld et al. (1981) distinguish between the forms of tridents and 'more naturalistic' bird tracks. The curvilinear designs and mazes and lines which occur at Early Man and other sites are consistently heavily patinated, as are pits or cupules, and sometimes covered in silica or crusts. Engraved macropod tracks (hind feet) are present in many sites and usually exhibit slight to moderate patination (Cole 1988; Rosenfeld et al. 1981). Figurative engraved motifs recorded at the Amphitheatre Site (Cole and Trezise 1992) and also on the Laura River bed present many of the stylistic elements of Laura paintings.

The Koolburra Plateau

The Koolburra Plateau (Fig. 3/8), although geologically part of the same sandstone formation, is separated from Laura and its environs by the Kennedy River. The area lies within 50 km of Laura township, but is relatively inaccessible. Early ethnographies suggest (Flood and Horsfall 1986) that the Koolburra area was the country of the Koko-jawa people and Flood (1987) has concluded that Koolburra rock art differs substantially from that of Laura. Work by one of us (NC) at Laura includes exploring this aspect further through more detailed comparative analysis. During Earthwatch Projects of 1981-82, Dr. J. Flood conducted an extensive recording and analysis of Koolburra rock art (Flood 1987) from which the following data are obtained. The project also involved excavation and other archaeological work (Flood and Horsfall 1986; Flood and Trezise 1981; Lilley 1986).

Rock art at Koolburra occurs within rockshelters and sometimes in niches within boulders or cliff-lines. The techniques of painting, stencilling and petroglyph are all visible in the surviving rock art. Stencilling is the most frequently used technique, followed by painting and then petroglyph. As at Laura, stencils at Koolburra are mainly those of hands, with small percentages of stencilled boomerangs, human feet, dilly bags, and indeterminate objects. 'Human beings' in various forms and therianthropes ('echidna people') account for 50% of the painted motifs. Paintings of fauna such as crocodile, turtle, lizard, catfish and snake account for 16%, and smaller percentages occur of vegetable motifs, artefacts, bird tracks and non-figurative motifs. Post-contact motifs such as the horse have not been recorded at Koolburra.

Most Koolburra paintings are in red ochre. Much less frequently used colours are orange, white, black and yellow. Paintings are usually infilled, but in contrast with Jowalbinna, a large percentage is in outline only. Although most paintings are monochrome, around one-fifth are bichrome with infill and outline of contrasting colours.

Superimpositions occur infrequently in Koolburra art (Flood 1987: 106). Flood considers that placement of figures at Koolburra is 'more haphazard', less formally arranged than at Laura, with no interaction between figures. The size of paintings is said to be somewhat smaller than at Laura.

The predominant petroglyph type is the circle which includes small asymmetric circles, pits and dots. Human feet and hands, bird and macropod tracks and, rarely, dog tracks, account for around one-third of Koolburra petroglyphs. Some linear designs also occur, and also a small percentage of figurative motifs such as turtle, snake and spear-throwers. Consistently patinated petroglyphs consist of pits, tracks, and a maze. Unpatinated marks are shallow tracks, human hands and feet and a few non-figurative motifs. Abraded grooves occur only rarely at Koolburra (Flood 1987: Table 5).

Limestone belts

The towering limestone karsts of the Mitchell and Palmer River area occur 50 km south of the centre of the Laura sandstones, and stretch in a narrow belt (averaging 4.5 km) from the Palmer River in the north to the Mitchell River in the south. The limestone reappears 10 km south of the Walsh River, immediately south of the Featherbed Ranges, and continues for 75 km as a narrow NW-SE belt known as the Chillagoe-Mungana-Rookwood limestone belt. Geologically, the Chillagoe and Mitchell Palmer limestone belts both share a common history, yet their rock paintings are completely different.

Little is known of the Aboriginal people who inhabited these areas at the time of first European contact. By the time that Roth (1909) undertook his ethnographic studies in this area it had been noted that the country between the Palmer and Mitchell Rivers was not occupied permanently by Aborigines. In the nineteenth century, many Aboriginal people were removed from their homelands in various parts of the CYP region, and some became associated with European-owned cattle stations around Chillagoe and Mitchell Palmer. Today, some residents of Wujal Wujal and other Aboriginal communities in north Queensland claim affiliation with the Mitchell Palmer area, and a number of Aboriginal people live at Chillagoe and in the surrounding district.

Mitchell Palmer limestone belt

Within the limestone outcrops of the Mitchell Palmer (Fig. 3/10) are numerous rockshelters which often exhibit evidence of past human occupation. Investigation of rock art had not been conducted in the Mitchell Palmer area prior to 1987 when David (1988a; 1992) engaged in a program of recording and excavation. Of the ten sites so far recorded within the Mitchell-Palmer limestone belt, all contain paintings, and the picture assemblages in all sites are extremely homogeneous in terms of the range of motifs, forms, colours and techniques represented. It is estimated, on the basis of the area of limestone outcrop surveyed, that 3.6% of the Mitchell Palmer art has been recorded.

A total of 252 paintings have been recorded from these ten sites, in addition to 24 hand stencils and one hand print. During new work David has also located petroglyphs and abraded grooves in this region. Paintings at Mitchell Palmer comprise three major motif types (David in press):

(1) figurative anthropomorphs and zoomorphs;

(2) boomerang-like paintings;

(3) non-figurative, linear, geometric designs.

Most paintings are anthropomorphs and zoomorphs which are extremely standardised in appearance. The figurative paintings of the Mitchell Palmer would not be out of place within the Laura assemblage.

Anthropomorphs are mainly depicted as generalised figures with little evidence of body decoration but sometimes with the addition of fingers, toes, penis or breasts. A few have elbows, heels, eyes, ears, and/or headdresses. The zoomorphs also have generalised body shapes with the addition of characteristic body parts defining the animal depicted. Animal shapes recorded include birds, dogs, turtles, echidnas. Eels/catfish and sword fish have also been noted from other unrecorded sites (M. Moylan pers. comm.). The aspect of subjects depicted follows conventions followed elsewhere in the CYP region, e.g. larger animals and birds are in profile, flying foxes front on, and turtles in plan view. Most zoomorphs are monochrome infilled and devoid of internal details.

The non-figurative pictures consist almost entirely of short (10-30 cm) vertical lines, barred circles, horizontal lines and irregular criss-cross designs. These constitute 12% of the region's paintings. Boomerang-like motifs occur in groups of two or more and, interestingly, are always painted in mud.

The dominant colours used are reddish mauve, black (charcoal), brown (mud) and white. Motifs are predominantly monochrome, although a small proportion of the figurative anthropomorphs and zoomorphs are bichrome (infilled red with white outlines). Few cases of superimposition exist.

Chillagoe limestone belt

The many shelters which occur amongst these limestone towers (Fig. 3/11) often show evidence of human occupation in the form of ashy deposits, lithic scatters, food remains and rock art. Although Chillagoe caves and rockshelters have been visited by Europeans since the 1870s and archaeological investigations began in the mid-1960s (e.g. Wright 1971) and continued in the 1970s (Campbell 1982, 1984; Mardaga-Campbell 1986), systematic recording of the region's rock art did not begin until 1987 (David 1987; 1988a; David and David 1988). In this study 41 sites were recorded. It is estimated that 25% of the Chillagoe limestone is systematically explored for rock art.

At Chillagoe, painting accounts for most prehistoric pictures, and petroglyphs and stencils occur with much lower frequency. Of the 826 cave paintings recorded from the Chillagoe and Ootan area, 669 (81%) are non-figurative designs of the types previously classified by David and David (1988) as extended linear and geometric. Tracks of birds, macropods and dogs are also numerically important. Other motifs include boomerang shapes, amorphous infilled shapes, and sets of dots and circles. Figurative depictions of anthropomorphs and zoomorphs account for only 3.4% of Chillagoe's cave paintings.

The size of Chillagoe's paintings varies dramatically from elongated linear designs of four metres and more in length, to small, geometric and track paintings a few centimetres long. Stencils recorded at Chillagoe consist of 48 hands, one boomerang and one unidentified circular object. Most paintings are in reddish mauve, white or black, others are in yellow, brown and orange. Mud pigments, which occur in Mitchell Palmer paintings, appear not to have been used at Chillagoe. Chillagoe paintings and stencils are usually monochrome, bichrome paintings are rare, and when present are commonly red and white. Figurative paintings are usually monochrome and infilled. The natural configuration of the cave wall is often incorporated within the picture and six pictures have short incisions incorporated in the painting.

Paintings at Chillagoe form a highly standardised and homogeneous assemblage of linear or track pictures, although there cannot be said to be any standardisation of the predominant motif designs. Most sites display few if any superimpositions. Compositions are not known, although in two sites, a sequence of animal tracks occurs.

Petroglyphs at Chillagoe range from deep and heavily patinated pictures to those which appear pounded, shallow and fresh-looking. The 67 peckings and poundings recorded follow the same range as Chillagoe's paintings. The most common petroglyphs are geometric or non-figurative, including sets of deep pits which are always heavily patinated. Macropod and bird 'tracks' are present but rare; mazes which were thought to be absent in this area were located during recent recording. Abraded grooves set singly or in convergent lines to form V and trident shapes also occur.

Chronological contexts of rock art, Cape York Peninsula region

Most discussions of chronological aspects of rock art in the region have focused on the Early Man, Laura, excavations (Rosenfeld et al. 1981) where two examples of buried art were stratigraphically minimum-dated at c. 13 600 BP and 5000 BP respectively. With other data this formed the basis of a postulated art sequence in which a later figurative style, signified by a naturalistic bird track motif on the buried slab of more recent context, was added to an enduring non-figurative petroglyph repertoire of late Pleistocene origins. Rosenfeld's hypothesis stressed the continuity of the non-figurative 'engraving' tradition which, over time, incorporated some additions and eventually became contemporaneous with a later tradition of figurative petroglyphs and paintings. This presented significant differences from Woolston and Trezise's (1969: 126) sequence which proposed that an earlier tradition of non-figurative petroglyphs was replaced by a later phase of figurative forms.

However, a key issue of the Laura petroglyphs lies in the definition of the bird track and trident motifs. Flood (1987), following Rosenfeld, has claimed that bird tracks are absent from the earliest part of the Laura (and Koolburra) non-figurative scheme, but Trezise (1987b: 124) has disputed this point prompting Clegg (1988) to argue that the distinction should be reviewed. The issue is not merely one of terminology, but is relevant to the hypothesis that figurative forms, including tracks, followed non-figurative petroglyphs in the Laura/Koolburra sequence (see David 1991).

A number of other archaeological excavations in rockshelters containing art in the CYP region (see Figure 10) have provided possible contexts for the art, and at Koolburra and Chillagoe as well as Laura, researchers have used excavation data to postulate chronological sequences of 'art styles'. Occupation dates in art shelters range from 31 000 BP at Laura (Morwood 1989b; Morwood and Trezise 1989), 26 000 BP (David 1990) and 15 000 BP (non-basal date, Campbell and Mardaga-Campbell 1990) at Chillagoe, to Holocene dates at PCB (Beaton 1985) and the rainforest (Horsfall 1987), so the possible temporal contexts of rock art are extensive. Since petroglyphs do not occur in PCB or CYP granite sites it seems that an early phase of rock pictures surviving elsewhere in the region is absent from these areas, where pre-Holocene occupation remains have yet to be discovered. Quite recent dates

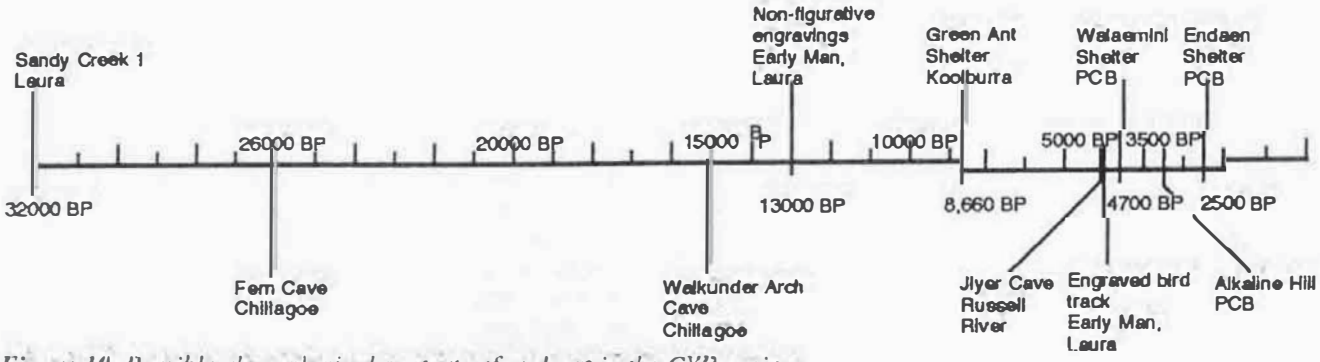


Figure 10. Possible chronological contexts of rock art in the CYP region.
Early Man (Rosenfeld et al. 1981); Fern Cave (David 1990); Walkunder Arch Cave (Campbell and Mardaga-Campbell 1990, non-basal date); Jiyer Cave (Horsfall 1987); Green Ant Shelter (Flood and Horsfall 1986); Sandy Creek 1 (Morwood and Trezise 1989); Walaimini, Endaen and Alkaline Hill (Beaton 1985).

(<1000 BP) have been obtained for excavation deposits (Kelly 1982) in the Torres Strait, but Moore's (1979: 308) model of Torres Strait prehistory envisages that occupation of this part of the Sahul Shelf occurred 'long before the last glacial maximum'.

Fern and Hearth Caves, Chillagoe (David 1989, 1990), contain non-figurative petroglyphs which may be related to those of the 'early' style found in Early Man and at Koolburra, so it is possible that the petroglyph style throughout the greater Laura area and its environs was originally fairly generalised (see also Flood 1987). There is some agreement (David 1988b; Flood 1987; Rosenfeld et al. 1981) that the early petroglyphs of the CYP region (i.e. Laura, Koolburra, Chillagoe) exhibit general links with Maynard's (1979) pan-Australian first phase Panaramitee style unit, while presenting significant differences.

Nothing is known of the absolute antiquity of rock paintings in the CYP region. However, a range of research infers the existence of flourishing, locally distinctive, Holocene painting traditions. Increased Holocene or late-Holocene deposition rates of ochres recorded in excavations at Laura (Morwood 1991; Rosenfeld et al. 1981), Koolburra (Flood and Horsfall 1986) and at Fern Cave, Chillagoe (David 1990), have been postulated as evidence for painting tradition[s] which arose possibly in association with post-Pleistocene social, demographic and technological changes, also in evidence in the archaeological record. However, it is important to note that in some excavations ochres have been found throughout the temporal sequences, and specific evidence of the chronological origins of rock painting has not yet been brought to light.

Maynard (1979: 99) placed Laura paintings in the 'Simple Figurative' unit, which lies in the middle of her three-phase sequence of pan-Australian rock art. Within the Laura assemblage, Maynard (1976: 172) was unable to detect 'any clearly visible sequence in the use of motifs, colours or forms', whereas Trezise (1971: 126) has observed a progression from stencils and outline paintings, to solid monochrome and bichromes and finally to the paintings of the 'mudman' style. The latter phase is also visible at Koolburra (Flood 1987) and in the Jowalbinna area (Cole 1988). At Jowalbinna (Cole 1988), analysis of many superimpositions revealed some trends in colour and techniques but few in motif types. Work in progress of a wider nature will hopefully shed more light on aspects of stylistic change or stability in the Laura painting tradition.

A sequence identified at PCB by Walsh (1988c: 5) has little in common with phases perceived at Laura, since it proceeds from 'early monochrome red styles to bichrome recent styles featuring complex decoration and in cases of distinctive white dot outlining'. Although Hale and Tindale (1934: 151) referred to 'old designs' in one shelter which held 'no special meaning' to their informants, they detected elsewhere at PCB 'no definite break in technique or design'.

Patterns in painting sequences have not been detected at Koolburra or Chillagoe where superimpositions are infrequent. However, it must be noted that the patinated (old?) petroglyphs and the paintings of Chillagoe are morphologically similar, perhaps implying stylistic continuity in this area. The presence of the dingo and/or its tracks in paintings at Laura, Koolburra, Mitchell Palmer and Chillagoe, and also at Jowalbinna, where paintings of the dingo occur at lower levels of the sequence (Cole 1988), implies that some paintings are less than c. 3500 years old, given that the dingo arrived in Australia within this period (Solomon and David in press).

Painting is known to have continued into the post-contact era at Princess Charlotte Bay (Chase et al. 1975; Hale and Tindale 1934), Brown's Bay (Seaton 1952b) and Bloomfield (N. Horsfall pers. comm.), and post-contact motif types have been recorded at Laura, Princess Charlotte Bay and Cape York. The range of post-contact motifs indicates the incorporation of dramatically new subjects within a well-established and highly formalised tradition. It is clear that in spite of immense social and physical upheaval, the tradition of rock painting continued to be practised with remarkable resilience by Aborigines in post-contact CYP.

CYP rock art: a preliminary comparative study

The limited data available for some areas have restricted the scope of a comparative study of rock art across the region. Therefore the following section is intended to present a preliminary indication of intra-regional relationships by comparing features for which some quantitative data are available. Quantitative data are from 163 sites at Koolburra (Flood 1987), 41 sites at Chillagoe (David and David 1988), 10 sites at Mitchell Palmer (David 1988a) and 58 sites at Jowalbinna (Cole 1988). Data for Torres Strait were obtained from records of 21 sites, rainforest data from 23 sites, PCB from Walsh (in prep.), Bare Hill five sites (Clegg 1977 and pers. obs.).

Technique distribution

Table 3 gives an indication of the known distribution of the main techniques evident in the Peninsula rock art

systems and also the predominant site geology. The analysis shows that painting, stencil and petroglyph occur together at Laura, Koolburra, Mitchell Palmer and Chillagoe, although with different frequencies. Petroglyphs appear not to occur at Princess Charlotte Bay, and in granite or basalt sites of the Peninsula. Stencils occur only rarely in rainforest or coastal sites and in Torres Strait.

Locality	SG	No. of sites	Painting sites %	Stencil sites %	Petrogl. sites %
J'binna	S	58	87	81	21
K'burra	S	163	45	96	20
M/Palmer	L	10	100	10	0*
Chillagoe	L	41	88	22	22
PCB	S	c. 50	100	(1-10)	0
R'forest	G, b	23	100	9	0
T. Strait	G, B	21	65	18	35

Table 3. Percentages of sites in CYP regions containing each technique. (1-10) = estimate taken from records when no quantitative data are available. SG = predominant site geology: S = sandstone, L = limestone, G = granite, B = basalt; b = few basalt sites. Sources of data: Jowalbinna (Cole 1988); Koolburra (Flood 1987); Mitchell Palmer (David 1988a); Chillagoe (David and David 1988); PCB (Walsh in prep.); rainforest and Torres Strait data from Heritage Branch and other records.

Density of pictures

Table 4 shows that on an average, art sites at Jowalbinna, Laura, contain substantially more pictures than sites elsewhere on CYP. This high density of pictures has been shown to be fairly typical of Laura as a whole (see Cole 1990a). However, Walsh's records for PCB appear to indicate a high density for rock pictures in this locality also. Many sites of the rainforest appear to contain only a few surviving motifs, but other sites which contain many surviving paintings may reflect picture density more accurately. For example, a Cape Grafton rockshelter contains >50 pictures and the five Bare Hill sites have an average of >40 pictures per site.

Although records for Torres Strait include little quantitative data, they show that painted sites usually contain at least three paintings, and in some sites, >30 pictures are indicated. Superimpositions in all CYP areas apparently reflect picture densities since they occur abundantly at Laura and apparently rarely elsewhere. However, at least one rainforest site (pers. obs.) contains many superimpositions.

Locality	Pictures per site
Jowalbinna	44
Koolburra	19
Mitchell Palmer	28
Chillagoe	23
Bare Hill	45

Table 4. Density of pictures in Peninsula rock art areas for which quantitative data are available. Sources of data: Jowalbinna (Cole 1988); Koolburra (Flood 1987); Mitchell Palmer (David 1988a); Chillagoe (David and David 1988); Bare Hill data from pers. obs. and Clegg (1977); note: Clegg's tables indicate 'diagnostic' motifs only.

Petroglyphs

It seems that the petroglyph technique has been far less favoured in CYP than that of painting, and is largely confined to the sandstone and limestone belts. The subject matter of petroglyphs in these areas is similar in the consistently more weathered motifs which include pits and other non-figurative motifs and tracks or tridents. Table 5 indicates that the distribution of petroglyphs in CYP shows less variation than that for paintings, perhaps adding further support to the theory expressed earlier of some type of earlier cultural homogeneity which has dissipated in more recent times. Chillagoe has no petroglyphs depicting fauna or anthropomorphs, and except for tracks, figurative petroglyphs of Laura and Koolburra have little in common. At Laura, figurative petroglyphs overlap the painted motif range (Cole and Trezise 1992) and at Chillagoe, the non-figurative repertoire covers both petroglyphs and paintings (David and David 1988). Flood (1987) has identified little technique/motif overlap at Koolburra. Abraded grooves occur extensively at Chillagoe but only rarely in the sandstones to the north. Engraved pictures in the eastern islands of Torres Strait have no resemblance to any recorded petroglyphs in Cape York Peninsula.

Paintings and stencils

Pigmented art occurs in all Peninsula rock art areas and the combined data indicate some interesting trends. Table 5 indicates that figurative paintings predominate at Laura, Koolburra, Mitchell Palmer and Bare Hill, and are outnumbered by non-figurative motifs only at Chillagoe. Figurative types (humans, animals or canoes) are recorded in all nine Torres Strait sites in which shapes of paintings were decipherable, and non-figurative paintings only in four (Table 1). Although quantitative data are usually not available for rainforest sites other than Bare Hill, records for 12 other rainforest sites (Table 2) show that figurative paintings occur in all, and non-figurative motifs in only five.

Locality	Figurative paintings %	Non-figurative paintings %
Jowalbinna	90	10
Koolburra	85	16
Chillagoe	17	84
Mitchell Palmer	88	12
Bare Hill	76	24
Other rainforest	*	*
PCB	*	*
Torres Strait	*	*

*Table 5. Percentages of figurative and non-figurative painted motifs, CYP. 'Figurative' includes tracks. * indicates presence of these types where no quantitative data are available. Sources of data: Jowalbinna (Cole 1988); Koolburra (Flood 1987); Chillagoe (David and David 1988); Mitchell Palmer (David 1988a); Bare Hill (Clegg 1977 and pers. obs.); PCB (Walsh in prep.); rainforest and Torres Strait from Heritage Branch and other records.*

Much intra-regional variation occurs within the entire figurative repertoire. Flood (1987) states that the Laura Quinkans do not occur at Koolburra and 'echidna people' are generally restricted to Koolburra. The distorted limbs of anthropomorphs at Bare Hill and other rainforest sites to the south are reminiscent of Laura Quinkans (Brayshaw

1977), but lack their special character. Locally distinctive types include the PCB moth (see Walsh 1988a: 146-7) and canoes and other motifs at Torres Strait.

In the areas where stencils are common, Koolburra and Laura, the stencilled motif range is very similar. However, where stencils are less common the range is limited to hands. Where specific data are available, most stencils are of left hands. It seems there is a direct relationship between the frequency and the range of stencils. In areas where this technique was frequently practised, conventions were broadened to include a wider range of stencilled objects. However, although stencils at Laura and Koolburra are prolific, the technique is generally less developed in terms of motif range and compositional aspects than in central Queensland where stencilling is dominant (e.g. see Walsh 1983).

Records from Laura, Koolburra, PCB and rainforest sites indicate variability in the size of paintings with the presence, in all of these areas, of some paintings of large dimensions. However, most paintings in CYP areas appear to be less than 60 cm in height and length, except in the Laura area where the scale is generally larger.

Comparison of colours used in paintings and stencils in the various regions shows a similar range of main pigments (red, white, yellow, orange, black), but much variation in the proportions of each, as shown in Table 6. Torres Strait appears to present the most restricted colour range, possibly reflecting the absence in island environments of naturally occurring yellow and orange-coloured pigments, cultural preferences, or the failure of these pigments to survive.

Although form of paintings is predominantly monochrome (see Table 6), bichrome paintings occur in varying proportions in all areas, but are most frequent in Laura, Koolburra and PCB. The use of outlines in contrasting colours to infills is recorded in all regions. However, the distinctive dotted outline of PCB occurs rarely elsewhere. Fifty per cent of rainforest sites contain (or once contained) bichrome paintings. However, Tindale (1952: 25) refers only to a very small proportion of bichrome paintings (3% of 250) in Seaton's records of paintings in the Cairns area, and personal observations of the Bare Hill paintings indicate that around 2% of these are bichrome. Records indicate that bichrome paintings occur in two Torres Strait sites. Polychrome paintings occur rarely in the entire region, and most notably at Laura. In view of differential weathering of paints, especially in humid coastal areas, data now obtainable may not indicate accurately the original form of many paintings.

CYP area	Red %	Wh %	Y %	Or %	Bl %
J'binna	77	20	1	2	<1
K'burra	86	5	1	6	2
Chillagoe	36	48	4	1	11
Mit/Palmer	65	12	2	2	20
Bare Hill	83	16	<1	<1	
PCB	*	*	*		*
Rainforest	*	*	*	*	*
Torres/St.	*	*			*

*Table 6. Frequencies of colour in Cape York paintings (includes stencils). * = Colour recorded but no quantitative data available; Wh = white, Y = yellow, Or = orange, Bl = black. For sources of data see Table 5.*

Form	M'chrome %	Bichrome %	Polychrome %
Jowalbinna	77	23	<1
Koolburra	80	19	0
Chillagoe	95	6	0
M/Palmer	98	2	0
Bare Hill	98	2	0
PCB	*	*	
Rainforest	*	*	*
Torres Strait	*	*	

Table 7. Form of paintings, Cape York Peninsula: percentages of paintings in each form. Walsh's data (Walsh in prep.) indicates that most PCB paintings are monochrome but 20 sites contain >10 bichrome paintings). For sources of data see Table 5.

Continuity and discontinuity in Cape York Peninsula rock art

The preceding analysis indicates that the character of rock art within the CYP region presents continuity in some respects and discontinuity in others. By referring to continuous trends in the data a broad region of north-eastern Australian rock art may be identified, but a number of discontinuities emphasise significant local distinctiveness and the temporal dimension introduces further complexities.

Cape York Peninsula regional rock art and the CYP figurative tradition

The rock art of far north-eastern Australia exists primarily as a system of pigmented art. In each of the CYP areas described here, petroglyphs are either absent or occur with far less frequency than paintings and or/stencils. In all but one of the areas, Chillagoe, the subject matter of paintings is mainly figurative. Chillagoe lies on the south-western boundary of the region and the implications of this discontinuity are discussed later.

The painting repertoire of Laura and Koolburra, the Mitchell-Palmer limestone belt, Princess Charlotte Bay, and of sites of the rainforest fringes and possibly of Torres Strait is dominated by representations of various types of anthropomorphs and zoomorphs. Other motif types such as tracks, artefacts and plants occur throughout with variable distribution and in smaller numbers. Although all of these areas contain a range of non-figurative paintings, these appear to be far less numerous than the figurative motifs.

At Jowalbinna, Koolburra and Bare Hill around 50% of motifs are in the anthropomorphous category, and in rainforest sites generally, and in Torres Strait, this group has the widest distribution of all types mentioned in records. As shown in Figure 11, although locally distinctive types of anthropomorphs are identifiable, some attributes are repeated in more than one area.

Paintings of dugong, turtle, fish and sailing craft of similar appearance occur in many coastal and island localities (at PCB, Cape Grafton, Cape York, Torres Strait), reflecting more obvious aspects of marine situations, irrespective of specific geographical location or presently known cultural affiliation. Other depictions of fauna (e.g. macropods, birds, reptiles, freshwater fish) have fairly wide distribution away from the coast and appear also to have basic similarity across the region. This apparently cross-cultural selectivity of subject appears to have been environmentally determined, although other attributes of these motifs can be locally specific. In general, faunal and (more rarely occurring) botanical

Figure 11.
Anthropomorphs in CYP; red, red/white, red/yellow; solid infill except for 'a'; (after Tindale 1952, Flood 1987, Horsfall 1987, Hale and Tindale 1934, Beckett 1963 and records of Heritage Section, G. Walsh, B. David, N. Cole; not to scale). Left to right: row 1: Bare Hill, Somerset, Koolburra; row 2: Jiyer Cave, Mitchell Palmer, PCB; row 3/4: Torres Strait, Laura, Chillagoe, Somerset.

subjects depicted in CYP art are readily recognisable in current animal and plant populations of the region.

Figurative paintings in all areas are usually in monochrome (mainly infilled) but sometimes in bichrome, and display a variety of combinations of colour and form. In all areas conventions, e.g. the aspect of the subject depicted, are those followed in many other Australian systems of figurative rock art. CYP figurative paintings generally conform at least visually to a convention which emphasises the separate and apparently unassociated nature of each motif. However, discernible elements of association have been recorded in art of the rainforest, the far north (Cape York and Torres Strait) and Laura. Obviously compositional (and other) elements may be subtly encoded and difficult or impossible to identify in the absence of esoteric knowledge.

At Laura and Koolburra, the regional figurative tradition embraces to a limited degree the technique of petroglyph. The engraved fish motifs of the eastern Torres Strait reflect relationships with the marine environment which are also evident in the figurative painting tradition of the western islands.

Spatial and chronological divisions

Other researchers have observed spatial changes in the character of north Queensland rock art. Brayshaw (1977), Morwood (1984) and Walsh (1988a) have referred to a gradation in proportions of figurative and non-figurative rock art moving in a northerly direction from Townsville, with figurative motifs attaining predominance to the north of Cairns and in the direction of Laura.

Elsewhere (David and Cole 1990) we have described in greater detail some divisions which appear to be evident in Cape York Peninsula rock art. Investigations of petroglyphs in the Laura, Koolburra and Chillagoe regions point to the existence of an earlier, more generalised, non-figurative and perhaps track assemblage which has also continued in more recent times. However, a chronological separation appears to occur between this and a later, mainly figurative tradition.

A spatial division appears to separate rock art areas to the north and to the south of the Walsh and Mitchell Rivers. Sites south-west of Chillagoe and the Walsh River seem to contain a predominance of geometric and other non-figurative as well as track paintings. For example, rock art assemblages around Georgetown (Heritage Branch

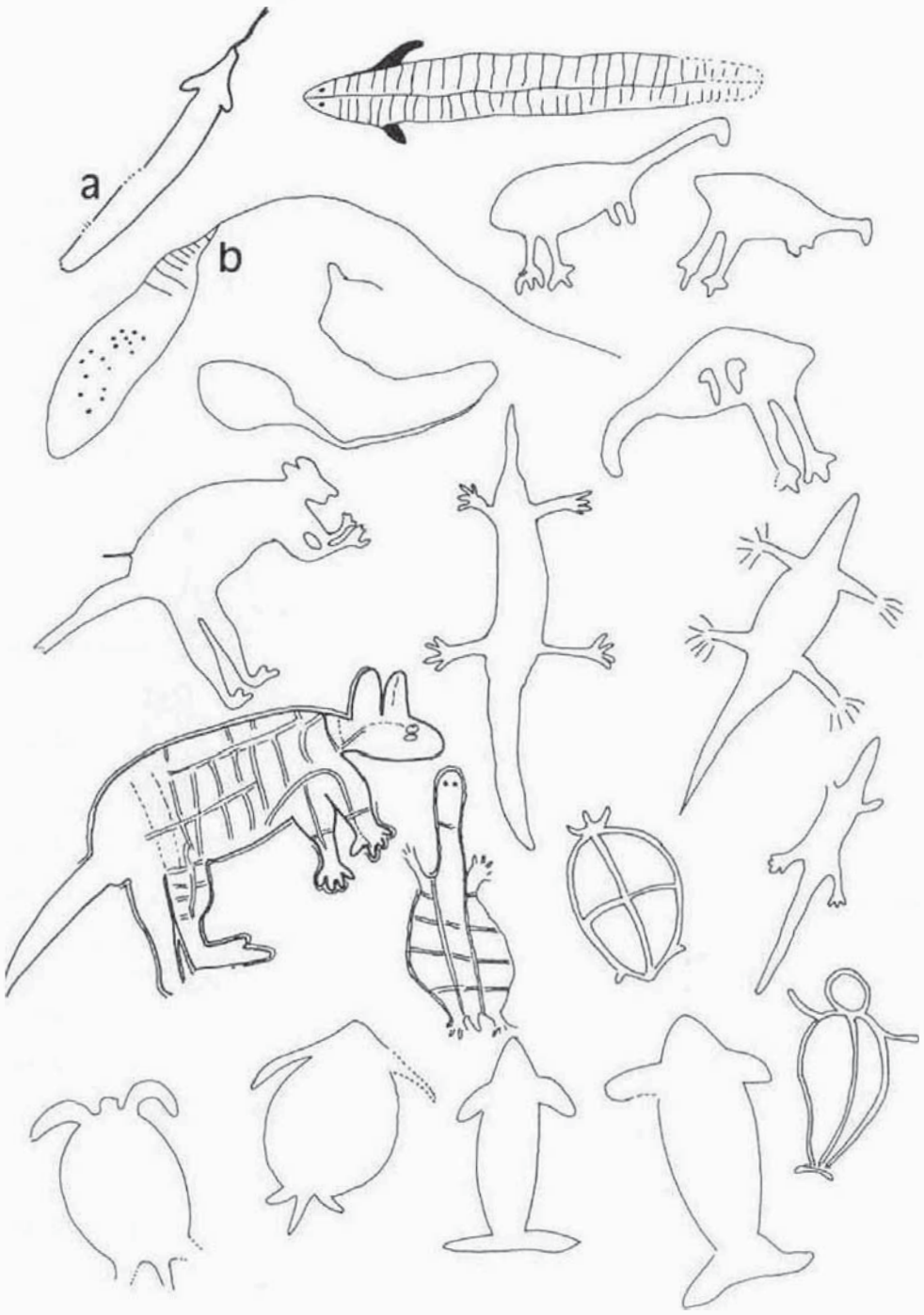


Figure 12.
Figurative paintings (fauna and plants) of CYP, red, red/white, solid infill except for a, b (after Clegg 1977, Flood 1987, Tindale 1952, Roth 1902, records of B. David, N. Cole; not to scale). Upper: Bare Hill, Laura, PCB, Silver Valley. Lower: Laura, PCB, Koolburra, Cape Grafton, Somerset.

records), Forsayth (Cole 1990b), Lawn Hill (A. Border pers. comm.: M. Morwood pers. comm.: pers. obs.) are comparable with those of Chillagoe (with some local variation). Another notable feature of sites north of Chillagoe is the less frequent occurrence of incised grooves.

The change-over from the northern figurative to the south-western non-figurative art appears to occur somewhere between the Mitchell and Walsh Rivers: the rugged Featherbed Ranges may act as a barrier between people and ideas to the north and to the south, although this has to be further investigated.

Archaeological and circumstantial evidence suggests that much of the surviving visible painted rock art in the CYP regions dates from Holocene times, and since in ethnohistoric times differing social networks and patterns of regional interaction between regions north and south of the Mitchell/Walsh have been fairly extensively documented, such factors may be responsible for obvious differences in the character of painted rock art in these divisions.

East of Chillagoe different patterns apply. Brayshaw (1977: 210) has observed a southern limit for naturalistic paintings in the 'Laura style' in the Cardwell area, around 150 km south of Cairns. However, the appearance of geometric designs resembling 'rainforest shields' near Cairns and at a similar latitude to the west, at Watsonville, presents a variation from the usual marine, faunal, anthropomorphous and non-figurative motifs in coastal sites further north. McCarthy (1979) and Walsh (1988a) refer to the Mt Elliott (near Townsville) shield motifs which Tindale compared with those at Watsonville. Shields in the Townsville/Ingham (see Brayshaw 1977) are presently being studied by Hatte (1992, pers. comm.) who has defined a southern limit for this motif. The distribution of shields in the sites of the rainforest and margins suggests a northern limit for this motif in line with the base of the Peninsula. Interestingly, such a limit is well to the south of the Endeavour River, which represented the northern extent of the use and manufacture of rainforest shields on the east coast, according to Roth (1909).

The far northern boundaries of CYP rock art are somewhat diffuse, since painted sites of Cape York and the adjacent islands appear to exhibit both Aboriginal and Melanesian elements, reflecting the situation of Torres Strait as an area of 'reciprocal influence' (Haddon 1935: 266). Rock art of the more remote islands is distinctly different and in these terms may mark the end of the gradation from Aboriginal to Melanesian and/or Papuan

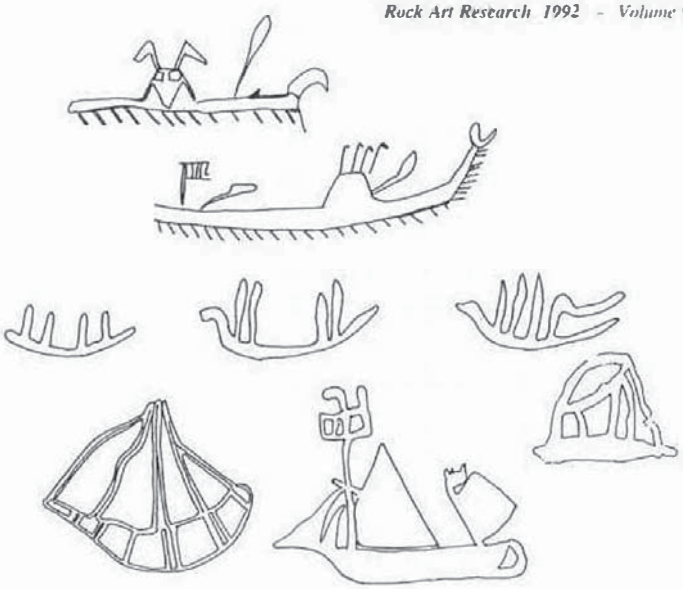


Figure 13. Boat and canoes in paintings of CYP (not to scale). Top: Torres Strait, after Haddon 1904; centre: Somerset, after Heritage Section records. Lower (left to right): PCB after records of G. Walsh; Cooktown, after Trezise 1971; Cape Grafton.

sociocultural systems.

Discontinuity within the region

The distribution of techniques within the different CYP areas is variable, and is sometimes but not always consistent with variable patterns of site geology. Sites of the rainforest and rainforest margins have art surfaces generally composed of granite and a general absence of techniques other than painting. In the granites and basalts of the Torres Strait, paintings and petroglyphs occur in separate realms and Haddon (1904: 360) suggests that 'carved stones' are absent in the western islands due to the hardness of the surface of the 'old igneous rocks'. However, the sandstone rock art of Princess Charlotte Bay lacks the technique of petroglyph and contains few examples of stencilled art, although these techniques are highly developed in nearby Laura and Koolburra.

In comparing the PCB and Laura rock art Walsh (1988c: 36) states: 'In spite of its geographical proximity to the Laura art body [it] represents the core of a discrete regional body of art'. Walsh refers to major differences in the selection of motifs and stylistic features of paintings, but the two regions also have an entirely different distribution of techniques. The PCB style, although adjacent to the vast Laura art body, seems more closely related to other coastal styles, in terms of technique selection and motif character.

Although the presence of suitable rock such as sandstone or limestone must have encouraged the development of a petroglyph tradition in Laura, Koolburra, Chillagoe and Mitchell Palmer, the apparent absence of this tradition from the sandstone sites of PCB may suggest the operation here of other factors in technique selection. In spite of the suitability of sandstone and limestone surfaces for petroglyphs in the former areas, this technique was definitely less favoured there than painting. In the CYP sandstone belt the figurative petroglyph tradition in particular did not achieve the scale of production of a similar tradition in the Sydney-Hawkesbury sandstone region of south-eastern Australia.

The significance of rock type in the selection of technique has been examined elsewhere in northern Australia or its environs by McNickle (1984) in the Pilbara and by Specht (1979) in the western Pacific. However, it is clear that so far in Australia no uniform correlation between medium and technique can be demonstrated. The granites of the Pilbara appear to have been immensely attractive to engravers, in contrast to the prolific free-standing granite and the basalt boulders of the CYP region, even though a tradition of rock art exists in this zone and sheltered sites do not occur in abundance. However, it is possible that shallow petroglyphs executed on exposed granite rock surfaces have repatinated in the manner described by McNickle (1984: 9) and remain invisible.

In ethno-historic times cultural differences have been well documented between eastern and western areas of the Peninsula (Peterson 1976; Tindale 1974) and coastal and inland people (e.g. Hynes and Chase 1982; Thomson 1933). However, since petroglyphs are known to have late Pleistocene origins in the wider region, their distribution cannot be considered solely in terms of the Holocene environment and ethnohistoric patterns of settlement and social organisation. It is possible also that coastal petroglyph sites lie submerged on the continental shelf.

It seems difficult to attribute the relative absence of stencilling from sites of the rainforest and fringes and from PCB to factors of site geology. However, the effects of severe tropical conditions on the more fragile forms of stencils placed on less-accommodating rock surfaces could account for a low survival rate for this technique in these areas.

Although rock art of sites of the rainforest and its margins contain similar techniques and a similar general range of motif types, variation occurs in terms of specific motif selection. As is reiterated in the literature, such differences may be attributable to a range of physical, functional or cultural influences (e.g. see Clegg 1977, 1987) and, although the widely dispersed 'rainforest' sites are known to have been associated with a number of different sociocultural systems in the recent past, the sources of variability cannot be assumed in the absence of detailed investigation. Likewise Walsh (pers. comm.) has suggested that rock art at PCB may not be a continuous and homogeneous system.

Local variations in the wider region of colour use (especially black and yellow) suggest areas worthy of investigation, relating to the influence of local cultural and/or environmental factors. The restricted distribution of some distinctive motifs and attributes and the variations evident in painting systems have already received attention. Flood (1987) has suggested more diversified social organisation in Holocene times as the sources of distinctiveness in the pigmented art of Koolburra, as have David and Cole (1990) for south-east CYP more generally. Morwood (1991) views a Quinkan painting tradition of Holocene origin as a further example of the economic and technological change which is evident in other archaeological evidence for this period from Laura.

At least in terms of the extent of its art body, the dense concentration and the consistently more complex nature of its pictures, the Laura area is an isolate. It is likely that here the vastness of the sandstone system with its abundance of fine rockshelters and suitable art surfaces has contributed to the development of an enduring art tradition of immense cultural significance.

As already indicated, several domains of rock art may be present in the Torres Strait. Surviving art in the more

remote islands is quite different in character from that of the mainland and adjacent islands, coinciding with significant cultural and geographic distance. However, lack of data prevents legitimate comparison of the subjects of Torres Strait rock art, and the relationship between the Cape York (Somerset) and island sites cannot be further investigated without detailed documentation. The general trend identified by Specht (1979) for the western Pacific of an east-west spatial division between painting and petroglyph is also evident in Torres Strait.

Conclusions

As demonstrated here, rock art in the CYP region has a wide distribution over a range of geological and biophysical zones and documented socio-cultural systems, and a chronology which extends from late Pleistocene to ethnohistoric times. Although some features relate the different areas within a broad Cape York Peninsula or north-eastern Australian domain of rock art, their heterogeneity in other respects is compatible with this variety of physical, cultural and temporal contexts, and many interesting research questions may be derived from consideration of these issues.

Preliminary spatial analysis of techniques and motif attributes has indicated a number of patterns, and research so far has identified divisions in engraved and painted motifs which appear to involve both diachronic and synchronic trends in prehistory. However, most if not all aspects require further investigation, such as the relationships between systems and the sources of variability within the bodies of art described above, and the antiquity of the painting tradition in the general region.

Importantly, the distribution of techniques and design attributes found in the Peninsula is not always synonymous with the distribution of different lithologies. Although the distribution of petroglyphs appears to reflect general patterns of site geology, significant discontinuities exist which are more likely to be explained in terms of other factors. These discontinuities are best seen in the following examples:

(1) The rock paintings of Chillagoe (limestone tower karst) and Ootan (granite boulders) present a single stylistic convention.
(2) The rock art of the Chillagoe and Mitchell Palmer limestone belt can be divided into two distinct systems.
(3) The rock arts of the adjacent sandstone systems of Laura and PCB are substantially different in terms of technique distribution and range of motifs.
(4) Rock art of the granite sites of the mainland and islands is not homogeneous.

Detailed investigations of geomorphological features of the Peninsula rock art localities are required to explore meaningfully the likely role of mechanistic values in technique selection. However, since rock art of this region presents such a complex pattern of continuous and discontinuous themes it is clear that simple models of correlation between physical, cultural and 'stylistic' attributes will not provide adequate solutions to questions of internal variability.

As observed by Roth almost a century ago, further systematic recording of rock art is required in north Queensland. Remoteness, difficulties of access associated with rugged terrain, severe climatic conditions, and variable preservation of the art are some of the factors which have created difficulties and gaps in the documentation of rock art in this region. Much of the rock art of the rainforest and rainforest margins has been lost already, and systematic and detailed recording of the remnants of this system is urgently required. Since most is now beyond visual interpretation the retrieval of further information will benefit from the application of more sophisticated recording techniques. A site predictive model based on the distribution of known art sites in CYP would suggest the existence of further sites in the granites and uplands of the east coast. In the Torres Strait, although some sites are on record or have been described in the literature, systematic recording of rock art has not been undertaken. Without comprehensive quantitative data further analysis of this significant and unique body of Australian rock art cannot proceed.

Rock art research in the Cape York Peninsula region offers some interesting challenges and future projects in all rock art areas will benefit from long-term consultation with Aboriginal and Torres Strait Islander people.

Many of the difficulties encountered in the preparation of this account have arisen from the variable methodologies used in CYP rock art research. It would be useful if researchers were to achieve some consensus in methodology and terminology in order to develop more standardised records. Such records might serve as a basis for a more elaborate comparative study than is currently feasible for this region.

Information obtained from further survey, documentation and analysis will add new lines of investigation to those we have indicated. However, it is hoped that this overview and preliminary study has demonstrated the considerable extent and complexity of CYP regional rock art and its contexts, and the potential for future research.

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Noelene Cole
Department of Archaeology
James Cook University
Townsville, Qld 4810
Australia

Bruno David
Department of Anthropology
University of Queensland
Brisbane, Qld 4072
Australia

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Résumé. *Cet article présente un exposé sommaire de l'art connu de la Péninsule du Cap York, Queensland, et de ses contextes. Bien que le caractère hétérogène de la recherche antérieure a limité l'étendue d'une analyse empirique, nous avons entrepris des comparaisons préliminaires de façon à extraire certaines formules élémentaires des données. Des traits continus ont été identifiés qui définissent un vaste corpus régional d'art rupestre. Cependant, la présence d'un certain*

nombre de traits discontinus est compatible avec la diversité physique de la péninsule, sonhétérogénéité culturelle connue à l'époque récente, et les longs contextes temporels de l'art.

Zusammenfassung. *Dieser Artikel legt eine kurze Übersicht der derzeit bekannten Felskunst der Cape York Halbinsel in Queensland und ihrem Zusammenhang vor. Obwohl die heterogene Natur früherer Studien die Möglichkeit empirischer Analyse begrenzt, werden präliminäre Vergleiche unternommen, um grundlegende Züge des Tatsachenbestandes erkennen zu können. Manche gemeinsame Merkmale, die einen grösseren regionalen Körper von Felskunst definieren, werden identifiziert. Die Abwesenheit einer Anzahl von unterschiedlichen Elementen ist jedoch vereinbar mit der Umweltsdiversität der Halbinsel, ihrer aus jüngerer Zeit bekannten kulturellen Heterogenität, sowie dem beträchtlichen zeitlichen Raum dieser Kunst.*

Resumen. *En este artículo tratamos de presentar un breve panorama del arte rupestre conocido de la región Cape York Península, Queensland, y sus contextos. A pesar de que la naturaleza heterogénea de investigaciones anteriores ha limitado el alcance de un análisis empírico, hemos llevado a cabo comparaciones preliminares a objeto de descubrir pautas básicas en los datos. Algunas características contínuas fueron identificadas que definen un amplio cuerpo regional de arte rupestre. Sin embargo, la presencia de un número de elementos discontinuos es compatible con la diversidad física de la Península, su conocida heterogeneidad cultural en tiempos recientes, y los contextos temporales bastante largos del arte.*

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Plate 1. Sandstone landscape of Laura region, CYP (photograph: Queensland Heritage Branch).

Plate 2. *'Motjala' (moth) painting at PCB (photograph: Queensland Heritage Branch).*

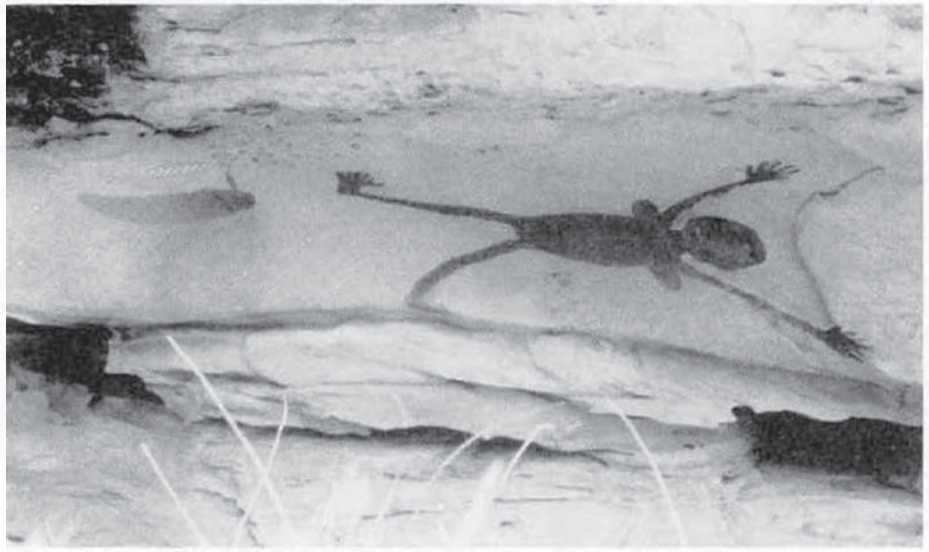

Plate 3. *Well-preserved paintings on smooth sandstone surface at Laura.*

Plate 4 *Heavily superimposed paintings at Laura.*

Plate 5. Varied infill in Laura paintings.

Plate 6. Mitchell Palmer anthropomorph.

Plate 7. Koolburra 'echidna people' (photograph: J. Flood).

Plate 8. *Laura petroglyphs - bird tracks/tridents.*

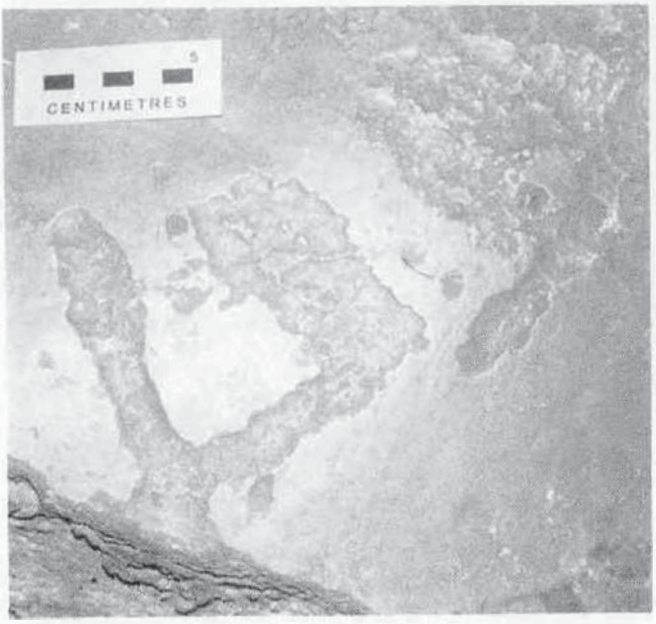

Plate 9. *Patinated peckings at Mitchell Palmer.*

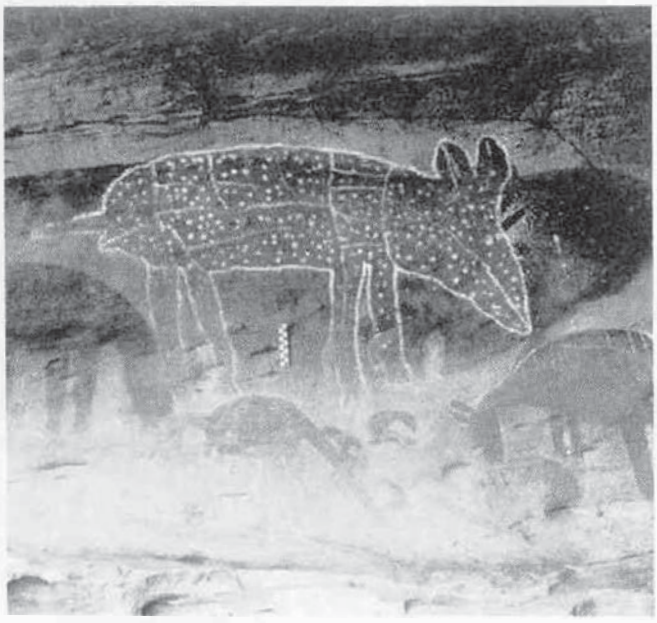

Plate 10. *Laura post-contact art: pig.*

KEYWORDS: **Plant fibres - Paint samples - Ethnobotany - Binders - Queensland**

PAINTING WITH PLANTS

Investigating fibres in Aboriginal rock paintings at Laura, north Queensland

Noelene Cole and Alan Watchman

Abstract. Investigation of paint samples from rock paintings at Laura, north Queensland, has revealed the presence of fibrous material which appears to be derived from plants. This paper outlines recent research into the nature and source of this material. Ethnobotanic data and the analyses conducted so far suggest that fibres may occur as by-products or as integral components of the painting process. This study presents direct evidence in the archaeological record for the physical involvement of plants in the creation of Aboriginal rock paintings.

Introduction

Little has been recorded of the specific methods, processes and techniques used in the creation of Laura Aboriginal rock paintings, a tradition apparently abandoned at some time following violent European invasion of this region in the 1870s. Since direct information on the processes of painting appears to be so limited, it was hoped that analytical methods might shed further light upon such aspects and provide data relevant to rock art conservation.

Current techniques require only minute paint samples in order to conduct complex analyses (e.g. see Lorblanchet et al. 1990), so analysis of paints used in the surviving rock art was proposed as an initial stage of investigation. During sampling and analysis, observations were made of what appeared to be fibrous organic material in some paint samples. We describe here investigations into the nature and composition of this material and offer some possible explanations for the origin of the fibres. Valuable knowledge shared by Aboriginal people such as George Musgrave, a custodian of Laura rock art, has greatly assisted in the following investigations.

Field methods

Permits to conduct paint sampling were obtained from the Queensland Heritage Branch and the Quinkan Reserves Trust. Sampling sites were chosen to give a good geographic coverage of the region and to include sites excavated in M. Morwood's current project (Morwood 1989a, 1989b). Samples selected according to specific criteria were obtained from motifs affected by (usually acute) deterioration. Fine dental probes were used for the removal of minute samples which were coded and stored within foil in labelled plastic containers. Weights of the samples proved to be in the order of 0.00017 - 0.5 g. The heavier samples include multi-layered fragments and naturally exfoliating flakes bearing paint, and sometimes fibres. Provenance of samples was documented and on-site Munsell colour readings were taken at the sampling points.

Analytical techniques

Whereas some the fibres were visible on-site through an optical lens, other fibres were discovered later during chemical and mineralogical analysis of paints. Fibres were also indicated in FTIR spectra of inorganic paint components (see Watchman et al. in press).

To date, investigation of the fibrous organic material has been directed at detailed examination using high magnification (375-600 times) polarised light microscopy. Tweezers and a scalpel were used to separate the fibres from the particles of pigment; fibres were then mounted in immersion oil (refractive index of 1.515). The same techniques were used to examine fibres from a few selected local plants, for some experimental comparative analysis. Paint samples from three sites were tested for the presence of reducing sugars using triphenyl tetrazolium chloride (Wolbers and Landry 1907).

Paints and paintings with fibres

Fibres were identified in paint from seven of the fourteen sites sampled throughout the region, in approximately 20 per cent of all samples and across a range of colours and mineralogies (Table 1). 'Fibre sites' are from a number of different localities (e.g. around Laura, Deighton and Little Laura Rivers). A broad range of motifs is also represented in the fibre samples, with the majority being in the anthropomorphous category which is the most common motif type at Laura, and the one most often sampled in our study. Samples containing fibre came from paints in solid infill, outlines and interior marks, and from paints at various levels of the superimposition sequence (Table 2). Sampled motifs show variable degrees of natural deterioration. Striations or brush marks were recorded when they were clearly evident (see * in Table 2). Fibres were not detected in paint samples associated with stencils.

Ethnography of paints

The presence of fibre-like material in paints raised a number of obvious questions relating to the origins of this material. Although a variety of natural organic materials were used in paints and painting, e.g. feathers (Edwards and Guerin 1969; Mountford 1956), human hair (Edwards and Guerin 1969; Levitt 1981; Morphy 1981), beeswax, honey and eggs (Edwards and Guerin 1969), ethnographic and ethnobotanic records suggest that plants (Table 3)

were the most common source material for implements or additives used in the application and preparation of paints and colourants. Paints were mainly applied with bark or twig brushes, and additives, such as fixatives, binders and dyes, were mainly derived from sappy or resinous plants. Although stone utensils were used in paint preparation (Edwards and Guerin 1969; Levitt 1981; McCarthy 1979; Roth 1904), in the Laura region, white pigment was prepared by mixing white clay on sheets of tea tree (paper or *Melaleuca* sp.) bark which were also used to store and

SAMPLE	COLOUR	MUNSELL	SEM/EDXA	MINERALS
YC1A, 1B, 1C	white	10YR8/1	Si, K, Al, Fe, [Ti], (Ca, S)	qtz, musc, kaol
YC4A	white	10YR8/1	Al, Si, K, Fe	kaol, qtz, musc
YC2A	pinkish white	5YR8/2	K, Al, Si, (Fe, Ti)	musc, qtz, kaol
QK16	red*	5YR8/1	Fe, Si, Al, K, (Ti)	hem, qtz, musc
QK22	red*	10YR8/1	Si, Al, K, Fe	qtz, musc, hem
QK11	yellow	10YR7/8	Al, Si, (Fe, [Ti])	kaol, qtz
QK18	yellowish brown	10YR5/8	Fe, [Si, Al]	goet, kaol, qtz
GH3	white	10R8/1	Fe, Si, K, Al	goet, qtz, musc
GH4	red	10R5/6	Fe, (Si, [Al, Ti])	hem
BF7	weak red	10R4/4	Fe, [Mn, Si, Al]	hem
BF1	dusky red	10R3/3	Fe, (Mn, Si, [Al])	hem, qtz
BF11	brown	7.5YR5/4	Fe, Si, (Al, K)	goet, qtz, (musc)
BF2	reddish brown	5YR4/4	Fe, Si, Al, K	hem, qtz, kaol
BF4	reddish brown	5YR5/4	Fe, [Si]	hem
BF3	brownish yellow	10YR6/8	Fe, [Ti, Si, Al, K]	goet
*BF5	cross-section: blue grey/red/white			
*BF8	yellow *			
CT2	reddish brown	5YR5/4	Fe, Si, Al, K, (Ti)	qtz, kaol, hiot
MG9	white	5Y8/1	Si, Al, K, (Fe, Ti)	musc, qtz
MG2	weak red	10R5/4	Fe, Si, Al, (K, Ti, S)	hem, qtz, kaol
MG3	pinkish white	7.5YR8/4	Si, Al, Fe, K, Ti, Ca, S	kaol, hem, musc, gyp
MG12	pale yellow	2.5Y7/4	Si, Fe, (Al, K)	qtz, goet, (musc)
MR6	red	2.5YR5/8	Fe, (Si, [K])	hem, qtz

*Table 1. Summary of inorganic analyses of paint samples in the Laura region containing fibres: qtz = quartz, musc = muscovite, kaol = kaolinite, goet = goethite, hem = hematite, Mn = manganese mineral, biot = biotite, gyp = gypsum. ( ) indicates minor amounts, [ ] indicates trace amounts of an element or mineral. Note: BF5 is a cross-section with three layers of paint. * = multi-layered: in QK16 and QK22, fibre is in red paint beneath the white of the samples and in BF8 in yellow paint beneath the sample of bluish grey.*

SAMPLE	MOTIF	FORM	LAYER
YC1A,1B,1C*	anthropomorph	solid infill	x/?
YC4A	anthropomorph	solid infill	x
YC2A*	anthropomorph	solid infill	x/?
QK16	macropod	solid infill	1/x/3
QK22	anthropomorph	solid infill	2/x/?
QK11*	crocodile	solid infill	1/x/1
QK18	emu	solid infill	x/2
GH3	'horse'	outline	x/3
GH4	artefact	solid infill	1/x/2
BF7	anthropomorph	solid infill	x/6
BF1	indeterminate	solid infill	6/x
BF11	fish	solid infill	1/x/2
BF2	anthropomorph	outline	5/x/1
BF4	crocodile?	solid infill	3/x/2
BF3	crocodile?	outline	3/x/2
BF5	indeterminate	solid	2/x/3
BF8*	anthropomorph	solid infill	1/x/2?
CT2	anthropomorph	solid infill	x/?
MG9	artefact	solid infill	1/x/?
MG2	anthropomorph	solid infill	x/?
MG3	anthropomorph	interior line	x/?
MG12	anthropomorph	dotted outline	x/?
MR6	anthropomorph	solid infill	x/?

*Table 2. Motif type and form of paint samples with fibres. x = a visual estimate of position of sample (x) in the superimposition sequence (e.g. 3/x/2 = sample motif x lies below three layers and over two layers); ? = older paintings may occur below. * = brush marks recorded.*

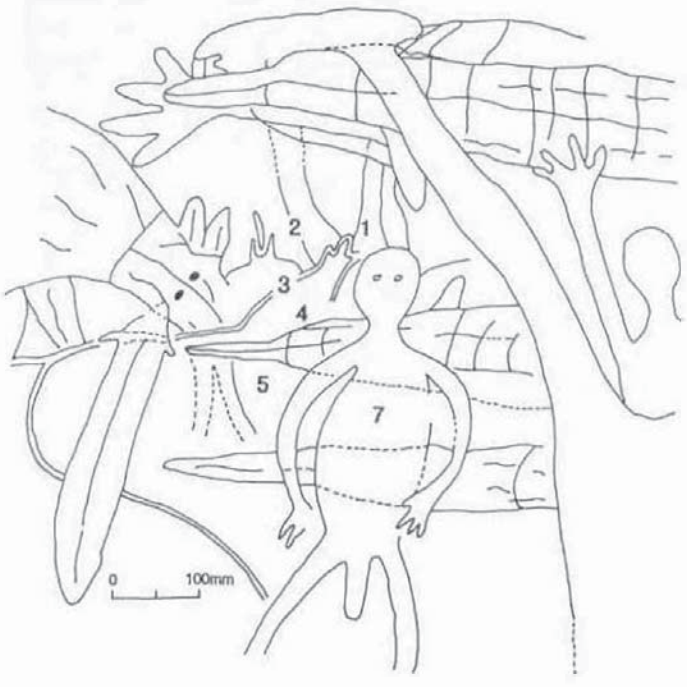

Figure 1. Provenance of samples containing fibres in site BF.

PLANT	REFERENCE	AREA	USE
Aleurites moluccana	Roth (1904)	NQ	fixative
Alphitonia excelsa	Roth (1904)	NQ	red/brown stain
Antidesma ghaesimbilla	Brock (1988)	A	purple dye
Antidesma parvifolium	Brock (1988)	A	purple dye
Betel nut, red berry	Specht (1979)	PNG	red pigment
'bloodwood leaves'	Edwards and Guerin (1969)		fixative
'blue berry'	McCarthy (1979)	NQ	blue dye
Calamus sp. (lawyer vine)	G. Musgrave (pers. comm.)	NQ (L)	brush
Cochlospermum fraseri (kapok bush)	Chaloupka & Giuliani (1984); G. Musgrave (pers. comm.)	A, L	brush
Coelospermum reticulatum	Brock (1988)	A, Au	red dye
Cymbidium canaliculatum	Levitt (1981); Specht (1958)	G	brush, fixative
Dendrobium sp.	Adderman (pers. comm.); Lawler (1981)	CYP, PNG	yellow dye, yellow decoration
Dendrobium dicuphum	Brock (1988); Levitt (1981); Specht (1958)	G	fixative, colourant
Dendrobium sp.	Mountford (1956)	A	fixative, bark and rock painting
Eucalyptus tetrodonta	Morphy (1981), Brandl (1982); Edwards & Guerin (1969)	A, G	brush
Grewia rutisifolia	Specht (1958)	A	brush
Haemodorum coccineum	Isaacs (1984); Roth (1904)	A, NQ	red dye
Haemodorum breviculae	B. Duelke (pers. comm.)	VRD	brown dye
Leptospermum fabricia	Roth (1904)	NQ	fixative
Livistona humilis	B. Duelke (pers. comm.)	VRD	grey/black dye
Melaleuca sp.	Roth (1898, 1902)	L	utensil
Moghania parviflora	Specht (1958)	A	brush
Morinda citrifolia	Levitt (1981)	G	dye
Morinda reticulata	Roth (1904)	Bl	yellow stain
'palm leaf fibres'	Mountford (1956)	A	brush
pandanus	Brandl (1982)	A	brush
'paperbark'	Brandl (1982)	A	brush
'plant ash'	White (1965, 1972); Isaacs (1984)	PNG, Au	white pigmt.; added to dye bath
'swamp roots'	Elkin et al. (1950)	A	brush
Terminalia carpentariae	Smyth & von Sturmer (1981); Chaloupka & Giuliani (1984)	A, G	binder
Wallaby grass	G. Musgrave (pers. comm.)	L	brush

Table 3. *Some ethnographic references to plants used in painting and colouring. PNG = Papua New Guinea, L = Laura, A = Arnhem Land, NQ = north Queensland, CYP = Cape York Peninsula, G = Groote Eylandt, Au = Aurukun; VRD = Victoria River District, Bl = Bloomfield River.*

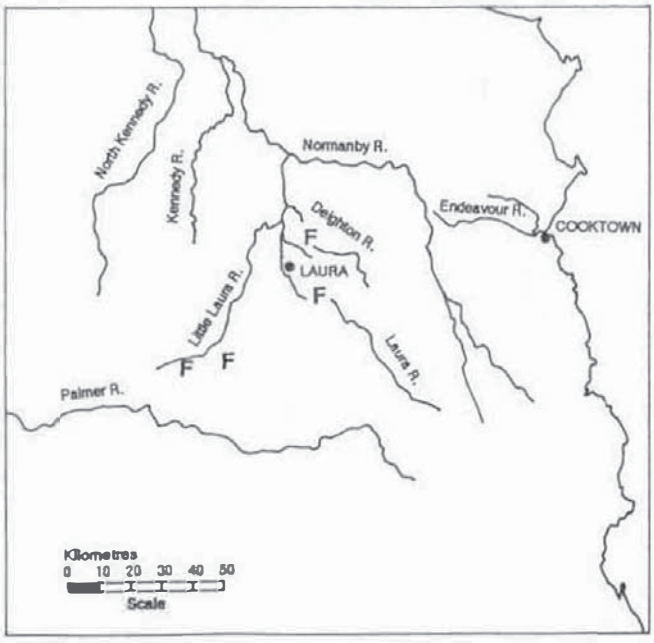

Figure 2. *Laura region, indicating with 'F' the broad localities of paintings found to be sources of paint samples with fibres.*

transport the clay (Roth 1898, 1902).

Plant sources for paintbrushes include stringy-bark (*Eucalyptus tetradonta*) (Brandl 1982; Edwards and Guerin 1969; Morphy 1981), pandanus (Brandl 1982), kapok bush (*Cochlospermum fraseri*) (Chaloupka and Giuliani 1984), tree orchid (*Cymbidium canaliculatum*) (Levitt 1981), swamp roots (Elkin et al. 1950), chewed stems of *Moghania parviflora* and *Grewia retusifolia* (Specht 1958), and palm leaf fibres (Mountford 1956). George Musgrave has informed us that Aborigines in the Laura region used bark and stems of the native kapok bush or small bundles of wallaby grass as paintbrushes. He also suggested that lawyer vine, a rainforest plant used for painting purposes on the coast, could have been used, since it was traded inland.

Extensive evidence exists for the use of plants as binders or fixatives by Australian Aborigines for painting on bark or artefacts (e.g. Brandl 1982; Brock 1988; Chaloupka and Giuliani 1984; Edwards and Guerin 1969; Elkin et al. 1950; Lawler 1984; Levitt 1981; Mountford 1956; Smyth and von Sturmer 1984; Specht 1958). Roth (1904: 15) refers to the use of certain plants as 'media for fixing pigments' in the painting of artefacts in north Queensland.

Lawler's (1981) ethnobotany of orchidacae indicates

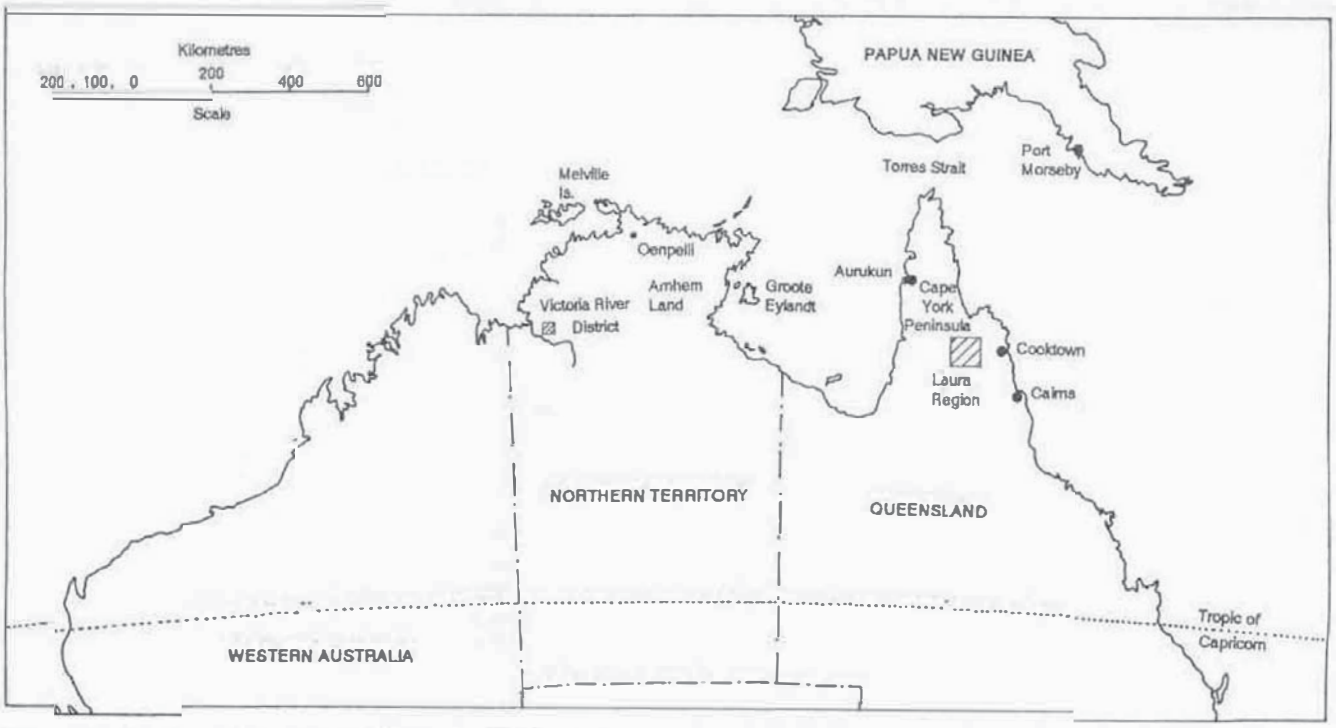

Figure 3. Northern Australia, with geographic locations of ethnographic references relevant to the use of plants in painting.

that orchid juice was used as a paint fixative in many different parts of the world. In Arnhem Land this and other natural binders are still in use by a few Aboriginal bark painters (Caruana 1987: 4). Specht (1958: 487) described the use of sap of the tree orchids as a fixative for ochres in Arnhem Land: 'After the basal colour has been painted over the sheet of bark ... the sap of a freshly-cut stem is expressed into the ochre by rubbing'. At Groote Eylandt Aborigines also used crushed orchids in painting (Levitt 1981: 146):

> The crushed bulb was rubbed on the bark surface and on the flat stone serving as a palette. The stone giving the desired colour is rubbed on the wetted palette and the coloured paste obtained is mixed with the sap extracted from the crushed stem.

Mountford's (1956: 11) brief account appears to be the only reference specifically describing the use of plants (*Dendrobium* sp.) as fixatives in rock painting:

> The orchid bulb is cut in halves, broken slightly by chewing, and in the Oenpelli and Yirrkala areas, rubbed directly on the surface of the bark or rock surface, or in Groote Eylandt, mixed with the colour in the grinding stone. This method of holding the pigment is effective as long as pigments are applied thinly, if not they tend to flake off.

Investigating fibres

The ethnographic information and the extent and nature of the occurrence of fibres strongly suggests that the fibres in Laura paints are more likely to be present as by-products of painting (from brushes or utensils) or ingredients of paints (as fixatives or colourants) than as naturally deposited ingredients of ochres and clays (see below). Initially in this project it was hoped that fibres could be classified according to their microscopic features and then matched to local plants known to have been in use. However, although such an approach was recommended for other archaeological identifications involving plants, e.g. plant residues on stone (Hall et al. 1989: 138), macroscopic plant remains (Beck 1989; Boyd and Pretty 1989; Clarke 1989; Ladd (1988), carbonised plant macrofossils (Donaghue 1989; Kamminga 1988) and fibres from ancient string and textiles (Körber-Grohne 1988), this approach proved not to be appropriate to our investigations.

The fibres in paints presented only minute amounts which cannot be readily sectioned and manipulated to reveal radial, tangential and transverse sections of their cellular structures and the identifications must be based solely on the visible cellular structures. Fibres from many plants are similar; for example, fibres from many grasses look alike and also resemble fibres from some parts of trees, especially the fibrous tissues taken from young stems.

The spectrum of potential source plants and plant parts for fibres in paints is vast, and for this project, no data base of reference materials in a suitable form exists for comparative purposes and the range of specific local information is limited. Although there may be several distinctive cellular and pit features in fibrous tissues which can be used to define plants unequivocally, we do not know which part of a plant was the source. For example, roots, bulbs, stems, bark, leaves, flowers and fruits may have been involved, with each anatomical plant category containing countless numbers of slightly different fibrous cells and presenting variable optical properties.

The pristine cellular structures found in fresh plant specimens are no longer present in paint fibres, which instead consist of arrays of variously distorted broken and stressed cells, making identification of anatomical features difficult. It is obviously not feasible to rely on degrees of polarisation (as in Hall et al. 1989: 138) for the identification of plant fibres. The standard test for birefringence in fibres using a variable compensator (ASTM 1982) is also unsuitable because most paint fibres are damaged and not cylindrical, a critical assumption of the method. Identifying characteristic features in the fibres using high-magnification microscopy is also problematic. The section of the fibre that is observed and the anatomical features discernible depend on the orientation of the fibre in the

slide mount. The number, dimension and state of preservation of fibres are dependent to a large extent on the size of the paint sample collected, and by necessity that size must be very small to minimise damage to the painting. Such a problem is compounded because minute particles of inorganic paint ingredients adhere to fibres and obscure cellular structures. Washing the fibres from paint samples in an ultrasonic bath only partly cleans the fibres because sticky exudations from the plant strongly bond the paint to the fibre (perhaps a reason for the selection and use of plants and fibres by the artists).

It was felt that chromatography would accomplish little apart from identifying cellulose, carbohydrates and lignin, all of which may be found in woody tissues. Waxy or resinous residues may offer scope for research but some previous studies on natural resins (Rosenfeld 1981; Bowden and Reynolds 1982) indicate that inconclusive results are likely. In addition, although it may be possible theoretically to identify starch grains in plant residues (Hall et al. 1989), this method has not been attempted with Laura paints. A fluorochrome test using triphenyl tetrazolium chloride (TTC) revealed the presence of reducing sugars (carbohydrate) in one paint sample (B. Ford, pers. comm. 1990), but this method cannot determine the precise identity of the plant from which the reducing sugars are derived. Testing other Laura paint samples with TTC led to inconclusive results.

Such difficulties indicated the futility of attempting accurate sourcing of fibres in the context of this short-term and resource-deficient project. The objectives of the study were therefore limited to a detailed examination and description of the paint fibres, an analysis of their morphological features and optical properties, and the formulation of some hypotheses on their possible origins and functions. AMS dating of some fibre samples is being conducted. On the basis of local information, several plants were selected for some experimental comparisons with paint fibres, using the same techniques applied in analysis of paint fibres.

Descriptive analysis of fibres

Inspections using polarising light microscopy of fibres in immersion oil revealed that the fibres often possessed a bruised and broken appearance and were present either as individual strands or splinters or in small bundles matted together. The properties and appearance of the fibres as presented in Table 4 suggests that those fibres closely mixed with the paint may represent ingredients of the paints (e.g. binders), and those fibres with a woody appearance and in less intimate association with the paint may represent brush or implement residue. Table 4 also indicates a possible source plant for some fibres, based on the evidence presented in this study.

SAMPLE	FIBRE APPEARANCE	ANATOMICAL & OPTICAL FEATURES	POSSIBLE FUNCTION	POSSIBLE PLANT
YC1A, 1B, 1C	matted bundle with epidermal hairs, paint adhering	cluster of narrow parallel cells with marginal scalloped ribbing on one side	binder	orchid?
YC2A	loose mat, paint attached	large parallel lumens, some cells infilled with red colourant	binder	orchid?
YC4A	few, sparse single, paint adhering	as for YC 1B; straight fibres have narrow parallel cells	binder	orchid?
QK11	large single woody splinter from paint surface	scalariform elements, narrow parallel cells	brush/implement	unknown
QK11	individual fine, sinuous, paint attached	solitary gelatinous fibre tracheids, high birefringence	binder	similar to YC2A, possibly orchid
QK16	single twisted strands, from red paint under white	parallel thin cells extinguish in successive segments indicative of damage	brush/implement or binder	kapok
QK18	single twisted strands	as above	brush/implement or binder	kapok
QK22	single twisted strands, attached to red paint under white	as above	brush/implement or binder	kapok
GH3	single woody splinter	parallel cellulosic structure, scalariform and annular elements	brush/implement	unknown
GH4	single woody splinter	as above	brush/implement	unknown
BF1	single, thin mixed with quartz-rich paint	fibre tracheid, weak extinction	binder	unknown
BF2	as above	as above	binder	unknown
BF3	wispy single and bundles; paint adheres	weak undulose extinction	binder	unknown
BF4	short, single, paint adheres	tracheid with no obvious structure	binder	unknown
BF5	short bundle from paint under blue	twisted spirals, no extinction	brush/implement	kapok
BF7	cluster, thin <1 mm, paint attached	no obvious structure	binder	unknown
BF8	single, in yellow under blue	libriform tracheid	brush/implement?	unknown
BF11	thin, <2 mm, paint adheres	weak undulose extinction caused by micro-checking	binder	unknown
CT2	bundle, short, paint adheres	weak undulose, extinction, no obvious structure	binder	orchid
MG2	single splintery frigments, <1 mm	fine parallel cells, weak extinction, low birefringence	brush/implement	kapok
MG3	as above	as above	brush/implement	kapok
MG9	individual short, paint adheres	narrow parallel cells	brush/implement?	unknown
MG12	large single woody pieces	narrow parallel cells, weak extinction, low interference colours, spiral elements	coarse brush	kapok
MR6	3 woody fibres, <1 mm paint attached	parallel cells, weak extinction, low interference colours, spiral elements	brush/implemem	kapok

Table 4. *Properties of fibres in Laura paints, with possible functions and sources.*

Materials examined for some experimental comparison with paint fibres included local kapok bush (stems and bark), wallaby grass selected by George Musgrave, parts of orchid and other local species, paper bark and human hair (Table 5). Paper bark fragments and human hair presented a distinctly non-fibrous appearance. The most promising aspect of the examination of the local plant fibres was the analysis of the samples from the kapok bush which grows in close proximity to many art sites in the Laura region. Kapok bush samples were found to be composed of bundles of twisted individual fibres which never reach optical extinction under crossed polars, a characteristic optical property which presented a close match with properties of fibres found in at least three art sites, and which distinguished them from most of the other fibres found in Laura paints.

PLANT NAME	FIBRE APPEARANCE	MORPHOLOGICAL FEATURES	OPTICAL PROPERTIES
Cochlospermum fraseri (kapok bush) young stem	long twisted spiral strands	regular transverse pits	anisotropic, high interference colours, no extinction
Cochlospermum fraseri (kapok bush) coarse stem	short woody splinters	parallel cells, spiral elements	low interference colours, weak extinction
Wallaby grass	long looping threads	simple pit pairs, elongate cells and vessels	very low interference colours, parallel extinction
Cymbidium canaliculatum (black orchid) bulb	straight strands	parallel simple cells, abundant exudations	second order interference colours, parallel extinction
Cymbidium canaliculatum leaf	green straight strand	regular ribbing on epidermal surface	bright yellow, weak extinction
Cymbidium canaliculatum stem	straight strand	elongate parenchyma and parallel vessels	very weak colours, parallel extinction
Dendrobium biggebum (Cooktown orchid) bulb	straight strands	parallel simple cells, abundant exudations	second order interference colours, parallel extinction
Calamus australis (lawyer vine)	coarse woody splinters	prominent elongate rectangular cells, sparse exudations	low interference colours, weak and incomplete extinction
Melaleuca, paper bark	thin sheets of narrow cells, non-fibrous	large epidermal cells	very low interference colours, weak extinction
Human hair	single discrete fibre	simple features, central core of small irregular cells	array of interference colours, parallel extinction
Alyxia spicata	multiple	epidermal sheath covers bundle of twisted strands, off-set border pits, elongate rectangular cells	second order interference colours, parallel extinction

Table 5. Properties identified in fibres from some local plants.

Fibre origins

It is possible that sources of some fibres were parts of plant (tree or grass) rootlets which were embedded in ochres and clays in the ground or which became incorporated in pigments during collection or excavation. However, the general appearance and distribution of fibres together with other evidence presented in this paper suggests that these are unlikely sources of fibres in paints.

Fibres occurring as one or more separate woody or splintery fragments (Table 4) were probably shed from brushes or other wooden implements or containers used in the preparation or application of paint, or perhaps from wooden implements or utensils used in the excavation, collection, transportation or storage of earth pigments. The close resemblance of some fibres to woody tissue from the stems of the kapok bush supports George Musgrave's significant information.

In other samples fibres occur in bundles or clusters, usually in close association with the inorganic components. Three samples from one painting (YC1A-1C) all contain such fibres, suggesting a non-random pattern of occurrence and a specific function for these fibres. The identification by B. Ford of reducing sugars in one of the YC samples could indicate that, in this case, sap or juice from a plant has been included with the inorganic components of this paint. The remaining samples in this group were not tested for reducing sugars using the TTC method because the technique gave inconclusive results on a range of samples with and without sugars. It is possible that even if sugary plant exudations were once present they may not be present today in paint samples because of natural degradation of the sugar.

As suggested by the ethnobotany, plant materials (saps and fibres) may have been crushed and added (to the paint or to the painting surface) to enhance the binding, fixative or even colouring properties of mineral components of paints. Orchids grow profusely in the Laura region, so these plants must be seen as potential sources of fixative material for local paints. However, it is also possible, especially since some of the fibres in this group (QK16, 18, 22) resemble kapok fibres, that closely associated fibres may, like discrete fibres, represent materials from the bruised surfaces of implements or containers which have become incorporated (inadvertently or intentionally) in the paint at some stage of the painting process. Although in our examination paper bark fragments (not necessarily from the appropriate species) showed no resemblance to fibres in paints, Roth's (1898, 1902) local reports of the use of paper bark in storing, transporting and processing pigment are of great interest.

Most fibre samples could be assigned through their attributes to one of two source groups (implements/brushes or binders, see Table 4), but no obvious association was identified between specific fibre attributes and motif types or forms, states of preservation, colours, paint mineralogies, or apparent positions in the superimposition sequence. Brush strokes are visible in motifs of both groups. Only one sample, (QK11), contained fibres of the two different types. The absence of fibres from stencil samples is not surprising if fibres are derived from brushes or binders. Stencils are blown rather than brushed and

presumably the distinctive fine spray effect typical of most stencils would not be enhanced by the presence of fibrous plant particles.

The range of paints with fibres presents the usual wide Laura spectrum of clays and ochres: in general no obvious mineralogical or inorganic chemical features distinguish the paints bearing fibres from those in which fibres have not been found (Table 1; Watchman et al. in press: Tables 1-6). In the light of this geological homogeneity, various other reasons might explain the presence of fibres in the paints and motifs sampled: culturally or personally determined preference by painters for different paint ingredients, methods or implements, desire to obtain ease of application of paint onto poorly adhesive, dusty rock or previously painted substrates, or random and fortuitous deposition.

It may be significant that 72 per cent of Aboriginal paints sampled at Laura (and a similar percentage of paint/fibre samples) contain quartz as a major or subordinate mineral. In recent French analyses where quartz was also revealed to be a significant component of prehistoric paints, Lorblanchet et al. (1990) conclude that it is a natural ingredient of local (Quercy) pigments whereas at Niaux, Clottes et al. (1990) believe that quartz has been incorporated through the grinding process. Such explanations are under consideration and investigation in the current phase of our analysis of paints at Laura, where the sandstone geology of rockshelters is of particular relevance. For example, although quartz is a likely natural ingredient of earth materials which formed the basis of Laura paints, it may have been accidentally included in paint mixtures during preparation or application, or even sometimes incorporated from the substrate during removal of paint samples.

The presence of quartz in Laura paints, in the form of angular and poorly bonded grains, would reduce durability, whereas adding plant fibres and their sticky exudations to pigments would enhance cohesiveness and adhesiveness. Most of the fibre samples are from motifs which overlie other paintings (see Table 2), so extra adhesiveness could have been a desirable property in these paints. The proportion of quartz in the 'YC' site samples is particularly high, and in this paint the matted fibres would have been essential to the paints' cohesive/adhesive qualities.

Conclusions

This study presents direct evidence in the Australian archaeological record for the physical involvement of plants in the creation of rock paintings. Fibrous material present in Laura paints is likely to consist of fibres shed individually or in clusters from wooden implements or utensils used in a range of activities associated with the collection, preparation or application of paint, and/or of plant matter included in the painting process for fixative purposes.

Although many of the ethnographic references in relation to painting practices emanate from the north-west of Australia, distribution of the plant species referred to in this ethnobotany frequently extends to north-eastern Australia, including Cape York Peninsula. It would therefore be expected that aspects of painting technology such as resource exploitation might have wide application across this biogeographically homogeneous zone. The distribution of the kapok bush and its use in the manufacture of paintbrushes as indicated in this study fits this pattern. As north Queensland Aborigines used plants as fixatives in the painting of artefacts it is not unlikely that they also followed a similar practice in rock painting, as in Arnhem Land.

If artists at Laura developed paint recipes which were designed to enhance the cohesiveness and adhesiveness of the pigments used in rock painting it would emphasise the importance of quality and durability of paint in the painting process. Such preoccupations with specific paint technology and techniques of preservation further confirm our belief that in this system of rock art, the ideological processes involved in creating pictures were complex and multi-faceted.

Finding fibres so widely present in Laura paints is highly significant in terms of the associations between plants in paintings. Even though many surviving paintings at Laura may date from fairly recent times, fibre ingredients were identified in various superimposition layers, indicating the continuity of practices or events involving fibres.

This study evolved unexpectedly from what began as a fairly straightforward chemical and mineralogical analysis of pigments, and the severe resource limitations of the project precluded prolonged and detailed investigations. However, it is felt that this preliminary investigation gives strong evidence for the existence of a most interesting paint technology, with important implications not only for rock art conservation measures, but also for the study of the complex intellectual and physical processes which lay behind the creation of the remarkable system of Aboriginal art at Laura.

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Noelene Cole
Department of Anthropology and Archaeology
James Cook University of North Queensland
Townsville, Qld 4811
Australia

Alan Watchman
Department of Geology
Australian National University
G.P.O. Box 4
Canberra, A.C.T. 2601
Australia

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Résumé. *L'investigation de prélèvements de peintures rupestres de Laura, au nord du Queensland, a révélé la présence d'une matière fibreuse qui semblerait provenir de plantes. Cet article résume les recherches récentes sur la nature et la source de cette matière. Les données ethnobotaniques et les analyses conduites jusqu'à présent suggèrent que les fibres représentent soit des sous-produits, soit des constituants intégraux du procédé de peinture. Cette étude présente l'évidence archéologique directe sur l'utilisation physique de plantes dans la création de peintures rupestres par les aborigènes de l'Australie.*

Zusammenfassung. *Die Untersuchung von Farbproben von Felsmalereien bei Laura, Nord-Queensland, ergab die Anwesenheit von fibrillärem Material anscheinend pflanzlichen Ursprungs. Der Aufsatz umfasst neue Forschung in die Natur und Herkunft dieses Materiales. Ethnobotanische Einzelheiten und die bisher durchgeführten Analysen deuten an, dass die Fasern als Nebenprodukte oder als wesentliche Zutaten des Bemalungsvorganges vorkommen. Die Studie legt direkte Evidenz in den archäologischen Aufzeichnungen für eine physische Rolle von Pflanzen in der Kreation von Aboriginal Felsmalereien vor.*

Resumen. *Investigación de muestras de pintura provenientes de un conjunto de pinturas rupestres en Laura, norte de Queensland ha revelado la presencia de material fibraso que parece derivar de plantas. Este artículo presenta las recientes investigaciones referentes a la unnaraleza y fuente de este material. Información emobotánica y el análisis llevado a cabo hasta el momento sugieren que las fibras podrían presentarse como productas secundarios o como componentes integrales del proceso de pintura. Este estudio parece contener la primera evidencia material directa para la participación física de plantas en la creación de pinturas rupestres.*

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Plate 1. *Kapok bush in flower, Laura.*

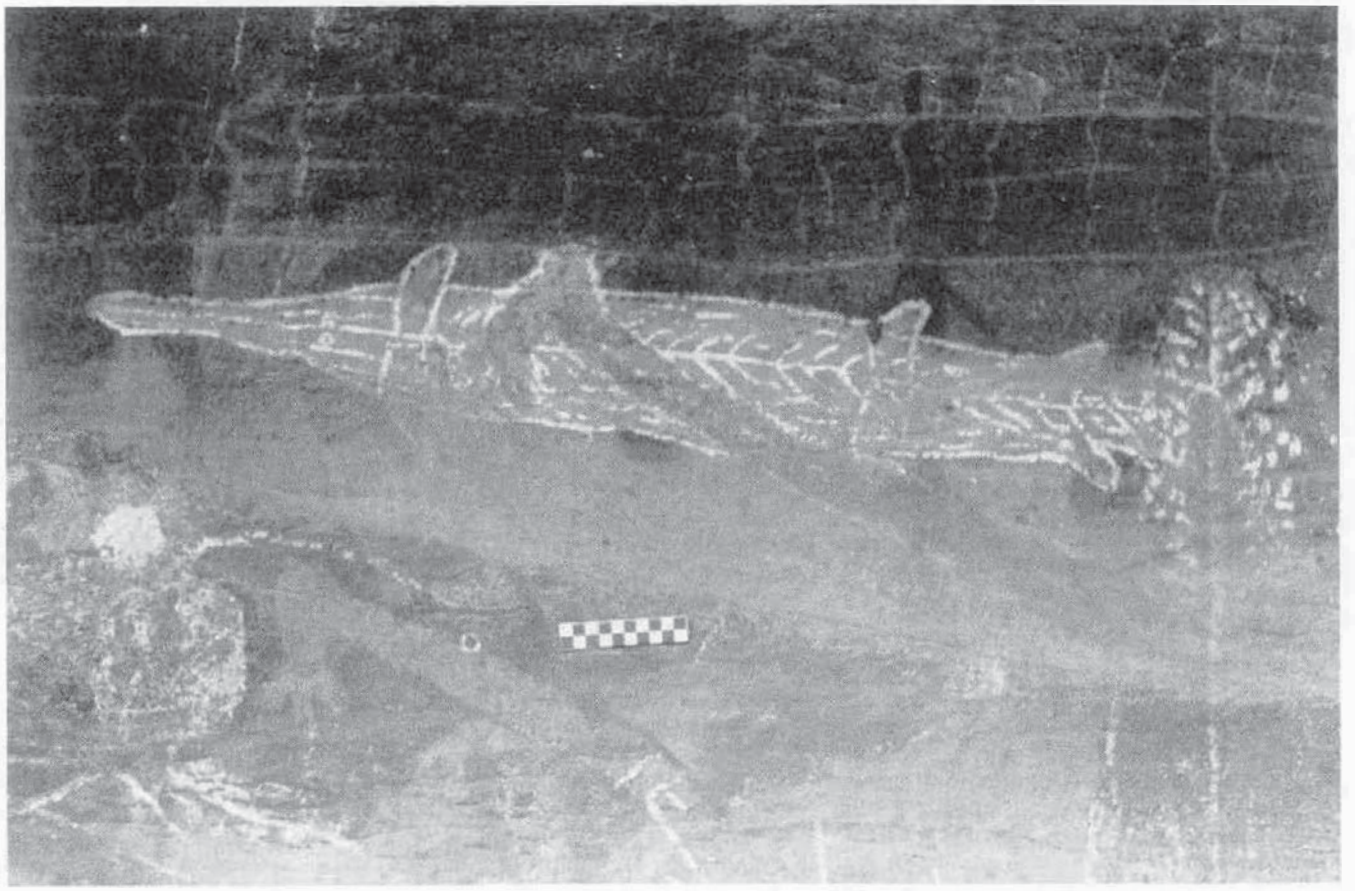


Plate 2. Painting of fish, source of sample BF11.

Plate 3. White painting of female anthropomorph, source of samples YC 1A-1C which contained matted fibres.

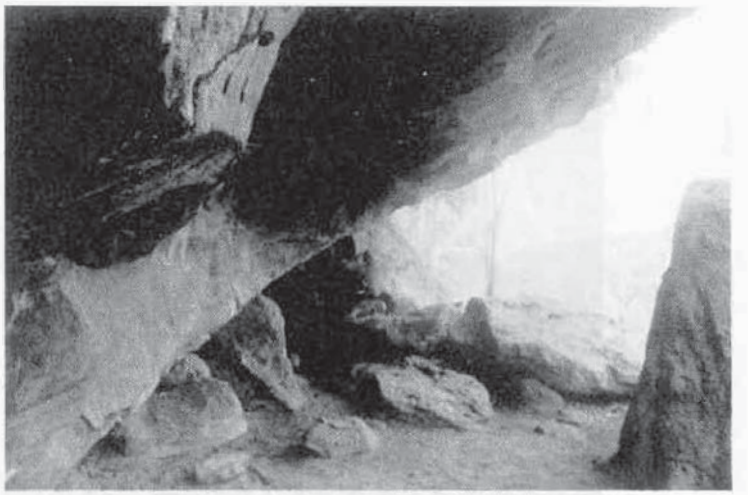


Plate 4. Three of the paintings sampled in this rockshelter were found to contain fibres (site YC).

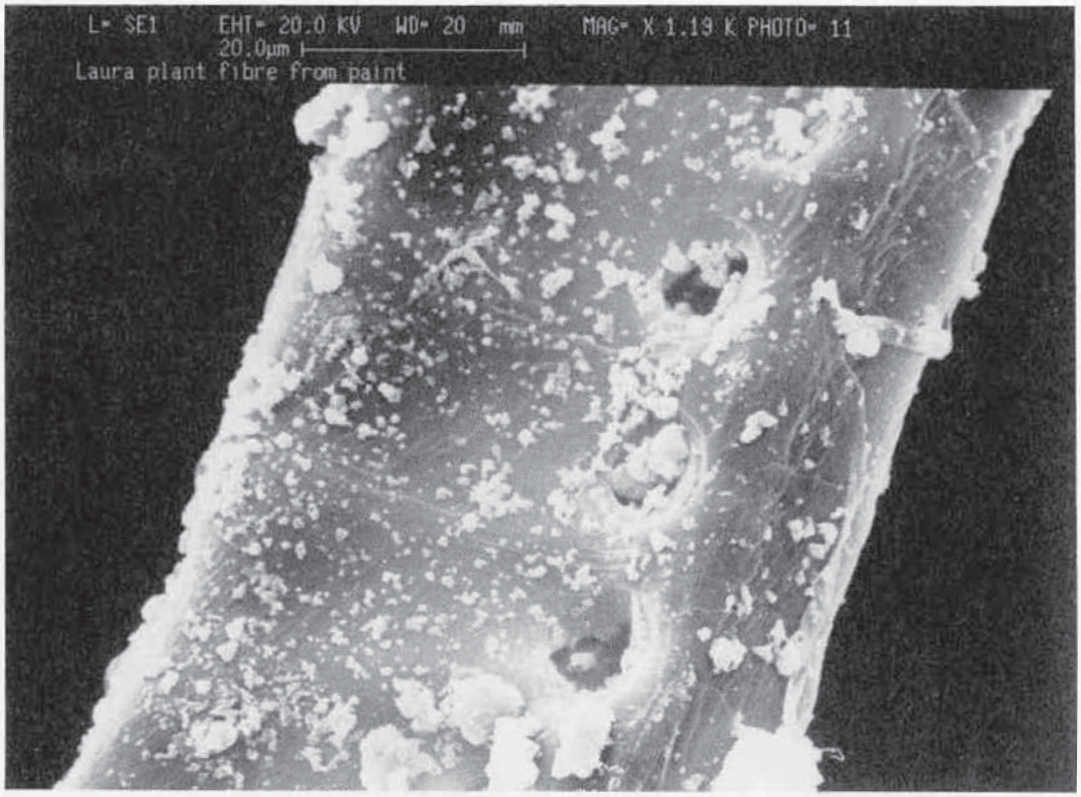


Plate 5. Secondary electron image of a scanning electron photomicrograph of a collapsed cellular 'woody' fibre showing a row of lumen-like hollows. Tiny particles of paint adhere to the fibre which is actually about 0.05 mm in diameter. The short, straight fibre is from sample MG9 and may be a fragment from a brush (magnification is 1190x).

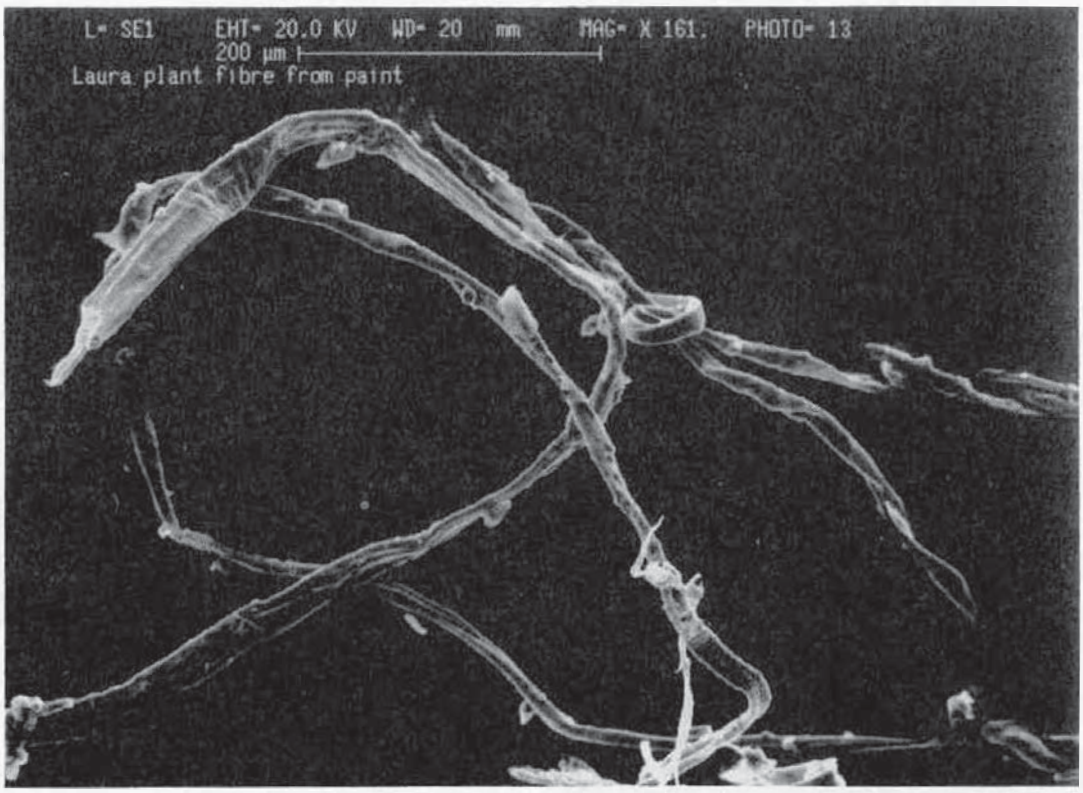


Plate 6. Secondary electron SEM image of a bundle of short, twisted fibres (in sample BF5). The spirals in the fibres may be an artefact created by collapsing of the fibres under vacuum or they may indicate that the fibres are from the native kapok bush. Paint particles were ultrasonically and chemically removed prior to observation. Actual diameter of the fibres is approximately 0.01 mm (magnification is 161x).

RAR DEBATES

Debate of
MICROSCOPIC AND STATISTICAL CRITERIA FOR THE IDENTIFICATION OF PREHISTORIC SYSTEMS OF NOTATION

By FRANCESCO D'ERRICO

In *Rock Art Research* 1991, Vol. 8, No. 2, pp. 83-93.

FURTHER COMMENT

An innovative analytical technology: discussion of its present and potential use

By ALEXANDER MARSHACK

D'Errico's recent work is a major and important contribution to the study of cutting edges and the changes that occur to cutting edges during the process of engraving, resharpening etc. Scanning electron microscopy (SEM) will be of increasing value in a wide range of studies concerned with early and prehistoric incised symboling systems, studies that I had pioneered some decades ago by use of optical microscopy.

D'Errico's comparatively short paper has, in large measure, eliminated from discussion many of the arguments and hypotheses that he had previously published concerning (a) the use of the optical microscope, (b) the nature of symbolic engraving and the criteria for their study, and (c) the nature of notation and notational analysis. Unfortunately I cannot judge the nature of the composition on the rhinoceros rib since no illustration is provided. This would be required since it is primarily the internal structure of a *composition* and *not* the presence of cross-sectional data, that ultimately determines the presence or absence of notation: it is internal structuring that differentiates notations from other modes of accumulating sets, images and motifs. Notations are essentially *visual* modes of recording and *structuring* information: they often, therefore, provide internal evidence for notation-specific visual modes of problem-solving, cueing, referencing, differentiations among sets, sequencing etc. (Marshack 1972a; 1991a)" D'Errico's sparse cross-sectional and statistical analysis tends to eliminate the possibility of discussing the composition, the nature of notation, or how one might distinguish notation from other, different forms of symboling and marking made over a period of time.

There is no indication in anything that d'Errico has published about how one does study, test, and validate or disprove the presence of notation since this cannot be done by mere cross-sectional analysis. As a result, his present statistical-graphical breakdown of cross-sectional data (d'Errico 1991: Figs 7-9) provides largely meaningless computations in the determination or discrimination of 'notation' from any other form of marking produced over time. This has been recognised, in some measure, by Bednarik (*RAR* 8: 91). D'Errico admits to this criterial failure by stating that 'it is, however, difficult for the moment to determine valid criteria for distinguishing "notations" made by the same cutting edge from other kinds of expression (schematisations, abstractions, decorations etc.)' (*RAR* 8: 89). But there *are* such criteria, they can be tested, and it was in large measure to establish these criteria that the investigations undertaken by this commentator were made (cf. Marshack 1972a, 1991a).

The subject must therefore be addressed at a level that goes beyond d'Errico's present paper. I shall do this by discussing both his analytical method and his own 'criteria', not merely as they affect the problem of possible notation but, of greater importance, as they affect the study of Upper Palaeolithic and epipalaeolithic materials in general. This discussion is necessary also because d'Errico has announced that he is continuing his inquiries based on his present methods and criteria.

It is clear that, using precisely the same 'criteria' and methodologies as described in his doctoral thesis (d'Errico 1989a) and his papers derived from that thesis (d'Errico 1989b), he had earlier declared, categorically and absolutely, that his SEM studies of a few *post-Upper Palaeolithic* Azilian incised stones from France had *proved* that notation could *not possibly* have existed in the Upper Palaeolithic and that 'all' the compositions he had studied were made at one sitting. Since d'Errico's methodology and 'criteria' have not changed there was a failure somewhere, either in the methodology, the 'criteria' applied in its use, or in the criteria used in the selection of material to study. This makes me suspect that d'Errico's new analyses and statistical data may not, in fact, suggest the possibility of notation.

His data may suggest something far more important. I have argued for decades (Marshack 1969a) that in the Upper Palaeolithic and epipalaeolithic there are numerous modes of accumulating sets of marks and images over time. Unfortunately d'Errico seems not to have addressed the problem of this diversity. Nor has he addressed the equally important problem of the variability found in human modes of symbolic marking and production generally. His paper is, in fact, the perfect example of an extraordinarily good analytical technique, used carefully and well to address a number of exceedingly difficult questions that the researcher has apparently not yet prepared himself to ask.

The scanning electron microscope is of such potential importance and utility for the study of certain classes of early image and symbol that I feel it is necessary to discuss its potential and the pitfalls that one may face in its inadequate application and use. The issues are of general interest to the study of prehistoric image and its manifestation in world 'rock art'. The discussion will also be useful because of the theoretical conclusions that d'Errico had earlier promulgated. 1) The journalistic reports of his earlier categorical and absolute assertions that 'notation' could not have existed (d'Errico 1989a, b) remain in the published record (for a one-sided report, cf. Lewin 1989; for a balanced report, cf. Bahn 1989). In these widely disseminated reports it was apparently mere use of the scanning electron microscope that was taken as the empirical, technological 'proof' that notation could not possibly exist. There was never a discussion of d'Errico's skewed sample (except in my response in *Current Anthropology*) or of his lack of any criteria for discriminating notations from other forms of marking that may have been made either at one sitting or over time.

Differing modes of study

In an earlier response to a d'Errico paper (d'Errico 1989b) I indicated that, had he been interested in testing the hypothesis of

1) In his thesis d'Errico stated that, since 'all' the French Azilian objects he had studied were made at one sitting, this not only proved that notations were impossible, but that his finding was so important that 'this work will become perhaps a palaeopsychology ...' etc. (1989: 398). Beginning to study a wider range of materials and artefacts, he has begun to tread more cautiously. The 'palaeoneurology' we are interested in must include the more realistic concept of symbolic variability.

'notation', he had studied the wrong class of material from the wrong culture and the wrong period. I indicated that more than a dozen years earlier I had studied the same Azilian pebbles that he had studied, had found the same results, and had ascertained that the pebble he was then illustrating and discussing was not 'notational'. It met none of the internal, visual criteria for notation. In my response I illustrated the type of Upper Palaeolithic microscopic data that his research had not addressed or discussed (Marshack 1989a: Figs 2-5).

I suggested that d'Errico could have quickly and simply addressed the notational problem by studying those examples of 'notation' I had already published which were available in Paris where he was doing his research. This would have provided an immediate and direct test of the notational hypothesis on artefacts that had been published as notational on the basis of microscopic study. Instead, d'Errico embarked on a search through an apparently random collection of incised Upper Palaeolithic bones and happened to come upon 'one' artefact that may have been incised by different points over a period of time. Following d'Errico's criteria and mode of publication, if he had not found that 'one' example he would clearly have felt justified in declaring categorically, once again, that notation did not and could not exist in the Upper Palaeolithic. There is nothing in d'Errico's method or 'criteria' or in his short article to indicate otherwise.

What d'Errico has found, therefore, on purely statistical grounds is therefore probably not related to notation. 2) I am not quite sure that d'Errico understands the *statistical* inadequacy of the method he has been pursuing. It seems that he thinks that a study of engraved marks, *because* they are engraved, provides an adequate test and that the data acquired in a random search represents a proper sampling of the Upper Palaeolithic or epipalaeolithic engraved materials and, therefore, a test of the notational hypothesis.

It is not difficult to indicate the inadequacy of that approach. There are *thousands* of engraved artefacts and sets of marks in the Upper Palaeolithic. That culture, in fact, provides the richest and most variable body of engraved symbolic materials and sets of marks known to have come from any hunting-gathering culture. This is due in part to the length of the period involved, 25 000 years; in part to the geographical distribution of these traditions, encompassing western, central, Mediterranean and eastern Europe; and in part to the nature of the materials used (antler, ivory, bone and stone), a significant portion of which has managed to survive archaeologically. In the last quarter century I have conducted a microscopic study of all the symboling traditions of the dispersed European Upper Palaeolithic cultures. This involved direct and comparative study of thousands of artefacts and compositions - and yet in this search I have found only a few dozen examples of possible 'notation', and of these I have published perhaps a dozen or so, often devoting a major analytical paper to the discussion of a single composition (cf. Marshack 1972b, 1991b). During these studies I have had to abandon my early suggestions of notation among traditions that turned out to represent non-notational modes of accumulation. In these analyses it was always the visual, *internal structure* of a composition and the strategies that were involved in its formation, that were as important as microscopic data in suggesting the presence of notation.

It should be evident that pre-writing notations (including mnemonic devices, message sticks etc.) are by their nature personal forms of record keeping, usually made by a specialist or an elite. They could be read only by the maker. They would therefore be rare in the Upper Palaeolithic corpus as compared to more common, more public symboling modes. This should not be surprising. Notations, tallies, record sticks and even mnemonic devices, in those historic cultures where they are known to have been used and where examples exist ethnographically (in Africa, Australia, Siberia, Europe, the Americas etc.) are always the rarest of the symbolic artefacts to come from these cultures (Marshack 1972a & 1991a: 141-3, 1985a, 1988b; Orlova 1966). Though there is a large body of ethnographic evidence for the presence of such traditions, they are artefactually rare. The archaeological rarity of notation can be indicated in another way.

In 1987, at the time d'Errico was preparing his doctoral thesis on the use of SEM, I presented a paper (Marshack 1990) in which I indicated that as a result of a comparative study of all the Upper Palaeolithic and epipalaeolithic symboling traditions across Europe, I had found many different modes or types of engraving (actually a few dozen): decorative marks, designs, edge marks for gripping, forms of ritual participatory marking, the periodic accumulation of motifs and signs, work marks, abstract representations of pelage and fur, 'killing' marks and other types of marking on animal and human figures etc. I indicated that these modes often occurred on different classes of artefacts or in different contexts and they involved different modes of production, accumulation, structuring and use. I indicated that many of these modes may on the first viewing, and *because* they involved incised sets of marks, 'look like' notation. Given this variability, it is clear that one can not merely study 'engraving as engraving' in a blind search for notation. One needs a set of criteria for differentiating types of engraving and the different classes of artefacts and surfaces used for these modes. My 1987 paper was a synthesis of dozens of papers I had published documenting a portion of this variability in Upper Palaeolithic and Mesolithic engraving. Within this huge and complex body of materials, the Azilian engravings that d'Errico had studied also contained different modes and types of symbolic production and image making. Each of them presented a different analytical problem and required different criteria for their study. Unfortunately, d'Errico could not distinguish between these traditions and so did not realise that they required different criteria for their study. For the purposes of his thesis they were merely 'engraved compositions'. I shall describe below some of the diversity present among the Azilian stones that d'Errico studied (Figs 12-21).

Modes of accumulating and using images over time are so common in pre-literate cultures as to hardly require discussion. These modes, in fact, constitute a large proportion of world 'rock art'. 3) Diverse modes of periodic marking are also one of the distinguishing characteristic of the Upper Palaeolithic and epipalaeolithic symbolic materials. How, without proper criteria for judging notation, could d'Errico have hoped to distinguish one mode of accumulating sets of marks over time from any other?

It may be of value, therefore, to describe the analytical and methodological criteria by which the research initiated by the present commentator was begun, how criteria were initiated, developed, tested and broadened, providing at the same time some indication of the different uses to which microscopy was thereafter put in the inquiry. The discussion will address those questions that d'Errico has not yet addressed and indicate the differences in the theoretical assumptions that have driven the two studies.

On uses of the microscope

D'Errico has argued that his method allows him to determine (a) the direction of movement of a point, (b) whether marks were engraved by the same tool and (c) the order in which strokes were made, the probable 'time' required for engraving the lines etc. What SEM does allow, in contrast to an optical microscope, is a better and more precise documentation of the processes, proces-

2) When I studied the Solutrean artefacts (from Le Placard, Solutré, Isturitz, Fourneau du Diable, Laugerie Haute and other sites) by optical microscope I found that they contained different classes of marking on different classes of artefacts, including needles, points, awls, pendants, whistles, amulets, with some of the most complex engravings being made on non-utilitarian scraps and fragments of bone and stone etc. Because they all contained sets of marks, they often had an initial appearance of mimicking 'notation'. It became quickly clear that they represented different systems and modes of marking.

3) I have studied thousands of accumulations of images, motifs and sets of marks available in the prehistoric materials of Australia, the Americas, Africa, Upper Palaeolithic and epipalaeolithic Europe, Southeast Asia, Siberia, the Middle East etc. In only a few rare and special cases, however, did I find evidence of 'notation'.

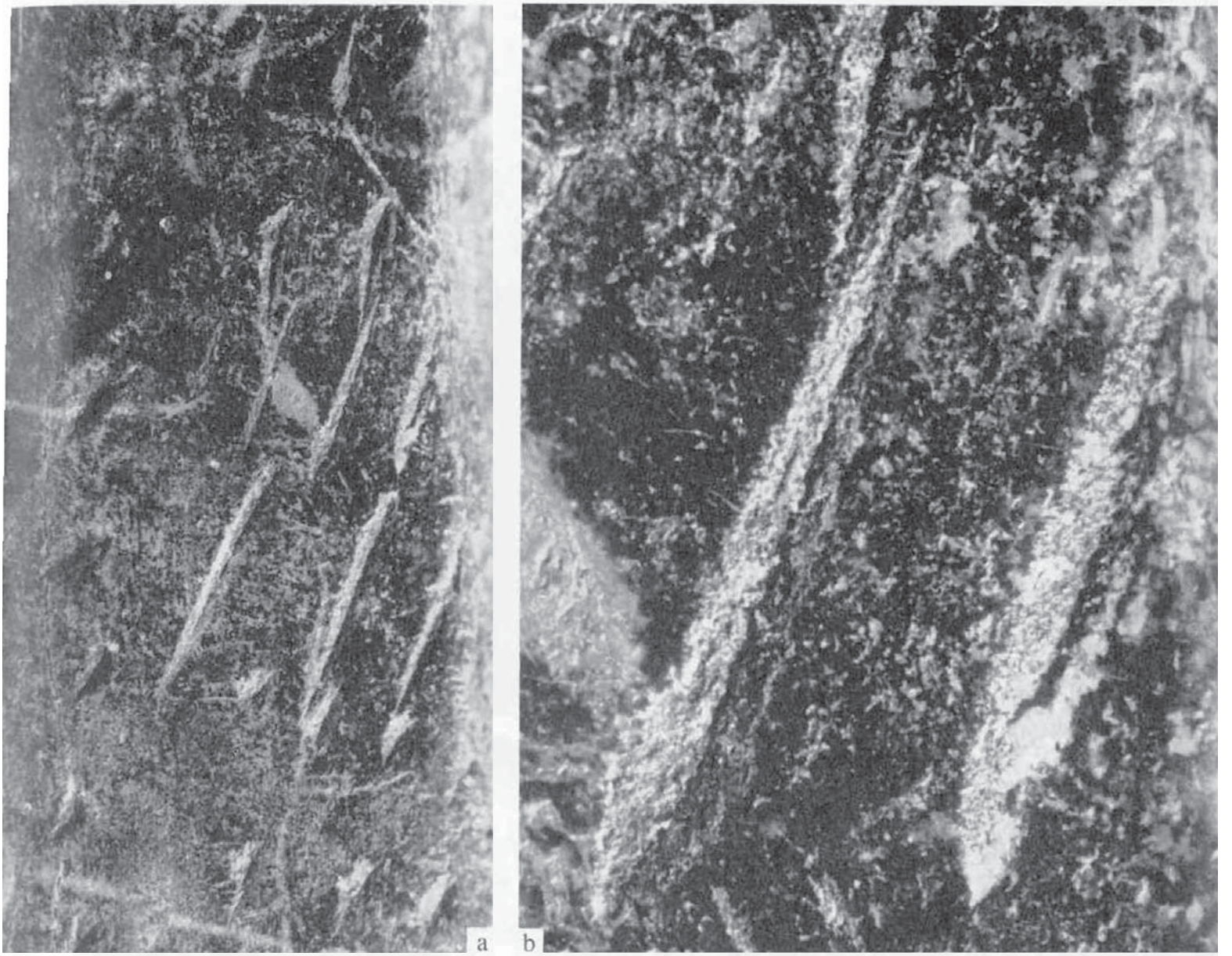


Figure 1. La Marche, France. (a): Detail of the broken edge of the fragmented antler, indicating some of the remnant marks on the horizontal rows that were on the missing face. Each horizontal row was incised in a reversed direction. The smaller marks on the lower rows are made with a different rhythm of marking and spacing. Middle Magdalenian, c. 15 000-15 500 BP.
(b): Macrophotograph of the incised strokes indicating the reversal in the direction of marking each row with a clear indication of the points of impact and the tailing out.

ses which are usually quite visible to a skilled worker with a binocular microscope. Bednarik has also indicated that these processes are often quite visible with, and at times even without, optical magnification. The optical microscope is, in fact, still the preferred instrument for field studies and for an indication of those problems that might thereafter be better addressed by scanning electron microscopy (Odell and Odell-Vereecken 1980). 4)

My first analytical papers on notation (Marshack 1972b) documented the presence of sets of marks that were incised in opposite directions. The macrophotographs documented the point of impact, the tailing out, and the direction of engraving. These reversals in the direction of marking required a 180° turning of the surface to incise neighbouring sets only a few millimetres apart. These intentional changes in the orientation of the surface and the direction of engraving raised some of the very early questions that were subsequently pursued through the body of Upper Palaeolithic materials.

A broken section of reindeer antler from La Marche, France (c. 14 000 BP), for instance, had once been a baton on which a horse and sets of marks had been incised in descending rows (Marshack 1972b). The baton had broken during use and the antler fragment was then reshaped to become a retoucher of stone

4) In a study comparing the optical microscope with other microscopic methods, Odell and Odell-Vereecken (1980) have stated: 'Several freshly knapped pieces of fine-grained basalt were utilized by an experimenter for a large variety of tasks. The tools were then submitted to an analyst, who was ignorant of the uses to which each of the objects had been put. Employing low-power microscopic techniques, he was able to identify with reasonable accuracy the used part(s) of the implements, the prehended part(s), the activities in which the pieces had been engaged, and the relative resistance of the materials worked. It is argued that low-power micro-wear techniques have several advantages, among which are ease and speed of analysis and availability of equipment. The methods selected for any use-wear analysis of stone tools, however, must be adopted to the particular situation and the questions to be asked of the data.' This may be said also of the optical microscope for the study of engraving.

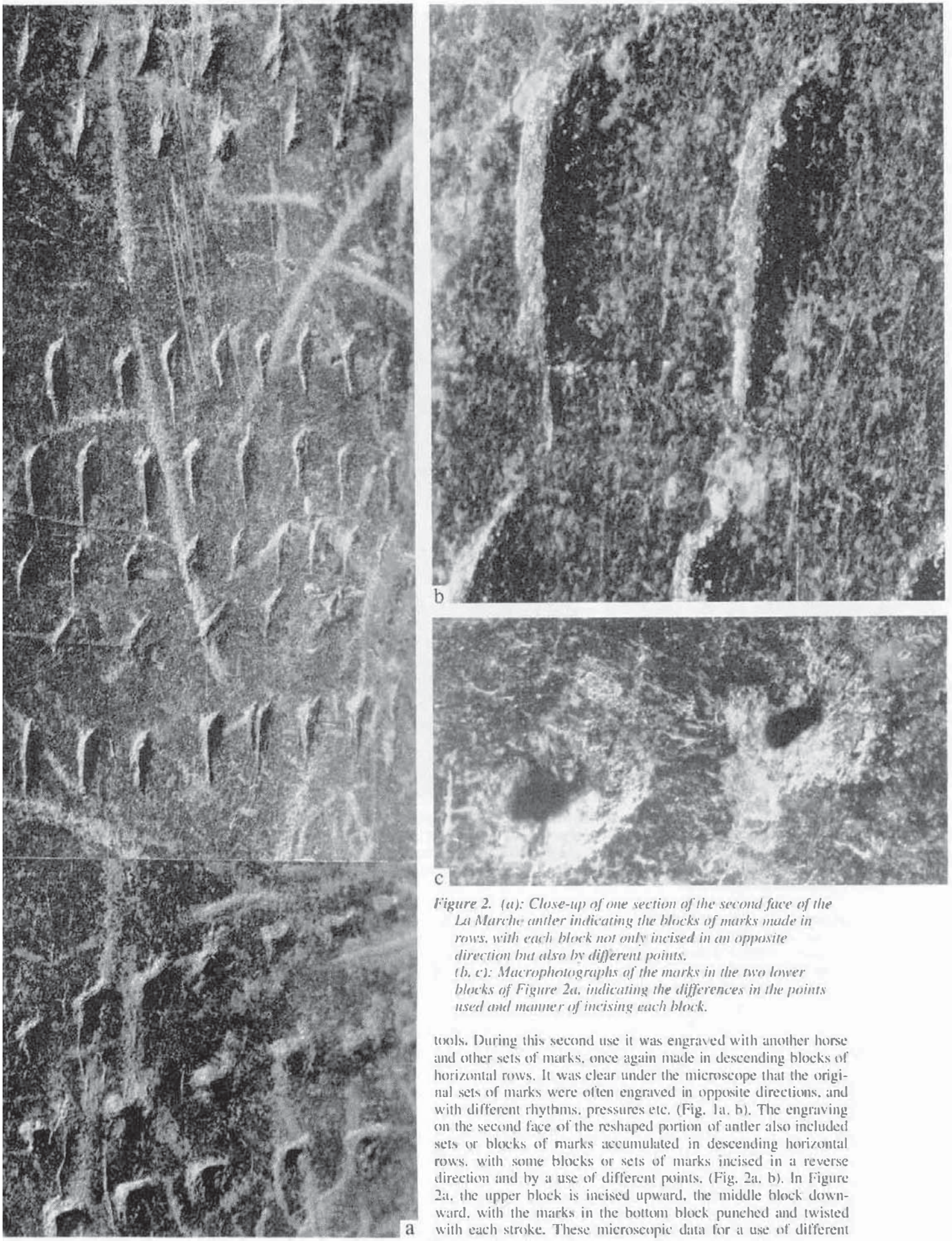


Figure 2. (a): Close-up of one section of the second face of the La Marche antler indicating the blocks of marks made in rows, with each block not only incised in an opposite direction but also by different points.
(b, c): Macrophotographs of the marks in the two lower blocks of Figure 2a, indicating the differences in the points used and manner of incising each block.

tools. During this second use it was engraved with another horse and other sets of marks, once again made in descending blocks of horizontal rows. It was clear under the microscope that the original sets of marks were often engraved in opposite directions, and with different rhythms, pressures etc. (Fig. 1a, b). The engraving on the second face of the reshaped portion of antler also included sets or blocks of marks accumulated in descending horizontal rows, with some blocks or sets of marks incised in a reverse direction and by a use of different points. (Fig. 2a, b). In Figure 2a, the upper block is incised upward, the middle block downward, with the marks in the bottom block punched and twisted with each stroke. These microscopic data for a use of different

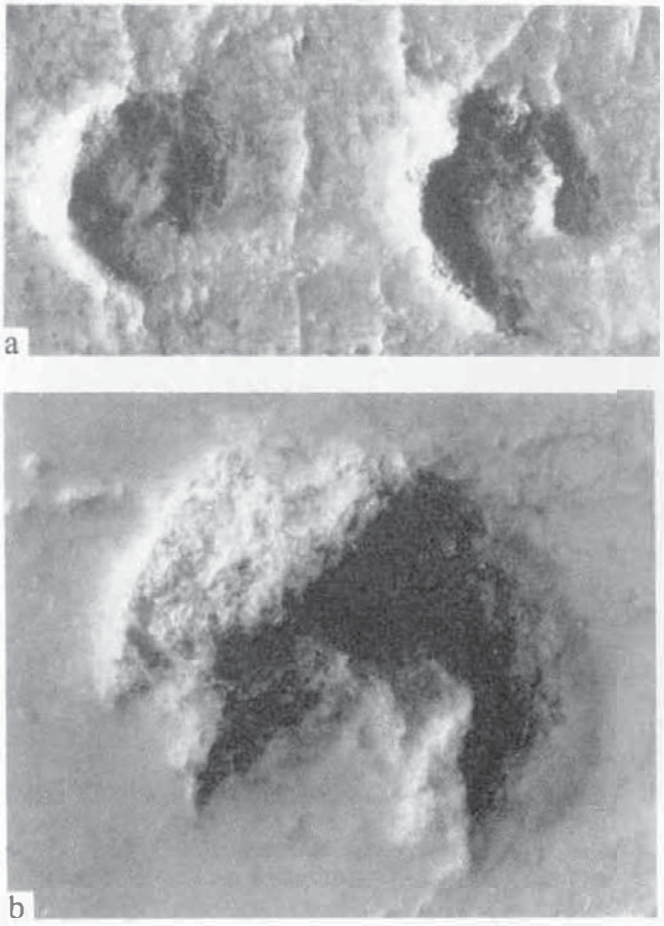


Figure 3a, b. Abri Blanchard, France. Macrophotographs of marks from two separate rows of marks in the serpentine accumulation on the main face of a bone plaque, indicating that they were made as strokes that intentionally varied in opposite directions. Aurignacian, c. 30 000 BP.

directions and tools in marking 'sets' or blocks of marks were published two decades ago and on simple evidential grounds contradict many of the assumptions concerning optical microscopy and compositional complexity found in d'Errico's doctoral thesis and papers. SEM photography would, of course, have been able with greater precision to document, and either validate or invalidate, these findings which seem so demonstrably clear under the optical microscope. It should also be noted that this is not the type of data that d'Errico found on the Azilian pebbles he studied - an entirely different class of symbolic material. The Azilian pebbles he studied had a different type of internal structuring and complexity. The microscopic data at La Marche did not, by themselves, prove 'notation' (which required additional levels of study) but they did suggest an accumulation over time.

The evidence for cumulative marking over a period of time on the La Marche antler, however, went beyond these tiny unit marks. The horse seemed to have been renewed or reused by the addition of extra eyes, ears and manes, to have been over-marked with a sign, and to have been killed with sets of darts made by different tool points and at different times (Marshack 1985: Fig. 13). 5)

Both types of data, for the accumulation of sets of marks and for the variable use of representational images over time, were

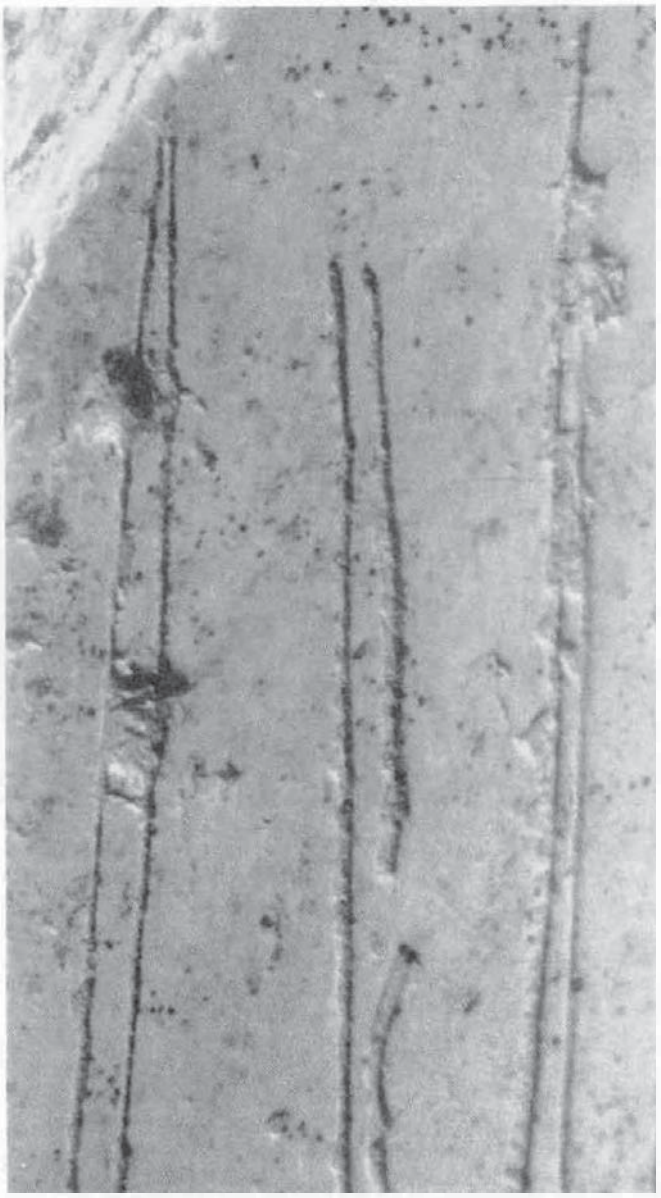


Figure 4. Eliseevichi, Ukraine. Close-up photograph of an incised motif of two parallel strokes on a non-utilitarian fragment of mammoth ivory containing an accumulation of such parallel double strokes. The engraving point broke during the incising of one stroke. It skipped, made another point of impact, and continued downward. Late Upper Palaeolithic, c. 13 000 BP.

subsequently found throughout the Upper Palaeolithic as well as in the post-Ice Age, epipalaeolithic materials (Marshack 1969a, b, 1972a, b, 1979, 1983, 1985, 1990, 1991a, b, c). It was not merely notation, then, that began to be studied by microscope but, simultaneously, the variability in Upper Palaeolithic modes of image production, accumulation and use. For this reason, from the beginning, it was *not* cross-sectional analysis that was the sole or primary determinant in suggesting the presence of notation and other modes of symboling over time, but the evidence for different modes and strategies of marking on different classes of material (cf. Marshack 1991c). 6) Notations were merely one differentiable class among the others. I did not create these 'criteria'. The criteria were revealed by microscopy and the study of engra-

5) More than a decade later (Arl, Leroi-Gourhan and Allain 1979), the tracings made by the abbé Glory in the cave of Lascaux would reveal a similar multiplicity of extra eyes, ears, muzzles, legs, bellies etc. engraved on horses in the chamber of engravings. These images came from the same general period as the engraved horse from La Marche and therefore validated a tradition of animal use I had documented on portable artefacts from Germany to Italy.

6) The extra eyes and ears of the La Marche horse were not only made by different points, but they were also incorrectly placed. This was often found to be true of the addition of animal parts to animals on portable artefacts and in the 'sanctuary' caves. Added eyes are incorrectly placed on some Lascaux horses, extra tails are incorrectly placed on a painted bison in Fontanet etc.

Figure 5. Rochedane, France. Close-up photograph of some of the incised sets of marks made along the edge of a water-worn pebble, indicating that they were made with a tool that made 'parasite striations'. These striations do not appear on the sets made in mid-pebble. Azilian or epipalaeolithic period, c. 11 000-9000 BP.

ving modes, and it was these data that instituted the need for a broad analytical, comparative and theoretical inquiry. That inquiry grew and changed as it self-corrected during the process of accumulating a large body of analytical, comparative data. 7)

Unexpected data were apparent, for instance, even in the first notational artefact I studied, from the Aurignacian of the Abri Blanchard, c. 28 000 BP. The microscope indicated that the bone plaque was a retoucher of stone tools and had been kept and used for a considerable period of time. During that time, apparently, a serpentine accumulation of marks had been incised on one face. Within this accumulation, neighbouring sets of marks on different rows were engraved in reverse directions, some arcing to the right, some to the left (↻, ↺) (Fig. 3a, b); one could determine the points of impact and tailing out (Marshack 1972a and 1991a: 45-9) as is done by d'Errico's use of SEM. This reversal in the direction of engraving particular sets on different rows did not require a 180° turning of the artefact; it required, instead, a 180° reversal in the direction of engraving the arced sets. These sets were preceded and followed by other sets made differently, as strokes, as cupules etc. This is not the way in which a decorative rhythmic pattern of marking would have been made. D'Errico does not refer to these published data. Nor has he tested these microscopic findings though they were published two decades ago and were available to him during preparation of his thesis. Instead, he claims that SEM analysis can do the same, that it can do it better and that it can show similar results experimentally. It probably can. But if so, why has this later technology not been used to test the results of the earlier?

In his thesis, d'Errico states that his method can experimentally determine when a point has broken or has changed during engraving. He presents a photograph illustrating the process (d'Errico 1989: 39, Fig. 17). A decade earlier I had published the same process within the Upper Palaeolithic materials with a close-up photograph that is a near-mirror image of the one he has published (Fig. 4; cf. Marshack 1979: 281, Figs 22, 23). A cutting point had snapped during engraving; it had jumped, made a second point of impact, and had continued downward. It was this type of processual data, seen under optical magnification, and the corollary fact that there were usually *no* apparent significant changes in the cross-section of the last mark in a notational set and the first mark in the next set that was part of the accumulating data suggesting the presence of notation. No great issue was made at that time of this finding, or of innumerable others, because they seemed to be obvious observations of the type continuously made by a skilled use of the optical microscope (cf. Odell and Odell-Vereecken 1980).

One of d'Errico's major discussions in his thesis concerns his recognition of the parallel 'parasite striations' that often accompany an incised stroke. These depend on the irregularities on a point and the way it is held. They are usually so obvious under optical magnification that they automatically entered the 'criteria' by which sets were evaluated and discriminated a full two decades before d'Errico's use of SEM. The process, again, seemed so obvious that it required no special mention. When, two decades ago, I examined the same Azilian pebbles from Rochedane that d'Errico studied for his thesis, for instance, I documented precisely the same 'parasite striations' on the same pebbles (Fig. 5) that he documented in his thesis (d'Errico 1989a: 134, Figs e-f) and I came to the same conclusions that he did: that these sets along the edge of the pebble were made by one point. However, the marks incised on the interior surface of that pebble were apparently made by a 'different' point. It was in fact my recognition of such natural 'parasite striations' that made my study of the entirely different process of *intentionally* adding artificial 'feet' to a set of strokes so significant in the ongoing research (cf. Fig. 12a, b). From what d'Errico has written it seems that he believes that such 'parasite striations' represent the same process as the intentional addition of 'feet' to a stroke and that

7) The developing research, in fact, forced me to change conclusions I had made early in the inquiry and the ongoing process of validation has sent me back periodically to re-examine artefacts, compositions and traditions I had not at first understood. The second edition of my book (1991a), therefore, has had to make a number of amendments and additions.

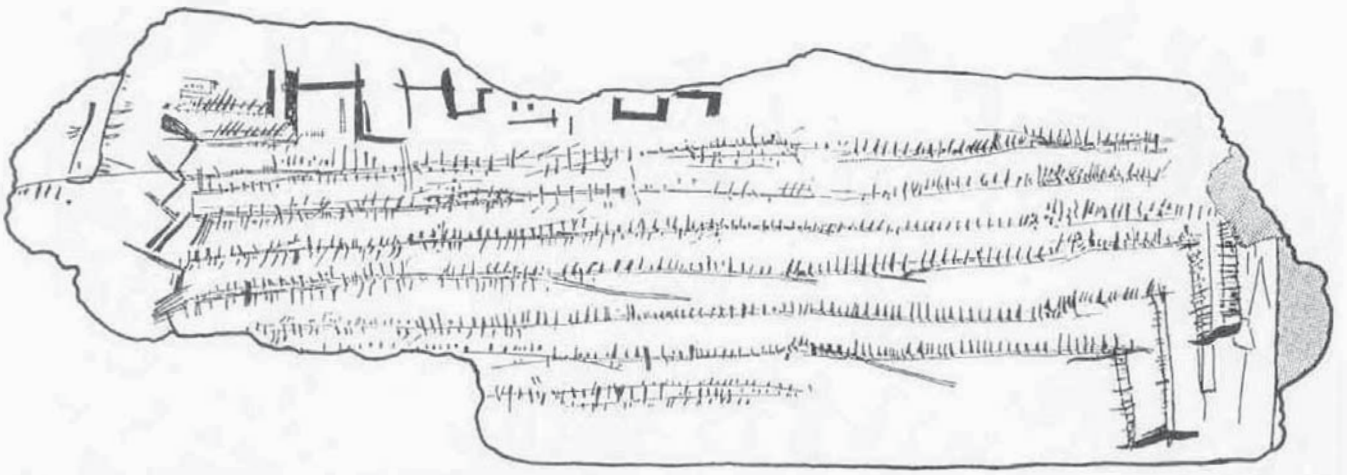


Figure 6. Taï, France. Line rendition of all the incised and accumulated containing lines and their sets of marks made on a non-utilitarian fragment of bone. The accumulation is made in a continuous, serpentine manner. Terminal Magdalenian or early epipalaeolithic, c. 11 000-10 000 BP.

therefore, once again, the notational hypothesis must be wrong.

Given these comparisons between the data that can be derived by use of the optical microscope, and that provided by the SEM method, it may be of value to indicate how and why the optical microscope began to be used almost a quarter of a century ago and to describe the role that the original 'notational' studies played in expanding and developing the inquiry. This will clarify the differences in the methodological and theoretical 'criteria' by which the notational research was originally begun, and the way in which it has recently been conducted using the SEM technology.

The point of a tusk of a young mammoth was excavated at the late Upper Palaeolithic Russian site of Gontsi in 1914-15, during World War I. The published image (Marshack 1972 and 1991a: 39-41) indicated that an incised 'containing line' began at the thick end. This containing line was marked with sets of marks; each subset was separated by a long stroke and each group of sets was also separated by a wide space that contained a symbol or sign. The direction of accumulation was indicated by the containing line. The sets progressed from right to left on the upper register, but from left to right on the lower register, suggesting a continuous, boustrophedon or serpentine mode of marking. Some of the single strokes were themselves overmarked, thus differentiating them from others. The use of a containing line and the intrusion of signs, symbols and visual cues into the composition at particular points suggested that the composition was not 'decorative'. It seemed, before I had seen the artefact, to be internally structured and organised like a form of notation.

There was an even more intriguing possibility apparent in the published image. The marks on the upper row or register were incised *below* the containing line, but those on the lower register were incised above the containing line, as presented in the published rendering. It was therefore possible that the upper register was marked from right to left, that a second containing line was then incised on the other side of the tusk and the tusk was then turned 180° so that its point now faced to the right. The second register was then incised again from right to left, once again by marking *under* the containing line. The orientation of the surface had apparently been changed, but the marking itself was always from right to left. The possibility that microscopic analysis might contribute to an understanding of these processes and perhaps also indicate that the sets were made by different points sent me to the Soviet Union. There I learned that the tusk had disappeared during World War II. The 'notational' questions that had been posed by the published rendering were, however, found as data in other 'notational' compositions I eventually studied. I found, for instance, that a containing line often indicated an intent to accumulate a constrained, linear sequence or set of marks of a certain quantity or length. In addition, 'cueing marks' and other visual strategies for differentiating sets and for structuring a sequence were found to be present whenever notation could be verified. Though the Gontsi tusk was lost, the inherently 'notational' questions it posed were found to be relevant.

At the time d'Errico was completing his doctoral thesis and publishing his papers stating that notation could not possibly exist in the Upper Palaeolithic, I was not only summarising decades of research by documenting the variability within the dispersed Upper Palaeolithic traditions (Marshack 1990), but I had also just finished 'decoding', after twenty years, the most complex single composition to come from the Upper Palaeolithic, a small incised bone plaque from the site of Taï, France, whose eventual unravelling was based on obtaining answers to precisely the type of questions that were originally posed by the lost Gontsi tusk (Marshack 1991d). The Taï engraving (Fig. 6) consists of a serpentine, sequential, linear accumulation, not only of sets of marks, but also of *sets of containing lines*, each apparently made by a different point and each marked differently with its own set of marks (Fig. 7a, b). At every point or position in the composition - which visually divides itself into three sections, a right, a middle and a left - a different set of notational problems was solved by the engraver. The published analysis describes the complex sequence of changing strategies that was imposed on the engraver at different positions in the composition. Unravelling the sequence not only required a study of all the Upper Palaeolithic symboling traditions, but a study also of the known traditions of notation found among the world's preliterate cultures. 8)

8) D'Errico has remarked that the ethnographic presence of such traditions in other preliterate cultures does not 'prove' the presence of notation in the Upper Palaeolithic. There was never a claim that it did. I had applied the method of internal sequential analysis to these artefacts in order to test the analytical method against unpublished, unstudied examples of notation to see whether the method, derived from a study of the Upper Palaeolithic materials, could 'break the code' or indicate the strategies that had been involved in forming or structuring a notation in a different culture. This was done as a test of the analytical methodology, as an attempt to establish a range of 'criteria' for notational analysis as opposed to mere cross-sectional analysis. These analyses and tests made it possible to publish the first internal analysis of the notational strategies involved in a calendar board kept by a Mayan shaman, a calendar stick made by a North American Indian chief, the calendars kept by Siberian hunter-gatherers etc. These were, as stated in each paper, conducted as tests of the method of internal, sequential analysis, and to determine the range of strategies by which notations are structured and maintained. In the case of the Mayan calendar board, infra-red analysis was used instead of microscopy since charcoal had been used as the marking material. It verified the extraordinary variability in the marking of small subsets even in an arithmetically structured calendar.

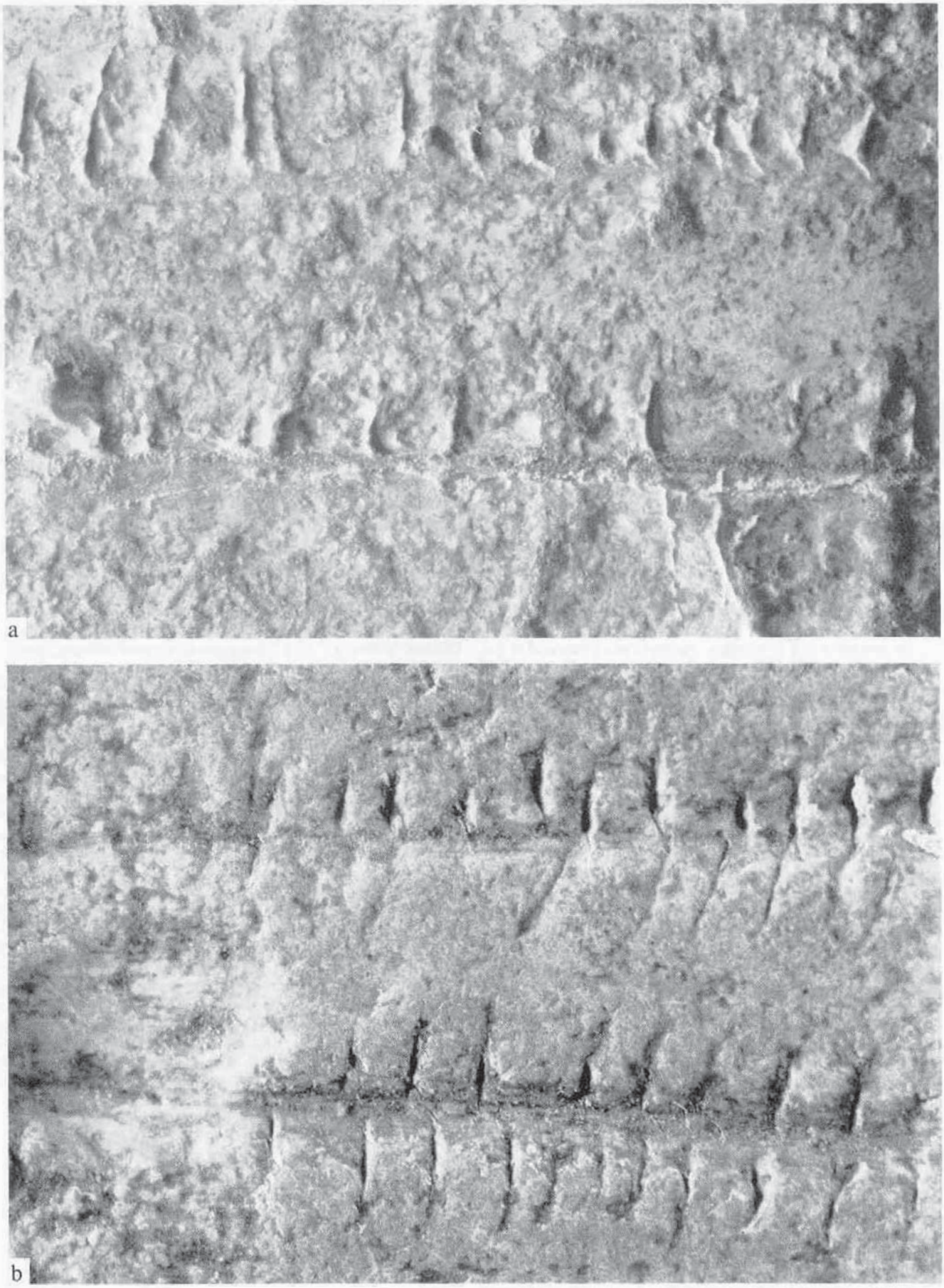


Figure 7a, b. Macrophotographs of the marking on different rows of the Taï plaque, indicating the differences in the marking of sets on their horizontal containing lines. On some rows marks are made only above a line, on others marks are made both above and below by different points and rhythms.

Figure 8. Tai plaque, macrophotograph of the incised marks on two horizontal rows at the far right of the composition, indicating the differences in the marking on each row, the differences in the pressures and rhythm of marking and spacing, the over-marking of some sets by others made later etc. Compare these marked rows with those of Figure 7a, b.

The least important part of the Taï analysis involved the cross-sectional study of single marks. It may be for this reason that d'Errico considers the analysis 'hypothetical' in contrast to his empirical studies of cross-sections. The few illustrations presented here indicate why cross-sectional studies were not of central concern (Fig. 8). We had clear differences in stroke size for different sets, as well as differences in pressure, rhythm of marking, angle of marking, placement of sets, the over-marking of one set by another set made with a different tool, etc. Of crucial importance was the fact that when one horizontal row was not long enough to contain a required number of marks, that row was extended downward, vertically, and continued to be marked as before. A horizontal bar of connection was then incised to make the accumulation of sets to the next containing lines continuous. This process occurred twice during the accumulation, uniting four rows of notation. This was a purely notational strategy, indicating continuity by connecting lines: it occurs within notations of other cultures (Marshack 1991a, d) but it occurs in no other known class of marking. There is perhaps no better contrast, therefore, between the methodologies and criteria used in studying 'notation' than a comparison of the published Taï composition with the analyses in d'Errico's current paper - with its precise but ultimately irrelevant statistical breakdown of cross-sectional information, with no illustration or analysis of the composition he studied, yet with the inadequate suggestion that his data may imply the possibility of notation.

The use of a notational containing line to carry sets of marks made by different points, rhythms, pressures and direction of marking occurs in the Upper Palaeolithic and the epipalaeolithic. I present an example from a distant region of the European epipalaeolithic. It contradicts d'Errico's earlier publications and statements concerning epipalaeolithic engraving.

An amber pendant from the Danish Mesolithic site of Sejlflod (Fig. 9) (Marshack 1972a and 1991a: 355-6, 1976) is incised with separate sets of marks, made with different tools, rhythms, pressures, length of strokes, and angle of marking (Fig. 10a-e). One deeply incised set of marks (Fig. 10a) is heavily polished and worn; neighbouring sets, made by different tools and oriented at a different angle, are still 'fresh'; they have clean abrupt edges

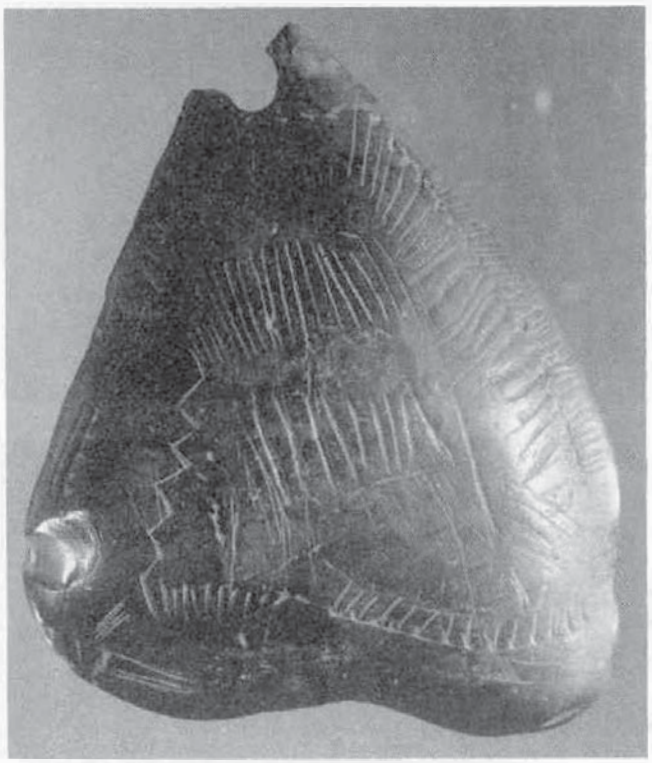


Figure 9. Sejlflod, Denmark. Small amber pendant, marked with an incised zigzag motif and accumulations of sets of marks. Mesolithic period, c. 6000 BP.

and some sets still contain the white granular material that forms when amber is newly incised (Fig. 10h). The pendant was apparently used over a period of time for a periodic marking of sets and symbols (including a zigzag). What was intriguing was that it contained sets of marks incised upon containing lines in the Upper Palaeolithic manner.

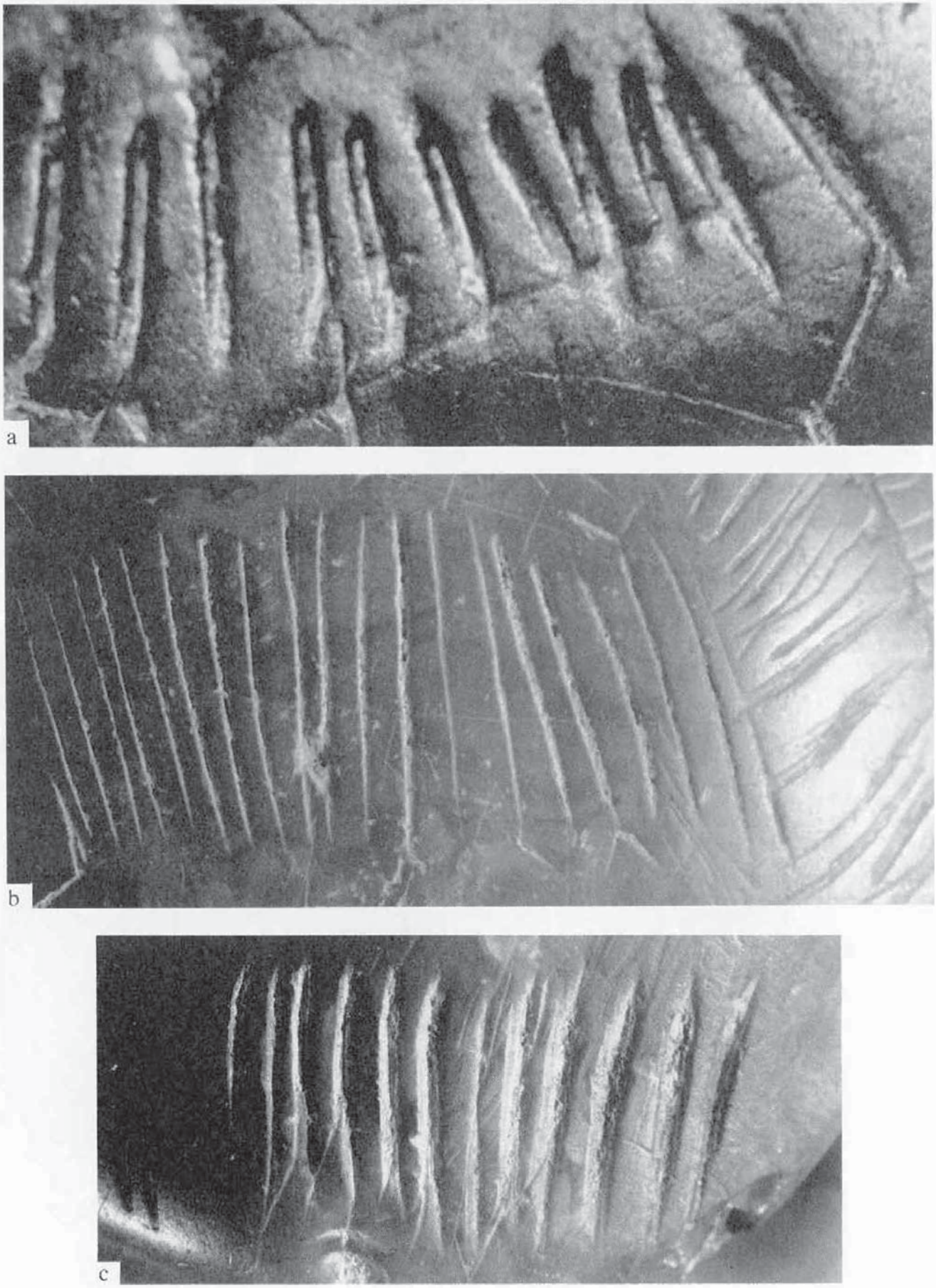


Figure 10a-c. Close-up photographs of some of the different sets of tiny marks incised on the amber from Sejlflod with different points, pressures, rhythms etc. The edges of the set in Figure 10a are rounded and worn with polish and time; the other sets are relatively fresh and still contain abraded amber.

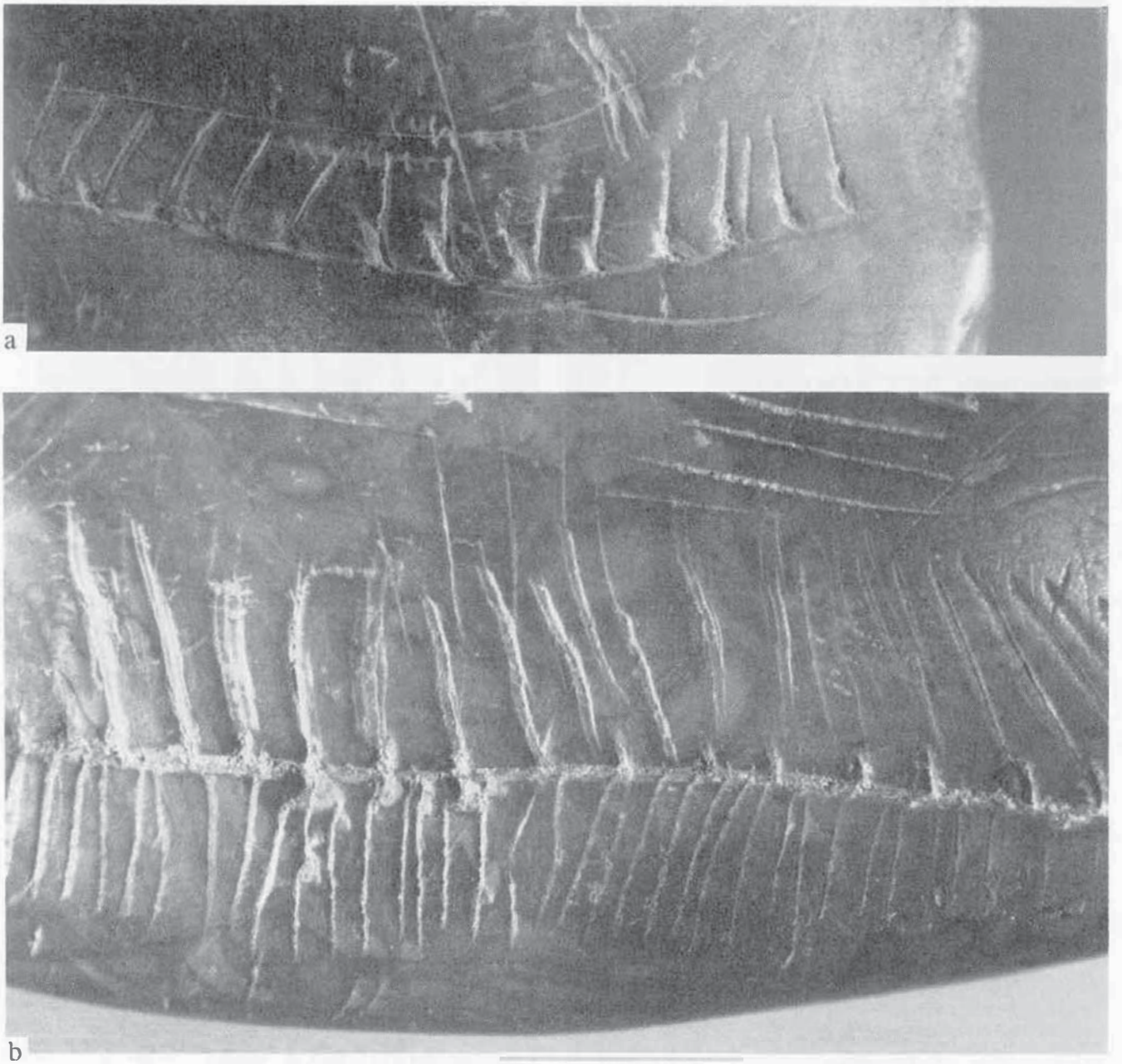


Figure 11. Sejlflod pendant. (a): Close-up of a containing line marked with vertical strokes and apparent 'feet'. The microscope indicates that the 'feet' were made first and the verticals appended to them. Above the containing line is another faint subsidiary horizontal marked with strokes. (b): Detail from a long vertical containing line incised at the right of the amber that was first marked with small strokes; sets of vertical strokes were made above the line, and other sets of marks made by different points, rhythms and angles of marking were added below the containing line.

One horizontal containing line has 16 vertical strokes (Fig. 11a); these seem to have been over-marked by 16 small 'feet'. The microscope indicates, however, that the 'feet' were made first and that the verticals were added to them. This is a regional variation of the Upper Palaeolithic method. The vertical strokes are divided into subsets incised at somewhat different angles. This process of over-marking one set by another set made by different points, and presumably made at a later time, was documented in the Upper Palaeolithic of France in my early papers. I suggested that the mode may have represented the over-marking of one period of a certain length by another period judged in advance to be of probably comparable length. This process of parallel over-marking occurs a number of times on the amber. But there are other modes of accumulation. Above the first set in Figure 11a are two additional, lightly engraved containing lines, also marked with sets of strokes. At far left is a vertical containing line marked with four deep strokes. This subsidiary set, like subsidiary sets found in other notational compositions, may represent a different type or category of information (cf. Marshack 1985, 1991a).

The most interesting accumulation occurs at far right (Fig. 11b). A long vertical containing line is marked with sets of strokes above the line and a set of smaller 'feet' deeply incised into the containing line; these more or less tally with the verticals. Other sets of marks, made by different points, rhythms and angles of marking, are appended below the line. While the upper verticals more or less tally with the 'feet', the lower do not. Microscopic analysis indicated, again to my surprise, that the 'feet' were made first and the upper verticals were incised later. These intentional accumulations are clearly neither decorative or random. They are made in a tradition that is documented throughout the late Upper Palaeolithic and epipalaeolithic, from

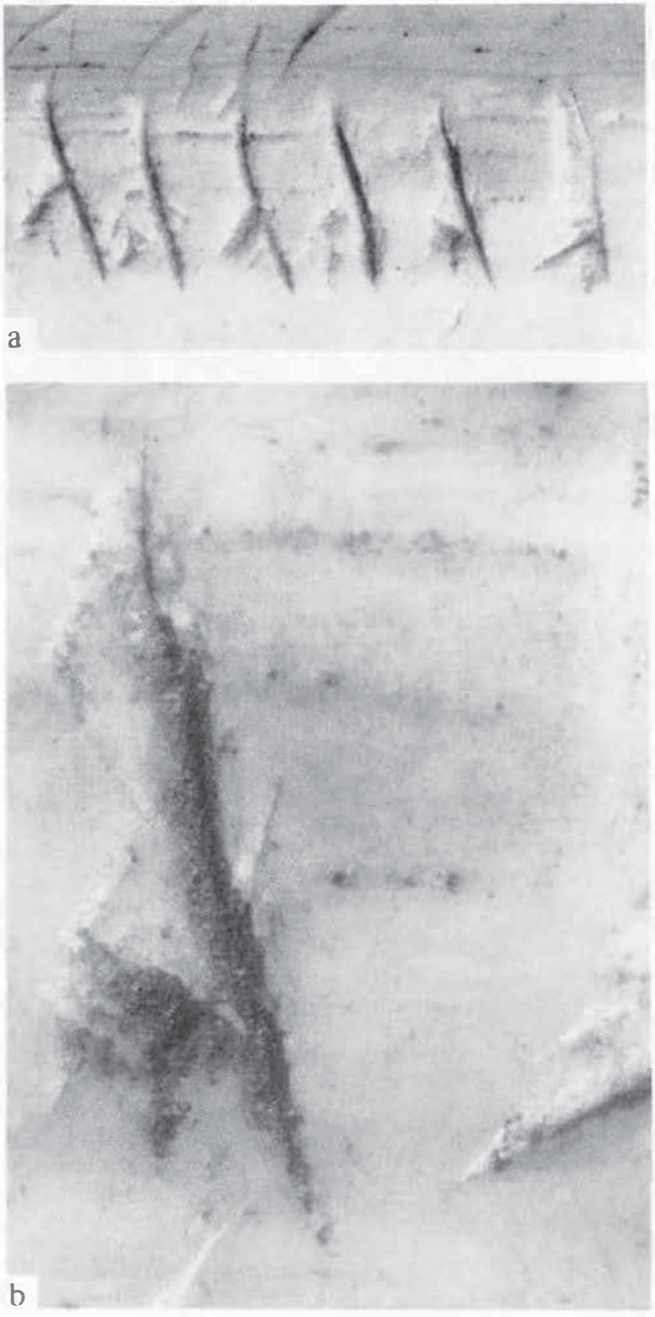


Figure 12a, b. Le Placard, France. Detail of a set of marks made on a bird bone whistle, indicating the marking of verticals and attached 'feet'; (b) indicates that the last stroke of one set shows no breakage or change in cross-section and that the next set begins with a new point and with 'feet' again made with a different point from the prior feet. In some Le Placard sets, 'feet' made by one point are maintained into the next set. Middle Magdalenian.

France to the Russian plain. These modes of accumulating sets, of over-marking sets, and of matching sets with other parallel sets of marks, represent a unique tradition that belongs to the archaeological record of Europe (cf. Marshack 1990: 151, Fig. 17). This epipalaeolithic mode of marking, significantly, was *not* found within d'Errico's small and skewed sample of French Azilian pebbles. To my knowledge he has never seen or studied this class of marking.

The Danish example raises an important point. In my early publications I indicated that the over-marking of sets made by different points, by 'feet' made by still different points, was documented among Magdalenian materials at the site of Le Placard, whose earlier Solutrean materials d'Errico has recently

Figure 13. Avdeevo, Ukraine. Line rendition of a portion of the accumulated sets of marks on a fragment of mammoth ivory. Horizontal and vertical containing lines made by different points are over-marked by sets of marks also made by different points and in different directions. Late Upper Palaeolithic.

studied. 9) In my response to d'Errico (Marshack 1989a: 493-4) I presented a number of macrophotos that indicated this process at Le Placard. What is significant in these Magdalenian examples is that the marks within a single set have a cross-section that is fundamentally similar from the first mark to the last mark. Except for one uncertain instance there is no evidence of major changes or of point breakage within a set or within the *last* stroke of any set; nevertheless, the adjoining sets begin and continue with dramatically different points or cross-sections (Fig. 12a, b). There are also places in an accumulation where numerous 'feet' are inserted on one vertical, as though more marks were required at that place; on other verticals 'feet' were left out entirely. This type of data is so clear in the macrophotographs and is so contrary to the type of marking found by d'Errico among his Azilian pebbles that I am again puzzled as to the reasons he did not study these published examples since they were available in Paris.

These, then, are a few of the 'criteria' that have surfaced over the years for distinguishing certain types of marking from decoration, ritual marking, motif accumulations etc., with an indication of some of the internal evidence used for discerning the possible presence of notation. Despite d'Errico's opening statement, therefore, 'criteria' for discussing or discriminating different forms and modes of notational marking do exist, but they are not the criteria used or investigated by d'Errico. Of particular significance, these forms of marking and criteria do not appear in any of the materials that d'Errico has studied or published.

Having indicated a few 'notational' modes or strategies and some of the criteria for distinguishing them, it may be of interest to indicate similar processes on the Russian plain, since it was the engraving from Gontsi that prompted the inquiry into the possibility of variable strategies in modes of notational marking. A broken piece of ivory, perhaps originally a peg or a polisher,

9) The use of 'feet' to over-mark a set of verticals does not occur among the earlier Solutrean materials. However, examples that may be incipient to this mode of placing one set of marks parallel to, or in conjunction with another set, are present among the Le Placard Solutrean materials.

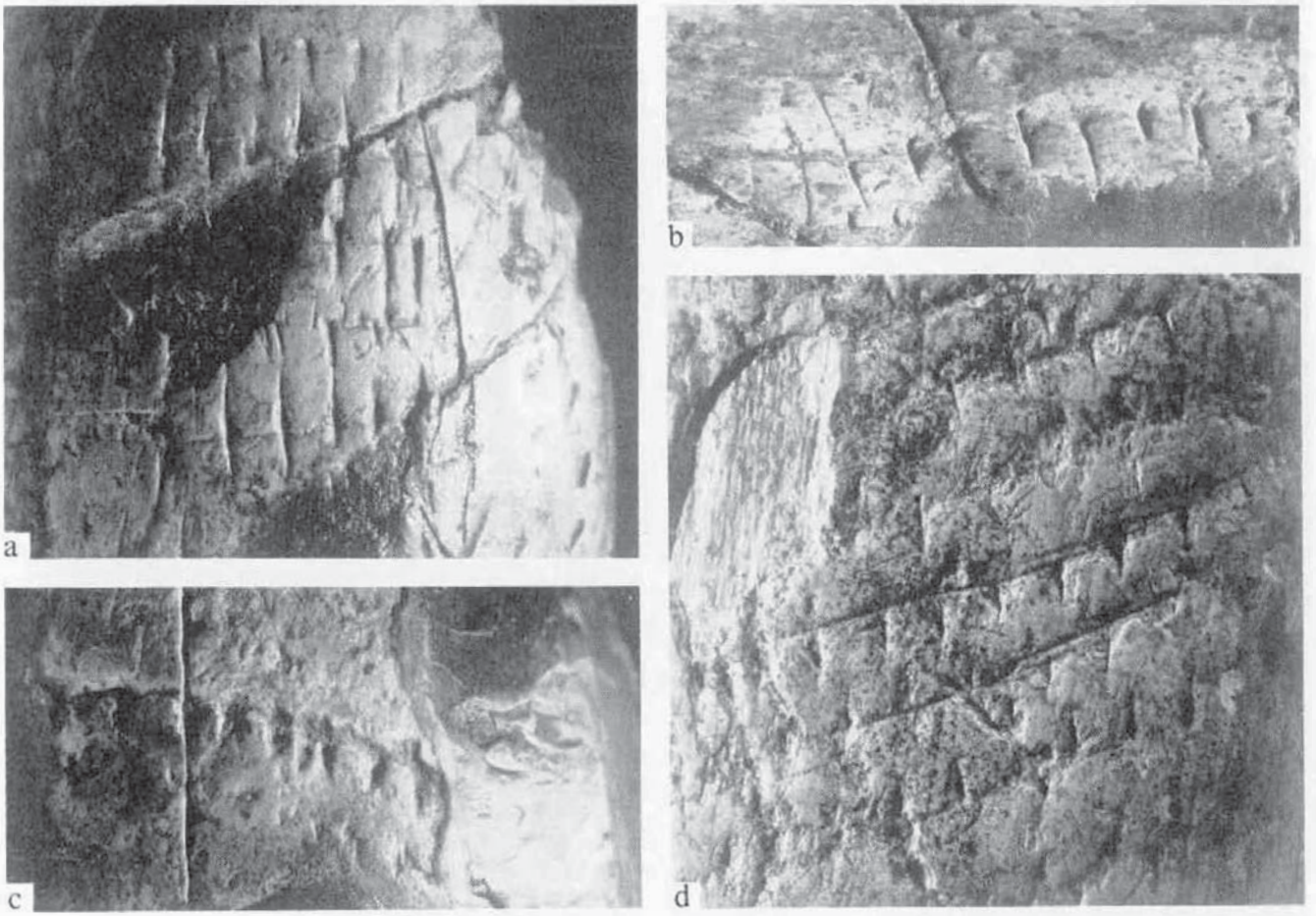


Figure 14a-d. Avdeevo specimen, details of some of the containing lines made by different points with the attached marks also usually made by different points, with some incised downward, others upward. Some are incised above a containing line and some below.

from the mid-Upper Palaeolithic site of Avdeevo in the Ukraine, c. 22 000 BP, was used as a surface for the accumulation of sets of marks made on sets of containing lines (Figs 13, 14a-d). Many of the containing lines are accumulated in descending horizontal rows (much as rows were accumulated *without containing lines* on the La Marche antler); other containing lines are vertical (like the containing line at one side of the Sejlflod amber). Some sets of marks have no containing line. Some marks are incised downward, neighbouring marks or sets are incised upward. Different 'sets' were apparently made by different points at different times. In many respects this composition is comparable to the marking on the epipalaeolithic amber from Sejlflod made more than 15 000 years later. In my recent discussion of this composition (Marshack 1990) I stated that the marking suggests a form of record-keeping or tallying, perhaps even a form of score-keeping. It is clearly non-decorative, it is clearly cumulative, it is clearly decomposed into discrete sets of marks made differently: it is also different in every respect from the engravings studied by d'Errico. Unfortunately, it is not structured in a linear, continuous sequence of sets and so it can not be studied or tested by any of the other criteria developed for the study of notation. What is clear is that the sets are differentiated spatially, positionally, by their attachment to a containing line, by their direction of marking etc. These modes of marking could be applied to calendrical record-keeping, to tallying and score-keeping, or to ritual sequencing and forms of prognostication. Many of these marking modes were used in the notational accumulations on the Gontsi tusk from Russia and the Taï plaque from France.

I list some of the criteria that are necessary for the study or validation of possible notation at three different levels:

(1) Since notations are *visual* forms of encoding information, analysis is required to determine the set of strategies involved in structuring and differentiating the sets in an accumulation. These differ in consistent ways from the processes found in random marks, work marks, decorative and design marking, ritual marking, gripping marks etc. These analyses usually involve a determination of the problem-solving and cueing strategies that were used to differentiate and position sets or groups of sets. Often, but not always, these sets are arranged linearly and sequentially. Cueing strategies and devices are often found in such accumulations (containing lines, connecting lines, boustrophedon sequencing, different angles and directions of marking, etc.).

(2) A microscopic search for non-visible aspects of the engraving process. Cross-sectional data, including the sequence of over-crossing marks and the direction of marking a stroke, represent some of the microscopic information sought. One must also study, however, the nature of the artefact and its uses (notations are often found on a variety of curated long-term artefacts); where possible one may study differential wear among sets, differences in the mode or style of marking adjacent or neighbouring sets, etc. Optical microscopy can usually provide these data; SEM microscopy, however, will often provide a more precise and accurate determination.

(3) A test of the structural and microscopic data to determine whether the accumulation and sequence of sets and groups of sets show any evidence of arithmetical grouping or significant periodicity. Non-notational cueing devices often indicate relevant points in a sequence and can aid in these tests. Such cueing devices are never found in decorations or other forms of marking and can be important in the analysis and determination of notation. 'Periodicity' is of special concern since tests of early notation do not usually indicate numeracy or arithmetical, astrono-

mical precision. I have never found evidence for systems of counting (by multiples or fractions of fives, sevens, tens etc.). My tests have indicated, however, that though the notations may be recording a passage of time and of months, the sets themselves are often larger or smaller than our arithmetically defined lunar months or phases. We cannot use our calendrical, numerical divisions in the attempt to ascertain notation, but must use an accurate astronomical, observational model against which to test accumulated sequences. It has been found that notational groups of sets usually end or begin at an observational lunar point, the period of the last to first crescent, and occasionally the period of the full moon. Such persistent 'astronomical' matching has never been found in tests with other forms of marking.

D'Errico has been concerned with the second category of data. He has not addressed the complex problems attending the first and third categories. In his thesis he does provide sequential reconstructions of compositions, but these were primarily decorative designs and motifs and, as he acknowledges, he had no criteria for distinguishing these from notations. The criterial differences between notations and other forms of marking are always determined by inquiries at each of the three levels noted above (cf. Marshack 1991a). **10)**

In addition to d'Errico's failure to address the nature of notation there is a failure to properly evaluate the potential capacity and use of the optical microscope in distinguishing the engraving processes he has studied. It is the optical microscope that will for many years continue to be the basic instrument for most museum and field studies of engraved material and for most preliminary studies of these materials. The SEM technique will most likely be used where it is specifically needed and where it provides a level of required precision and data not available to the optical microscope. I have indicated that the optical microscope can determine many of the 'criteria' d'Errico assigns to SEM. A large proportion of d'Errico's 'criteria', such as the 'parasite striations' that accompany the strokes by one tool, are apparent under an optical microscope and were consistently used in my comparative studies. These manifests are often so obvious they did not seem to merit mention, a behaviour of mine that seems to distress d'Errico. The fact is that such observations become part of the ongoing skill one develops during use of the microscope. It was precisely the difference between these natural 'parasite striations' that may accompany a stroke and the *intentional* addition of a 'foot' to a vertical stroke that was one of the earliest unexpected findings and differentiations made in the research, a difference that was detected by the optical microscope and was subsequently pursued throughout the enquiry. Even the fact that a vertical stroke, when incised across a horizontal line, may abruptly change its angle and direction of marking and thus give the impression of a 'foot' was noted during the research (cf. Marshack 1991a). This is another form of evidence that is described by d'Errico as belonging to the SEM technology (d'Errico 1989: 35, Fig. 14). What d'Errico has done is to systematise and increase the precision and range of data possible in the study of these engraving processes and to make them part of a standardised microscopic technology and vocabulary. Since this is so, it would now be helpful if the SEM technology could validate the differences found by optical microscopy between the 'feet' that are intentionally added to a stroke and the natural 'parasite striations' that accompany a stroke because of the shape of a point. The presence of these added 'feet' represent some of the crucial evidence in one type of notational marking. Is the SEM technique able to verify my early finding that these 'feet', as seems evident, are often made by different tools and at different times (cf. Fig. 12a, b)?

Having indicated some of the criteria and findings that were used in the original inquiry, it may now be possible to indicate where d'Errico, despite his innovative and valuable use of the SEM method, has not yet asked the necessary questions or realised the complexity or nature of the traditions and materials he has been studying. I therefore close with a discussion that is not directly related to d'Errico's paper on notation but that nevertheless concerns the methodological and criterial issues that have

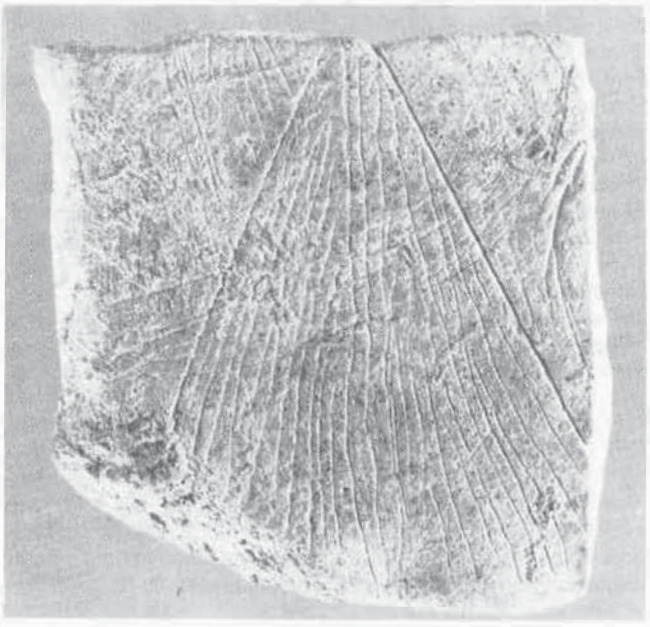


Figure 15a. Roc de Marcamps, France (see Fig. 15b for details).

10) The present commentary is directed to issues raised by the use of scanning electron microscopy. However, other challenges to the notational hypothesis have come from those who have argued against the 'criteria' discussed in categories 1 and 2 (Lewis-Williams and Dowson 1989; Layton 1985, 1991).

In these arguments it is usually the failure of grouped sets to match an arithmetical lunar month or an astronomically precise observational lunar month or phase. This contrasts with reports of other researchers who have claimed to find lunar periods and phases on the basis of simple counting. The ongoing research has addressed these 'critical' arguments in a number of ways. First, by an exhaustive comparative study of the Upper Palaeolithic engraved materials, a study which has eliminated certain classes of marking and artefacts from notational discussion, including some that I had originally thought might be notational (cf. Marshack 1991a). Second, by an analytical and theoretical investigation of the notational modes of sequencing, structuring and cueing, etc. found both in the ethnographic record (Marshack 1974, 1975, 1985, 1988) and among the Upper Palaeolithic materials (Marshack 1991a, b). And, finally, by a theoretical and analytical investigation of the more general problems that adhere to any observational, non-arithmetical calendrical notation. The latter studies have shown that one cannot maintain an astronomically precise observational notation of the lunar phases and months because the periods are neither arithmetically determined or observationally precise, and because the chance of making a precise observation at a particular phase point or evening is not high if one attempts, as I have attempted, to keep such a record by marking one stroke each day. There is always a variation of a day or so in distinguishing phase points; cloud cover often eliminates the opportunity for observation in mid-latitudes and activity of the record-keeper often eliminates a marking opportunity. Even a Mayan shaman and arithmetical calendar keeper found that it was possible to make her day marks as sets of elapsed days after she had returned to her home (Marshack 1974).

If marks, therefore, are not made one a day, but rather as sets marking off the sub-periods, one finds that most groupings of subsets tend to either begin or end at the lunar crescents and occasionally at the full moon period. Observational phases are occasionally missed and phasic groups are often coalesced. It is only when such sets are linearly and sequentially accumulated that one can test them against an observationally accurate lunar calendar model. In such tests, like those conducted for the Taï notation, it was found that major sets, subsets and groups of sets tend to begin or end around the period of the crescents, and occasionally at the period of the full moon. Such matching was never found in tests conducted with random marking, ritual marking, motif marking, design accumulations etc. As a result, I have waited for many years for others to conduct statistical and astronomical evaluation of these studies and criteria, comparable to those that d'Errico has recently been conducting for the microscopic data. Since hypothesis testing proceeds slowly and incrementally I assume that my persistent requests for such studies will succeed when a new generation of researchers has become interested in these problems.

Figure 15 b. Roc de Marcamps, France. A nearly square limestone pebble (c. 27.5 mm high) incised with a central 'comet' with bands attached to its side and with an over-crossing serpentine. Azilian period, c. 9000 BP.; the detail shows the finely incised serpentine that begins in the upper right corner and crosses the 'comet'. The sets or bands attached to the 'comet' and the serpentine seemed, under the microscope, to have been made by different tools.

been raised. It will suggest possible uses for SEM in the study of other classes of Upper Palaeolithic and epipalaeolithic imagery and symbol.

How the SEM method can be used

In his doctoral thesis d'Errico discusses an epipalaeolithic 'comet' (or 'fan' motif) on a small piece of limestone from the site of Roc de Marcamps (Fig. 15a) (d'Errico 1989: 303-5). He presents it as an example of his argument against notation, stating that many of the sets on the pebble seem to have been incised by one tool and at one sitting. I studied the same limestone pebble years before by microscope and found that it had *not* been incised with one point. The serpentine band coming from the upper right corner and crossing over the comet was not only made last, as d'Errico recognised, but, as far as I could tell, it was probably made by a different point (Fig. 15b). D'Errico does not provide the SEM documentation to indicate otherwise. Many of the bands of parallel lines that were attached to the comet at the left also seemed to have been made by different points. What was more important, however, was that both the 'comet' and the associated bands and serpentines represent a tradition of *non-notational* motif marking and accumulation that I have documented throughout the European Upper Palaeolithic and epipalaeolithic (Marshack 1975, 1976, 1977, 1991a). This tradition is different from the other types of symbolic marking on the Azilian pebbles d'Errico was studying and different from any form of notation.

The 'comet', I have suggested - a suggestion that is still controversial because it fits no contemporary category of discussion - is a variant of the serpentine 'macaroni' mode of Upper Palaeolithic motif marking found incised or painted on cave walls and in diverse regional styles on stones and bones in home-sites from France to the Russian plain (Marshack 1975, 1976, 1977, 1979, 1981, 1983, 1990, 1991a, c). I have suggested that it and its variants (the multiple band, zigzag, serpentine etc.) are 'water-related' motifs. The suggestion was derived from a study of all the European materials and was made for a number of internal analytical and contextual reasons. The Upper Palaeolithic cultures were essentially riverine, dispersed along the European networks of rivers flowing to the Atlantic, the Mediterranean and the Black Sea. The 'macaroni' motif and its variants are found in home-sites near these rivers. I have also indicated that 'comets' with appended or attached branches, bands and 'macaroni' serpentines occur in many of the important Ice Age caves: Lascaux, Altamira, La Mouthe, Gargas, Tuc d'Audoubert, La Pileta etc. These are often incised on a wall by a use of different tools: at La Pileta in Spain they are made with paint; at La Mouthe with paint and engraving; at Rouffignac in the Dordogne, hundreds of macaronis are made by different fingers marking the soft *montmilch* (Marshack 1975). The site of Roc de Marcamps is two kilometres from the Dordogne river and seven kilometres from its confluence with the Garonne. These are the major rivers of that region of France and their seasonal changes and manifests were apparently mythologised and ritualised.

To document the macaroni tradition in the post-Ice Age

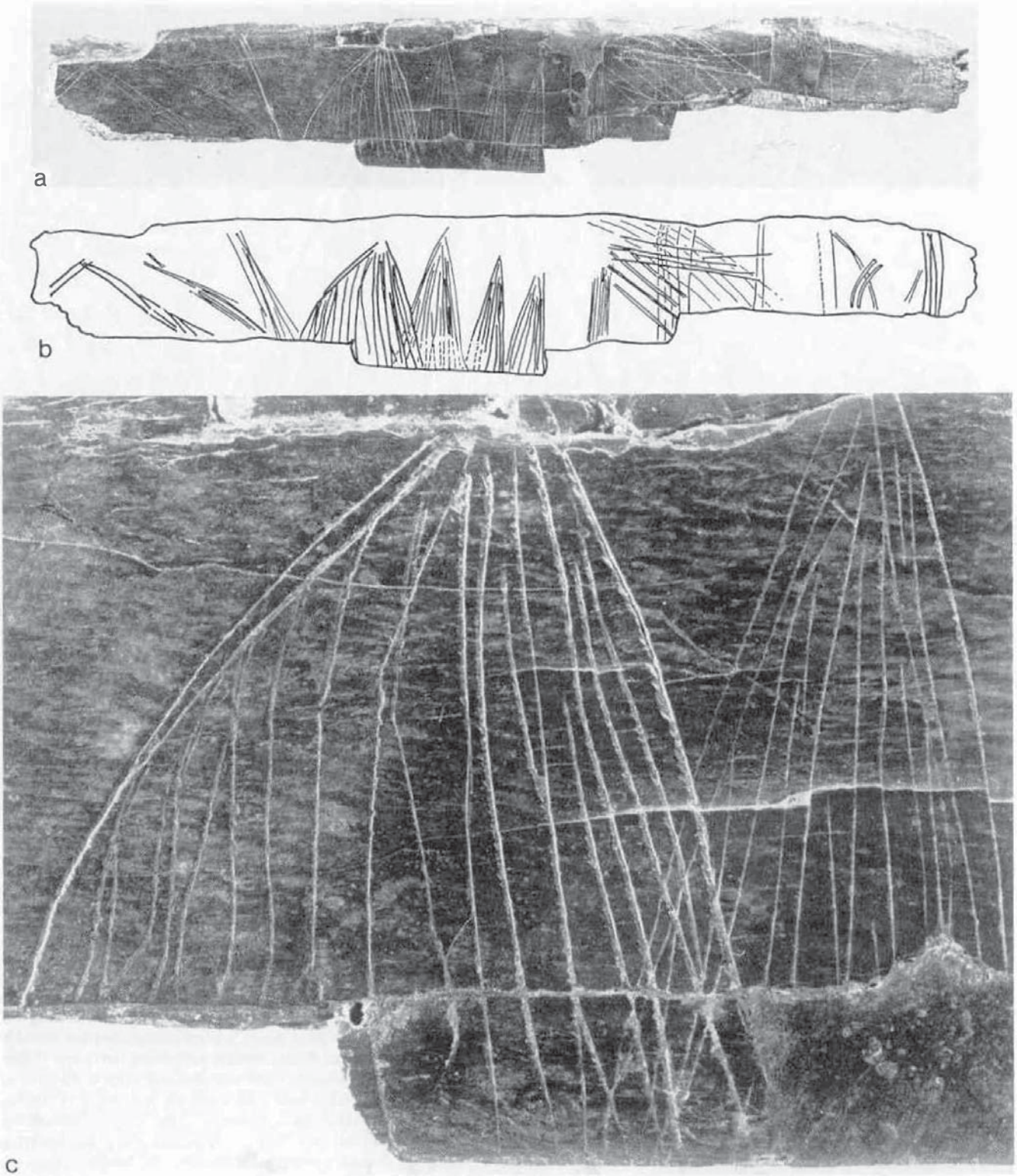


Figure 16a-c. Ogaarde, Denmark. Incised rib with an accumulation of 'comet' forms and associated streams or bands made by different points. Maglemose culture, c. 6500 BP. (c): Detail showing the large central 'comet' which was made by first incising the outer angle, then filling in one half, then the other half, as it was done on the Roc de Marcamps 'comet'.

epipalaeolithic of Europe I present an accumulation of 'comets' (or 'fans') with associated bands incised on the fragment of a rib from the Danish Mesolithic site of Ogaarde (Fig. 16a-c). A large 'comet' was engraved in the same manner as the one on the Roc de Marcamps stone. First a large angle of two lines was incised; the right half was filled with descending lines, then the left side was filled (Fig. 16c). This is the same mode of marking I had found on the Roc de Marcamps stone and that d'Errico also found. But, whereas on the square Roc de Marcamps stone there was little room for the addition of associated bands, branches or 'comets', the bands had been marked at its side and finally a serpentine was incised *over* the image. On the Ogaarde rib, where *horizontal* space was available, the cumulative process was accomplished by repetition of the comet motif and by the addition of the band motifs placed horizontally, each band made in an increasing degree of abstraction and by use of a different point or tool (Fig. 16d). I have documented a comparable accumulation of 'comets', serpentine bands and abstracted band motifs made by different tools on a late Upper Palaeolithic - epipalaeolithic piece of limestone from the site of Romanelli, Italy (Marshack 1975,

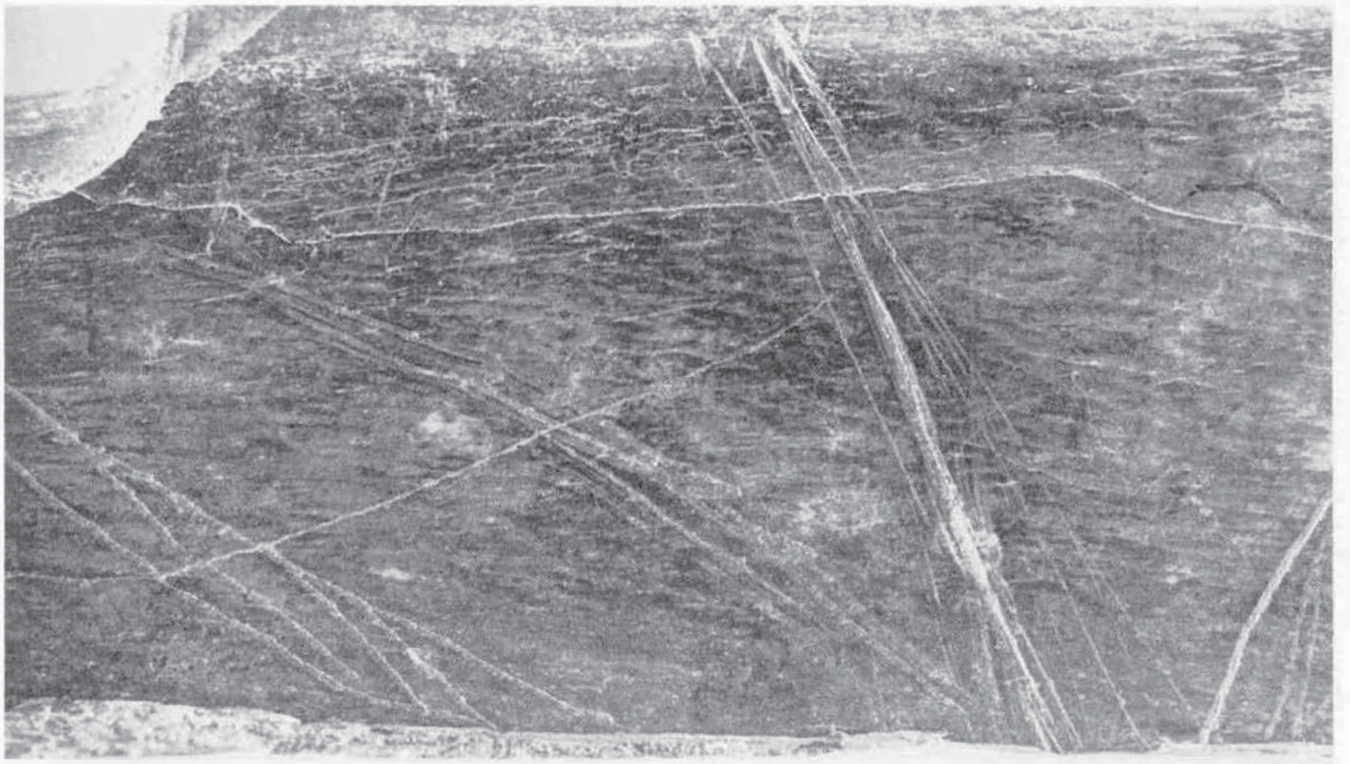


Figure 16d. Ogaarde, Denmark. Detail of the 'bands' made by different points accumulated to the left of the 'comets'. Other 'bands', some of which are incised as over-crossing sets to form a hatch pattern, occur at right.

1977, 1991a). The composition from the Roc de Marcamps in France therefore stands geographically between these widely dispersed but comparable examples of motif marking from the late Palaeolithic and early epipalaeolithic. 11) My early microscopic analysis of the Roc de Marcamps stone was conducted therefore, not to prove 'notation', but with the knowledge that it was part of a tradition and a mode of marking that was *not* notational but was nevertheless cumulative and 'time-factored'.

I have learned that d'Errico has begun to study some of the incised slates (schists) from the Magdalenian site of Gönnersdorf in Germany. I spent a number of years studying these stones but have not yet found it possible to publish all the data. On a comparative basis, therefore, it will be interesting to see what d'Errico finds, what questions he asks, what categories or classes of imagery he chooses to investigate and how he does this. I will briefly indicate some of the evidence I found two decades ago and discuss the relevance of these findings to the variability of Upper Palaeolithic marking traditions, including the relation of the Azilian pebble from Roc de Marcamps to images at Gönnersdorf. I will wait to see if d'Errico finds or recognises similar data and, if he does, can either confirm or invalidate the findings I made years ago using an optical microscope and a different set of criteria.

Gönnersdorf is known for its engraved female and animal images (Bosinski 1973, 1984; Bosinski and Fischer 1974, 1980). However, some of the most interesting images I found among the Gönnersdorf materials represented the ubiquitous 'macaroni', serpentine, band, 'comet' motif. These have not, to my knowledge, been published. I found that these macaroni motifs were made at Gönnersdorf in precisely the same manner as they were made throughout Europe: as bundles of marks, bands or ribbons that are either accumulated on a surface or are appended one to another to form a band or serpentine (Fig. 17a, b). Occasionally

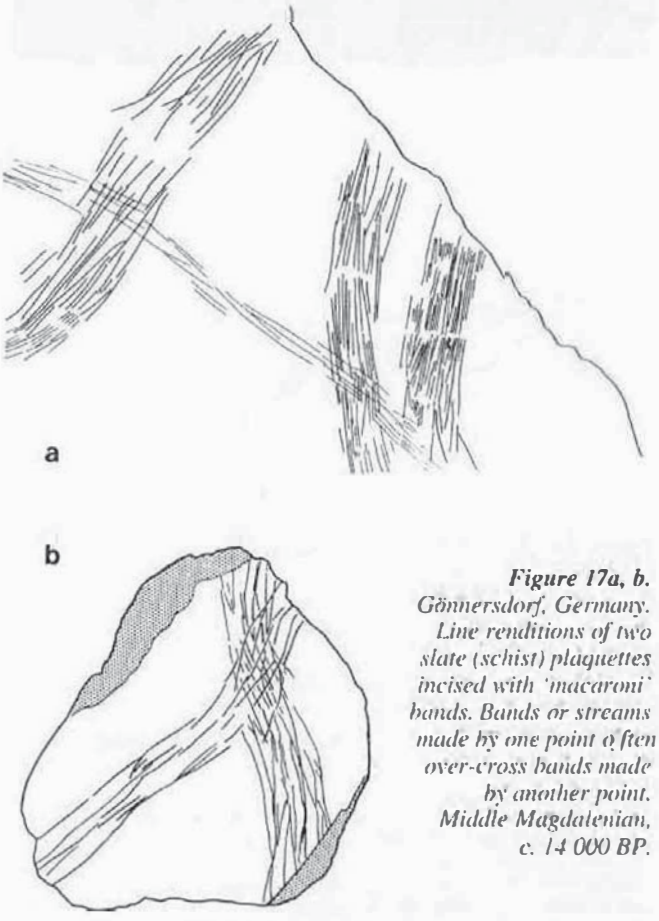


Figure 17a, b. *Gönnersdorf, Germany. Line renditions of two slate (schist) plaquettes incised with 'macaroni' bands. Bands or streams made by one point often over-cross bands made by another point. Middle Magdalenian, c. 14 000 BP.*

11) Every culture has its own sets of symbols and motifs used in ritual and accumulated on different surfaces and artefacts. Among the riverine cultures of the Upper Palaeolithic of Europe the serpentine-band-macaroni-comet set represents such a motif. It has regional variations and could be either abstracted or elaborated. This is only one of the symbols and motifs distributed throughout the European Upper Palaeolithic and used in different contexts and particular ways. Many of these motifs were categorised by Leroi-Gourhan as oppositional 'male' or 'female' signs, but a study of each motif has found that they usually had different meanings and modes of use.

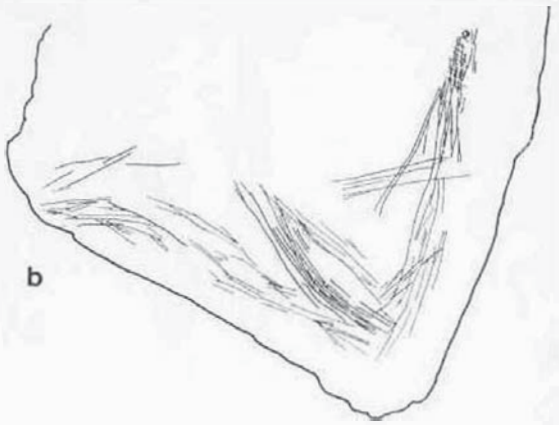


Figure 18a, b. Gönnersdorf, Germany. Close-up photograph and line rendition of the hole in a piece of slate from which an incised 'comet' emanates and wanders across the surface. The head of the 'comet' has been over-marked.

these macaronis occur on slates that also contain female images; often they stand alone. 12)

At times they are incised by different tools, suggesting an accumulation over time. It would be interesting, therefore, to see whether d'Errico can validate or invalidate this 'time-factored' process. One Gönnersdorf stone is particularly interesting. It has a serpentine macaroni band that begins as a 'comet' or 'fan' at a small hole. The head of the comet is over-marked as though to highlight this beginning position and it then 'streams' as a set of band sections around the stone (Fig. 18a, b). It would be of value if SEM analysis can determine whether the hole is natural or incised. I have suggested elsewhere that the 'comet' may represent an abstraction of the source of waters. I have shown, for instance, that serpentine bands emanated from the 'comets' on the Romanellian stone noted above. In Cantabrian Spain, in the cave of Hornos de la Peña, a serpentine/comet band, drawn by fingers into the soft wall, emanates from deep inside a large natural hole in the wall; at the sites of Gargas and Tue d'Audoubert in Pyrenean France, macaroni bands and their branches, incised by different tools, emanate from natural cracks and corners in the wall; at the Romanellian site of Cavallo (Lecce, Italy) I have documented the fact that bands begin and stream from holes in a stone plaquette (Marshack 1976: 145) (Fig. 19). At the Mesolithic or epipalaeolithic site of Taarupgaard (Funen) in Denmark (Marshack 1976: 146), there are 'comet-bands' made by different points that emanate from the hole in an antler axe; in the common European manner, these have bands or branches made by different points appended to them or crossing over them (Fig. 20a, b). 13) This mode of 'comet + band' accumulation is quite common

Figure 19. Cavallo, Italy. Macrophotograph of two holes in a limestone plaquette from which incised bands or streams flow. Romanellian culture, c. 11 000 BP.

12) Gönnersdorf sits on a high terrace overlooking the Rhine. I note, somewhat gratuitously, that both the female and the river represent 'time-factored' phenomena and processes. Bosinski has documented a strong seasonality in the coming and going of the groups inhabiting the site and even a seasonality among the animal images incised on the slates. One of the carved female images that Bosinski found at the site of Andernach, across the river from Gönnersdorf, is incised with a multiple chevron, a motif which is related to the serpentine zigzag (Marshack 1990). I merely indicate a coexistence of serpentine/zigzag, female motifs, and seasonality within the Gönnersdorf corpus and will address the problem of their possible relation elsewhere.

13) Scandinavian epipalaeolithic artefacts often contain 'geometric' motifs that are accumulated over time. These motifs are often more highly stylised than those found in the Upper Palaeolithic, but the essential mode of accumulating and of appending or associating later motifs to earlier motifs is taken from the Upper Palaeolithic. The question as to whether such accumulations were made with one tool, at one time, or by many tools and over a period of time goes to the heart of the problem of the diversity and the periodicity that needs to be investigated in early human symbol use. More than the problem of notation, which represents one form of usage, SEM should undertake a study of the generic problem. In doing so the data for a discussion of notation as an aspect of the more general problem will be acquired.

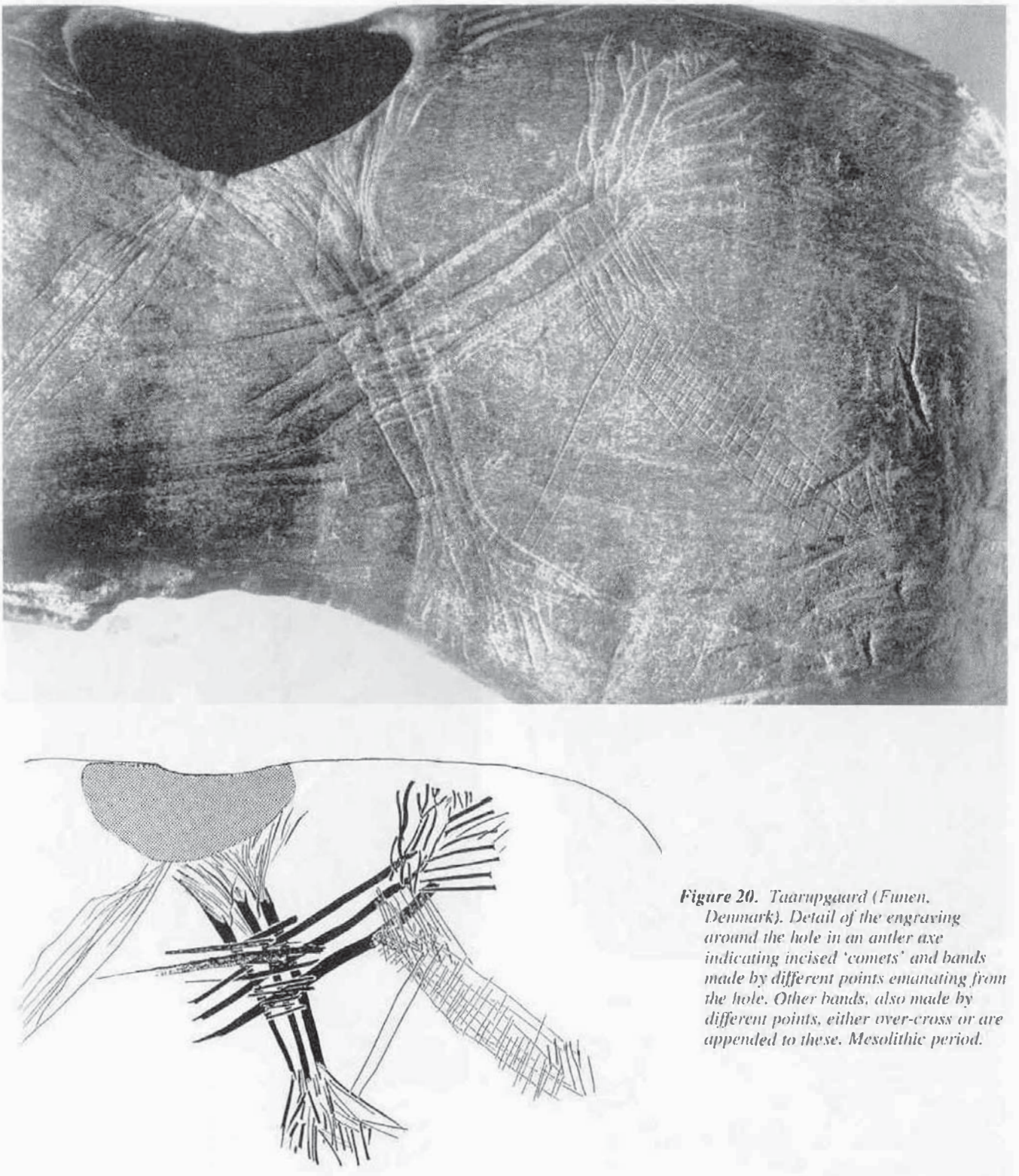


Figure 20. *Taarupgaard (Funen, Denmark). Detail of the engraving around the hole in an antler axe indicating incised 'comets' and bands made by different points emanating from the hole. Other bands, also made by different points, either over-cross or are appended to these. Mesolithic period.*

among the coastal, riverine and lake-side sites of Mesolithic Scandinavia.

I mention these findings to indicate once again that there are different modes and traditions of marking and of accumulating motifs and these require different criteria for their microscopic and comparative study. The questions to be asked of the 'macaroni' tradition by a use of the microscope are not those that one would ask in a study of possible notation. The 'criteria' for their study are different. The conceptual strategies involved in their production and accumulation are different. The data to be sought, even when it includes the cross-sectional analyses of particular strokes or groups of strokes, must therefore also be different. If the SEM technique is to be properly used in studying the many traditions of symbolic marking present in the Upper Palaeolithic and epipalaeolithic it will require 'criteria' that go beyond mere cross-sectional analyses of incised strokes and will require a recognition that different classes of marking provide different types of analytical problems and forms of microscopic data. In such studies a finding that marks may have been made over a period of time may have absolutely nothing to do with 'notation' or with the arguments about notation either pro or con. A marking over time may have much to do, however, with the fact that different types of images and motifs were made and used at symbolically relevant times and places.

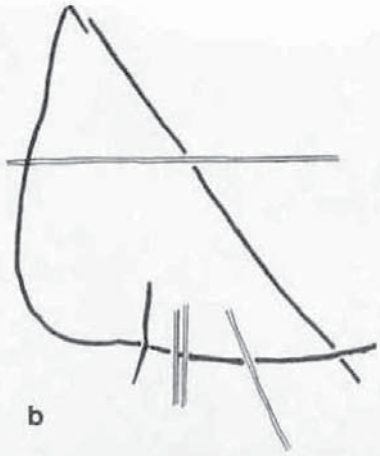


Figure 21a-d. Gönnersdorf, Germany. (a, b): Close-up detail of lightly engraved abstract 'buttocks' female image over-marked with strokes made by different points. Middle Magdalenian. (c, d): Close-up details of other incised female 'buttocks' images over-marked with strokes.

I close with another class of marking made over time, this time in terms of one of the most controversial subjects in the realm of Upper Palaeolithic imagery - more controversial and more often discussed than notation. It will be interesting to see if d'Errico notices or studies this aspect of Upper Palaeolithic symbolic variability within the Gönnersdorf materials. In his doctoral thesis, d'Errico presents the image of a triangular 'vulva' over-marked with strokes from the Magdalenian cave site of Gouy (d'Errico 1989: 393, Fig. 388). On simple visual grounds he asserts that the vulva seems to be covered with a loincloth similar to the 'fringes' of tiny marks he found among some of the patterns among the Azilian pebbles from Rochedane. Gouy (Seine Maritime) is the most northerly of the decorated caves in Upper Palaeolithic France. Its chalk-like limestone walls have incised vulvae as well as engraved female images in the 'buttocks' style found at Gönnersdorf in Germany and as far east as Czechoslovakia. These vulvae and female images pose questions that have for a century been debated in discussions of Upper Palaeolithic symbol (cf. Bahn 1986; Marshack 1986a).

In numerous papers I have indicated that Upper Palaeolithic vulvae and female images were often ritually over-marked - sometimes by engraving, sometimes by use of ochre etc. I have indicated that this over-marking and reuse of the vulva and female figure occurs for some 25 (00) years and is found in home-sites in western and central Europe and the Russian plain (Marshack 1972a, 1976, 1986a). It occurs also on the Gouy vulvae and buttocks images I studied. It occurs on the vulva from Gouy that d'Errico published and described as probably wearing a 'fringe'. It occurs on the female buttocks or torso images incised on stones at Gönnersdorf (Fig. 21a-d) and it occurs in precisely this manner during this period on buttocks images incised on stones in France (Fig. 22a-e; Fig. 22a is located on the back cover of this issue). Were these over-markings on the Gouy, Gönnersdorf and Lalinde females made at the same time the image was produced in a ritual related to its manufacture, or was some of this marking made later, in a ritual reuse or renewal of the image? Did the over-marked vulvae found in Upper Palaeolithic home-sites represent a *home-site* form of ritual activity, perhaps carried out by females, as opposed to other classes of image manufacture and use found in the home-site or in the caves? SEM analysis could address the problem.

My microscopic studies have indicated that there were, in fact, many ways of using female images (Marshack 1991b). At the site of Mezin in the Ukraine, for instance, tiny carved ivory figurines are often decorated with multiple zigzag and meander motifs. Microscopic examination indicated that these careful and precise decorations were usually incised with a single point, probably at the time of producing the carving. On the front of

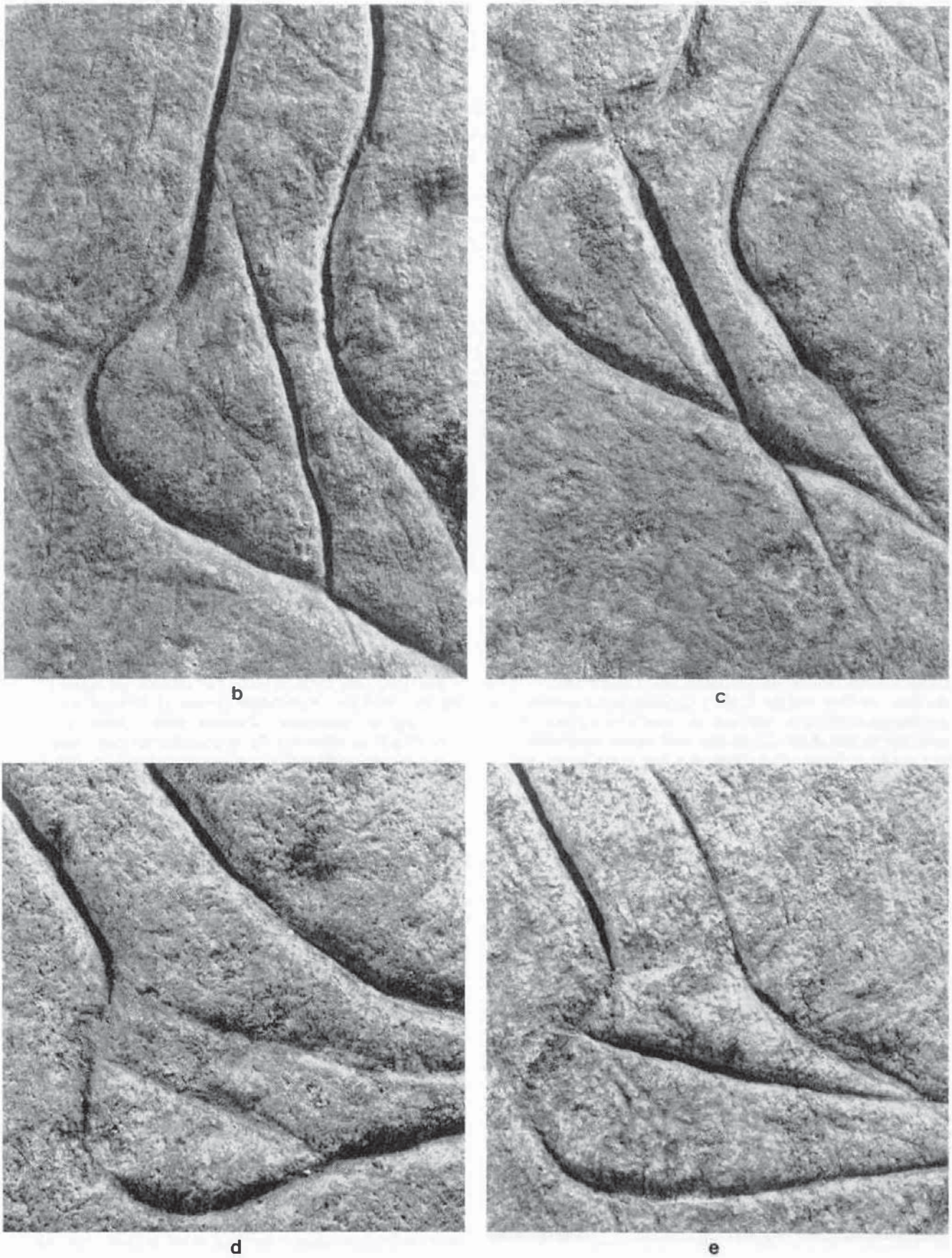


Figure 22b-e. Lalinde, France, Middle Magdalenian. Close-up details of four 'buttocks' images over-marked with strokes. For Figure 22a (two further examples), see back cover of this issue.

Figure 24a, b. La Marche, France. Line renditions of the engraved head of a young adult on a piece of limestone, indicating the intentional over-marking both on the face and the stone around the face. Middle Magdalenian (after L. Pales).

each figurine, however, is a large incised vulva. Each of these vulvae has been repeatedly over-marked by a use of different tools, pressures, angles of marking etc. (Fig. 23). In fact, the only 'random' and chaotic marking on these ivory figurines occurs on these vulvae. We seem again to have evidence for the symbolic use of an image, or rather the use of one specific part of an image over time. Such over-marking was not 'notational' and seems to have been ritual. SEM analysis could probably determine if this suggested evidence for a periodic over-marking of female images across Upper Palaeolithic Europe could be confirmed. If we are investigating early human 'art' and symbol or the manufacture and variable use of images in human prehistory, such a determination would be of great value.

There are other questions at Gönnersdorf. Bosinski has suggested that some of the female images depict a 'danee', since the knees are bent and the females are sometimes in groups. The implication is that these 'dancers' may have been engraved at one time. My studies of the Gönnersdorf and related compositions (as at Lalinde in France) have indicated that these female images were often accumulated on a stone over a period of time, image by image, and that they were also often periodically over-marked. Could both suggestions be true? Could SEM supply data of relevance to these seemingly contrary opinions? Or is there, in fact, no contradiction between these suggestions, with some groups of female images having been made in order to depict a ritual occasion but with others having been made one at a time and being over-marked, either at that time or at a later time, in separate acts of ritual?

Figure 23. Mezin, Ukraine. Close-up of one of the vulvae on a carved mammoth ivory figurine. The vulva has been over-marked with different points, pressures and in different directions. Late Upper Palaeolithic, c. 13 000 BP.

Questions concerning the variable production and use of images, that is, *when* an image may have been made and *how* it was used are ubiquitous within the Upper Palaeolithic materials (Marshack 1986b; 1991a, b, c). These represent 'time-factored' questions of a different sort from those that instigated d'Errico's research with SEM. I return to the La Marche materials, with whose notation and over-marked horses this commentary was begun. SEM analysis could test my suggestion for notational accumulation and image use. But there are other possible uses for SEM at the site. The huge collection of incised stones from La Marche have been published by Pales and de Saint-Péreuse (1976). The most remarkable fact about this collection of rock art is that it not only contains images of animals and naked females but also 'portraits' of particular persons of different age and sex in a range of behaviours (Marshack 1988a). These stones and their images are often heavily over-marked by what seems to be an incomprehensible melange of intertwined and scrambled lines, some of which recall the engravings on the Azilian stones that d'Errico studied. This type of scrambled marking occurs also at Gönnersdorf and other sites. I have suggested that such engraving often represents a form of ritual marking. Internally and structurally this mode of marking is different from design marking or macaroni marking, and it is clearly not 'notation'.

One can therefore suggest that an SEM study could be conducted of the different processes of image manufacture, use and accumulation found at that one site. This would include study of the use and reuse of images, either at one time for some classes of imagery, or over time for other classes. **14**) Such a study would make a significant contribution to the classic studies of the incised slates from La Marche by Pales and Saint-Péreuse, by addressing not merely compositional or representational problems but equally important and necessary 'time-factored' questions. I therefore come full circle in my discussion. The La Marche notation that I published two decades ago could in such an inquiry be studied as one specialised class of 'time-factored' symboling within the corpus. Once again, it is the question one asks, and not the available technology, that directs and develops an inquiry.

One of the La Marche stones, for instance, has the exquisitely engraved profile of a youth or young woman (Fig. 24a, b). It is heavily over-marked both on the face and on the stone around the face. The marks around the face make it clear that they are

14) Pales and St-Péreuse did discuss the over-engraving of images and the changes that may have been made to an image by later engraving, but they never addressed the question of whether this had occurred at one moment, or over time in the reuse either of a particular image or the surface.

not a representation of tattooing or face painting. Such strokes may be, as I have elsewhere suggested (Marshack 1991a, c), a form of ritual marking related to a use of the image or the images found on a stone. I have suggested that one reason that human portraits are so rare in the Upper Palaeolithic, despite the evidence for a capacity for the realistic rendering of animals and their sex, age, pelage, behaviour etc., is that human images could, once made, be ritually over-marked. The process of ritual over-marking may, therefore, not only explain the presence of such marking, but the general absence of human portraits in the Upper Palaeolithic as well as the special nature of the material at La Marche. From my study of the variability of symbolic materials at the site of La Marche - which includes notations, ritual paraphernalia, a collection of engraved and over-marked stones, female images and vulvae, and even a set of 'comets' or 'fans' apparently made by different points and incised on a bone in a manner similar to the set of comets from Taarupgaard - I have suggested that it may have been a specialised 'shamanic' site where different types of ritual or ceremony were performed. Some may have been conducted at seasonally or periodically relevant times. The human images, even when only partial and suggestive, may have been used in a range of rituals: for curing, safe delivery, desired pregnancy, exorcism, threat etc., by someone skilled in such practice. I have suggested the possibility, therefore, that more than mere 'art' or 'representation' is present in the La Marche corpus. The images of males and perhaps also of females in ceremonial or 'dance' positions suggests such ritual possibilities. It is not merely the engraved images on stone, then, but also the different classes of imagery found at La Marche that may have to be considered in any proper discussion of the 'notation' found there. We therefore come full circle in our discussion. Once again, it is the question one asks, and not the available technology, that directs and develops an inquiry.

Alexander Marshack
(Peabody Museum of Archaeology
and Ethnography, Harvard University)
4 Washington Square Village
New York, N.Y. 10012
U.S.A.

REPLY

A reply to Alexander Marshack
By FRANCESCO D'ERRICO

Marshack's Comment reveals two important obstacles that confront researchers presently studying the problem of prehistoric notations. Firstly, the methodological shortcomings of Marshack's work have been apparent since its beginning and his hypotheses have been surrounded by scepticism. Such opinions compel colleagues working in the same field as Marshack to detail their methods and results even more carefully than in other sub-disciplines of prehistory. Marshack's defensive detractions (1989; cf. d'Errico 1989a) are the second major obstacle. He does not appear to wish the reasons which gave rise to this scepticism to be elucidated.

Marshack attempts to lead the reader astray with numerous inexactitudes. I will enumerate these in the first part of this Reply and then demonstrate how Marshack's methodological errors have led him to propose erroneous interpretations.

First of all, my article does not concern 'the study of cutting edges and the changes that occur to cutting edges during the process of engraving, resharpening etc.' - as Marshack states - but, on the contrary, the technological analysis of the notches produced by these cutting edges. This imprecision allows Marshack to pretend that my work does not pertain to the analysis of portable art, but to that of the tools used to produce it.

Marshack also attempts, on several occasions, to reduce the argument to a dispute over the use of SEM by depicting me as an advocate of the use of this instrument in favour of the optical microscope. This is clearly false. My thesis was not, as he affirms, based 'on the use of SEM'. Over 90% of the microphotographs included in it were taken with an optical microscope.

The importance of SEM is related to the possibility of demonstrating the existence of microscopic analytical criteria 1) in the clearest manner possible. I illustrated my *RAR* article with SEM photographs of experimental notches simply in order to demonstrate the existence of analytical criteria for the technological study of archaeological notches. Their formation could also be studied more thoroughly. Knowing why each phenomenon occurs results in a better understanding of the possibility of encountering it on successive notches. Most of these criteria could have been presented with optical microscope photographs, but would have been less demonstrative in that form. Once experimentally demonstrated, other researchers can identify these criteria without ambiguity on archaeological material with the use of a simple optical microscope or, where possible, even with the naked eye. At that stage it is no longer necessary even to photograph them.

Certain technological criteria are not visible without SEM. This, however, only concerns a limited number of criteria, frequently those which are most susceptible to surface alteration processes on archaeological objects.

In short, SEM is but one means of microscopic analysis 2). Presenting the debate as one over the preferred technology is merely an attempt to hide the real problem. Most of the criteria (whose existence I have demonstrated) could have been observed and described by Marshack over thirty years ago if he had only applied a correct epistemological approach to the problem: that is, to experimentally observe criteria which would have then allowed the technological analysis of archaeological material. A more careful reading of my article reveals that these criteria are not necessarily 'clear' or 'obvious', and to consider otherwise can lead to errors in analysis and interpretation.

From the very start of his investigations, Marshack had chosen different means than I. Using his 'microscopic analysis' as a shield, he affirms without feeling obliged to demonstrate. He has been greatly aided in this by the lack of interest in this domain by other researchers.

Marshack also attempts to minimise my results by alleging that my method for studying notches is purely statistical. On the contrary, it is based on the use of three convergent methods: (a) technological analysis, based on the identification of experimentally demonstrated criteria on archaeological objects; (b) comparison of the cross-sections of the notches, observed at magnifications of several hundred times thanks to the measuring apparatus; and (c) statistical analysis of angle variability. In the first two methods statistics do not enter at all. As for the third method, Marshack's Comment reveals both an incorrect reading of my text and a weak knowledge of statistics. My statistical

1) Marshack cites Odell and Odell-Vereecken (1980) in order to support the use of the binocular microscope against the use of SEM. For several years these authors and their students have conducted experiments designed to identify microscopic criteria for the functional analysis of stone tools. The article cited by Marshack concerns the results of blind tests undertaken to test the validity of the method. The procedure followed by Odell - in total opposition to that followed by Marshack - is similar to that which I present in my investigations. Moreover, having worked in the same fields as Odell (d'Errico 1985a, 1988a, 1988b, 1988c; d'Errico and Mouncadel-Espinet 1986), I can state that today the use of the lower-power optical microscope by itself is of minor consequence in the functional study of stone tools. Such a citation proves nothing as regards the superiority of the optical microscope over SEM.

2) To contrast SEM with the optical microscope revives an idea that is already ten years old as far as the microscopic analysis of archaeological objects is concerned. Today there are several new analytical tools. The Conturoscope mentioned in my article, for example, reconstitutes a surface in three dimensions. The perfecting of new techniques in microscopic analysis (cf. for example Figs 3-5) ameliorates contrast in the optical microscope and, in certain cases, achieves a photographic quality that is not very different from that of SEM.

analysis does not aim at differentiating sets of notches that are notational from those that are not, but at differentiating sets that were made by the same cutting edge from those made by different cutting edges. If he understood statistics properly he would have realised that my results - far from presenting a 'statistical inadequacy' - are extremely relevant and demonstrate the validity of the method employed.

Several other erroneous statements concern the contents of my doctoral thesis 3). It is quite false to state that this research applied to a 'few post-Upper Palaeolithic Azilian incised stones from France'. The material which I studied (146 bone and stone objects with 197 engraved surfaces from 25 sites) constitutes 95% of all the material discovered in France, by far the richest country in Europe for portable art of that period. It is equally incorrect to claim that the sole purpose of my thesis was to determine if these Azilian engraved pebbles were systems of notations. It is also wrong to affirm that these Azilian objects only represent 'engraved compositions' for me. While awaiting the publication of my thesis I invite readers to become acquainted with my work on the subject (1988d, 1989b, 1991, 1992). Furthermore, it is extremely surprising to read that I should have examined the material from Abri Blanchard for my thesis on Azilian art: these pieces are at least 20 000 years older!

Furthermore, I have never stated that my study of Azilian art 'had proved that notation could not possibly have existed in the Upper Palaeolithic'. I cite a phrase from the conclusion of my thesis (1989: 400): 'our experimental results and the analytical approach that we have followed show that the identification of possible systems of notation can be approached with a new optic, both more circumspect and more demonstrative' 4). I am not responsible for the attacks other researchers might have made on Marshack, nor for what others might have written on the results of my work.

According to Marshack, the problem of notations cannot be approached without first knowing what are 'good' and 'bad' materials upon which to base a study; possessing the 'proper criteria for judging notation'; and being able to 'distinguish between different traditions'. These traditions (like several other concepts determining Marshack's jargon), however, have never been defined by him as analytical instruments. We have been waiting thirty years to find out to what these 'traditions' correspond chronologically, geographically and culturally. This lack of clarity eliminates all scientific value from the statement and criticism that Marshack makes concerning my work. As with his 'microscopic analysis' and his 'strategies', these vague concepts allow him to appear as the sole proprietor of a truth which, in reality, he has never demonstrated to possess.

Marshack also affirms that my analysis is conducted at random. This is without truth. My research is systematic and includes the 'thousands of engraved objects and sets of marks' to which Marshack refers, all the objects examined by him in the past, as well as numerous objects that he has never seen. I do not have Marshack's good fortune of possessing these 'truths'. Consequently, my work is undertaken without presumptions, in the most systematic manner possible to me.

One of Marshack's 'truths' is the wear that he mentions as a criterion to identify systems of notation. His research presumed that some objects showed evidence of long manipulation and/or transport (Marshack 1970, 1972a, 1976a, 1985, 1985a, 1987, 1991b). However, explicit methods were never offered to differentiate these traces from natural or from other artificial ones. Recent experimental studies (d'Errico in press a, b; d'Errico et al. in press) describe criteria for identifying such traces on bone, antler, ivory and shell objects.

The La Marche bone - which Marshack claims I have never examined - is a perfect example. Included in many of his articles, it is one of the pieces about which he seems most sure of his conclusions. In his Comment he reiterates, point by point, his first study of the piece which is now twenty years old (Marshack 1972b). This object

> had once been a baton on which a horse and sets of marks had been incised in descending rows. The baton had broken during use and the antler fragment was then reshaped to become a retoucher of stone tools. During this second use it was engraved with another horse and sets of other marks, once again made in descending blocks of horizontal rows.

The schema published by Marshack (1972b) typifies his technological analysis (Figure 1). It shows 'the breakdown into set, the differences in the engraving points and the direction of engraving, and the sum of marks in each set, as determined by microscopic analysis'. 'Microscopic examination showed that these sets (J to Q) had been engraved by many points, different from those which engraved the two sets I had examined on the prior face' (1972b: 818); 'the documentation reveals that the eight sets A to H were engraved by different points, indicating an accumulation in time'.

From a technological point of view, the incisions present on this object have no relation to notches. The microscopic criteria used in their study are therefore necessarily different. The analysis of hundreds of experimental incisions made by eight different procedures and with three types of points has allowed me to identify analytical criteria for recognising the 'techno-gestural' procedures used by the prehistoric engravers (d'Errico in press b). In this research I continued from White's (1982) earlier approach.

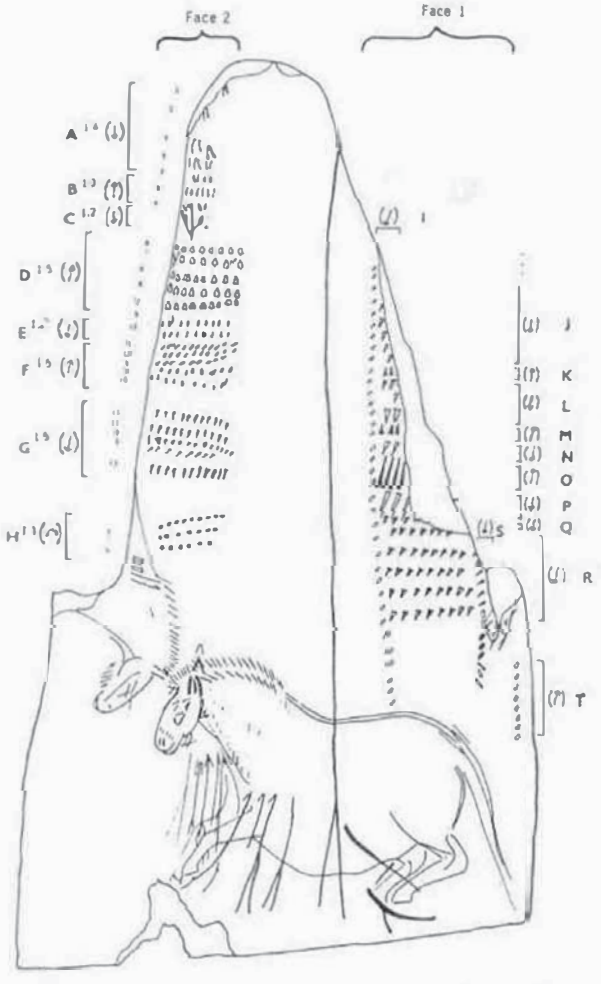


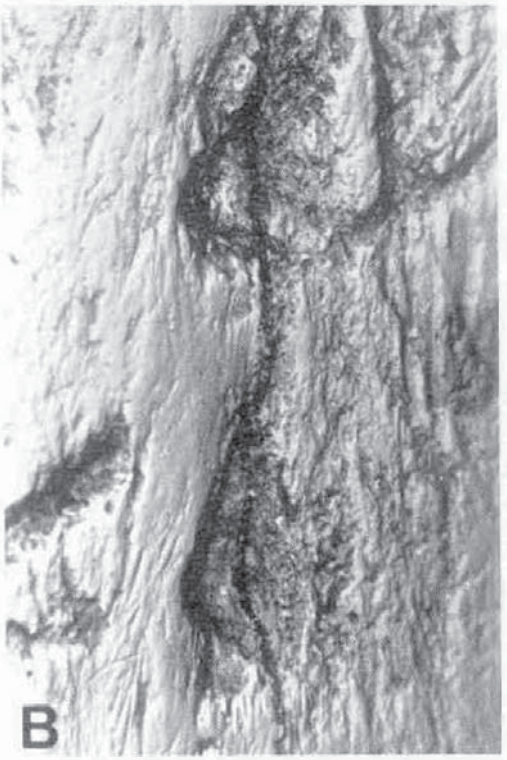
Figure 1. Schema of the La Marche bone according to Marshack (1972b: 822).

3) In his Note 1 Marshack associates in a single statement several affirmations taken out of context from different parts of my thesis. Using such a method of what I consider to be 'scientific terrorism', it becomes possible to attribute absolutely any statement to anyone.

4) *'nos resultats expérimentaux et l'approche analytique que nous avons suivi démontrent que l'identification d'éventuels systèmes de notation peut être approchée dans une nouvelle optique, à la fois plus circonspecte et plus démonstrative'.*

Figure 2. SEM photograph of the edge of the La Marche bone, on the level of set E2. The incision nearest the edge (arrow) is absent in Marshack's schema. It was partially destroyed when the piece originally broke. This suggests that the fracture is posterior to the incisions.

Figure 3A-E (below). La Marche bone, details. A: Microphotograph of the incisions of group D (face 2, last incisions on the right of lines 1 and 2; cf. Figure 1). B: Microphotograph showing the last two incisions on the right of the preceding photograph. C: incisions of groups I and J. D: Detail of the preceding photograph showing the third and fourth incisions on top. E: Incisions of group S (upper series and first incision of central ones). The incisions of series D, I and the upper incisions of S were produced by the same point. The difference that can be observed in the incisions of groups I and D-S is due to the fact that the tool (or the piece) was turned 180° for the production of these series (transmitted light microscope onto transparent resin replicas).



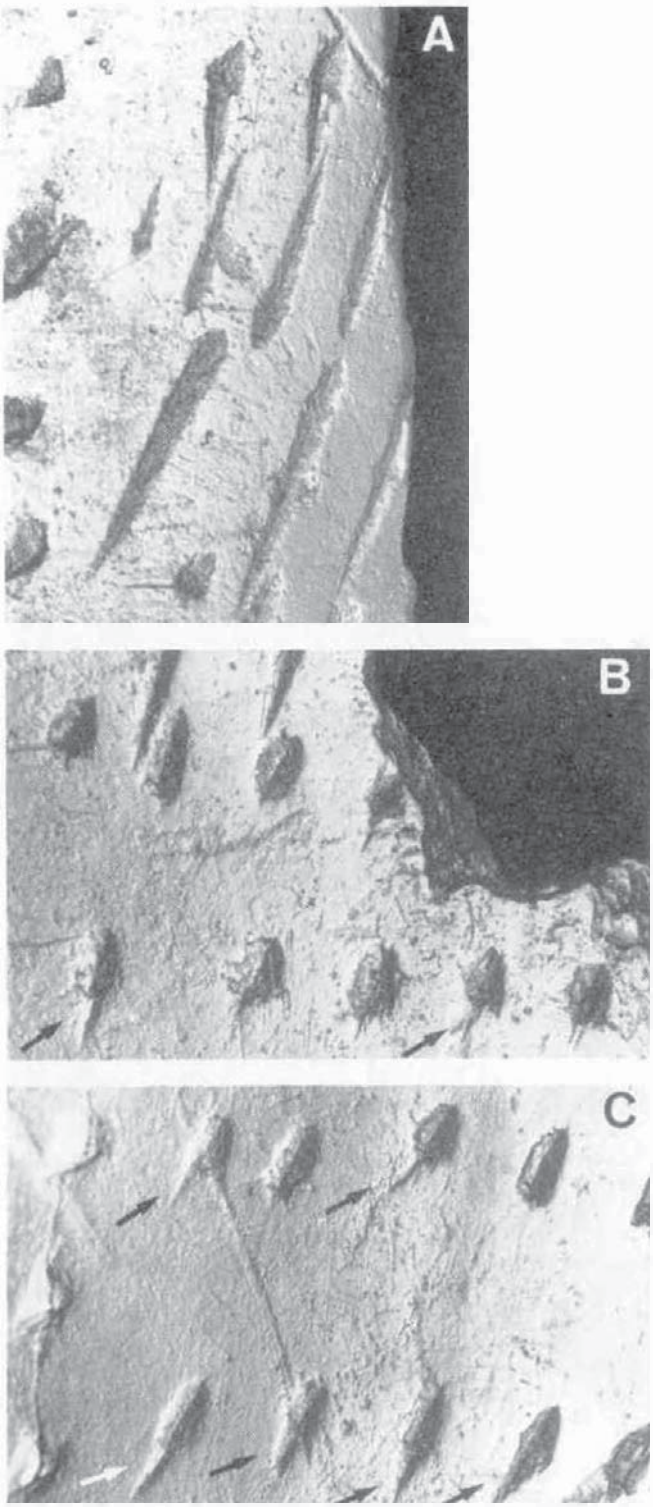


Figure 4. La Marche bone. A: Groups N-O-P. B: Two upper lines of group R. C: Last lower two lines of group R. Seven series (K-Q) were engraved by exerting a pressure, followed by a movement of the wrist which produced an 'end tail' (A). The morphology of the zone on which the pressure was applied as well as the section of the 'tail' show that the same point was used to make all these incisions. The difference between series R and the rest is due to the fact that the engraver limited himself or herself, in most of these incisions, to a simple pressure without engraving a tail. This is visible by observing certain incisions of the second line from the top and the last two lines of series R. The engraver here reproduced the short tails (arrows) seen in the upper series (transmitted light microscope onto transparent resin replicas).

Figure 2 shows the edge of the La Marche object at the level of set E2. The incision nearest the edge (arrow), absent in Marshack's schema, is of technological interest. Like others along this edge, it was partially destroyed when the support was fractured. The engraving of the sets on 'face 2' (A to H) is thus anterior to the fracture of the piece, and not posterior as Marshack affirms [5]. The incisions on both faces were made before the piece was broken. Figure 3 compares the morphology of the incisions of group D (face 2, last incisions on the right of lines 1 and 2) with those of groups I and S (face 1). Experimental reproductions of similar incisions were produced by a tool exerting a pressure perpendicular to the surface of the object. It is thus impossible to attribute a direction to the movement during their production, as attempted by Marshack. The experimentation also revealed that, with this technique, the use of the same point can be recognised on the basis of the morphology of the incisions. These criteria, as well as others not mentioned here, demonstrate that the incisions of set D and I as well as the upper incisions of set S were made by the same point; this is contrary to what Marshack affirms. The differences between the incisions of the group I and D-S are due to the fact that the tool (or the antler) was rotated 180° during the marking procedure [6].

Figure 4 compares the morphology of the sets from N to R. Seven sets (K-Q) were engraved by exerting a pressure which was followed by a movement of the wrist which produced a tail. Marshack recognised this mechanism but incorrectly attributed each of these groups to a different tool. The morphology of the zone on which the pressure was exerted as well as the section of the 'tail' reveal that the same tool was used to produce these sets. The difference between set R and the other sets is due to the fact that the engraver limited himself (or herself), in most of these incisions, to a simple pressure without engraving a tail. This is clearly seen in the bottom row of set R. Here, the engraver resumed to produce short tails identical to those made in the upper series.

In short, *in the nine sets (J-K) where Marshack 'identifies' nine changes of tools, there are in reality no changes at all.*

All these elements suggest that the fashioning of the two sides of this object was not the result of a slow accumulation over time. Changes of tools are present, but evidence for them is much less frequent than Marshack affirms. It is easily possible to demonstrate, for example, that no tool change took place between set A and set B (Figure 5), between D and E, or between F and G. What Marshack attributes these changes to is nothing more than the result of turning the object between engraving the two sets in question. The engraver, in effect, aimed to produce *the largest number of morphological differences between the sets while using a minimal number of tools*. In order to achieve this, he or she changed the orientation of the support, the technique used and the gestural procedure. The experimentation showed, moreover, that it was difficult to produce sets of such deep and numerous incisions with the same tool on dry reindeer antler without breaking the point. It is probable that the piece was soaked in water or some other liquid prior to the production of the incisions.

Taken as a whole, the data suggest that the sets were not accumulated over time as Marshack claims. The exact opposite is more likely to be the case. Marshack correctly states that the overall character of these incisions cannot be explained as a simple decoration. The reasons he gives, however, are incorrect. Likewise, his hypothesis of a notational system is not valid on the grounds that he gives.

5) 'Not one mark among the descending horizontal rows has been cut through by this edge, and the continuing analysis revealed that all the sets on this face were complete' (Marshack 1972b: 820).

6) Here, I will deal neither with the errors in Marshack's schema nor with those in his counting of the incisions. I will limit myself to demonstrating a few errors of his technological reading of the object.

Figure 5. *La Marche bone, groups A and B (face 2). The morphological differences that can be seen between these two groups of incisions is due to the fact that the object was turned between the making of the two groups, without any change of the tool being applied.*

In this Reply, the interpretation of the La Marche bone is not discussed in detail. However, with reference to the three types of notations I proposed in my Reply to Bednarik (*RAR* 8: 91), this piece falls between type 1 and type 2: a notation prepared in advance in which morphological differences between the elements on the support are the expression of the code which organises the system.

In my opinion, Marshack's Footnote 7 clearly demonstrates the differences between our respective approaches. The few photographs I have commented upon reveal that the basic data on which Marshack has based his hypothesis are false for the La Marche bone, and might equally be false for other objects he has examined. My efforts over the last few years have been aimed at creating methods which offer basic data that will still be valid in thirty years' time, regardless of whether the interpretations (mine or other researchers') have changed or not.

Marshack 'identifies' the mode of production, the direction of movement, changes of tool and changes of the orientation of the object by relying on the morphology of the incisions. The observation of a particular morphology in archaeological incisions does not, however, demonstrate that this morphology is the result of a particular technological procedure. It may result from other processes which have not been taken into consideration and which experimentation may reveal. Marshack's approach underestimates the profusion of technical and gestural procedures used by prehistoric people. I hope that I have also shown that the La Marche bone, contrary to Marshack's affirmations, in no way contradicts my results concerning Azilian engraved pebbles. The methodological procedures which demonstrated that these pieces were not systems of notation are the same that demonstrate that the incisions on the La Marche specimen were not made over a period of time.

The several pages dealing with the figurative engravings from Gönnersdorf and Marshack's hypothesis concerning the signification of 'macaroni' motifs are irrelevant to the discussion of the subject treated in my article. In order to add greater weight to his attacks, Marshack frequently tacks on several pages which have nothing at all to do with the argument of the article in question. I leave it to the reader to judge their pertinence.

The engraved motif on the Roc de Marcamps plaquette seems to resemble similar pieces of the French epipalaeolithic (Pagès, Murat, La Pommeraye, Grotte du Roc, Rochedane, Campalou) more than a Palaeolithic 'tradition'.

Gönnersdorf (Bosinski 1973; Bosinski and Fischer 1974, 1980) has produced, among other things, 160 stone plaquettes with over 400 female figures. About half of these have been published. The analysis of these plaquettes should not ignore the rich archaeological structures of which they are an integral part. If Marshack 'spent a couple of years studying these stones' he might care to answer himself the questions he asks me about their signification. I invite him to publish his observations. This would demonstrate, against the opinions of his denigrators, that he is capable of a quantitative and systematic study of archaeological material. Furthermore, if he considers (as he affirms) that I do not understand the 'different traditions' - an understanding necessary in order to grasp the significance of these engravings - then I do not see why he claims to be interested in knowing the results of my research. Moreover, most of these plaquettes cannot be studied by SEM analysis due to their porosity. The use of the presently known replication products would risk damaging their surface. As Bednarik states in his Comment (*RAR* 8: 90), the use of these replication products requires considerable competence. If Marshack, who accuses me of 'inadequate application and use' of SEM, had this competence himself, he would never have suggested SEM analysis of these plaquettes in the first place. It is best that he acquires this competence before placing unique archaeological objects in jeopardy. For my part I fear that his use of SEM would merely serve as another means of increasing the weight of his affirmations without changing his approach in the least: to affirm without demonstrating. If Marshack had created a valid analytical method for identifying 'technical gestures' of prehistoric peoples he would not feel obliged to smother with his comments the results of the only researcher who is trying to work on this subject. May I conclude this Reply by remarking that Marshack does not propose any valid criticism of either the method or the results of my research. I must therefore deduce from this that he has no major criticism addressing one or the other.

Dr Francesco d'Errico
Institut de Paléontologie Humaine
1, rue René Panhard
75013 Paris
France

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Debate of
THE PETROGLYPHS OF WEST YORKSHIRE
Explorations in analysis and interpretation

By JACK STEINBRING and MAURICE LANTEIGNE

In *Rock Art Research* 1991, Vol 8, No. 1, pp. 13-28.

REPLY

A reply to Peter Jackson

By JACK STEINBRING and MAURICE LANTEIGNE

Archaeoastronomy

We acknowledge Jackson's observation that not all rock art studies in Britain have been concerned with the application of archaeoastronomical models. We do maintain, however, that the more widely-acclaimed and publicised works (albeit controversial) have been those concerned with the passive relationship of Hominidae with the motions of the heavens, rather than hominid evolution in visual cognition. The former assumes a static relationship, whereas the latter is always in a state of continual transformation. A typical example of the former are the investigations by Patrick (1974) and Garnett (1983) on the Newgrange megalithic tomb, where the incorporated rock art is described only in a context which elucidates the megalith's functional relationship with celestial phenomena. Such studies subsume the significance of art-bearing stone slabs which may originally have been in a similar context as many of the panels at Rombalds Moor, then re-utilised as megalithic building material. They may predate the actual construction of such features by a considerable time-span and, as such, have no necessarily direct symbolic or cultural relationship with megaliths. In our opinion, three-quarters of a century of reliance on the more illustrious archaeoastronomical and megalithic studies has proved exceedingly detrimental to British rock art research in general.

Methodological biases

In the application of statistical methodology one must be exceedingly meticulous in reducing the potential for biases and observational errors. Part of this process involves 'cleaning-up' the data as much as is permissible, the extent being dictated by the types of questions posed in the study. For our purposes the movement, fragmentation, unknown orientation and known recording difficulties associated with two-thirds of the Rombalds Moor assemblage presented biases which could only be resolved by their removal from the analysis. This is standard procedure, providing that it is accompanied by an explicit indication as to the criteria being employed.

The problem of differential erosion of motifs is a difficult, if not impossible, one to resolve. We have chosen to accept the recorders' interpretation, but have acknowledged the potential conditions for observational recording errors. A number of new recording (cf. Magne 1989) and comparative erosional assessment (cf. Bednarik 1992) techniques are now being perfected and may be applied to this kind of problem.

Relative dating

The finite sampling strategy we have employed is permissible only if the generated conclusions are restrained within the context of the assemblage itself. For Rombalds Moor, it was demonstrated that the presence of cupules is not conditioned by the presence of circles, but the presence of circles is conditioned by the presence of cupules. The probability potential for cupules predating circles is therefore much higher than the probability potential for circles predating cupules. Do rings always postdate cupules everywhere in the British Midlands? Based upon statistical inferences they do for Rombalds Moor, but such has yet to be sustained for assemblage clusters elsewhere in the region.

We have inferred through correspondence assessment of various assemblages in the world (many personally visited by JS) that it is evident that many traditions of cupules and lines are consistently early in various rock art sequences. A recent neurophysiological investigation now suggests that the cognitive recognition of these primary elements may be a natural intrinsic feature of the human brain (Lanteigne 1991a). The differential distribution of the neural activity-related immunocytochemical enzyme cytochrome oxidase, as 'dot' and 'line' patterns in the primary and secondary visual cortices (respectively), may represent the essential building blocks of symbolic cognition without which more complex geometric motifs could not develop. This does not imply, however, that circles necessarily postdate cupules everywhere nor that a circle could not be conceived of as a primary element. Indeed, there is evidence which suggests that the development of a 'circle' concept may also be a natural part of human neurophysiological processes: the fovea region and its associated differential distribution pattern of cone and rod photoreceptors of the retina, with a corresponding retinotopic distribution pattern within the striate cortex (ibid.).

Such evidence underscores the observation that while symbolic cognition is a neurophysiological derivative, not 'neuropsychological' as postulated by others (cf. Lewis-Williams and Dowson 1988), no one architectonic aspect of the human brain is solely responsible for symbolic cognition in general. While there are neurologically valid reasons to assume that the intra-evolution of symbolic cognition proceeds along a uniform linear fashion (as suggested for Rombalds Moor), it does not follow that the inter-evolutionary process is also pre-conditioned to precisely the same phylogenic path (as Jackson understood our conclusions to imply). The architectonic parcelling of the human brain is so extensive and functionally unique that differential evolution of critical neurophysiological processes among divergent genetic pools is a 'logical' postulate, if valid at the speciation level (cf. Armstrong 1979). To what extent this divergence needs to proceed before it may become qualitatively identifiable within the visual symbolic record remains to be addressed.

In contrast with the Rombalds Moor sequence, there is preliminary evidence which indicates that circles may predate cupules by more than 10 000 years for the Karolta district petroglyph assemblage of Australia (Lanteigne 1991b). Although the efficacy of the dating procedure itself has been called into question (Lanteigne 1989b, 1991c), the known genetic isolation of the Australian population for more than 30 000 years (cf. Barbetti and Allen 1972; Pearce and Barbetti 1981) does sustain the seemingly contradictory hypothesis for intra-evolutionary linearity and inter-evolutionary divergence of symbolic cognitive processes. And further, if particular 'classes' of motifs are indeed linked to the development of specific neurophysiological aspects of the human brain, as now being suggested (Lanteigne 1991a), then traditional morphological classification procedures may not be as invalid as some would have us believe. Indeed, the differential distribution of such motifs along temporal and spatial parameters may constitute trace identification markers of specific neurophysiological aspects which may have undergone divergent evolutionary modification.

The second relative dating aspect our study dealt with that of differential site usage patterns. We have discovered that there is a non-random distribution of orientational siting preference around the panels during the manufacture of the petroglyphs, which apparently does not coincide with regular astronomical and geophysical site contour patterns. The only plausible explanation we have thus far been able to devise is that of cultural discontinuity in the generational transmission and maintenance of orientation preferences. We take this opportunity to correct an error in our original presentation. It was implied that 'all' adjoining orientational groupings were statistically discrete from each other; this is not so for the central groups 3 and 4. The chosen statistical significance level of $P<.05$ was not adjusted for the Bonferroni Inequality Effect, i.e. $P<.0125$ (cf. Lanteigne 1991b).

This does not significantly alter our model, but does clarify that the effect of cultural discontinuity in the generational transmission of orientation preferences resulted in an approximate inversion of directional values (i.e., from south-west to north-east, or vice versa). This has significant implications for understanding cultural and site formative processes, if similar non-random patterns are evident for other regional petroglyph assemblage clusters.

Random vs non-random

Variable terminology is quite often the source of much misunderstanding; random is one such word which, irrespective of its context, can convey quite different meanings. We have identified two distinguishable patterns in the placement of individual petroglyphs at Rombalds Moor: a Random Phase, and a Non-random Phase. We have posited that, during the Random Phase, the manufacture of particular clusters of glyphs was conducted without specific regard as to their spatial relationship with other clusters on the panel. When a spatial analysis is applied collectively to such patterns, however, a non-random distribution is identifiable, the reasons for which may vary according to various physical or cultural parameters. During the later Non-random Phase, the manufacture of petroglyph clusters was conducted with intentional regard as to their spatial relationship, both within and between clusters; either as linear arrangements, enclosed in and by grooves, equally spaced etc. When a spatial analysis is applied to such distribution patterns, however, the null hypothesis of random distribution cannot be rejected because the intentional use of equal spacing artificially satisfies random probability distribution laws. The conflicting conclusions which arise between the two different types of perception, human and statistics, are the source of much of the confusion, as demonstrated by Jackson's use of 'non-compositional' tests with students; here, the collective non-random distribution of individually intended randomness is not necessarily a function of individual or collective intent, but of other non-intentional factors: physical limitations, cultural limitations, neurophysiological limitations etc. That such random and non-random patterns exist is important for the relative dating of the Rombalds Moor petroglyphs; why they exist is another matter.

The difference between our interpretations of the two models may also be the result of problems in semantics. There are at least six other terms which could be employed to describe random: arbitrary, causal, chance, haphazard, indiscriminate, irregular; all of which carry some hidden value of intent quite different from that posed. Even the word 'preference', when used to describe the collective placement of glyphs within the three-quarter section of the panel, can be misinterpreted to imply relative social significance (cf. Jackson's paper), when all that was proposed was general behaviour in placement patterns irrespective of explicit value assignation.

Theoretical implications

The archaeological evidence for the symbolic use of orientation preferences, other than for astronomical observation purposes, is not strong but is growing as our theoretical understanding of human cognitive processes becomes more elaborate. One study demonstrated the use of rock art panel orientation inversion patterns as part of a territorial demarcation complex erected between two hunter/gatherer bands of the same macro-language family which had been separated from each other for up to 2000 years (8500 to 6500 BP) by a gradually receding glacial lake (Lanteigne 1989a). A second study demonstrated the use of tangential burial orientation patterns to denote band or lineage affiliations in a hunter/fisher/gatherer communal cemetery (3930 ± 130 bp), orientation patterns which tended to correspond with associated burial accoutrements (Lanteigne 1991d). However, the non-random orientation patterns of the latter case could not be statistically distinguished from a random pattern until the effect of cultural discontinuity in information transmission values, exemplified in the form of directional inversion, was accounted for (i.e., which do we bury in what direction, the head or the feet?).

For Rombalds Moor, directional inversion as part of a yearly, or even generational, phenomenon would produce a random distribution of directional orientation throughout the entire site. That the spatial pattern of directional inversion is non-randomly localised, with at least three major overlapping events, suggests that directional inversion transpired macro-generationally, indicative of site formative (usage) patterns. We now posit that such major directional modification events may reflect general discontinuity in band life-span patterns, demonstrated to be of a finite duration (cf. Newell and Constandse-Westermann 1986). That a specific directional orientation could be consistently maintained throughout a band's lifetime (e.g. 15-20 generations) implies a complex symbolic infrastructure support system. Although change in orientation preferences does indicate a fragmentation or collapse of band structure at some point in its generational history, that these directional alterations proceeded through inversion (rather than tangentially) suggests either that band disconformity was not complete or that the source of symbolic infrastructural stability was not localised (i.e., the symbolism for directional preferences originated at the macro-phylum level). The test for the latter resides in whether or not similar non-astronomical orientation patterns, subjected to macro-generational discontinuity, are also evident among other regional petroglyph assemblage clusters.

The understanding generated from such studies would have significant implications for the more traditional archaeoastronomical theories, in that it would demonstrate the presence of a non-megalithic non-astronomical orientation in the rock art sequence. Such an understanding, however, requires that the various petroglyph assemblages be viewed quite apart from the more traditional perspective that many British researchers have heretofore been unwilling to part with. Even Jackson is unable to shake free from the dogmatic constraints placed upon the interpretational context of rock art incidentally associated with megalithic structures; as illustrated by his use of the radiocarbon dates of the Newgrange and Knowth structures as also indicating the temporal context of the incorporated rock art. As a point of departure for future investigation we suggest that (in the absence of direct quarrying evidence) such incorporations should be viewed as the baseline termination of an earlier petroglyph tradition, the panels of which were re-utilised for purposes other than their original intent; e.g., as kerbstones, roofstones and orthostat stones of passage graves.

At Newgrange, for example, several kerbstones had minor decorations on their external faces, but three elaborately-carved kerbstones had their decorated surfaces in contact with the cairn base and thus were invisible (O'Kelly 1968). O'Kelly further pondered that there was apparently no work co-ordination between the carvers of the petroglyphs and the builders of the megalith; he concluded that the megalith builders 'had an eye only for a good kerb line and turned the slabs whichever way they looked best regardless of the surface ornaments' (ibid.: 41). Eogan (1978) noted that many of the art-bearing kerbstones at Knowth were not dressed, with many of the surfaces exhibiting natural weathering pits (as at Rombalds Moor). He also noted that two entrance stones had their rock art panels transected by a vertical line similar to two kerbstones at Newgrange (one was also an entrance stone, and the other situated opposite the entrance). The transections may indicate a builder's mark for selecting keystones, a behaviour more consistent with the builder's concern for architectural balance of the megalith, rather than with the aesthetic or religious significance of the incidental petroglyphic art.

While we are prepared to concur that the ten ^{14}C dates tendered by O'Kelly (1982) are sufficient to indicate a Late Neolithic context for the construction of the Newgrange megalith (4163 ± 84 bp), we do not support the contention that such dates also indicate the production of the petroglyphs. Rather, the seemingly haphazard manner in which many of the petroglyphic slabs were re-utilised demonstrates that a very sharp

cultural/temporal discontinuity existed between the original production of the petroglyphs and the subsequent incorporation of their panels into the megalithic structure. How much earlier the rock art tradition of Great Britain predates such megalithic construction may be a contentious issue, but a pre-megalithic (even pre-Neolithic) assignment for some regions is not as unreasonable as some would have us believe.

In our opinion, the potential value of Great Britain's petroglyph assemblage is far greater than any which has been, or could be demonstrated for its megalithic component. It is up to British researchers to realise this potential by systematically exploring the extremely complex neurological, behavioural and symbolic infrastructural aspects associated with such an assemblage, with as much fervour and tenacity as the previous 75 years have witnessed for the phenomenon of British megalithomania.

Professor Jack Steinbring and Maurice Lanteigne
Department of Anthropology
University of Winnipeg
515 Portage Avenue
Winnipeg, Manitoba R3B 2E9
Canada

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RAR 9-230

Debate of
A NEW NAME FOR A NEW DISCIPLINE

By OSAGA ODAK

In *Rock Art Research* 1991, Vol. 8, No. 1, pp. 3-12.

FURTHER COMMENT

PPEF or ppiffle?

By PAUL G. BAHN

I read Osaga Odak's article and the Comments accompanying it with great interest and not a little amusement. After pondering a while I came to the following conclusions.

1. *Rock art studies vs archaeology*

As an archaeologist with a particular interest in rock art, I think Odak's somewhat melodramatic view of RAS as 'suffering under archaeological tutelage' misses the point. Like it or not, rock art is inevitably a part of archaeology for the simple reason that archaeology is concerned with all traces of the human past. Within that vast realm of study are numerous specialisations from numismatics to underwater archaeology - and rock art. Whether these should be considered sub-disciplines or separate disciplines is a matter of name-games and not something I propose to lose any sleep over. But RAS have, in effect, long been separate owing to the attitudes of most archaeologists. There are three basic types of archaeologist with negative attitudes:

A) Those who choose to ignore rock art as a source of information, and use it only for decorative purposes on book covers (see Bahn 1991a).
B) Those who actively dislike it and treat it with disdain. I have met one or two eminent Palaeolithic specialists who actually regret that Ice Age art was ever discovered because it distracts scholars from the serious and more worthwhile aspects of the period, i.e. arranging chips of flint into categories and chronological order.
C) Those who see rock art as 'easy' and who, without knowing anything much about it, plunder it for their own purposes, selecting material and pulling it out of context to bolster a pet theory about the past (see Bahn 1985, 1991b).

The remainder, those who take a keen interest in rock art, are already part of RAS, with its separate identity enshrined in several journals for some years now. And I believe that the current strides being made in RAS, not only in chronology (which is of great interest in some areas despite Odak's comments) but also in technological, distributional and other analyses will eventually make those three categories of archaeologist realise that they have missed the boat, and it is too late for them to leap aboard without looking like modern-day Cartailhacs.

2. *What's in a name?*

Odak is rightly concerned that we should have an adequate mechanism of informing the public. But a meaningless name for RAS will not help. Quite the reverse - an obscure acronym such as PPEF or a highbrow term such as cognitology smacks of elitism and secret esoteric societies, and will cut us off from the public. There is even a hint here of wanting to make ourselves sound grand, like dustmen calling themselves 'refuse disposal operatives'.

We all agree that the term 'rock art' does not fully encompass our broad areas of interest; in particular it omits objects in non-lithic materials, and the definition of 'art' is a problem that will no doubt be debated for ever. But will a new name be of any help? To rank with the 'greats', to sound serious and academic,

we would need an '-ology', but there is no single term that fits. The best I could conjure up was petrographology, but it's a mouthful and ungainly, and inevitably fails to encompass all our raw materials once again.

Odak and Kumar have argued instead for a simple word, and 'we do not necessarily have to introduce a Classical European language'. Their choice is the acronym PPEF, but they then tack it to '-ology': this bastard hybrid is a nonsense. If a Classical language is not wanted, why add '-ology'? Personally I can see no good reason to jettison the use of ancient Greek for this kind of thing, any more than the use of Latin for genera and species, but that's another topic.

They claim that PPEF - petroglyphs, pictographs, engravings, figures - 'embraces all areas which are the subject of RAS'. But does it? 'Figures' is very vague - aren't petroglyphs, pictographs and engravings figures too? Odak seems specifically to exclude sculpture (*RAR* 8: 6) which cuts out a lot of (e.g.) Ice Age art; and what about geoglyphs, petroforms, bas-reliefs? In short, PPEF does not cover all the bases. No term can.

As Anati says, 'terms are ... means of communication', and I agree with Odak that we need a simple word. It seems best and simplest to stick to 'rock art' - not out of conservatism or archaeological hegemony, or to resist change for the sake of it, but because despite its inadequacies it is a simple, already well established term which the public can understand far more readily than any acronym or '-ology'. John Clegg's peanut analogy (*RAR* 8: 8) is beautifully apt. There are many other poor or inaccurate names in common usage - the glove compartment, the lavatory ... It ain't what you call it, it's what you do with it that counts.

Dr Paul G. Bahn
428 Anlaby Road
Hull, HU3 6QP
England

REPLY

Pefology: a new scientific discipline

By OSAGA ODAK

In recent papers (Odak 1990, 1991, and the presently debated *RAR* paper) I have argued for independent status of rock art studies (RAS) as a scientific discipline, and that there is a need to give it a name that encompasses various aspects of its preoccupation. Comments on these papers have generally been encouraging, although further discussion is needed to clarify certain issues concerning the shape and form the new discipline is to take. I am grateful to those who have reacted to my papers. In responding to them I have the opportunity to clarify certain aspects that might have been ambiguous or were omitted altogether. Thus I am particularly grateful to Dr Giriraj Kumar for producing a new and elaborate definition of pefology. According to him it is a science of the eternal relationship of humans with their environment, their cognitive development, aesthetic sense, creative activity and the process of humanisation as seen through the study of petroglyphs, petrographs, engravings on figurines, ornamental objects or any surface produced by humans at different stages of their evolution (Kumar 1991a).

Kumar's definition is relevant to my Reply on the issues raised by Dr Paul Bahn in his Comment. So before turning to Bahn I wish to comment on certain questions posed by Kumar concerning my reservation about including figurines and ornamental objects in the scope of pefology. I had objected to including these works of art not because I do not regard them as creative outcome of competent artistic activity in a particular province of art by accomplished artists, nor do I in any way underestimate the value of these objects as important part of human culture. But I see figurines and ornamental objects as three-dimensional art forms or sculptures. They can themselves bear engravings and paintings, and these, not the support on which they occur, should be the object of our study. Analogically, the focus of pefology is not the rock per se, nor the wall, land or any other medium, but the modifications to it in the form of engravings, paintings or other embossments. Accordingly, three-dimensional art should be considered together with sculpture, architecture and similar aspects of culture, and should not be included as a major concern of pefology. So we have to delimit the latter's scope to distinguish its concern from that of other disciplines dealing with other elements of human activity.

In my opinion Kumar's definition of pefology is sufficiently comprehensive as it comprises those aspects Bahn thinks are excluded in pefology. Kumar includes in his definition the study of petrographs, petroglyphs etc. on any surface. He sees the scope of pefology as also incorporating 'ornamental ... and any other objects on any surface'. Thus the 'o' in pefo designates objects embedded on any surface; geoglyphs on the earth's surface, bas or high relief on any surface etc. Strictly speaking, the Ice Age figurines mentioned by Bahn are sculptures and so cannot be embraced by pefology. But markings on their surfaces, such as those studied by A. Marshack and F. d'Errico are, undeniably, a part of RAS and a subject of study by pefology. In this case the study of sculptures (i.e. their forms, interpretation, symbolic significance etc.) is excluded, but not that of any engravings, paintings or inscriptions on them.

Regarding other points raised by Bahn I first turn to his assertion that rock art is 'inevitably part of archaeology'. The reason for this, he contends, is that archaeology is concerned with 'traces of the past'. But as I have stated, not all rock arts are traces of the past. They can well be traces of the present or be part of an ethnographic present, playing a role in the current concerns of living peoples.

While archaeology may have an endless number of branches, it definitely has one area of central concern and this happens not to be rock art. Other peripheral 'branches' of archaeology could, for instance, touch on aspects of geology, physics, history, botany, osteology etc., or even numismatics, which is concerned with ancient coinage that could be comfortably placed in economic history instead. Each of these 'branches' consists of a part of a separate discipline which has been incorporated into archaeology to aid the latter's activities. But it is wrong to say that they are areas of central concern to archaeology, and this equally applies to RAS which is not its major branch.

The second point concerns the suggested name which Bahn says is meaningless and will not help RAS. Obviously a name should reflect a particular reality and if it does so effectively, then it is not meaningless. I agree with Bahn that we are not interested in what he calls a 'highbrow' term or a term that symbolises any form of grandeur, but one that reflects reality - which I think pefology does very well. The question of 'elitism' does not arise. Conversely, Latin and other classical languages were elitist in particular periods of history. For me, all the terms deriving from classical European languages and the English language are foreign, and I use them only for scientific convenience without seeing them as elitist, though they should be so seen. All names of scientific disciplines would qualify as elitist, not excepting 'rock art'. The public, about which Bahn seems so concerned, is more acquainted with 'prehistoric art' or 'rock painting' than with 'rock art', which is itself a scientific jargon word that is being popularised by specialists without regard to its content, nor consideration of whether the public cares about it or not. There is no reason why the word pefology could not gain currency among the public once we use it in our writings. After all, the knowledge of the lay public about rock art is only now being enhanced, due to the world-wide intensification of research efforts.

It is true that we need a term that fits, but of all the terms I know, including petrographology (a term which would exclude petroglyphs), none is as fitting as pefology in accordance with the criteria set by various writers (e.g. Bednarik 1990; Bedekar 1991; Kumar 1991a, 1991b; Pant 1991; G. Kumar pers. comm. July 1991).

I expressed reservations about using classical European terms for the basic component of our discipline's possible name, but I

did not imply a dogmatic refusal to include a word derived from any language if such a word serves our purpose. For this reason I prefer adding the '-ology' derived from classical Greek and referring to 'science' or 'study'. However, I would not, if there were reason for it, be uncomfortable with 'pefo studies'. If any reader could provide a non-classical European suffix to pefo implying a scientific pursuit I would wholeheartedly embrace such a term. But since pefology seems to serve our purpose, there is nothing nonsensical about it.

I am particularly happy with Bahn's acknowledgment that RAS has long been a separate area of enquiry. But that separateness he perceives is within the umbrella of archaeology and Bahn, being an archaeologist himself, would presumably like to see all rock art researchers calling themselves archaeologists. The three basic types of rock art researchers represent three disciplinary orientations. Firstly, there are artists and art historians. Secondly, archaeologists, who rightly see rock art as not being of central concern to them. It is therefore legitimate for them to complain, as Bahn observes, that it distracts scholars of archaeology from mainstream archaeology. The third type represents ethnologists and students of other aspects of culture who would like to see rock art as representing lower levels of artistic evolution; they are those who would like to see it as 'primitive art' and thus use it to support their ethnological and related cultural theories concerned with the evolution of culture. The last type includes presumably Bahn and Odak, i.e. those scholars who, though coming from different disciplines, would like to see RAS as a distinctive discipline. Each one in this last group still owes allegiance to their own discipline, even though these scholars are already part of RAS for which they advocate a separate identity. But the type of identity we must strive for is complete self-identity, as distinguished from internal autonomy within archaeology, art history, ethnology or any other allied discipline. It is this form of identity which is beginning to emerge, as evidenced by the ascending journals dealing specifically with RAS, which are no longer part of a mainstream discipline. It is the type of independence we should encourage instead of the relative autonomy within archaeology which Bahn is advocating.

Professor Osaga Odak
Institute of African Studies
University of Nairobi
P.O. Box 30197
Nairobi
Kenya

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RAR 9-231

Debate of
A TESTAMENT TO THE SHAMANISTIC HALLUCINATORY TRANCE THEORY OF THE SOUTHERN AFRICAN ROCK ART

By CYRIL A. HROMNIK

In *Rock Art Research* 1991, Vol. 8, No. 2, pp. 99-108.

FURTHER COMMENT

Ethnographic clarifications: a response to Hromnik and Willcox

By PIETER JOLLY

As the principal interviewer of M., I welcome the opportunity to respond to Hromnik's assessment of her evidence, as well as the Comment by Willcox.

Hromnik's article

This article displays a lack of understanding of much of the material on M. which I presented in the *South African Archaeological Bulletin*. I shall restrict my comments to those remarks which relate to my article.

1) *'Medicine men did the painting'*

This comment has been quoted out of context. It refers, in context, specifically to those paintings which contained 'medicine', including eland's blood, and which consequently exuded a particular 'power'. M. initially told me that all the paintings in the rockshelter had 'medicine' in the paint but later modified this and remarked that *many* possessed 'power' and 'medicine', including eland blood. These paintings, she said, were done by medicine men. She did not tell me that they reflected ideas or metaphors associated with trance. It is generally accepted that many paintings do reflect ideas and activities associated with trance, but M. herself did not link the paintings to trance in her interviews with me (nor did she exclude such a possibility).

She did, however, remark that only animals 'with power' were painted. A powerful animal, like the eland, would be placed next to a painted scene (like that of a row of dancers in the shelter) to lend power to that scene, and her general attitude towards the paintings in the shelter could best be described as reverential. It is difficult to assess this last-mentioned evidence in the absence of direct supporting material from the ethnography, although it must be recognised that that portion of the ethnographic record which refers directly to the art is not by any means comprehensive.

2) *The identity and location of M.*

The identity of the informant was protected to prevent her being visited and imposed upon by people who might have had an interest in her other than of an academic nature. This is common practice. Hromnik was free at any time to have approached me for details of her name and place of residence.

3) *The identity of M.'s mother and the possibility of San's living as a community in the area c. 1918*

Hromnik is interested to know whether M.'s mother was San or Mpondomise and doubts the possibility of the San's living as a community in the area around 1918. According to L. Matiyela's informant, who initially led Matiyela to the woman, as well as the chief of the area and M. herself, M. had been born in a river shelter containing paintings, and both her mother and father were San. The father of my interpreter, however, claimed that M.'s father was San, but had left the river shelter at the age of about 20 years and settled amongst the Mpondomise, marrying an Mpondomise woman, M.'s mother. Despite the evidence of the other

three informants. I accepted this man's testimony as I preferred to take a conservative position.

Mapote, interviewed in about 1932, told How that 'some Bushmen' had died 'quite recently' at Sebopala (How 1962: 33). From the context it is clear that these were people living in a manner that could be identified as 'Bushman' and they were recognised by Mapote as being 'Bushman' rather than Sotho, although they would almost certainly have been in a patron-client relationship with the Sotho. Mapote further remarked to How that 'Mokoni, son of Mathletle, could take him to Bushmen in a little wood ...' (How 1962: 44).

While Mapote was not from the same area as M., his remarks, taken in conjunction with other evidence, some of which I have already cited in my article on M., strongly suggest that, until at least the early years of the 20th century, small San communities were living in the more remote areas of southern Africa in a manner that was different in many ways from the black mixed-farmers surrounding them. Hromnik's assertion that I was being speculative and wishful in my thinking when I remarked 'It is not impossible that there were still San living as a community near the river at that time (about 1918)' is therefore not supported by the ethnography.

4) *The motivation behind M.'s testimony*

Hromnik remarks that 'there is a strong indication that she wanted to convince the interviewers about her dubious San identity' and he cites her invention of a 'San language' in support of this statement. While this invention and her contradiction of some of her evidence were acknowledged in my article as disturbing, it should nevertheless also be said in her favour that she refused for two years to divulge any information concerning the San to Matiyela, despite knowing that she would be rewarded for doing so. Initially she refused to speak to me about the San, saying that she would not divulge the 'secrets of the Bushmen'. She only agreed to be interviewed when I showed her a picture of !Kung San in the Kalahari and she was convinced that I knew about San who were still living then. She would not be interviewed in the presence of any Mpondomise, other than her grandson (on to whom she wished to pass her knowledge of the San) and my interpreter.

None of this is indicative of a constant eagerness on M.'s part to exploit a case of mistaken or dubious San identity, as Hromnik suggests, though there were aspects of her evidence which suggest that she was over-eager to please. I made this clear in my article. This does not mean that we should reject her entire evidence, aspects of which are acceptable, as Willcox points out in his Comment, in view of their being supported by other ethnography.

5) *M.'s remarks on therianthropes and masks*

M. consistently mentioned the use of antelope masks by the 'Bushmen' and interpreted the therianthropic figures in the river shelter as well as published copies of therianthropes as figures wearing masks. Some of the evidence I cite in my article for the use of animal masks by the San, as well as evidence previously cited by other writers (see, for example, Lee and Woodhouse 1966; Woodhouse 1966, 1967; Thackeray 1983) strongly suggests that this was in fact a custom practised by the San, and about which M. had been told by her father - rather than simply a 'guess' as Hromnik remarks.

Moreover, further important evidence for the use of such masks by the San and their depiction in the art is evident in Stow's copies of figures wearing masks made of entire antelope heads (Stow 1930: Pls 13, 14). This evidence could not be used in support of M.'s testimony in my published article as the original paintings had not yet been located and it was not possible to be completely sure of the accuracy of Stow's copies. However, the recent location and photographic recording of the original paintings in the Queenstown District by Woodhouse has confirmed that Stow's copies of the paintings which depict masked figures are in fact accurate (Woodhouse, in press). This validates M.'s evidence on this custom and its depiction in the art, particularly since the figures she initially commented upon, unlike Stow's copies, did not show the clear separation of head and mask and thereby allow her to easily guess what they represented. This is not to suggest, as I pointed out in my article, that all the animal-headed figures in the art necessarily represent San wearing masks, but simply that a custom of wearing antelope-head masks, of which M. had been made aware by her father, was known to, and probably practised by, the San, and that a smaller or larger proportion of the figures with antelope-heads in the art depict people wearing such masks. Stow, for instance, makes a number of references to the use of animal masks by the San (Stow 1905).

6) *The metaphor of trance implied in M.'s testimony*

Hromnik remarks: 'She did not believe that dropping in the water meant "being in trance", as her interviewers would have it.' I did not claim that M. personally believed that the account of the capture of a river snake was a metaphor for trance. I stated that 'M. related the account of the snake's being captured as if it really did occur'. I, not M., suggested that the account might possibly be a metaphor for trance. The existence of San rain-making ceremonies reported by Prins (1990: 113) make it more probable, however, that an actual event was being described, and that the magical capture of a water snake had been transformed into an overt ritual, which may have been influenced by Nguni ritual practice. Further examination of the historical and social context of interaction between the San and black farmers should throw light on the development of rituals such as these, which were performed by the San during the later years of their occupation of the Transkei when patron-client relationships had developed between them and black farmers. Moreover, while it seems that, in the sphere of religious belief and ritual practice, the San have influenced Nguni cosmology to a large extent and that the general trend has been for the Nguni to adopt religious practices and beliefs of the San rather than the reverse (see Prins and Lewis, in press, for details of the profound effects of San religious cosmology on the beliefs and practices of Nguni diviners), we nevertheless must take into account the possible influence of Nguni cosmology and ritual practice on San society.

7) It is incorrect to suggest that I believed M. to be one of only two or three San ever to have been interviewed at all, as Hromnik claims. A re-reading will confirm that I was referring to those San who possessed 'authentic knowledge of the art'. However, as Willcox points out in his Comment (*RAR* 8: 124-6), there are more documented accounts of the San's painting (in areas other than those occupied by the south-eastern San) than I had realised. I am grateful for his bringing them to my attention.

8) *The language of the south-eastern San*

Hromnik implies that Nama or 'Soaqua-Quena' was spoken by the south-eastern San, rather than a 'Bush' language. Neither Westphal, nor any other writer that I know of, aside from Hromnik, mentions that the south-eastern San spoke a 'Soaqua-Quena' language. Westphal in fact identified a language, '!gã!ge', which was spoken in the Transkei and which formed part of the !Wi family of 'Bush' languages (Westphal 1971: 381). These 'Bush' languages are distinct from what he classes as the 'Hottentot' languages. Though borrowings obviously do occur between languages, it is clear from Westphal's classification that distinctively 'Bush' languages were in fact spoken in the Transkei.

9) *The ritual use of eland blood in paint*

The significance of the addition to the paint of blood from a ritually slaughtered eland is that it linked these particular paintings to 'a whole spectrum of San religious thought', as I pointed out in my published article, and not only, or even necessarily, to the symbolism of trance, as Hromnik wrongly reads into my article. I make it clear in my article that the art had *already* been shown to be concerned, to a large extent, with the symbolism of trance. The addition of eland blood to the paint, I believed, linked the paintings to a wider spectrum of San religious belief.

Moreover, Hromnik's unsupported allegations that M.'s testimony on the use of eland blood in the paint was 'obviously solicited' ignores extensive evidence for this custom (see, for example, Willcox's Comment) as well as evidence from Prins's interviews with her several years later. She described the same ritual use of blood in the paint to Prins, and her account of this practice, which is of central importance to her testimony, is further supported by the evidence of San descendants interviewed by Prins in the Mount Fletcher District (Prins 1990: 112).

10) *The use of 'Quang-Quang' to ward off lightning*

Hromnik asserts that the river shelter marks (which, according to M., were used to ward off lightning) were probably made with 'Quang-Quang', an ochre which is used by the Sotho to protect themselves against hail and lightning. He claims that the source of the idea, which M. claimed lay behind the painting, was a Sotho belief. In fact it is more likely that the Sotho borrowed the idea from the San. 'Quang-Quang' was the name given to the ochre by the San and it is strongly linked in Sotho religious belief to the San: 'The Quang-Quang paint used by the Bushmen is also the medicine recommended by Basotho witchdoctors when divining bones fall in a certain position, known as ... "the position of the huts of the Bushmen and Bakalahari".' (How 1962: 34)

11) *The evidence of Mapote*

Mapote, the old Sotho man who demonstrated to Mrs How the manner in which the San painted, is considered by Hromnik to be, in all likelihood, a 'fake'. However, there is every reason to believe, from the care with which he prepared the paints and selected a suitable painting surface, as well as his account of the San way of life and his experience of painting with them, that he had authentic knowledge of how they painted and of how they made their paint. Mapote's father, Moorosi, had more than one San wife, and Mapote painted in a cave with his 'half- Bush step-brothers' (How 1962: 33). Moreover, Hromnik's criticism of Mapote's and How's accounts contains a number of serious errors:

a) Mapote was not reluctant to paint, as Hromnik suggests. He was reluctant, as an old man, to make the considerable journey to Mrs How. Once there he was quite prepared to paint for her.

b) There is no evidence that Mapote was induced to paint for Mrs How by the offer of a pair of boots. This offer was made by Mrs How only after he had finished painting. There is nothing in How's account which suggests he was offered the boots in return for painting for her.

c) Mapote specifically and spontaneously asked for eland blood. He was not 'quite happy' to use ox blood, as Hromnik suggests. He used ox blood (it was Mrs How's idea to use it instead of eland blood) because eland blood was unavailable and he had no choice but to use the blood of another animal.

d) In support of his view that Mapote's paints were an 'ad hoc concoction', Hromnik cites How (1962: 39) when he concludes: 'Not surprisingly his [Mapote's] paintings disappeared completely in less than 30 years'. However, the paintings executed by Mapote to which Hromnik refers were done on a rock which, as Mapote explained to How, was unsuitable for painting upon, as water poured down it in the rainy season. Mapote wanted to paint on a more sheltered rock in a small cave nearby because, as he told How, the colours of the paint were sun-proof but not rain-proof and, as a result, the San 'preferred putting their paintings inside the caves or rock-shelters'. However, this cave was on the grounds of a neighbour and How would not allow Mapote to paint there (How 1962: 39). Two paintings done by Mapote on the previous day on stones selected by himself lasted a long time, and How remarked that 'today Mapote's painting is almost as clear as when it was painted 30 years ago' (How 1962: 37), a quite different assessment of Mapote's paintings from that which Hromnik selectively and misleadingly cites.

The great importance of Mapote's evidence in assessing M.'s testimony lies in the fact that he learnt how the San painted from first-hand experience, and he asked for eland blood to be provided as an ingredient of the paint. This latter fact strongly supports M.'s evidence. The ritual importance of the eland to the San and its integral part in their religious beliefs is not in dispute and the paintings containing eland blood would almost certainly have been linked to a wide spectrum of San religious thought, through the direct association of their ingredients with the eland.

The points made above concerning Hromnik's evaluation of Mapote's evidence hardly point to a 'careful reading of How's description', which Hromnik claims to have made. His more general remarks concerning M.'s testimony to me contain a number of serious errors and I trust my correction of these will allow a more balanced and accurate assessment of this testimony than is found in Hromnik's article.

Willcox's Comment

There are a number of points concerning M.'s evidence in my article which are raised by Willcox and which need to be responded to.

A) *Bleeding from the nose*

While I did not report M. as having mentioned dancers bleeding from the nose, she did in fact give a detailed and authentic account of a 'medicine dance', in which the dancers clearly experienced trance. M. described the dancers as 'acting strangely' and often 'falling down', when they would be revived by a 'sweet-smelling powder' which was contained in a horn (*buchu* was used in this way by other San groups). She also remarked that blood sometimes came from the nose of a medicine man when he 'shivered'.

B) *Dancers facing the paintings*

M. did demonstrate the way in which dancers faced the paintings when they wished to intensify their power. She stated that dancers would sometimes face the paintings and dance to them during a 'medicine dance'.

C) *Medicine in the paint and paintings done by medicine men*

As I mentioned above, M. initially told me that all the paintings had medicine in them and she also said that medicine men did the paintings which contained medicine. From this we could imply that all the paintings were done by medicine men. I informed Willcox of this in my letter to him, and I also informed him that she later modified her initial statement and told me that many, but not all, of the paintings had medicine in them, and that *these* paintings were done by medicine men. The statement 'medicine men did the painting', which is contained in my article, refers, in its context, to a painting which had medicine in it, including eland blood. M. clearly returned to her original position when being interviewed by Lewis-Williams, but her denial and modification of her original statement that all the paintings contained medicine needs to be taken into account when evaluating the authenticity of this statement.

D) *Lack of reference to other informants who knew about the art*

When writing my article I was unaware of the accounts of painting given by the informants of Moszeik, Hahn, Ellenberger and Galton. I am grateful to Willcox for having brought them to my attention. However, my inadvertent omission needs to be seen in its proper perspective. Only Ellenberger's informant, of the six informants listed by Willcox, for example, stated that blood was added to the paint, but analysis of paint samples, as Willcox himself points out, shows that blood was in fact added to the paint in many cases. The failure by the majority of the informants to mention the use of blood does not therefore necessarily mean that blood was not a constituent of the paint.

E) *Evaluation of M.'s testimony*

While it seems that M. was, at times, telling me what she thought I would like to hear, as Willcox remarks, and as was pointed out in my article, aspects of her evidence can be considered acceptable because of their similarity to ethnographic material derived from other San groups, and this is acknowledged by

Willcox in his Comment. In particular, her important accounts of the ritual use of blood in paint and the use of animal masks is corroborated by similar ethnographic material and by analysis of the paintings themselves.

Pieter Jolly
1 B, Kildare Road
Newlands 7700
Cape Town
South Africa

REPLY

A reply to Pieter Jolly
By CYRIL A. HROMNIK

It must be noted, for ethical reasons, that Jolly's Comment on my article in *Rock Art Research* was not solicited by the editor. My as yet unpublished manuscript was given without my knowledge to Jolly (among others) by Lewis-Williams, to whom it had been sent confidentially for pre-submission comment.

Jolly was the principal interviewer of the Transkei woman named Maqhoqha whom he calls M. and heralds as 'A first generation descendant of the Transkei San'. To him she 'appears to be the first San informant with authentic knowledge of the [rock] art to have been discovered for more than 100 years, and one of only two or three ever to have been interviewed at all' (Jolly 1986: 6). Jolly's claim is somewhat bombastic (as he humbly admits with deference to Willcox's comment published alongside), but by and large inconsequential. There are many people in South Africa who in ignorance of historical and linguistic evidence entertain the illusion, fostered without evidence by Stow, Schapera, Wright and others, that Kung (Bushmen) rather than Quena (Hottentots) and the mixed Soaqua-Quena inhabited the Eastern Cape and Lesotho in the eighteenth and nineteenth centuries (see Hromnik 1990).

Critical scholars knew better a long time ago. I have never implied that 'Nama or "Soaqua-Quena" was spoken by the south-eastern San', as Jolly wrongly states. How could they have done so when there were none? All I have said is, and I quote from my article, that 'we have no record of a genuine Bushman (a speaker of a Bushman language like !Kung, not a Quena language like Nama or Soaqua-Quena spoken in southern and eastern Cape Colony or by the MaSarwa) who spontaneously claimed that the rock art was created by Bushman people like himself' (*RAR* 8: 100). Jolly argues that Westphal 'in fact identified a language, "!ga!ne", which was spoken in the Transkei and which formed part of the !Wi family of "Bush" ... [not] "Hottentot" languages'. Westphal, however, never offered any evidence of such a language. On his linguistic map, Westphal marked Lesotho as dubiously 'Bush' language area, but he could offer neither the name nor any lexical substance of such a language (Westphal 1963: 243-5). His lexical evidence for the !Wi family originates from such disparate groups as those living in Gemsbok Park, near Kimberley, north of the Orange River and at Lake Chrissie. None from Transkei, the Eastern Cape or Lesotho (Westphal 1971: 381).

Jolly had his paper checked by Lewis-Williams before he submitted it to the editor of the *South African Archaeological Bulletin* (see acknowledgments in Jolly 1986: 8), herself a strong proponent of the shamanistic interpretation. Jolly apparently did not receive the benefit of reciprocity when his reader reworked the findings into his own hallucinatory trance and shamanistic mould (see no acknowledgments in Lewis-Williams 1986: 11). Lewis-Williams' reworking of the conventional (not related to trance and shamanism) testimony of a Mpondomise woman is of consequence because he sought in Jolly's and his own interview with Maqhoqha an imprimatur or confirmation of his theory that 'the painted depictions [on rocks] were principally associated with the trance experience of [San] shamans', and that 'perhaps most of the paintings were done by shamans themselves'. This, according to Dowson and with ample reference to Lewis-Williams, 'was confirmed by an old Bushwoman in Transkei who said that only shamans painted' (Dowson 1989: 84, 90; Lewis-Williams 1986: 10). Indeed, Lewis-Williams went as far as to recast the confused and apparently solicited statement of Mpondomise Maqhoqha about the 'medicine men' doing 'the paintings which contained medicine' into a declaration that 'The paintings were done by medicine men as part of shamanistic practices' (Lewis-Williams 1986: 10). Unfortunately, Jolly has nothing to say about this abuse of his findings.

My article, as stated in the Abstract, is concerned with the validity of these far-reaching though purely fictional assertions rather than Jolly's bombastic though harmless claim. Unfortunately, the last sentence of my Abstract, which would have made my intention perfectly clear, was inadvertently left out of the published version. I tried to discuss the matter with Jolly at the SARARA conference in Cathedral Peak Hotel in August 1991, but, unable to admit the misuse of his findings by his co-interviewer, he refused to do so.

Jolly begins his Comment by claiming that my article 'displays a lack of understanding of much of ... [his] material on M.' Yet in the end he fully confirms my critical analysis. He brings no new evidence to contradict my conclusion that his San M. was in fact a Mpondomise M. born of a Mpondomise mother and brought up in a Mpondomise environment without any experience of Kung (Bushman) social and cultural life. Jolly is emphatic that Maqhoqha's father was 'San', i.e. non-Bantu, although on historical grounds the latter could only have been Quena or Soaqua-Quena, NOT Kung (Bushman). This I was prepared to grant to Jolly (*RAR* 8: 105). However, evidence collected in the early 1930s reveals that even Maqhoqha's father Lindiso was only the mixed child of a Quena woman and an unidentified, most probably Bantu-speaking father. The collector of this information, using the confused nomenclature of his times, calls Lindiso's mother 'a true Bushwoman'. However, the sample of a so-called 'Bushman dialect' named !Gã!ne, collected from Lindiso, consists largely of Quena (Korana and Nama-related), Afrikaans and Xhosa words (Anders 1934-35: 81-9). To talk in these circumstances of Maqhoqha's having grown up in a living 'San' (meaning Kung) community in the Tsolo area in c. 1918 and thereafter is wishful thinking.

Jolly confirms that Mpondomise Maqhoqha 'was over-eager to please', 'at times, telling me what she thought I would like to hear'. But she never told him that rock paintings 'reflected ideas or metaphors associated with trance', and she 'did not link the paintings to trance in her interviews with [him]'. Mpondomise Maqhoqha never said anything that could justify Lewis-Williams' assertion: 'Again and again she insisted on a shamanistic view of the art' (Lewis-Williams 1986: 11). It was Jolly who tried to turn Mpondomise Maqhoqha's account of catching the snake into 'a metaphor for trance'; she herself offered no assistance. Realising his entanglement in Lewis-Williams' shamanistic trance beliefs, Jolly distances himself somewhat from the 'symbolism of trance' and unsuccessfully tries to clear his original article of the same.

Jolly's long comment on the use of animal masks by the 'San' is of no relevance to my article. The practice is a matter of common knowledge. That Mpondomise Maqhoqha's guess matched one of our own ideas about the meaning of the therianthropes does not make her any more Kung or any less Mpondomise than she was. Meanwhile, she certainly does not deserve to be accused of having 'missed the metaphor' or of advancing a 'naive' interpretation of the therianthropes, as Jolly (1986: 7-8) continues to maintain.

Jolly is putting the cart before the horse when he argues that the old Sotho man Mapote came to Mrs How from a long distance without being offered a reward. The rest of his Comment is equally trivial. He writes that he was 'unaware of the accounts of paintings given by the informants of Moszeik, Hahn, Ellenberger and Galton' when he was writing his article. Obviously he still does not know these accounts. Moszeik was not a witness. His source of a 'tradition' was o 'boer'. He himself believed that

the black paint was extracted from the black excrement of dassies [hyrax] (Mosziek 1910: 29-30). Ellenberger wrote enthusiastically in the most eloquent French about 'Bushman' artists. He believed that Bushmen lived on Table Mountain when van Riebeeck arrived, but even he could not bring himself to believe the essence of his 'old Basuto woman's' testimony. How could he, when she insisted that her Bushmen never used 'ochre' for their paintings? (Ellenberger 1953: 27, 148-51). Hahn asserted that 'all Bushmen' from the south of the Orange River to the latitude 25° and between the longitude 16° and 17° were 'still painting' (Hahn 1879: 307), but no one else had ever seen or even heard of them performing this art. The signs and symbols he said they were painting, which look as if borrowed from a cartographer's legend, have never been reported from anywhere.

Although Jolly is not trained in the rigours of historical writing, it is irresponsible and unscholarly of him to use in an accusatory argument references from other authors without having studied them first. He would do well if he shed the burden of Lewis-Williams' shamanistic and hallucinatory fiction and applied himself to the critical study of the available evidence, including that produced by the Quena people of the Eastern Cape and Transkei who were absorbed in Xhosa, Thembu, Mpondomise or other society.

Dr Cyril A. Hromnik
Indo-Africa
26 Sawkins Road
Mowbray 7700, Cape Town
South Africa

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RAR 9-232

BRIEF REPORTS

Nurrabullgin - 'A mountain, once seen, never to be forgotten'*

JOHN GRAINER, BRUNO DAVID, ROGER CRIBB, BRUCE WHITE and HILARY KUHN

Nurrabullgin (Mt Mulligan) is a tabletop mountain situated 100 km north-west of Cairns in north Queensland. It lies between the Hodgkinson, Mitchell and Walsh Rivers, forming part of the traditional homeland of the Kuku Djungan Aboriginal people, of whom over 300 currently reside in the broader region. Nurrabullgin is 18 km long and 6.5 km wide, rising 400 m above a maze of tangled ranges - the rugged Featherbeds which extend south-west to Chillagoe. The mountain contains two great tiers of sandstone, the upper one forming the undulating landscape of the plateau. Volcanic extrusions and ash deposits in the low hills to the north have formed rhyolite outcrops and volcanic tuffs, in which rockshelters have readily formed. Rockshelters are also to be found along the sandstone escarpments of the plateau itself.

Nurrabullgin was described by Idriess (1958: 105) as 'a meeting place of the aborigines from time immemorial ... [which] has seen the passing of a thousand tribes'. In 1991, the archaeological work of David (1992, in press a and b) and Cribb (1990) gave scientific substance to this statement by chronicling the great antiquity of Aboriginal occupancy on Nurrabullgin. Excavations at Nurrabullgin Cave revealed a series of radiocarbon determinations tracing human occupation on top of the plateau to a period predating 37 170 BP (Beta-45906; the full sequence of radiocarbon dates appears in David [in press b]). It is, thus, the oldest dated site in Queensland and one of the oldest in Australia.

The Kuku Djungan people have recently re-established their custodianship of Nurrabullgin by the acquisition of a 1 477 580 hectare pastoral holding that encompasses Nurrabullgin. The funds were provided by the Aboriginal and Torres Strait Islander Commission (ATSIC) as a traditional-land acquisition because of the spiritual significance of Nurrabullgin to the Kuku Djungan people. After negotiations, the Kuku Djungan Aboriginal Corporation agreed to claim Nurrabullgin and lease it back to the Queensland National Parks and Wildlife Service (Q.N.P.W.S.) whilst retaining full management rights over the proposed 6190-hectare Kuku Djungan Nurrabullgin National Park. This represents one of the first such management proposals in Queensland.

A Kuku Djungan account of the origins of Nurrabullgin was recorded by Richards (1926: 256) earlier this century:

> The mountain, which was built by wallabies on the advice of the eaglehawk, was originally a huge pile of stones. A swamp pheasant built its nest on the mountain and hatched its young. The Eekoo came along and killed the nestlings. The pheasants in their anger thereupon started a bush fire to burn the Eekoo, and so great was this conflagration that it melted the stones and so formed the towering cliffs of Mount Mulligan. To save his life the Eekoo created the lake and took refuge in its waters; and so the lake became his home. Although the lake is the home of the Eekoo, strictly speaking he is not a water devil but wanders about anywhere on the mountain.

The lake, Lake Koongirra, can still be seen on Nurrabullgin. Moreover, it is said that a giant white horse, entrapped within the depths of this impressive massif when it was formed, can be heard sometimes, fighting for its freedom.

As in many other parts of Australia, the early years of contact between Aboriginal and non-Aboriginal people were at times violent. The Kuku Djungan tell of how their grandparents had to flee from police and settlers after the first European contact. They would flee to Nurrabullgin, and climbing its escarpments sometimes escape the newcomers with their horses and guns. Samuel Wason, a Kuku Djungan elder, remembers a cave on the south side of the mountain where many of his people were massacred and then hidden.

During the era of the Hodgkinson goldfields, townspeople fearful of the Aborigines adopted a policy of pacification. In 1882 John Byrnes brought a small group of Kuku Djungan into town and fed them meat and potatoes. Soon there were 150 Aborigines living in a camp five miles west of Nurrabullgin, where store products became readily available.

By 1921 the Hodgkinson goldfields had declined and the Mt Mulligan coal mine had burrowed its way into the side of Nurrabullgin, much to the fear of the Kuku Djungan. A huge explosion occurred within the Mt Mulligan coal tunnels on 19 September 1921, killing 75 people. To this day it remains Queensland's worst mining disaster (cf. Bell 1978). To the Kuku Djungan this was retribution for the mine's disturbance of the sacred mountain, the white horse and the spirit Eekoo.

Nurrabullgin continues to have special Dreaming significance to the Kuku Djungan today. After generations of removal from their traditional lands and the dispersal to Aboriginal missions throughout Queensland, the Kuku Djungan people stood beneath the ramparts of Nurrabullgin on 27 July 1991, raised the Aboriginal flag and silently resolved to regain ownership of their mountain. This was achieved with the acquisition of their lands in December that year. Kuku Djungan elder and Chairman of the Kuku Djungan Aboriginal Corporation, John Grainer, describes Nurrabullgin as the point of focus for the Kuku Djungan people as it accentuates the sense of cultural continuity with previous Aboriginal populations: 'The mountain is very important to all members of the Kuku Djungan community. By regaining our traditional rights over Nurrabullgin and surrounding country, our children will grow up with their own cultural heritage. With our traditional lands managed by Kuku Djungan, we can start to teach our children their traditional culture.'

Archaeological research

The archaeological exploration of Nurrabullgin has occurred within the context of such Kuku Djungan aspirations. It is a partnership between the Kuku Djungan and a number of archaeological researchers. Such a partnership

* Mulligan (1875: 24)

Figure 1. Excavations in progress, 1991 test pit, Nurrabullgin Cave (photograph by C. Barron).

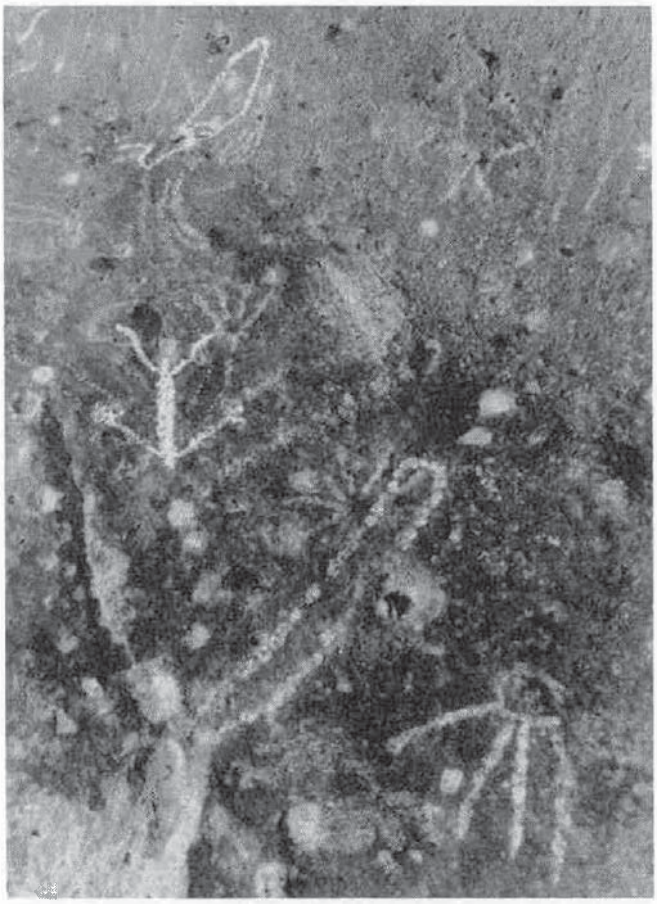

Figure 2. Rock art, Nurrabullgin 1.

rests upon a mutual trust that archaeological work will proceed in full consultation with traditional owners and that, within their policy guidelines, autonomy in research and publication of findings will occur. It involves frequent meetings with Kuku Djungan elders and their direct involvement in fieldwork wherever possible.

The case for Kuku Djungan custodianship of Nurrabullgin hangs significantly on archaeological data collected by Roger Cribb and Bruno David who have worked with the Kuku Djungan over the last two years. It has been archaeological rather than anthropological evidence that has figured most prominently in building their case. Kuku Djungan ties with this land are enhanced by the archaeological evidence and it is important that this aspect of Kuku Djungan heritage is preserved. However, the *Cultural Records (Landscapes Queensland and Queensland Estate) Act* has so far proven to be ineffective in protecting archaeological sites (and even fails to make any specific reference to Queensland's Aboriginal people!). The Kuku Djungan Aboriginal Corporation, with Archaeological Adviser Roger Cribb and Principal Researcher Bruno David, have requested that the federal government declare Nurrabullgin a heritage area and, by order, restrict legal entry to authorised visitors under the *Aboriginal and Torres Strait Islander Heritage Protection Act, 1984*.

Archaeological fieldwork in 1991

In May 1991, a shelter designated Nurrabullgin 1, on the northern slopes below the escarpment, was excavated by Bruno David. It yielded a radiocarbon date of 4110 ± 70 BP (Beta-45772) and contained extensive traces of paper bark, suggesting the use of sleeping mats. Large numbers of edible nuts were recovered, enabling a rare glimpse into this aspect of the prehistoric diet. A second site, on the plateau itself, designated Nurrabullgin Cave, contained artefacts in its deepest levels and a sub-basal date of 'greater than 37 170 BP' (Beta-45906) (Figure 1). The full sequence of four radiocarbon dates, three of them 30 000 BP or older, has served to focus attention on Far North Queensland as an important area for archaeological research.

In addition to the two excavations, thirteen rock art sites and 222 rock pictures were recorded from Nurrabullgin. Of these, paintings are the most common, contributing 185 of the pictures, with stencils (hands and boomerangs) and prints (hands) also being present. The paintings consist predominantly of non-figurative designs (Figure 2) reminiscent of the art of Chillagoe to the south and south-west, but distinct from the art of the Bonny Glen, Mitchell River, Palmer River and Laura regions to the north (Table 1) (cf.

	Biomorphs	Material Culture	Tracks	Non-figurative
Koolburra Plateau	69.9	1.0	13.6	15.5
Jackass Station	87.4		7.2	5.4
Jowalbinna Station	91.0	1.4	0.9	6.7
Mitchell-Palmer Limestone	78.9	9.1		11.9
Bonney Glen Station	62.8		2.9	34.3
Cooktown Hinterland	53.7	2.6		43.5
Bare Hill	65.5	7.3	3.6	23.6
Nurrabullgin	9.2		5.9	84.9
Chillagoe	3.3	0.2	13.1	83.3
Central Queensland	2.9		5.1	91.9
Lawn Hill	9.5		18.9	71.6
Mt. Isa	18.2		6.1	75.7

Table 1. *Proportions (percentages) of motif types by region. Note that biomorphs = anthropomorphs + zoomorphs + plants + therianthopes.*

David and David 1988; and Cole and David in this issue of *RAR*). David (1992: 4-5, 8) notes:

> Given the geographical position of Nurrabullgin and Kuku Djungan country on the periphery of what had previously been identified as a southern rock art tradition by David and Cole (1990) and David (1991), and adjacent also to a significantly different rock art tradition found to the north (including the art of Kuku-minni country) (see also Maynard 1977), the area was considered important to the investigation of rock art and territorial networks for the region's prehistory. Of particular interest was the possibility of investigating the distribution of rock art forms associated with documented inter-regional social relations in north Queensland.
>
> ...
>
> The separation of the northern and southern rock art forms ... occurs over a narrow area between the Mitchell and Walsh Rivers in southern Cape York Peninsula. The changeover is sudden and does not appear to involve gradual changes in the relative proportions of motif forms as the interface zone is approached. The exact location of this interface zone is not known, but includes the rugged Featherbed Ranges which are dissected by the Walsh River.

It was in this context that Nurrabullgin was originally surveyed - in order to shed further light on the nature of rock art sites in this area. There is a rich rock art assemblage in shelters on the plateau and the flanks of the mountain. The area lies within the range of the non-figurative painting tradition found in the Chillagoe area, which is distinct from the 'Quinkan' art to the north. There is a great diversity in colours used and individual motif forms, including a limited number of figurative motifs, bar and lattice designs, geometric patterns, boomerang and hand stencils, and hand prints. Many of the hand stencils are those of children. There are extensive, open areas to the north of the escarpment with high densities of surface artefacts, and these appear to be associated with nearby rockshelters. A great variety of raw materials have been used in the manufacture of stone artefacts, some of which have been introduced from sources a few kilometres from the sites.

Most of the archaeological sites noticed and recorded from Nurrabullgin are rock art sites, with recorded open stone artefact scatters being in direct association with rock art sites. All rock art sites recorded were located within 100 m of water, and most were within 50 m of a water source. Importantly, rock art sites were identified from all zones where suitable rock outcrops occur, and this may indicate that rocky areas such as the southern end of the mountain may be particularly rich in rock art sites.

The sites at Nurrabullgin are generally in good condition, but conservation problems have been identified in all cases. Major problems include termites (Watson and Flood 1987), water run-off on painted surfaces, natural flaking of the rock, and fungal growth on relatively flat rock surfaces (Table 2). Significantly, no graffiti have been observed in any site. Given the increase in tourism in north Queensland in recent years, and the proposal to make Nurrabullgin a National Park, conservation problems and issues of site management will need to be addressed. It is imperative that a management plan, devised by and employing Kuku Djungan elders, be developed in the near future. This should occur before tourist visitation to Kuku Djungan traditional sites gets out of hand.

The Kuku Djungan Aboriginal Corporation has proposed an immediate plan of action to ensure that no further damage takes place at Site 1 and at sites on top of the mountain. Brumbies (feral horses) have created extensive damage of the sediments in one part of Site 1, and the Kuku Djungan elders have therefore proposed that the site be urgently properly fenced to restrict brumbies from entering. A preliminary fence has already been erected, but it is only a temporary structure. The need to fence the site cannot be overstated. It is also proposed that access to the more culturally sensitive parts of the mountain be restricted and these be visited only in the company of Kuku Djungan elders.

As David (1992: 9) notes in his report to the Institute of Aboriginal and Torres Strait Islander Studies,

> Management and conservation issues at Nurrabullgin must begin with the wishes of the local Kuku Djungan traditional owners to whom the area has special Dreaming significance. The mountain is a sacred place, and normal conservation practices may or may not be applicable to all cases at Nurrabullgin. Because of the great sensitivity of the area, it is therefore imperative that all proposed conservation and management work in the area be preceded by detailed, two-way consultations with the Kuku-Djungan elders.

The current priorities are to begin drafting and implementing the 'Nurrabullgin Heritage Management Plan'. This includes the training of young Kuku Djungan as Rangers, site recorders and archaeologists. The elders will be involved in passing on traditional knowledge. The Archaeological Adviser, Roger Cribb, will begin a systematic site survey in 1992 with trainees. This will be a survey of the plateau and lower flanks, together with areas of the Featherbed Ranges to the west, aimed at assessing the full range of Aboriginal heritage in the area. Further excavations and rock art recordings by Bruno David and Kuku Djungan trainees will begin in mid-1993. The aim is to further investigate the Holocene and late Pleistocene chronology of the area, and the project will include an extension of the original test pit in Nurrabullgin Cave.

Lastly, and most importantly, the site protection program that will provide physical protection of heritage sites together with interpretation for visitors will be implemented by the Kuku Djungan Rangers, with archaeologists Roger Cribb and Bruno David, site recorders, other specialists and Q.N.P.W.S. staff. One of the first priorities is a program of feral animal control and

	Type of Damage							
Site	Pigs	Brumbies	Macropods	Insects (nests)	Mineral Staining	Fungus	Flaking	Leaching
1	*	*				*	*	
2			*	*	*	*	*	
3								
4				*	*	*	*	
5	*			*	*	*	*	
6				*				
7				*			*	
8				*		*	*	
9				*	*	*	*	
10				*				
11					*	*	*	*
12								
13				*				

Table 2.
Types of damage recorded in each of the thirteen rock art sites on Nurrabulgin.

management of visitation.

The first visitors to be received under the Nurrabullgin Heritage Management Plan will be delegates of the Second AURA Congress, scheduled to be held in Cairns in August/September 1992. The archaeological advisers with Kuku Djungan elders, Rangers and trainees will guide the visitors to the two sites outlined above, in addition to other sites of both archaeological and Dreaming significance. Nurrabullgin is a place of great importance to the local Kuku Djungan owners, with many Dreaming places on the mountain having restricted access. It is hoped that all future visitors to Nurrabullgin will enter Kuku Djungan country with the care and respect which such conditions require.

John Grainer, Chairman, Kuku Djungan Aboriginal Corporation, 19 Fenwick Street, Mareeba, Qld 4881, Australia
Bruno David, Department of Anthropology and Sociology, The University of Queensland, Brisbane, Qld 4072, Australia
Dr Roger Cribb, 8 McGregor Street, Manoora, Cairns, Qld 4870, Australia
Bruce White, 18 Duignan Street, Whitfield, Cairns, Qld 4870, Australia
Hilary Kuhn, Pinnacles Road, Julatten, Qld 4871, Australia

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RAR 9-233

SYMPOSIUM RATIONALE H, SECOND AURA CONGRESS

Management of rock imagery

Symposium H of the Second AURA Congress

B. FORD, G. K. WARD and B. WARE

Proper management of rock art sites can make a major contribution to their preservation. Site managers may apply conservation methods to prevent or lessen physical deterioration, implement simple protection measures to obviate the impact of wild, feral and domestic animals, and research, develop and apply visitor control techniques. It has become clear in recent years that this last aspect may be crucially important in site conservation, especially in areas of high visitation. Appropriate visitor management techniques can reduce the chance of vandalism, obviate inadvertent damage to rock art, lessen the impact of visitation upon site environs, and enhance visitor appreciation of rock imagery. Design of site access, directional, proscriptive and informational signage is important in this regard. Visitor books have been found to be important in monitoring visitation impact; simple evidence - such as a basic sign or visitors' book - that a site is managed can contribute significantly to site protection. What of the roles of signage, brochures, board-walks, low barriers, fences and protective cages? Is restricted access combined with guided tours the answer to visitor management and protection of imagery at many rock art sites? What do visitors want from guided tours and site information? Is site visitation compatible with site conservation?

These questions fall within the sphere of the site manager, and will provide the focus of this symposium.

It is expected that a major contribution to discussion will be made by Aboriginal site managers, both traditional custodians, and rangers and guides trained and employed by Aboriginal agencies and national parks authorities, as well as by non-Aboriginal researchers, managers and rangers working in Australia and elsewhere.

Call for papers

Papers on all aspects of site management are sought, including those dealing with:

- implementation of conservation methods, protective measures and visitor management such as construction of walk-ways and signage;
- contributions to evaluation of conservation methods, etc.;
- research into visitor behaviour;
- examples of site management strategies designed to ensure that a site is maintained in the future and the co-operative role of researchers and custodians in achieving long-term preservation policy.

Abstracts of less than 200 words should reach Graeme Ward before 15 July 1992.

Conveners:

Bruce Ford, The Australian National Gallery, Parkes Place, Canberra ACT 2600, Australia
Dr Graeme K. Ward, The Australian Institute of Aboriginal and Torres Strait Islander Studies, G.P.O. Box 553, Canberra ACT 2601, Australia
Bob Ware, Aboriginal Heritage Branch, Department of Environment and Heritage, G.P.O. Box 667, Adelaide S.A. 5001, Australia

RAR9-234

ORIENTATION

Cairns '92

THE SECOND AURA CONGRESS
Cairns, 30 August - 4 September 1992
FINAL ANNOUNCEMENT

ACADEMIC PROGRAM

The Second AURA Congress will comprise the following symposia:

A) ***Rock art studies: the post-stylistic era. Where do we go from here?*** Chaired by Dr Michel Lorblanchet (France) and Dr Paul Bahn (United Kingdom).
B) ***Rock art and information exchange.*** Claire Smith (Australia).
C) ***Rock art studies as a curriculum for teaching.*** Dr Giriraj Kumar (India) and Professor Osaga Odak (Kenya).
D) ***The rock art of the Sahara.*** Alfred Muzzolini (France).
E) ***Spatial considerations in rock art.*** Dr Paul Faulstich (U.S.A.) and Dr Paul Taçon (Australia).
F) ***Dating of rock art.*** Alan Watchman (Australia) and Professor Jack Steinbring (Canada).
G) ***Preservation of rock art.*** Andrew Thorn (Australia) and Jacques Brunet (France).
H) ***Management of rock imagery.*** Dr Graeme Ward (Australia), Bruce Ford (Australia) and Bob Ware (Australia).
I) ***Rock art of north Queensland.*** Dr Mike Morwood (Australia) and Noelene Cole (Australia).
J) ***The ethics of rock art research.*** Robert G. Bednarik (Australia) and Mario Consens (Uruguay).
K) ***General session.*** Chair to be nominated.
L) ***Workshops on management: indigenous experiences and perceptions.*** Natalie Franklin (Australia) and Michael Rowland (Australia).

Papers are still being accepted in several of the symposia, notably Symposia C, D, G, H, I and J. Abstracts of 100-200 words should be sent to the respective chair person(s) or the *RAR* editor. Rationales for most symposia have appeared in previous issues of *RAR*, and the rationale for Symposium H appears on page 77 of this issue. Any subject related to palaeoart studies can be accommodated in the General Session (Symposium K).

In response to concerns expressed by one participant, regarding 'publication rights' of papers: these are reserved purely on behalf of the symposium chairs, who have a reasonable expectation to preserve the final results of their considerable labours intact, as much as possible. It should be emphasised that the publication of proceedings places a very considerable strain on our quite limited resources, and most particularly on myself. AURA would be most receptive to any proposal by alternative publishers, provided that the integrity of the symposium proceedings in question is not at risk.

The official language of the Congress is English, but a small number of papers in other major languages can be accepted. A strict time limit of 20 minutes applies to all academic presentations, and symposium chairs will be obliged to terminate any presentation after that time.

ADDITIONAL EVENTS

1) The Second General Meeting of AURA. Chair: AURA President George Chaloupka, A.O., with Vice President Professor Jack Steinbring. AURA members are invited to submit agenda items to the editor.
2) The 1992 IFRAO Meeting. Chair: IFRAO Convener and Acting Chairman Robert G. Bednarik. The meeting will consist of two sections: the Third Executive Business Meeting of the IFRAO Council will be preceded by an open Consultation Meeting, which can be attended by any participant of the Congress and which will provide a forum for raising and discussing any matter concerning the discipline. The agenda of the business meeting appears in the *IFRAO Report No. 8*, this issue.
3) CAR Meeting. Chair: CAR President Dr Jean Clottes.
4) Meeting of the ICOM-CC Rock Art Conservation Working Group. Chair: Jacques Brunet and Ivan Haskovec (see announcement in *RAR* 8: 152).
5) AURA Exhibition Meeting. Chair: Dr Paul S. C. Taçon and Robert G. Bednarik.

Cairns '92 will include presentations of ***films*** and videos. The latter must be of VHS type. There will be an exhibition of ***posters*** and photographs. Of particular interest should be a major, professionally organised ***book exhibition***. Several new rock art books will be officially launched at the Congress, including two volumes produced by AURA.

A special event of the Second AURA Congress will be the world premiere of a new film about Australian rock art, currently being produced in the land of the Barunga-Wugularr Community, Northern Territory. This film includes ethnographic footage of a traditional rock artist, Peter Manabaru, at work. The project is conducted by symposium chair Claire Smith, and is a co-production of several organisations. Mr Manabaru and several other members of his community will attend the premiere and the Congress as guests of the Congress, and members of the Barunga-Wugularr Community will deliver an academic paper in Symposium J.

Reflecting the extensive Aboriginal participation in the Second AURA Congress, from numerous communities, Aboriginal academics and scholars, artists, site custodians and site managers, an ancient custom named Mulgri sticks ceremony will be revived during the opening of the Congress. All congress participants are requested to read the detailed announcement below (p. 80), in case they wish to contribute.

ORGANISATIONAL ASPECTS

Cairns committee member Mary Haginikitas has accepted the role of Congress Co-ordinator. She draws our attention to the following points:

There is a pronounced preference, in the bookings received so far, for accommodation close to the congress venue. It should be noted that the Colonial Club, although located 6 km from the congress venue, has a courtesy bus which travels to the Hilton and back at hourly intervals throughout the day. That hotel will also meet guests on arrival at the airport, and deliver them there on departure. Guests departing for field trips can leave their excess luggage in storage until they return, similar arrangements are possible at most hotels. Guests who have checked out on the morning of their day of departure may use the guest lounge,

gardens, pools and other facilities throughout the day. The same applies to arrivals before check-in time.

Congress delegates who have books, tapes or videos they would like to see featured in the book display are invited to bring such items. Also, new books or videos by delegates can be launched, at the cocktail party on Monday night (31 August) or on other suitable occasions.

There will be a desk at the Hilton (the congress venue) where Stephen Trezise will take all bookings and enquiries for field trips. There will also be a desk attended by Graham Gordon, of Toureps, Cairns Destination Management Services, where bookings can be made for tours other than listed congress tours (e.g. to the Barrier Reef, rainforest tours etc.).

The ***registration desk*** is to be located on the ground floor of the Cairns Hilton. It will be opened on 25 August and remain open daily until 5 September, for full registrations, day registrations and enquiries. The desk will be attended by AURA volunteers under the direction of Treasurer Elfriede Bednarik. Finally, there will also be a secretariat office for administrative matters.

Professional child minding services will be available to congress delegates on application.

Here are the addresses of ***key organisers*** of the Congress:

Concerning organisational matters, difficulties with bookings, media releases, book launches and exhibits, general enquiries concerning the host city, local transport and facilities:
Mary Haginikitas
AURA Congress Co-ordinator
P.O. Box 1506
Cairns, Qld 4870
Australia

Concerning rock art field trip details and bookings:
Stephen Trezise
Trezise Bush Guide Service
P.O. Box 106
Freshwater, Cairns Qld 4870
Australia

Concerning general tours, tourist packages etc.:
Graham Gordon
Toureps
P.O. Box 87
Melaleuca St., Cairns Qld 4870
Australia

Concerning transfer of payments, registration fees etc.:
Elfriede Bednarik
AURA Treasurer and Congress Registrar
P.O. Box 216
Caulfield South, Vic. 3162
Australia

Ansett Airlines is the official airline of the Congress, and Coles Myer Ansett Travel Pty Ltd is the official travel agent of the Congress (see registration form for address).

FIELD TRIPS

The Ang-Gnarra Aboriginal Corporation hosts the Laura field trips, but is not responsible for transport, food or camping equipment. Bookings will be taken each morning of the congress days, and bookings can be made at Ang-Gnarra's office in Laura. There will be half-day trips, day trips, two-day trips and three-day trips. For trips longer than a day, Ang-Gnarra will supply the necessary support pack horses. The charges for all tours guided by Ang-Gnarra Rangers are $A35 per half day, $A70 per full day per person. For delegates with lower budgets, three rock art sites will be accessible. The field trips guided by Ang-Gnarra Rangers are marked **1**) in this list:

Pre-congress field trips (for maps, see pages 6 and 81)

1-day trips from Cairns (self-drive):
1-day trip to Chillagoe rock art.
1-day trip to Bare Hill site.
Participants to call at registration desk.

Overview of north Queensland rock art (Bruno David): regretfully, this field trip had to be cancelled as the tour leader had to withdraw due to other commitments.

Self-drive tour to Laura (Quinkan Reserves): **1**)
Car rental companies permit only 4WD vehicles to travel to Laura due to road conditions, although Laura is accessible by conventional vehicles. The driving time from Cairns to Laura is about 5 hours. Laura is a very small town with limited services. Camp grounds and guide service available in Laura, day bookings at Laura office of Ang-Gnarra from 22-29 August.

Self-drive tour to Jowalbinna and Deighton (S. Trezise): **2**)
Self-drive visitors are welcome at both camps. Beds and meals may be available, depending on demand, but self-drive travellers should be equipped to camp. Guide service is $A50 per person per day. Access to Jowalbinna and Deighton River is via Laura.

Bus tour to Laura (Quinkan Reserves): **1**)
4 days, $A275, camp ground fee included, provide own camping gear and food. Participants to call at registration desk on 25 August.

Jowalbinna Bush Camp, Laura (S. Trezise): **2**)
5-day 4WD safari, $A750.
4-day 4WD safari, $A600.
2-day fly/fly, $A595.
1-day fly/fly, twin engine, $A275.
1-day fly/fly, single engine, $A210.

Deighton River Bush Camp, Laura (S. Trezise): **2**)
5-day rock art safari, drive/fly, $A625 (fit participants).

Rock art in Townsville area (Elizabeth Hatte):
1-day self-drive, 4WD not necessary.

Grand Tour 1992 (Dr Hugh Cairns and Howard P. McNickle):
Ex Perth/Dampier. See details below and in *RAR* 8: 151.

Grand Tour of New South Wales (Caryll Sefton):
Ex Sydney. See details in *RAR* 8: 151.

Nurrabullgin 3-day August tours (Kuku Djungan):
Depart Cairns 25 August and 27 August, see announcement below for details.

Post-congress field trips (for maps, see pages 6 and 81)

Self-drive tour to Laura (Quinkan Reserves): **1**)
Car rental companies permit only 4WD vehicles to travel to Laura due to road conditions, although Laura is accessible by conventional vehicles. The driving time from Cairns to Laura is about 5 hours. Laura is a very small town with limited services. Camp grounds and guide service available in Laura, day bookings at Laura office of Ang-Gnarra from 5-11 September.

Self-drive tour to Jowalbinna and Deighton (S. Trezise): **2**)
Self-drive visitors are welcome at both camps. Beds and meals may be available, depending on demand, but self-drive travellers

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1) The logistics of field trips marked 'Quinkan Reserves' will be arranged by tour operators where applicable, and the guide services will be provided by the Rangers of the Ang-Gnarra Aboriginal Corporation.

2) Field trips marked 'S. Trezise' are arranged by Trezise Bush Guide Service. Costs listed are approximate and all inclusive, except sleeping bag. Bookings can be made at the congress field trip desk, tickets will be issued for tours. For details, contact Stephen Trezise, address above left.

should be equipped to camp. Guide service is $A50 per person per day. Access to Jowalbinna and Deighton River is via Laura.

Bus tour to Laura (Quinkan Reserves): 1)
4 days. $A275, camp ground fee included, provide own camping gear and food. Bookings at congress field trips desk.

4WD safari to Laura (Quinkan Reserves): 1)
5 days. $A640 all inclusive, supply own sleeping bag. Bookings at congress field trips desk.

Jowalbinna Bush Camp, Laura (S. Trezise): 2)
5-day 4WD safari, $A750.
7-day 4WD safari, $A950. Jowalbinna/Deighton combined.
2-day fly/fly, $A595.
1-day fly/fly, twin engine $A275.
1-day fly/fly, single engine $A210.

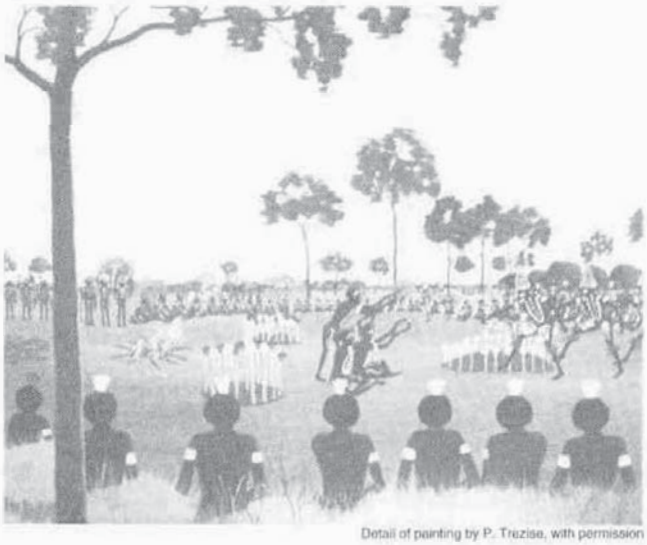
Deighton River Bush Camp, Laura (S. Trezise): 2)
4-day rock art safari, drive/fly $A500 (fit participants).

Nurrabullgin 3-day September tours (Kuku Djungan):
Depart Cairns 5 September and 7 September, see announcement below for details.

Queensland Tour (Robert G. Bednarik):
See details in *RAR* 8: 151. Confirm participation at registration desk.

CONGRESS OPENING CEREMONY

The Second AURA Congress is characterised by extensive Aboriginal participation. Numerous Aboriginal scholars, artists and custodians will attend the event, with many Aboriginal communities being involved, such as Ang-Gnarra of Laura, Kuku Djungan of Mareeba and Barunga-Wugularr of Katherine. This strong emphasis on Aboriginality has led to the suggestion that an ancient custom from the Cape York Peninsula be revived, and extended to the international context of the Congress. It is the ceremony of the Mulgri sticks, or 'country sticks'. Percy Trezise describes them as a type of message stick which bears a symbol representing the Mulgri spirit of a particular clan (the sea eagle Yarragarra, willy wagtail etc.). The Mulgri spirits of the Lardil, for instance, are associated with Thuwathu, the Rainbow Serpent. The 'country sticks' are brought to a meeting of clans and planted in a mound of soil or sand for the duration of the meeting. Their function is ceremonial, comparable perhaps to the credentials presented by ambassadors. Trezise has observed the ceremony many years ago, and recorded it in one of his paintings (see detail as reproduced here).



Detail of painting by P. Trezise, with permission

It is suggested that this Aboriginal protocol, whose symbolism is universally valid, should be the model for a similar 'presentation of the country sticks' at the opening of the Second AURA Congress on 30 August. Delegates of various countries, organisations, communities and clans will place their Mulgri sticks in a mound of sand at the venue of the opening ceremony, the Cairns Civic Centre, thus honouring and maintaining an ancient Australian custom.

Delegates wishing to actively participate in this ceremony are asked to bring sticks, pointed at one end and perhaps 40 cm long, decorated with their 'clan insignia'. Ideally (but not necessarily) the presenters would appear in a national costume or similarly distinctive attire. The ceremony will thus be colourful, but it will be conducted with the dignity one would expect of such an occasion, and under the authority of the most senior traditional Aboriginal delegates present, who will instruct on observing the correct protocol.

The clan stick of AURA is being designed by artist Mary Haginikitas. It will be 40 cm long, green and gold, and will bear the AURA logo (trident on Australian map). Overseas delegates are reminded that they will need to declare wooden objects when entering Australia, due to the strict quarantine regulations of the country, but I have been assured by the relevant government office that there would be no difficulties as long as the sticks are mentioned on the quarantine forms all international arrivals have to complete.

R. G. Bednarik

RAR 9-235

The Grand Tour 1992

This tour will leave Dampier on 1 August (or Perth overland 29 July) and arrive in Cairns 24 August. The minimum number required for the Amesz safari vehicle has been registered, so the 6WD vehicle is firmly booked. At the time of writing, four places remain available on it, the cut-off date for receiving fully paid bookings is 25 June.

Other participants of the Grand Tour will travel with hired or own vehicles, and may join this group at $A20.00 registration fee. It costs $A8.00 per day per person for Amesz to do the catering and we recommend that this option be taken. Participants are responsible for their own camp fees and personal and travel expenses. Register with Tour Leader Dr Hugh Cairns, 23 Wallaroy Road, Double Bay, NSW 2028, Australia, or phone (02) 327 1488. Please register early to assist planning.

The group comprises people of very diverse interests, knowledge and expertise, such as chemistry, geology, linguistics and anthropology of religion, as well as poetry, feminist studies, spirituality, nursing, motherhood and youth education; even the technical wizardry of world-beating boomerang throwing! What we perhaps all share is a need to pay homage to the art of the first Australians, to discover and adventure, and 'to keep thinking unto it' as Darwin said about how to solve problems and approach mystery.

H. C. Cairns and H. P. McNickle

The Grand Tour of New South Wales

This tour requires at least four more bookings to proceed. Additional participants are requested to urgently contact the Tour Leader, Caryll Sefton, 12 Chenhall Street, Woonona, NSW 2517, Australia, or phone (042) 360 542.

Kuku Djungan Nurrabullgin Rock Art Tours

Nurrabullgin: 'once seen, never to be forgotten'

The Kuku Djungan Aboriginal Corporation invites Congress delegates to visit Queensland's most exciting archaeological site: Nurrabullgin Cave, which has just yielded the earliest occupation date in Queensland - see full report on page 74 of this issue of *RAR*. Specially organised three-day tours will be available to congress delegates, and will be led by Kuku Djungan Aboriginal

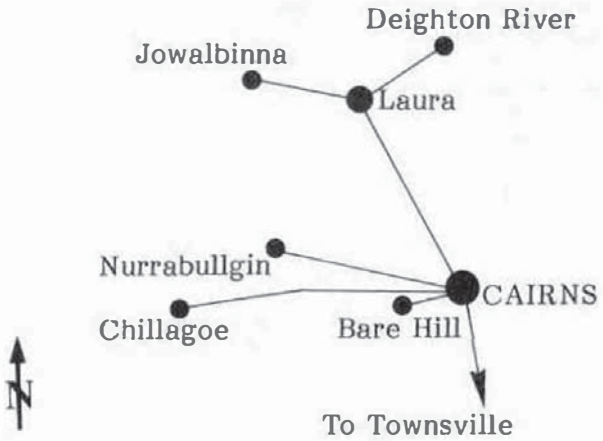
elders, assisted by archaeologists Dr Roger Cribb and Bruno David, and by trainee Aboriginal rangers. Participants will be the first visitors to be taken to the sites on this sacred mountain by the traditional custodians.

There will be four field trips, costs are all-inclusive (travel, camping, provisions, fees):

OPTION 1: both ways by 4WD: $A485.00 per person.
OPTION 2: one [illegible] helicopter, return by 4WD: $A695.00 per person.

Departures from Cairns: 25 August, 27 August, 5 September, 7 September 1992.

For all enquiries and reservations: telephone or fax the Kuku Djungan Aboriginal Corporation on (070) 923 797, or write to 19 Fenwick Street, Mareeba Qld 4880, Australia.



Field trip destinations, schematic

On behalf of the field trip participants of the Second AURA Congress, the members of the congress committees express their gratitude to the Aboriginal site custodians of Australia, whose sites delegates will visit in the course of the many field trips. Delegates are reminded that all rock art sites in Australia are visited by the grace of the Aboriginal people, to whom they belong.

Notices

Life membership with AURA has proved to be popular: at the time of going to press, AURA has twenty-seven Members for Life.

The Rock Art PROTECTION PROGRAM administered by the Australian Institute of Aboriginal and Torres Strait Islander Studies will continue in 1992. It has three main aims: conservation of endangered rock art sites, survey and documentation of newly reported rock art areas and major sites, and research into the Aboriginal cultural significance of sites. Applications must be received by 30 June 1992. For further information contact Dr Graeme Ward, AIATSIS, G.P.O. Box 553, Canberra 2601.

SIBERIA'S Museum Tomskaya Pisanitza has assembled the exhibition 'Ancient rock art of Asia', under the direction of Professor Anatoliy Martinov. It consists of 200 precise replicas of rock art from Altai, Kirgisia, Kasakhstan, and from the Siberian valleys of the Lena, Angara and Yenisei. The exhibition is available to travel abroad. For details contact the editor.

GERMANY'S Kult-Ur-Institut für interdisziplinäre Kulturforschung at Lollschied has received the world's largest collection of Scandinavian and Alpine petroglyph recordings, thanks to the efforts of its Director, Professor Harald Braem. The approximately 12 000 recordings are the result of over thirty years of work by Dietrich Evers and his wife Anneliese. Evers has always tried to make the results of his work accessible to the public, having so far conducted eighteen rock art exhibitions. These have created much interest abroad. He has also published numerous books and essays. In view of his achievements for rock art studies, Dietrich Evers has been made an Honorary Member of the Institut.

Thomas Schulte im Walde

Dr Josephine FLOOD, who has recently retired from her position as head of the Aboriginal Environment Section of the Australian Heritage Commission, has been made an Honorary Visiting Associate Professor of the University of Canberra.

The proceedings of the following Darwin congress symposia are now available from AURA: Symposia M (conservation and site management) and E (recording and standardisation) appear in Volume 4 of the *Occasional AURA Publications*; Symposia H (ethnography) and O (repainting) appear in Volume 5; Symposia C (Australia and Melanesia) and D (northern Australia) appear in Volume 6. For details please refer to page 73. The proceedings of Symposium G (prehistory) have been published in Britain. The Symposium A volume (Old World) has been published in India, where it was launched by the Prime Minister of India on 16 March 1992. The book is priced at US$50.00, ordering details will be in the next issue of *RAR*. The Symposium B proceedings (Americas) are in press.

Back issues of *RAR* are available, beginning with 1988. All earlier issues have been out of print for some time. Please note that membership fees and subscriptions for 1992 are now due (see enclosed form).

THE KÄTHE AND FRANZ SCHIPFER FOUNDATION

A bequest has been made to AURA by Elfriede K. Bednarik, on behalf of her parents, Käthe and Franz Schipfer. The sum of $10 000 is to be held in perpetual trust by AURA, with annual awards to be made from the income to gifted rock art researchers, under the supervision of a panel of rock art scholars. It is proposed that the award should be for the rock art publication judged to be the best of a year, in terms of originality, rigour and scientific merit. Any person shall be eligible. In the event that AURA should cease to function, the Foundation shall be passed on to an organisation of similar aims and ideals, to be administered by it for a similar purpose. The Käthe and Franz Schipfer Award shall be presented on the 26th day of January, every year beginning with 1994. Submissions for the first award will be invited in the May 1993 issue of *RAR*.

IFRAO Report No. 8

THE FIRST SARARA INTERNATIONAL CONFERENCE

MAURICE P. LANTEIGNE (RAAC)

The First International Conference of the Southern African Rock Art Research Association was held at the Cathedral Peak resort hotel in the Natal Province of South Africa, 25 - 31 August 1991. Isolated in the foothills of the Drakensberg mountain range bordering the eastern boundary of Lesotho, the resort is surrounded by the Amazulu peoples who have lived in the region for some 150 years. By tradition a cattle-rearing society, the Zulu were awarded the Natal Province by the British to serve as a buffer against 'Bushman' hunter-gatherers who frequently raided European settler farms. Today Natal-Kwazulu has 5.8 million people, 72 per cent of which are Amazulu, the majority of white South Africans preferring the more fertile provinces of Transvaal and Orange Free State.

The Conference was convened by the President of SARARA, Mrs Shirley-Ann Pager, the main objectives being to initiate a new international understanding on scientific recording and conservation standards in southern African rock art research. It was attended by approximately seventy-five South African and international scholars, and included delegates from Australia, Botswana, Canada, Italy, Kenya, Malawi, Netherlands, Tanzania, United Kingdom, U.S.A., Uruguay and Zimbabwe.

Some thirty-six papers were presented over a five-day period and included:

Rock art management, by S. Bassett, South Africa.

Rock art in the eastern Transvaal - can the ends be tied?; *Compositional relationships - a case study from Natal Drakensberg*; and *Putting the message across*, by A. Batchelor, South Africa.

Is ancient sky-mapping expressed in prehistoric artistic cultural material? by H. Cairns, Australia.

Methodological approaches in the research process of South American rock art; and *Change and variation in rock art, are they indicators of social difference and cultural modifications?* by M. Consens, Uruguay.

South African rock art and the South African National Monuments Council, by J. Deacon, South Africa.

Outdoor education: an effective vehicle for building conservation values, by M. Gorden, U.S.A.

The elemental analysis of rock art paint using PIXE and RBS, by L. Jacobson, M. Peisach and C. A. Pineda, South Africa.

Cation-ratio dating: some recent South African results, by L. Jacobson, South Africa.

A statistical analysis of animal figures in the rock art of the lower Tsisab Ravine, Brandberg, Namibia, by L. Jacobson, L. G. Underhill and M. Peisach, South Africa.

The role of rock art in education, by R. Johns, Australia.

Rock art of the Mphunzi Nthulu Hills, by Y. Juwayeyi, Malawi.

Monitoring cave paintings for pigment loss and deterioration, by D. Lambert, Australia.

Palaeoneurology - mapping the neural pathways of the human brain: implications for cognitive and ideological theory in rock art, by M. P. Lanteigne, Canada.

Correlations between the 'real' and 'unreal' in San rock art, by N. Lee, South Africa.

The role of rock art in mathematics education, by A. Martinson, South Africa.

The rock art of Lukuba Island, Tanzania; and *Speculation on the motivation and meaning of central Tanzania rock paintings*, by F. T. Masao, Tanzania.

Rock art and the public - an educational approach, by P. Miles, South Africa.

Rock art observations and research in the Northern Cape and the development of the McGregor Museum's collection; and *Multiple agencies in the deterioration of rock engravings at Driekopseiland*, by D. Morris, South Africa.

Recording rock art photographically, by G. Newlands, South Africa.

Dating rock art in the Olary district of South Australia: an evaluation of the cation-ratio method, by N. Nobbs, Australia.

Status of rock art legislation in Kenya; and *Distribution of cup marks at Kebaroti Hill sites of south Nyanzo District, Kenya*, by O. Odak, Kenya.

The intensification of ritual and the disappearance of trance-related rock art studies, by F. E. Prins, South Africa.

The challenges of conservation in the Natal Drakensberg, by J. S. Scotcher, South Africa.

Photography versus tracing, by L. Smits, Netherlands.

Figure 1. Some of the delegates at the First SARARA International Conference. Left to right, standing: Dr Fidelis T. Masao (Tanzania), Ms Elda Coretti (United Kingdom), Mrs Miriel Lenore (Australia), Professor Osaga Odak (Kenya), Mr Bert Woodhouse (South Africa), Darius (conference chauffeur), Mr J. Gorden (U.S.A.), Dr Yusuf Juwayeyi (Malawi); seated: Mrs Mary Gorden (U.S.A.), unknown, Mrs Runa Johns (Australia), Mr Neil Lee (South Africa).

Problems in the conservation of rock engravings in natural environments and in open and closed museums, by R. H. Steel, South Africa.
Methods of interpretation and the study of rock art in east central Nevada, by B. K. Swartz, U.S.A.
Rock paintings of sheep in Botswana, by N. Walker, Botswana.
'Entoptics': their incidence in southern African rock art, and *Prehistoric handedness*, by A. R. Willcox, South Africa.
Deterioration, damage, desecration, disappearance and dynamite, by H. C. Woodhouse, South Africa.

While the proceedings initiated very provocative discussions on recording standards, particularly on the appropriateness of contact recording, perhaps the greatest achievement of the conference was political, for it marked one of the first international scientific conferences in South Africa for more than thirty years which allowed participants from Kenya and Tanzania, an observation accentuated by Professor Osaga Odak's (Kenya) closing address to the conference. The international scientific community should take note, as it is a clear indication of the positive political and social changes 'all' peoples of South Africa are committed to, as well as the organisational abilities of SARARA members - their sensitivity to, and dedication towards, augmenting international principles of human rights and freedoms in southern Africa.

The SARARA conference also hosted the Second Executive Business Meeting of the International Federation of Rock Art Organizations on 31 August, with Delegates from ARARA and from ACASPP (U.S.A.), AURA (Australia), CIARU (Uruguay), RAAC (Canada) and SARARA (Southern Africa). Its success was measured by its preparedness to include as observers to the meeting international delegates lacking full member status: representatives from Kenya, Malawi, Netherlands, Tanzania and Zimbabwe.

Conference participants were also treated to several half-day field trips within walking distance of the conference, including the famed Ndedema Gorge - Botha's Rockshelter, where Harald and Shirley-Ann Pager lived for several years recording the art. Included was a four-day post-conference tour to the Giant's Castle game reserve, hosted by Paul Miles, Environmental Officer for the Natal Drakensberg, with day-long hiking trips to various sites to which the ordinary tourist would not normally have access.

Of particular sadness was the recent passing away of Mrs Nancy Willcox in March of this year, after enduring a lengthy and painful illness. Sincerest condolences to Alex, family and friends. Her courage and stoicism in the face of such adversity deeply moved many conference participants, memory of her shall not soon be forgotten.

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THIRD BUSINESS MEETING OF IFRAO
Cairns, Australia, 31 August to 4 September 1992

The 1992 IFRAO Meeting will consist of two parts: an executive business meeting of IFRAO Representatives which will consider official business, to be preceded by an open consultation session. The latter can be attended by any participant of the Second AURA Congress and will provide a forum for raising and discussing any matter concerning the discipline. The proposals or suggestions resulting from this consultation session will then be raised under 'New business' or 'General matters' in the subsequent business meeting. The full agenda of the business meeting will be as follows (for details of some of the specific matters listed, please consult earlier *IFRAO Reports*):

AGENDA
1. Apologies and declaration of proxies.
2. Confirmation of the minutes of the 1991 meeting, held 31 August in Natal.
3. Matters arising from these minutes.
4. Reports of the Official IFRAO Representatives.
5. Matters submitted for consideration by the Council (listing initiating member):
   5.1. Establishment of a universal code of ethics (AURA).
   5.2. De-centralised data-sharing archival network (RAAC).
   5.3. Standardisation of keyword system (CeSMAP).
   5.4. Exchange network: journals, waiving of copyright, other matters.
   5.5. Standards for recording methods and sample removal (AURA).
   5.6. Provision of IFRAO Standard Scale (AURA).
   5.7. Name of the discipline (RASI).
   5.8. National and international indigenous organisations (RAAC).
   5.9. Education and academic curricula (RASI and EARARA).
   5.10. IFRAO's role in facilitating bilateral research arrangements (AURA).
   5.11. Draft constitution (ACASPP).
   5.12. IFRAO Plan for organising international support for local action against threatened destruction of rock art (AURA).
   5.13. Relationship with UNESCO and its agencies.
   5.14. Rock art heritage nominations.
6. Election of new members.
7. The 1994 Meeting in Flagstaff, Arizona.
8. Determination of venues for meetings 1995-1998.
9. New business.
10. General matters.
11. Adjournment.

rgb

TWO NEW FRENCH MEMBERS OF IFRAO

A recent postal ballot has resulted in the acceptance of two new members.

The Société Préhistorique Ariège-Pyrénées has been accepted as the eighteenth member of IFRAO. The Société is primarily concerned with the Ariège of south-western France, one of the world's most celebrated rock art regions. Over the years, its activities have centred more and more on rock art studies, which is not surprising considering the role of Dr Clottes, one of Europe's foremost rock art specialists, as the Société's editor. *Préhistoire Ariégeoise*, the Bulletin of the Société, has some 650 subscribers (in 64 countries), and is one of the most highly respected specialist journals in the world. It publishes work on rock art studies in any country, but only in French. Researchers who write in French are urged to submit their best work to this journal. The contact address is:

Société Préhistorique Ariège-Pyrénées
Dr Jean Clottes (Editor)
11, rue du Fourcat
09000 Foix
France

The Association pour le Rayonnement de l'Art Pariétal Européen has been voted in as IFRAO member number nineteen. ARAPE was created in 1991, and its main role is to support the publication of the *International Newsletter on Rock Art* (No. 1 appeared early in 1992). This newsletter, also edited by Dr Clottes, is published together with CAR-ICOMOS and UISPP Commission 9. It is a fully bilingual publication (French/English), a valuable information sheet rather than a scientific review journal, the intention of which it is to bring the latest news about events, finds, methods, developments, conservation and ethics fast and effectively to all scholars in this discipline. It thus provides a most valuable dissemination service to the discipline and, indirectly, to the Federation members.

The contact addresses for ARAPE and the Société are identical:

Association pour le Rayonnement de l'Art Pariétal Européen
Dr Jean Clottes (Editor)
11, rue du Fourcat
09000 Foix
France

Notices

An eastern African Rock Art Research Association (EARARA) is currently being incorporated in Dar es Salaam, Tanzania. We have been notified that it will seek affiliation with IFRAO as soon as these formalities are completed.

The Centro Studi e Museo d'Arte Preistorica wishes to host the IFRAO Meeting of 1995 in Italy, while the Sociedad de Investigación del Arte Rupestre de Bolivia has lodged its notice to prepare a bid for 1997. The Rock Art Society of India intends to host the IFRAO Meeting of 1998.

Here is a list of the current members of IFRAO:
American Committee to Advance the Study of Petroglyphs and Pictographs (ACASPP)
American Rock Art Research Association (ARARA)*
Association pour le Rayonnement de l'Art Pariétal Européen (ARAPE)*
Australian Rock Art Research Association (AURA)*
Centro de Investigación de Arte Rupestre del Uruguay (CIARU)
Centro Studi e Museo d'Arte Preistorica (CeSMAP)*
Gesellschaft für Vergleichende Felsbildforschung (GE.FE.BI.)*
Groupe de réflexion sur les méthodes d'étude de l'art pariétal paléolithique
Indian Rock Art Research Association (IRA)
Institutum Canarium (IC)*
Japan Petrograph Society (JPS)*
Rock Art Association of Canada (RAAC)*
Rock Art Association of Manitoba (RAAM)
Rock Art Research Association of China (RARAC)
Rock Art Society of India (RASI)*
Sociedad de Investigación del Arte Rupestre de Bolivia (SIARB)*
Società Cooperativa Archaeologica Le Orme dell'Uomo
Société Préhistorique Ariège-Pyrénées*
Southern African Rock Art Research Association (SARARA)*

Together, these nineteen associations produce over fifteen periodicals and monograph series. Publishing members who have not already instituted regular exchange arrangements with all other publishing members (shown with * above) are urged to do so, as this will provide them with a complete coverage of everything that is being published by Federation members, while at the same time they are disseminating their own material in the most effective way possible.

THREAT TO HAZARIBAGH ROCK ART

ROBERT G. BEDNARIK

IFRAO has received a substantial submission from India, calling for our support to save rock art sites near Hazarihagh, in the State of Bihar, India. This rescue project has been initiated by Mr Bulu Imam, the Convener of The Indian National Trust for Art and Cultural Heritage (INTACH). It has the support of leading Indian rock art specialists such as Professor Somnath Chakraverty, Calcutta, and Dr Giriraj Kumar, Agra, and it has the backing of IFRAO member RASI (Rock Art Society of India). Here is the background of the project as I perceive it.

The North Karanpura Basin contains 14 billion tonnes of premium grade coal, and the threat comes primarily from mining activity, thermal power stations and proposed dam projects. It is not limited to rock art sites, it involves also significant archaeological resources, including megalithic structures, and the natural environment. The region is said to contain the largest and most diverse ethnic population in all of India, and its rivers and forests provide a habitat for more species than any other part of eastern India.

Knowledge about the extent of the rock art seems quite limited. A team led by Professor Chakraverty has discovered a series of new sites as recently as January 1992, and he expects that further new finds will be made. He reports that the principal threat is from illegal mining. The district administration has recently imposed restrictions but these are being violated by the illegal miners. For instance, the metal slags from prehistoric mounds are being quarried for road construction. The destruction of vegetation presents a more direct threat to the art, because the forests no longer protect the painted shelters (Chakraverty 1992). This problem, conversely, is widespread in India, as I have observed at many sites, and deforestation has also been cited by Tyagi (1991) as a major factor in the deterioration of Indian rock art.

One of the many painting sites threatened by this development is Isco Rocksheher, near Isco, a small village of the Munda tribe in the Sati Hills of east Barkagaon valley, Hazaribagh District. The paintings in this sandstone shelter used to extend for about 100 m, of which a panel of only 30 m has survived erosion and vandalism. The site has yielded rich Mesolithic and Neolithic occupation evidence, but there is also ample Palaeolithic material in the area. The rock art includes anthropomorphs, depictions of numerous animal species, and petroglyphs. Its most extraordinary component, however, is a large body of very complex geometric patterns, which include proto-Indian motifs (reportedly hieroglyphs of the Indus script) as well as apparently exotic designs. The site is clearly of major heritage value, but it faces various threats now and will not survive without decisive action.

Mr Imam and INTACH deserve highest praise for the competent actions already taken, which include: request for the involvement of a specialist from the National Research Laboratory for the Conservation of Cultural Property; appointment of a permanent guard (the village's high priest) and provision of a visitor's book; submission to UNESCO for nomination as a World Heritage Site.

The area has been declared and gazetted as a protected area by the Ministry of Environment and Forests, along with the Western Ghats, Arawalli Ranges and Siwaliks, and it has been declared a 'sanctuary' by the Bihar State Forests Department (Imam 1992).

None of these protective measures taken so far seem to have had the desired effect, and the strategy is now to seek international support. The Rock Art Society of India supports the project already, but has warned against using the option of attracting tourism (Kumar 1992), pointing out that 'in India we do not have an adequate system of rock art site management which can take proper care of the protection of rock art sites', and citing the well-known example of the most famous Indian site, Bhimbetka.

I have no doubts that IFRAO members will support this rescue project: such international support is central to our objectives. I shall provide addresses of appropriate offices to the Executive Council members of IFRAO. We can remind the authorities that the Archaeological Survey of India spends vast sums of money on maintaining archaeological monuments, but virtually no funds on rock art sites; that there is no effective legislation in place to protect rock art; that India is regarded as one of the world's three richest nations in rock art, but that not a single site has ever been properly and fully recorded anywhere in the country (S. Chakraverty, pers. comm.); that there is no program of effective rock art site conservation in place; and that the Rock Art Society of India does not receive adequate attention and support from the relevant public institutions. In our letters we must emphasise that we are not being critical of economic development as such; we fully realise that India must develop her resources as she sees fit. However, development and heritage conservation should not be seen as being necessarily incompatible, and an impact report is required, drawing on the knowledge already collected by those involved in this particular campaign. Through consultation a plan can surely be designed which permits development to proceed with minimal interference, while guaranteeing the perpetual preservation of sites.

It is not for international commentators to be critical of the local authorities and their decisions concerning development. One can easily exacerbate the situation by permitting the campaigners, on whom we must rely in such confrontations, to be painted as meddlesome. The most effective international support is to bolster their authority by expressing international endorsement of local action and proposals. Most particularly, the Rock Art Society of India should be seen, and decisively supported, as the final arbiter concerning all matters of Indian rock art.

Robert G. Bednarik

REFERENCES

CHAKRAVERTY, S. 1992. Letter to the Executive Committee of RASI, 25 February.

IMAM, B. 1992. Information on Hazaribagh rock art. Unpubl. MS, Archives of the Australian Rock Art Research Association, Melbourne.

KUMAR, G. 1992. Letter IFRAO-RASI-GK 92/101 to Shri Bulu Imam, 24 March.

TYAGI, G. S. 1991. Conservation of Indian rock art. In C. Pearson and B. K. Swartz (eds), *Rock art and posterity: conserving, managing and recording rock art*, pp. 28-9, Occasional AURA Publication 4, Australian Rock Art Research Association, Melbourne.

NOTES FOR CONTRIBUTORS

Manuscripts of major research papers should preferably be from 4000 to 8000 words. Longer articles will be considered on the basis of merit. Submissions should comprise the original together with one copy, typed in double-space, with a wide margin on one side of each page. Underline words to be italicised and identify each page by number and author's surname. The preferred method of submission is on a 5.25 inch double-sided, double density (DS-DD) diskette written in *MS Word*, together with a hard copy. The content of the paper should be outlined by three to five keywords (e.g. 'Petroglyphs - patination - ethnography - Pilbara') placed above the title. The manuscript must include an abstract of 50 to 100 words, summarising the article.

Spelling and punctuation in this journal follow the *Style manual for authors, editors and printers of Australian government publications* and the *Macquarie dictionary*; where the two disagree the former has precedence. Footnotes should not be used. The bibliography and references in the text should follow the style indicated in this issue.

If line drawings are included they must be larger than the intended published size (preferably by a factor of 1.5 to 2) and line thicknesses, stippling, lettering sizes etc. must be selected accordingly. Photographs should be black and white gloss prints of high contrast. Photographs of rock art which were obtained by physical enhancement or other interference will be categorically rejected. In regions where traditional indigenous rock art custodians exist, their approval must be obtained before submission of any illustrations of rock art, and where copyright applies the author must obtain the appropriate consent. Captions (on a separate sheet) are required for all illustrative material, together with an indication in the text as to where they, and any tables and schedules, are to be placed.

Announcements intended for a specific issue of this journal ought to be available at least two months before the month of intended publication. Galley proofs are issued of all articles and must be returned promptly after correction by the author(s). Each author or group of authors receive thirty free copies of their article, additional reprints are available at cost.

All correspondence should be addressed to:

The Editor
Rock Art Research
P.O. Box 216
Caulfield South, Vic. 3162
Australia

Telephone: Melbourne (03) 523 0549

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Lalinde, France, Middle Magdalenian. Detail of two incised 'buttocks' images so heavily over-marked that the crossing strokes form a star in the centre. Photograph by A. Marshack,