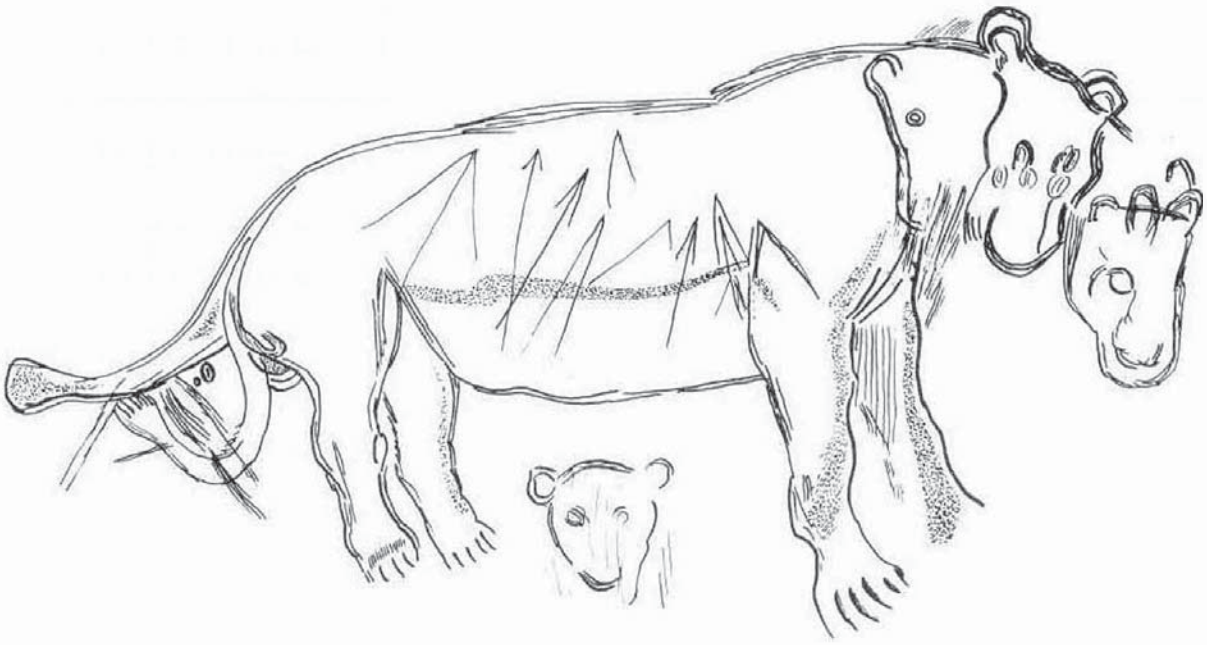
Registered by Australia Post - Publication No. VBP6658 ISSN 0813-0426

THE AUSTRALIAN ROCK ART RESEARCH ASSOCIATION (AURA)

ROCK ART RESEARCH

Volume 2, Number 2 NOVEMBER 1985



Trois Freres, France. Engraved and painted image of a lioness indicating a sequence of added details (see A. Marshack, p. 104)

The journal *Rock Art Research* is devoted to developing theory and methodology for the systematic and rigorous understanding of this form of human expression. It is supposed that rock art is the major surviving record of the nonmaterial aspect of prehistoric cultures, that which primarily defines any culture. Rock art is believed to be better suited than the study of the material aspects of prehistoric life, for detecting cultural change or continuity.

Although this journal is concerned principally with the Australasian region, the subject served by it is characterised more by its goals and approach than by its geographical bounds. Emphasis is given to communication across the various disciplines related to the study of rock art, and to synthesising related subjects around its focus: the surviving externalisations of prehistoric world views.

Contributions should be consistent with these general goals. Notes for contributors can be found on the inside of the journal's back cover. All articles submitted will be refereed; authors will receive a summary of the referees' comments, plus an editorial view. While final responsibility for the acceptance or rejection of an article rests with the Editor, responsibility for opinions expressed, or data introduced, always rests with the author.

Selected manuscripts will be sent to international or Australian commentators for reviews which may be published in order to promote scholarly debate. Where appropriate, the author may be requested to respond to these comments in the spirit of the involvement and discussion for which AURA stands. In addition to articles reporting original research, the submission of short reports, reviews, abstracts and bibliographical entries is also invited.

Rock Art Research is published twice a year, in May and November. The Australian recommended retail price per issue is $A 12.00

Annual subscription for Subscribing Members of the Australian Rock Art Research Association (2 issues, post paid) is $A 10.00

Full membership with the Australian Rock Art Research Association is **$A 15.00 per annum.** Besides journal subscription and constitutional rights, full membership entitles one to receive the *AURA Newsletter* and to take advantage of reduced prices for the monographs which the Australian Rock Art Research Association may publish from time to time. Please make all cheques payable to Archaeological Publications.

All correspondence, including applications for membership or subscription, should be directed to:

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

Rock Art Research is owned and published by Archaeological Publications, a non-profit company incorporated in May 1983.

ROCK ART RESEARCH

The Journal of the Australian Rock Art Research Association (AURA)

ISSN 0813-0426

Volume 2, Number 2

Melbourne, Australia

November 1985

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 overseas; and to generally promote awareness and appreciation of Australia's immovable cultural heritage, particularly prehistoric rock art.

Archaeological Publications, Melbourne

CONTENTS

Volume 2, Number 2, November 1985

aura

KEYWORDS: Palaeolithic art – Microscopic analysis – Ritual use – Symbolic markings

THEORETICAL CONCEPTS THAT LEAD TO NEW ANALYTIC METHODS, MODES OF INQUIRY AND CLASSES OF DATA

Alexander Marshack

Abstract. The author has closely examined numerous mobiliary objects and cave art compositions of the Upper Palaeolithic period of Europe, focusing his attention on traces of use. He reports that many carvings and figurines bear evidence of long term polish and wear, and intentional markings which were added over a period of time.

The author has found evidence of similar reuse and renewal in cave art. Many painted or engraved figures show repetition of anatomical detail in animal representation, such as additional muzzles, eyes, ears and legs, or they comprise cumulative abstract symbols. The repeated and possibly periodic use of representational art is interpreted as ritual overmarking, an explanation that is of considerable relevance for understanding the possible origins and functions of Upper Palaeolithic art.

Since the verification of Upper Palaeolithic European art in the late nineteenth century, the major effort in the continuing study of this growing body of symbolic material has been to document and publish the images, to establish a chronology and typology of styles and motifs and to seek some theoretical basis for understanding the 'origins', uses and possible meanings of these early images and symbols. My own research during the last two decades has taken a different direction. It began with attempts to develop new analytical techniques and new sets of questions concerned with how different classes of image and symbol were made, used and associated with each other. The research, in this sense, was 'problem-oriented', concerned not with style or chronology but with *process*, with the strategies and problem-solving modes involved in the symbol systems. Each class of image and symbol posed a different set of process-related questions. These could not be answered in the analysis of a single artefact or composition but often required the determination of a tradition or widespread mode of use and study of a comparative body of material. For this reason my published papers have always been devoted to the exploration of single analytic issues and to the study of particular classes of artefacts or images. In this paper I will discuss how questions concerning the *use* of Upper Palaeolithic animal images slowly led to a perplexing new body of data. The data seem to have some relevance for understanding the possible origins and functions of the early representational images.

MS received 18 February 1985

The earliest examples of representational carving, c. 32 000 BP, come from Vogelherd in southwest Germany. When I examined these early in my research, I was immediately confronted by a complex body of analytic data that fit none of the current theories concerning hunting magic, animism or art-for-art's sake. The Vogelherd horse, for instance, had ear, eye, nose, mouth, mane and tail carefully carved, but these were highly worn and polished by long handling and perhaps by carrying in a pouch. The amount of time required to wear down the mammoth ivory, if the horse were handled periodically in ritual, may have been a number of years (Fig. 1). In the shoulder of the horse was a single, freshly engraved angle or 'dart'. The horse and dart have, since my examination, been covered with lac for preservation, but when I examined the mark it was clearly engraved *after* long use of the ivory horse. The evidence seemed to indicate that this was not a horse made for one time use in hunting magic or as an example of 'art', but that it was a symbolic horse made to be used and handled, probably in periodic ritual, and that at one point in its use it had had a specialised symbolic killing. This may have been as part of a ritual of curing, birth, death, shamanistic installation, or a seasonal ceremony. The reason and meaning of the killing was not as important as the data concerning both long term and possible variable and specialised use of the image.

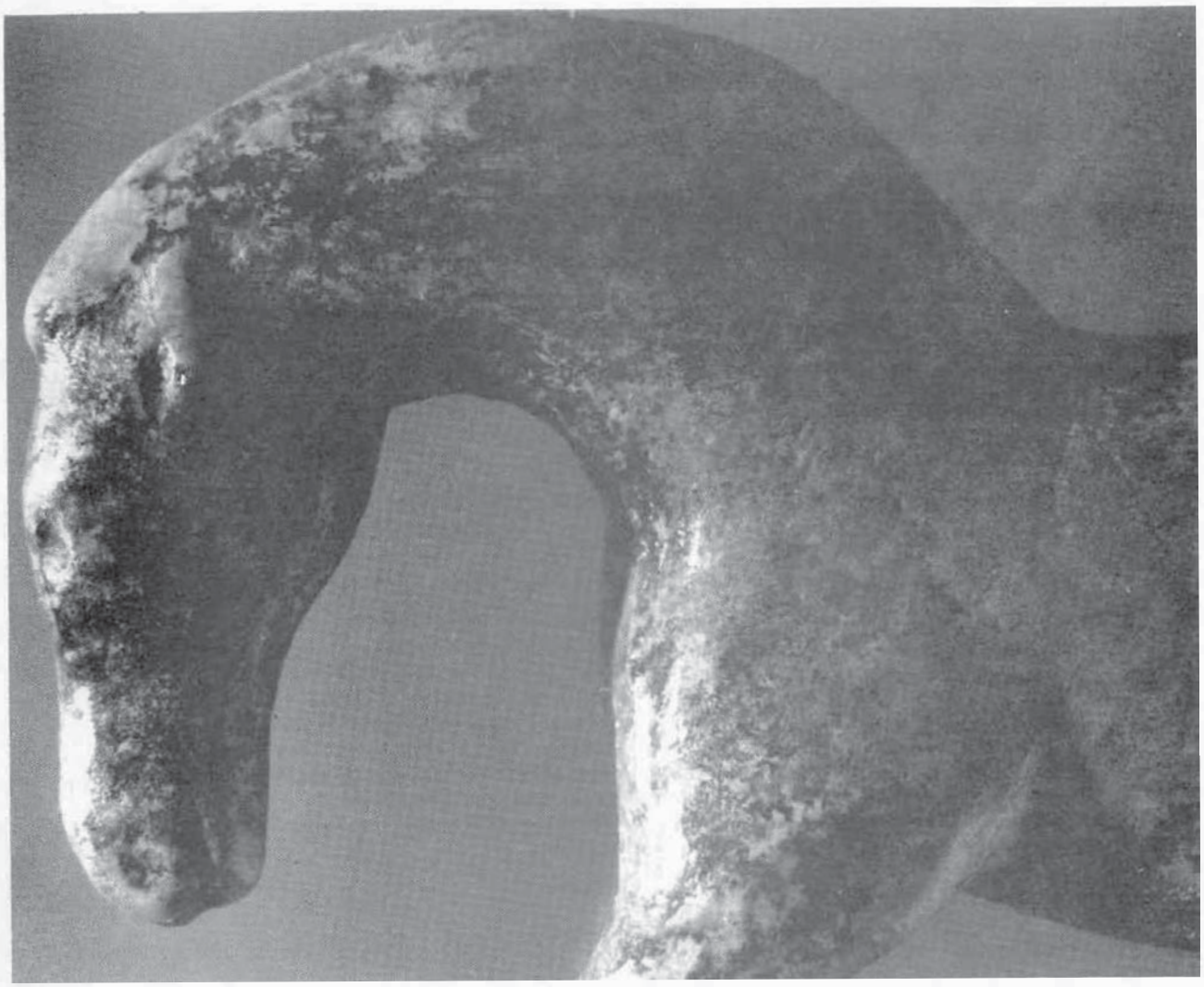


Figure 1.
Vogelherd.
Detail of mammoth ivory horse showing wear polish on ear, eye, mane and muzzle. An incised angle is on the shoulder.

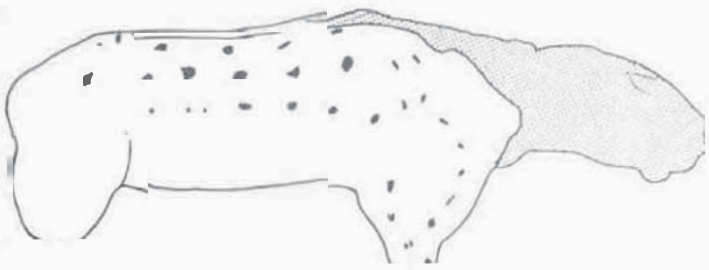


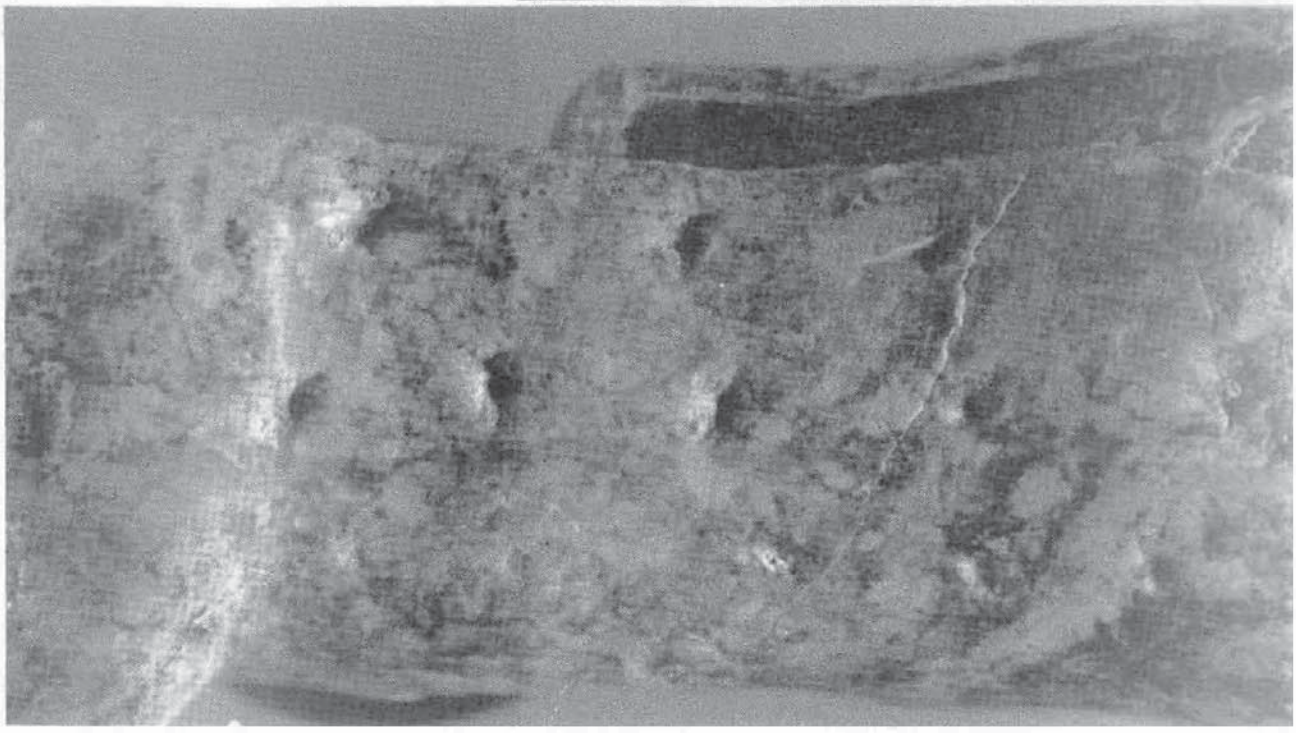
Figure 2. Vogelherd.
Left and right sides of mammoth ivory lion indicating the major intentional marks on its body.

I published these results (Marshack 1972a, 1975) but did not publish the results of my analysis of the other Vogelherd carvings, though these increased the initial impression that the statues were involved in periodic and variable use. I had to study the full body of Upper Palaeolithic imagery and the many traditions of image use before I dared publish the data I had found by microscopic analysis.

A fragmentary ivory feline, at first considered a spotted panther, was carved with the same skill and sophistication as the horse, catching the characteristic species posture of watchful attention, with the head low and far forward

Figure 3a. Vogelherd. ➡ *Detail of left shoulder of ivory lion showing the random marking by different tools and in different directions.*

Figure 3b. Detail of right side of ivory lion showing the deep stabbing of sets of marks.



(Figs 2a, 2b). Microscopic analysis of the so-called spots (Figs 3a, 3b) indicated that they were made in a haphazard, almost random fashion and as an engraved accumulation by different points and pressures and made in different directions. It seemed during the examination that the feline had been *used* by a sequence of ritual marks and that this was not a decorated or 'spotted' panther. Since the feline, unlike the horse, was not a major item of diet, there was the suggestion once again of a symbolic animal that had been used, perhaps periodically in acts of ritual over-marking.

This mode of ritual use by overmarking was confirmed in most of the Vogelherd carvings. A broken ivory bison (Fig. 4) has the head and legs missing and a broad section of ivory also missing from the lower body, giving it the appearance of a bison in summer moult. Microscopic analysis of the break indicated that its edge

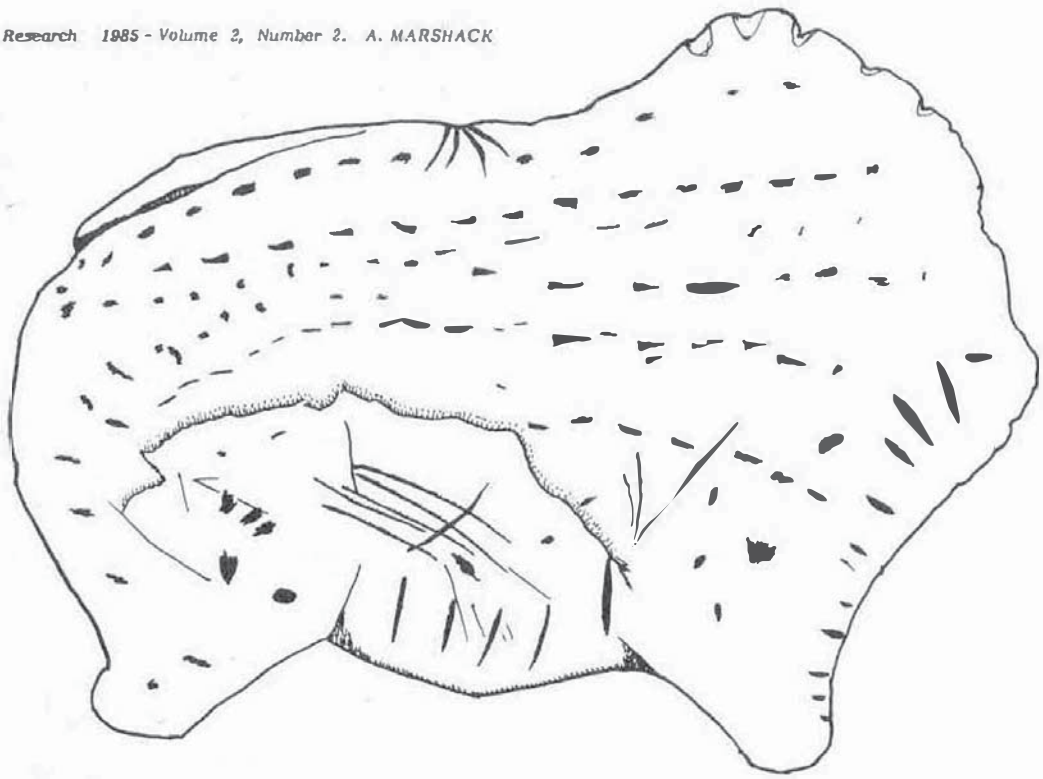


Figure 4. Vogelherd. Schematic line rendition of the major marking on a broken ivory bison, with the missing section overmarked by parallel lines and stabbing.

Figure 5. Vogelherd. Lower portion of ivory bison indicating missing section of ivory, the polish along the breakage, and the marking in the polished area of the missing ivory.

was highly polished and that the exposed area, also highly polished, had been marked by randomly placed punched dots and overcrossing sets of long lines (Fig. 5). The upper body of the bison was marked, like the feline, with sets or series of marks that had been engraved by different points or tools, often in opposite directions, some marks being incised from head toward the tail and others from the tail towards the head. Incised into the back or spine of the bison was a multi-lined 'comet' or angle (Fig. 6), suggesting a specialised killing comparable to the angle in the horse. The combination of long term handling, different types and classes of marking and

Figure 6. Vogelherd. Top of ivory bison showing the 'comet' form in its back.

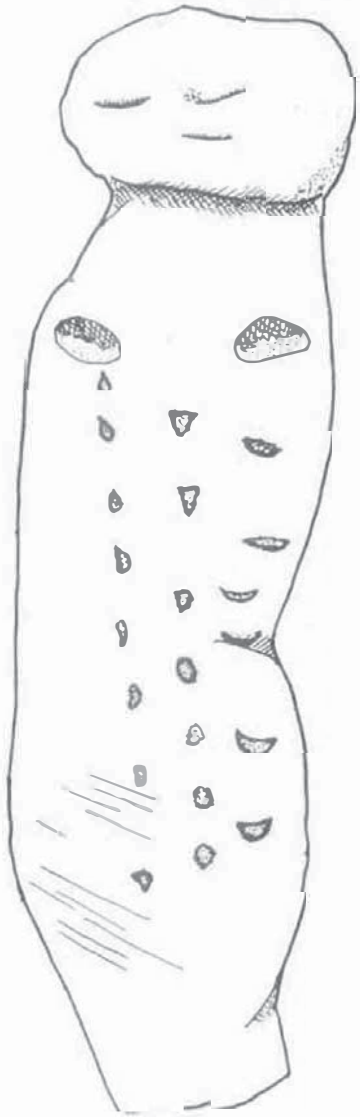


Figure 7. Vogelherd. Schematic rendition of the carved ivory anthropomorphous figure showing the three sets of descending marks, each made by a different tool, rhythm and pressure.

a possible 'killing' suggested that the bison, like the horse and feline, was a symbol that had been *differentially* used over time.

There was a possibility that some form of 'hunting magic' or ritual for species renewal was involved in the use of a food animal such as the horse or bison, but this would not seem to have been involved in the use of the feline. If these species were involved in a *range* of symbolic uses we might be dealing with the marking mode as an act of ritual participation which could have had a *range* of meanings for the engraver. This problem was raised again when I examined the crudely carved anthropomorphous ivory figure from Vogelherd (Fig. 7). It had a crude head and body, with an indication of eyes and mouth, two large depressions suggesting breasts and a curved swing of the left hip that together suggested a female torso. The figure had been hastily carved, in contrast to the carefully sculpted animal figures. The body of the figure was marked with three descending sets of marks, each set apparently made by a different point and with a different spacing and pressure. This overmarking was clearly not an act of 'hunting magic', but seemed to represent acts of ritual in *use* of the image. The image, in fact, may have been made for limited ritual use and it may have been used in ritual performance accompanied by words, gestures and a marking of the image itself. The crude anthropomorph seemed to represent a different type of short term image than the carefully carved, long term animals. It was apparently an image made for some ritual purpose by someone who was not a skilled craftsman. I have published a similar crude figurine apparently made for one time ritual use from the nearby Magdalenian site of Petersfels in southwest Germany (Marshack 1972a). Neither crude image shows signs of polish or long term use. Similar crude figurines occur throughout Upper Palaeolithic Europe. The continuing inquiry has indicated that these different classes of image and use pose some of the major theoretical and analytical problems in the study of the origins and possible meanings of prehistoric art and symbol. For instance, my study of the Upper Palaeolithic notations (Marshack 1970, 1972a, b, c) had indicated that there was no need to 'count' the marks on the Vogelherd figures, even though they evidenced changes in the use of tools and marking modes. The marks were not structured

as sequential, linear accumulations, which is the primary internal evidence for the presence of notation.

The problems concerning use, raised by my study of the carved Aurignacian figures from Vogelherd, were raised in a different form when I began a study of the two-dimensional engraved images. The boldly engraved muzzle of a horse on a fragment of reindeer antler from the Magdalenian site of Kesslerloch at Thayngen, in Switzerland, seemed to be the only image present (Fig. 8). Microscopic analysis, however, revealed that two almost invisible, finely engraved schematic muzzles, made by different points

Figure 8. *Kesslerloch at Thayngen. Antler fragment showing boldly incised muzzle of a horse.*

and apparently at different times, had been added to the horse muzzle (Fig. 9). This mode of using two-dimensional images, so different from the overmarking of the carved images, began to be documented throughout the late Upper Palaeolithic and into the post-Wurm epi-Palaeolithic.

From the Romanellian site of Polesini, Italy, c. 8500 B.C., comes a fragment of bone incised with what seems to be a crude cervid head with a badly-made muzzle (Fig. 10). Microscopic analysis revealed that the engraving had begun, like the Kesslerloch horse, with a finely engraved muzzle (Fig. 11), to which had been added a series of five or six crude, schematic muzzles which destroyed the original image. This cervid head had not only been reused or renewed but it had also been 'killed' by the overengraving of a series of feathered darts (Marshack 1969). The head had had *two* types of use, each with a different form of imagery or sign. If the original image was 'art', in our modern use of the term, could the schematic muzzles which destroyed the image also be considered 'art'?

This problem concerning the variable use of a symbolic image was most clearly documented in my microscopic analysis of a reworked fragment of reindeer antler from the middle Magdalenian site of La Marche, France. Microscopic analysis (Marshack 1972a, b) revealed that the antler fragment had apparently originally been a baton which had broken in use; it had then been reshaped at one end to become a fine retoucher. In its

Figure 9. *Drawing of the two finely engraved added muzzles on the above antler fragment.*

first use it was engraved on one face with a set of notation and a running horse, which was overmarked or used. In its second form the antler had again been used as the surface for an accumulation of sequential notation accompanied by the engraving of a running horse. Microscopic analysis of the horse revealed that it had three eyes, three ears (Fig. 12) and two backs and had therefore been reused many times, probably during the period of accumulation of the notation. However, the horse also had sets of darts and some signs in and around the body (Fig. 13), recalling the multiple use and killing of the cervid from Polesini. On a single artefact, therefore, we not only had evidence of a variable use of the antler material as a practical tool, but the evidence of a simultaneous accumulation of notation and a variable use of the horse image. At least three separate problem-solving systems or strategies were involved in the maintenance of this one artefact through time: practical usage, notational accumulation and a renewal and killing of a symbolic horse in association with the notation. The user of the artefact was involved in

Figure 10. Polesini. Bone fragment with seemingly crude antlered cervid head. Ear and eye of another animal can be seen at right.

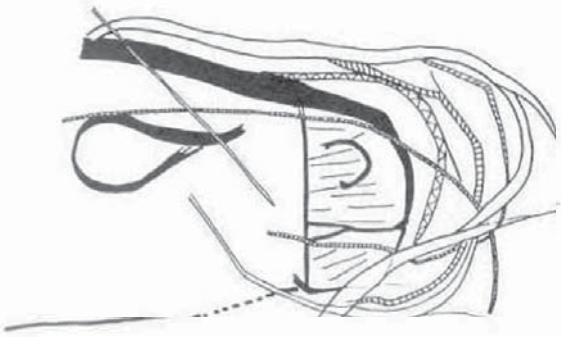


Figure 11. Schematic rendition of the well-drawn cervid muzzle in Figure 10, destroyed by a sequence of later added muzzles; as determined by microscope.

Figure 12. La Marche. Detail of incised horse head showing the original eye and ear, with two additional eyes and ears added later.

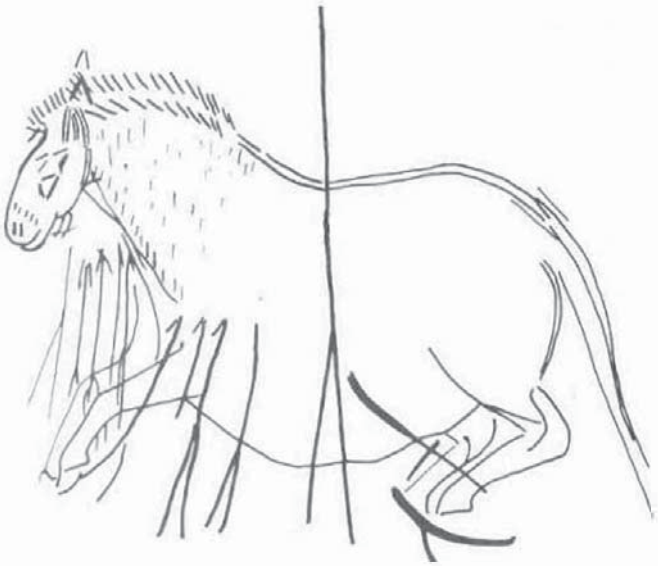


Figure 13. La Marche. The complete horse figure, indicating a second back line, sets of added darts and signs in and around the horse.

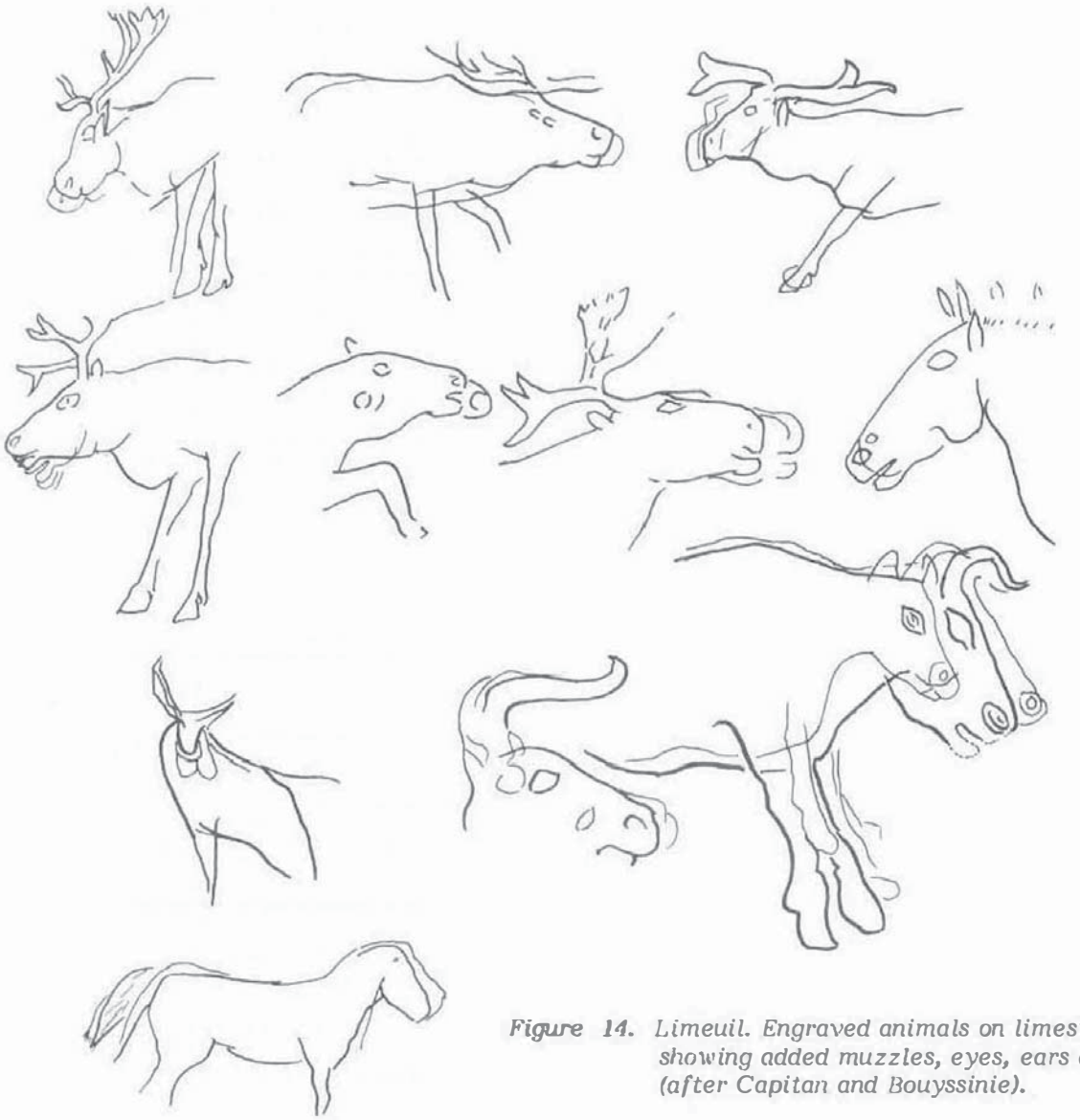


Figure 14. Limeuil. Engraved animals on limestone slabs showing added muzzles, eyes, ears and legs (after Capitan and Bouyssinie).

both practical tool use and complex symbolic scheduling and planning.

Precisely these modes of using the animal image occur often among the Franco-Cantabrian mobiliary materials and in the cave compositions. The incised slates from the open air Magdalenian site of Limeuil (Capitan and Bouyssonie 1924) provide numerous examples of animals with added muzzles, legs, eyes, ears and horns (Fig. 14). The cave of Sainte-Eulalie à Espagnac (Lorblanchet 1973) has one excellently-drawn reindeer with five or six crudely-drawn legs added to the rear legs and another reindeer with a renewed second muzzle and an extra set of eyes (Figs 15a, 15b). The cave of Trois Frères (Bégouën and Breuil 1958) provides us with an engraved and painted lioness which has had its head repeatedly renewed, with the addition of extra eyes, ears and muzzles. It also has a number of added tails and vulvae. Like the La Marche horse, the lioness was not only renewed, but it was also 'killed' with a sequence of darts in its body (Fig. 16). Other animals at Trois Frères were similarly reused and renewed. The process occurs at many of the major caves, at Font de Gaume, Altamira and Lascaux. At the recently discovered cave of Fontanet the bichrome bison has four tails, each made by a different paint. Infrared analysis indicates that the last tail, made with black paint over the three other tails, was placed at a distance from the body itself. In the cave of Lascaux (A. Leroi-Gourhan and Allain 1979), the Abbè Glory has documented numerous examples of horses that have been reused and renewed by the addition of extra eyes, ears, muzzles and legs; at times these horses have also been symbolically 'killed' by the addition of darts (Fig. 17). These horses were used in still other ways by the addition of signs and symbols, a number of which I have been studying as separate symbol systems and iconographies (Marshack 1977). This type of variable use occurs also with the painted images in Lascaux.

The accumulation of a body of data documenting these variable modes of using animal images, often over a period of time, led to my development of a number of specialised analytic techniques for the study of the painted images in the Franco-Cantabrian caves. An infrared analysis of the famous 'spotted' horses from Pech Merle indicated

Figure 15a. Sainte-Eulalie. Engraved reindeer with crudely added muzzles and legs (after Lorblanchet).

Figure 15b. Sainte-Eulalie. Cervid with two extra muzzles and one extra eye. Ibex at left has series of added legs (after Lorblanchet).

that these had originally been empty horse outlines that had been slowly filled with sets of red and black dots. The sets of red dots were made by use of different ochre mixes. The circle in the chest of the horse and the fish across its back were made by still different ochre mixes. Infrared analysis indicated that the little red horse in Combel was made with an ochre mixture that contained impurities of black, while the red spots within the horse and above it were made with a pure ochre without impurities. The empty horse had been used by marking it with spots. The red spots in Combel itself were shown by infrared analysis to have been sometimes applied as sets of blown paint and sometimes as sets of paint applied by a stamp or pad, even though the same basic ochre was used. The analytic data suggested that the Pech Merle horses were generic symbols that had been used over a period of time by the addition of sets of black and red spots as well as by other classes of image and sign (hand prints, a fish, a circle, sets of arcs, etc.), apparently made at different times and for different specialised purposes, though all these uses were apparently related to the generic symbolism of the horse. When the space within the first horse was filled, the area around it was used. When that was filled, a second horse outline was painted and that began to be filled. There was even a suggestion, but no proof, that the head of the first horse had been repainted (see note attached).

The use of an animal image or species for a range of specialised symbolic purposes apparently

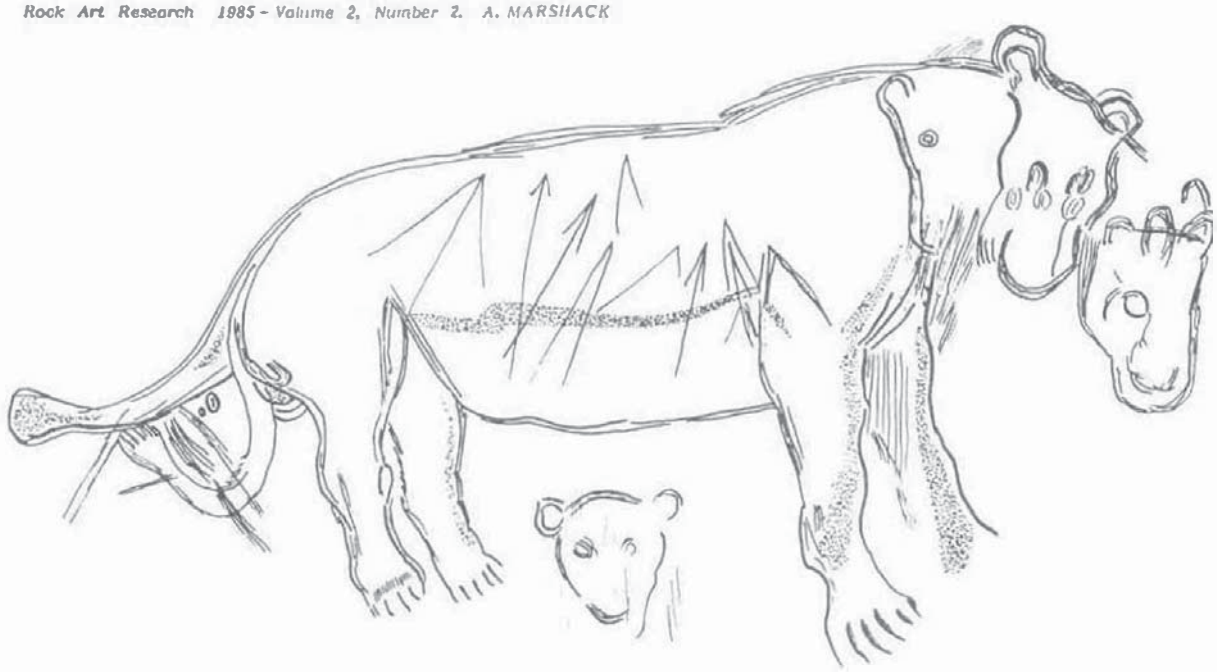


Figure 16. Trois Frères. Engraved and painted lioness indicating a sequence of added heads, ears, eyes, tails and vulvae. The lioness has also been 'killed' by 'darts' (after Bégouën and Breuil).

began in the Aurignacian and continued to develop through the Magdalenian. I have documented these modes of use in the caves of Cougnac, Niaux, Marsoulas, La Pileta, the caves at Puente Viesgo, etc. The data suggest that there was no single meaning, use or ritual that belonged to the representation of any single animal species, though certain animal species had rather specialised or restricted modes of use.

That a single animal image, such as the horse, could have repeated, periodic use is dramatically evidenced in the still unpublished example of a single, crudely drawn engraved horse on the ceiling of a tiny sanctuary in Tuc d'Audoubert. The 'sanctuary' area is difficult to reach and is only big enough for one person at a time, but around the little horse are eighty-four claviform or 'P' signs, made in a variety of styles and by different tools and perhaps by different hands. At least one 'P' sign is made in reverse, a few are renewed by the addition of an extra arc, at least one is made by a finger instead of a sharp tool. The sequence apparently represents the periodic ritual use of the horse by marking a sign with its own specialised meaning. The relation of horse and sign is subsumed by the more inclusive ritual act of marking, an act in which the maker of the sign participates in a specialised manner, at a particular time, in the generic symbolism of the horse, the sign and the act of marking.

The data do not give us the meanings of the animal images, the signs or the ritual acts of marking and use. They do not tell us whether eyes, ears, muzzles, legs and tails had specialised meanings or ritual uses, though the accumulating evidence suggests this. The data do, however, raise a host of new questions which have not yet been included in theoretical discussions about the origins, meanings and uses of this early art. I have indicated that similar modes of use occur with the Upper Palaeolithic female images and with certain classes of signs. We are therefore dealing not with images, but with symbol *systems* and cultural *modes* of symbol *use*.

Note

Validation of the theoretical and methodological bases of the research conducted during the last two decades has come from a number of sources. The most recent was published during the preparation of the present paper (D. H. Thomas 1983). This volume documents use of the binocular zoom microscope for analysis of the largest collection of incised mobiliary stones, 428 stones, ever excavated from a prehistoric, hunter-gatherer site, in the Great Basin region of Nevada, the United States. The stones were found *in situ* from c. 3300 B.C. to c. 1300 A.D. and document the cumulative, periodic use and overengraving of a limited set of geometric motifs comparable to those in the European Upper Palaeolithic 'macaroni-meander' tradition (Marshack 1977, 1979: 307).

Thomas writes that 'Marshack's technique of studying engraved materials was adopted' (p. 322), that is, use of a binocular zoom microscope to study 'differences in tool track width and cross-section, as well as relationships of marks to seemingly broken stone edges . . . The microscope provided means . . . to observe the order of marking of lines used to formulate motifs, which, in turn, enables us to determine some of the decisions made in the creation of designs' (p. 322) . . . 'Nearly one third of the [stones] show evidence of accumulation of marks . . . We cannot know how much time elapsed between marking sequences on any stone, but evidence for accumulation of designs, taken together with the wear pattern evidence . . . encourages speculation that many of the stones were carried about for a period of days, weeks, or even months,

Figure 17. Lascaux. Engraved horses indicating added ears, eyes, muzzles and legs. At least two horses have been 'killed' by 'darts' and others have various signs (after Glory).

perhaps while they were being incised' (p. 341).

The same theoretical and methodological bases were used in the study of the wall art or rock paintings found in relation to the incised stones. Small bits of paint were removed and were subjected to x-ray diffraction analysis using copper radioaction and a scintillation detector. Thomas asks: '. . . were the pictographs painted all at once, or were they accumulated over time?' (p. 410). When I attempted in the 1970s to get permission to perform this type of analysis in the French caves I was informed that it would not be possible. I therefore had to develop a series of nonintrusive colorometric and spectrometric analytic techniques (infrared, ultraviolet, fluorescence, special films, monochromatic filters etc.) to achieve comparable, but not metric, results. Thomas' Gatecliff results are therefore interesting, since they indicate that a careful use of the x-ray diffraction method would subject my own findings to possible metric validation.

Thomas writes: 'X-ray diffraction analysis has revealed that gypsum was used as a binder for pictographs . . . Red and yellow paints were created by adding various minerals to this gypsum base . . . The twelve elements samples are of a slightly different composition and it seems unlikely that they were applied in a single episode' (p. 412).

It is clear that the theoretical and methodological bases of the research can be applied to different classes of symbolic materials derived from different periods and cultures. I have already published a number of papers documenting these analytic procedures with other types and classes of American Indian materials (Marshack 1974, 1975, 1983).

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

Comments

By JOHN CLEGG

I am not a specialist in European Palaeolithic pictures, and I have not read all of Marshack's publications. Those I have read have been a delight—with, usually, the stimulation of something to disagree with.

The present paper is no exception. Marshack has used his whiztech to make a close examination of the ancient objects from Vogelherd. It turns out that microscopic examination tells us something of what happened to the objects *after* they were made, that is to say, how they were used. These studies inform us about marks which were made on the objects. It is possible to infer that the marks were made after a certain moment, which is identified with, and demonstrated by the finishing of the artefact. (One of the annoying things about this paper is that Marshack does not inform us about the state of the object's surfaces when they were finished; we are not told about any toolmarks which had not been smoothed away, or indeed the appearance of the finished surface. This information, I admit, may well be included in some earlier article with which I am not acquainted.)

What happened to these objects was that they were carried about in a leather pouch for a considerable time—for long enough to produce a polish on many of the surfaces. This polish could have been produced by handling and stroking (which amounts to rubbing with leather, as carrying in a leather pouch does.)

* I wonder whether use-wear people could find out any more about the rubbing-with-leather, like, perhaps how the leather was cured, or how long the polishing took.

* There must also be information, through study of which parts of the objects are most highly polished, about whether any particular parts of the objects were paid special attention. Presumably, an object in a leather pouch gets rubbed most on the parts which are most protuberant—muzzles, particularly. Simple experiments with replicas would clarify the issue of whether muzzles and the bison's flank were treated specially on purpose, or polished as a mechanical result of the shape of the object.

Occasionally the object was removed from its pouch, and a mark made on it. Such marks were made by different tools, on different occasions, presumably by different people. The last such mark made was, in at least two cases, peculiar as to shape (three or more lines meeting at a point), position (high on the back of the animal) and timing: not much rubbing happened after these marks; the use of the objects in pouches may have ended with a 'ritual killing'.

Discoveries of this sort are fascinating and immediately rewarding; they give us direct insight into something which was going on so long ago, of which we were previously unaware. They are also *productive*, for they raise further interesting questions, some of which (like those I marked with an asterisk above) are associated already with means to investigate them. Others are the old, perennial, fascinating but intransigent questions like 'Why did people treat their artefacts this way?' 'What did the artefacts, or the actions, mean?' Such questions will one day succumb as they are continually reworked in new lights, on new material, such as Marshack presents.

As this paper demonstrates, an intelligent, receptive person making *mere* observations, but willing to attend to the significance of those observations may produce valuable, interesting, and productive insights. L. Binford has on several occasions been both vituperative and funny (Binford 1972: 3-13, and other pages in the index under 'Griffin') about an apparent belief that artefacts speak directly to archaeologists. I have not noticed anywhere in those Binford writings which I manage to understand a statement that what I claimed at the start of this paragraph is impossible. But, as I documented recently (Clegg 1984: 112-5), such a stance was once taken very strongly in my environment by the Problem Orienteer, the Arrogant Theoretician, and Uncle Tim. (Uncle Tim is no longer frozen into that particular extreme and cramping asana.)

I suspect that Marshack was attacked by bullying problem orienteers from his environment, who told him that he COULD NOT do what he was doing, so what he was doing was no use. This sort of thing certainly happened to me (Clegg 1979: 43-5) in the late 1970s, and I suspect Marshack suffered from similar nonsense, which is why he now scatters problem words in his writing. I do not believe that those problem words do any good, except promise a little protection from problem orienteers, at the expense of seeming to join their camp. If the problem orienteers in Marshack's environment are akin to those of whom I have experience, joining their camp would be too much to sacrifice. It would involve defining problems so strictly before one begins work on them that there would never be any possibility of discovering something unforeseen; the problems would be trivial. It would mean ending research once a problem had been solved: the solutions to trivial problems are not likely to be productive. I would prefer Marshack to proceed step by logical and productive step, as is natural to him. We can now afford to ignore the problem-oriented bullies.

If Alexander were to throw out the references to problems, he would be free to proceed by scientific routes: make an observation; check it; contemplate it, with a view to working out some of its implications; make other observations to find out whether the original observation, and by extension its possible implications, is a single phenomenon, or one case of a widespread or general pattern; and so proceed to further insights, hypotheses, guesses, and perhaps even theories.

Marshack does some of those things in the present paper, and shows that many pictures of animals, over a long time span, had particular attention paid to their muzzles, and that that attention was paid by someone other than the original artificer, taking the form of marks made in different handwriting, by different tools.

With this paper begins the study of the *use* of pictures, now distinguishable from the original making of pictures (though an exact and productive definition of where making ends and use starts is not known to me, and needs to be found). Up to the present time, there has been a failure to distinguish the two: our new conceptual tool should lead to a clarification of concepts and

conclusions which cannot fail to be a breakthrough in the study of prehistoric pictures—if it becomes well known and is followed up.

Thank you Alex, and thank you, AURA.

John Clegg
Department of Anthropology, A 14
University of Sydney
Sydney, N.S.W. 2006
Australia

By PAUL FAULSTICH

Marshack has demonstrated the value of intensive looking at a body of material. His development of unique problem-oriented strategies has provided specific data which has enhanced our understanding of Upper Palaeolithic images and symbols. Although Marshack's interest in symbolic objects is principally from a materialist's perspective, his analyses provide useful intradisciplinary interpretations that are undoubtedly valuable to scholars conducting a wide range of interpretive studies.

Marshack approaches art as process rather than as result. He discusses the differential uses of carvings over time, hinting at the range of meanings that may have been attached to them. With such a perspective, the pieces can be metaphorically connected to spatial, temporal and cosmological orderings. Thus, we are led into the range of possible symbolic meanings. However, we cannot identify the symbolic meaning of an artefact without identifying its intended cognitive function. Although not elaborated, Marshack touches upon this when he mentions the evidence for the symbolic nature of the Vogelherd horse. The notion that, after long ritual use, the horse may have been symbolically killed is fascinating, albeit not surprising.

The creative and analytical processes involved in the conceptualisation, production and use of the Vogelherd horse should not be overlooked. On this ground, I question Marshack's contention that the purpose of the 'killing' is not as important as the data concerning the use of the figure. An object's use cannot be understood in isolation from its meaning. The meaning inherent in the assumed ritualistic killing of the horse is inextricably related to the use of the carving. In order to achieve a holistic understanding of the role of art in Palaeolithic culture, we need to address a wide range of theoretical and analytical questions regarding the forms and functions of symbols.

If we are indeed dealing with material culture of symbolic nature, we must inquire as to how the objects, and the processes involved in producing them, would have provided tangible representation of otherwise elusive concepts. Thus, a cognitive association becomes the impetus for the objectification of a concept, i.e. dart = death. In this death case, the dart motif is assumed by Marshack to represent both the object of dart and the concept of death. In light of the data, this interpretation makes good sense. As a signifier, the dart represents something in addition to what it is.

Perhaps Marshack will clarify his seemingly contradictory statement that 'The data suggests that there was no single meaning, use or ritual that belonged to the representation of any single animal species, though certain animal species had rather specialised or restricted modes of use'. Unfortunately, we are not presented with any of the data that supports this, and I am left questioning Marshack's conclusion. The use of animals within cultures as standardised, symbolic elements of art and myth is well known. Although there is no acceptable ethnographic analogy for Upper Palaeolithic European art, we must not overlook the cross-cultural use of enduring associations between animals and their symbolic meanings. I am unable to accept, on the basis of Marshack's presentation, that the horse in Tuc d'Audoubert, for example, is a generic symbol, while the markings around the animal have a specialised meaning. The relationship between the principal image of the horse and the presumably secondary marks is intrinsically complex: perhaps one is meaningless without the other.

I question Marshack's liberal use of words and phrases such as 'haphazard', 'random', 'crude', 'badly-made', and 'hastily carved'. These are ethnocentric terms which tend to negate the complexities of the artistic process. There is no doubt that some images show greater graphic sophistication *to us*. However, the accurate representation of species characteristics is only one measure of the creative and artistic process. Other measures, although difficult to extract and define, include the perceptions and cognitive strategies of the makers. I also wonder on what basis Marshack differentiates between random and nonrandom markings. It should be pointed out here that markings do not necessarily need to be sequential, linear or organised to have been purposefully produced.

Although I have questioned several aspects of his report, I should stress that Marshack's work with Palaeolithic European art has been pioneering and challenging. Marshack's microscopic and infrared analyses have proved extremely valuable, and the data that he has been successful in compiling has provided great insight into the production and use of Palaeolithic symbols. If this data could be systematically applied toward ascertaining the function and symbolic meaning of the artefacts, some of our most enigmatic questions might be answered.

As Marshack points out, the data he has accumulated raises a number of interesting questions concerning the symbolism and use of Palaeolithic art. These questions, made possible by the accumulation of meticulous data, encourage the continuing interpretation of Palaeolithic symbols.

Paul Faulstich
Southwest Museum
P.O. Box 128
Los Angeles, CA 90042
U. S. A.

The present paper is no exception. Marshack has used his whiztech to make a close examination of the ancient objects from Vogelherd. It turns out that microscopic examination tells us something of what happened to the objects *after* they were made, that is to say, how they were used. These studies inform us about marks which were made on the objects. It is possible to infer that the marks were made after a certain moment, which is identified with, and demonstrated by the finishing of the artefact. (One of the annoying things about this paper is that Marshack does not inform us about the state of the object's surfaces when they were finished; we are not told about any toolmarks which had not been smoothed away, or indeed the appearance of the finished surface. This information, I admit, may well be included in some earlier article with which I am not acquainted.)

What happened to these objects was that they were carried about in a leather pouch for a considerable time—for long enough to produce a polish on many of the surfaces. This polish could have been produced by handling and stroking (which amounts to rubbing with leather, as carrying in a leather pouch does.)

* I wonder whether use-wear people could find out any more about the rubbing-with-leather, like, perhaps how the leather was cured, or how long the polishing took.

* There must also be information, through study of which parts of the objects are most highly polished, about whether any particular parts of the objects were paid special attention. Presumably, an object in a leather pouch gets rubbed most on the parts which are most protuberant—muzzles, particularly. Simple experiments with replicas would clarify the issue of whether muzzles and the bison's flank were treated specially on purpose, or polished as a mechanical result of the shape of the object.

Occasionally the object was removed from its pouch, and a mark made on it. Such marks were made by different tools, on different occasions, presumably by different people. The last such mark made was, in at least two cases, peculiar as to shape (three or more lines meeting at a point), position (high on the back of the animal) and timing: not much rubbing happened after these marks; the use of the objects in pouches may have ended with a 'ritual killing'.

Discoveries of this sort are fascinating and immediately rewarding; they give us direct insight into something which was going on so long ago, of which we were previously unaware. They are also *productive*, for they raise further interesting questions, some of which (like those I marked with an asterisk above) are associated already with means to investigate them. Others are the old, perennial, fascinating but intransigent questions like 'Why did people treat their artefacts this way?' 'What did the artefacts, or the actions, mean?' Such questions will one day succumb as they are continually reworked in new lights, on new material, such as Marshack presents.

As this paper demonstrates, an intelligent, receptive person making *mere* observations, but willing to attend to the significance of those observations may produce valuable, interesting, and productive insights. L. Binford has on several occasions been both vituperative and funny (Binford 1972: 3-13, and other pages in the index under 'Griffin') about an apparent belief that artefacts speak directly to archaeologists. I have not noticed anywhere in those Binford writings which I manage to understand a statement that what I claimed at the start of this paragraph is impossible. But, as I documented recently (Clegg 1984: 112-5), such a stance was once taken very strongly in my environment by the Problem Orienteer, the Arrogant Theoretician, and Uncle Tim. (Uncle Tim is no longer frozen into that particular extreme and cramping asana.)

I suspect that Marshack was attacked by bullying problem orienteers from his environment, who told him that he COULD NOT do what he was doing, so what he was doing was no use. This sort of thing certainly happened to me (Clegg 1979: 43-5) in the late 1970s, and I suspect Marshack suffered from similar nonsense, which is why he now scatters problem words in his writing. I do not believe that those problem words do any good, except promise a little protection from problem orienteers, at the expense of seeming to join their camp. If the problem orienteers in Marshack's environment are akin to those of whom I have experience, joining their camp would be too much to sacrifice. It would involve defining problems so strictly before one begins work on them that there would never be any possibility of discovering something unforeseen; the problems would be trivial. It would mean ending research once a problem had been solved: the solutions to trivial problems are not likely to be productive. I would prefer Marshack to proceed step by logical and productive step, as is natural to him. We can now afford to ignore the problem-oriented bullies.

If Alexander were to throw out the references to problems, he would be free to proceed by scientific routes: make an observation; check it; contemplate it, with a view to working out some of its implications; make other observations to find out whether the original observation, and by extension its possible implications, is a single phenomenon, or one case of a widespread or general pattern; and so proceed to further insights, hypotheses, guesses, and perhaps even theories.

Marshack does some of those things in the present paper, and shows that many pictures of animals, over a long time span, had particular attention paid to their muzzles, and that that attention was paid by someone other than the original artificer, taking the form of marks made in different handwriting, by different tools.

With this paper begins the study of the *use* of pictures, now distinguishable from the original making of pictures (though an exact and productive definition of where making ends and use starts is not known to me, and needs to be found). Up to the present time, there has been a failure to distinguish the two: our new conceptual tool should lead to a clarification of concepts and

conclusions which cannot fail to be a breakthrough in the study of prehistoric pictures—if it becomes well known and is followed up.

Thank you Alex, and thank you, AURA.

John Clegg
Department of Anthropology, A 14
University of Sydney
Sydney, N.S.W. 2006
Australia

By PAUL FAULSTICH

Marshack has demonstrated the value of intensive looking at a body of material. His development of unique problem-oriented strategies has provided specific data which has enhanced our understanding of Upper Palaeolithic images and symbols. Although Marshack's interest in symbolic objects is principally from a materialist's perspective, his analyses provide useful intradisciplinary interpretations that are undoubtedly valuable to scholars conducting a wide range of interpretive studies.

Marshack approaches art as process rather than as result. He discusses the differential uses of carvings over time, hinting at the range of meanings that may have been attached to them. With such a perspective, the pieces can be metaphorically connected to spatial, temporal and cosmological orderings. Thus, we are led into the range of possible symbolic meanings. However, we cannot identify the symbolic meaning of an artefact without identifying its intended cognitive function. Although not elaborated, Marshack touches upon this when he mentions the evidence for the symbolic nature of the Vogelherd horse. The notion that, after long ritual use, the horse may have been symbolically killed is fascinating, albeit not surprising.

The creative and analytical processes involved in the conceptualisation, production and use of the Vogelherd horse should not be overlooked. On this ground, I question Marshack's contention that the purpose of the 'killing' is not as important as the data concerning the use of the figure. An object's use cannot be understood in isolation from its meaning. The meaning inherent in the assumed ritualistic killing of the horse is inextricably related to the use of the carving. In order to achieve a holistic understanding of the role of art in Palaeolithic culture, we need to address a wide range of theoretical and analytical questions regarding the forms and functions of symbols.

If we are indeed dealing with material culture of symbolic nature, we must inquire as to how the objects, and the processes involved in producing them, would have provided tangible representation of otherwise elusive concepts. Thus, a cognitive association becomes the impetus for the objectification of a concept, i.e. dart = death. In this death case, the dart motif is assumed by Marshack to represent both the object of dart and the concept of death. In light of the data, this interpretation makes good sense. As a signifier, the dart represents something in addition to what it is.

Perhaps Marshack will clarify his seemingly contradictory statement that 'The data suggests that there was no single meaning, use or ritual that belonged to the representation of any single animal species, though certain animal species had rather specialised or restricted modes of use'. Unfortunately, we are not presented with any of the data that supports this, and I am left questioning Marshack's conclusion. The use of animals within cultures as standardised, symbolic elements of art and myth is well known. Although there is no acceptable ethnographic analogy for Upper Palaeolithic European art, we must not overlook the cross-cultural use of enduring associations between animals and their symbolic meanings. I am unable to accept, on the basis of Marshack's presentation, that the horse in Tuc d'Audoubert, for example, is a generic symbol, while the markings around the animal have a specialised meaning. The relationship between the principal image of the horse and the presumably secondary marks is intrinsically complex: perhaps one is meaningless without the other.

I question Marshack's liberal use of words and phrases such as 'haphazard', 'random', 'crude', 'badly-made', and 'hastily carved'. These are ethnocentric terms which tend to negate the complexities of the artistic process. There is no doubt that some images show greater graphic sophistication *to us*. However, the accurate representation of species characteristics is only one measure of the creative and artistic process. Other measures, although difficult to extract and define, include the perceptions and cognitive strategies of the makers. I also wonder on what basis Marshack differentiates between random and nonrandom markings. It should be pointed out here that markings do not necessarily need to be sequential, linear or organised to have been purposefully produced.

Although I have questioned several aspects of his report, I should stress that Marshack's work with Palaeolithic European art has been pioneering and challenging. Marshack's microscopic and infrared analyses have proved extremely valuable, and the data that he has been successful in compiling has provided great insight into the production and use of Palaeolithic symbols. If this data could be systematically applied toward ascertaining the function and symbolic meaning of the artefacts, some of our most enigmatic questions might be answered.

As Marshack points out, the data he has accumulated raises a number of interesting questions concerning the symbolism and use of Palaeolithic art. These questions, made possible by the accumulation of meticulous data, encourage the continuing interpretation of Palaeolithic symbols.

Paul Faulstich
Southwest Museum
P.O. Box 128
Los Angeles, CA 90042
U. S. A.

By ROBERT LAYTON

Marshack's paper exemplifies the difficulty I find generally with this author's work, namely the support of interesting and plausible conclusions (in this case that carved and painted Palaeolithic animal representations had a range of meanings over a period of time) with often weak argument.

It should first be pointed out that, notwithstanding Marshack's original contribution, Laming and Leroi-Gourhan preceded him in asking 'questions concerned with how different classes of image were made, used and associated with each other'. These writers moved well beyond 'current theories concerning hunting magic, animism or art-for-art's sake'. Indeed Marshack's preoccupation with the 'symbolic killing' of images evokes the earlier work of Breuil. When writing of 'cultural modes of symbol use' reference could well be made to Conkey's work at Altamira (Conkey 1980) and Gamble's work on figurines (Gamble 1982).

It is important to distinguish two steps in Marshack's analysis: deductions concerning the length of time over which a carved object or representation was used, and inferences as to the cultural significance of this prolonged use. Thus his conclusion that it must have taken some time for handling to wear down the Vogelherd ivory horse appears sound. (In Marshack 1972, pp. 254-5 the period is assessed as 'many months, perhaps ... years'.) But no significant time may have elapsed between engraving different 'spots' on the feline from this site: suppose it was handed around a group one afternoon and each member drew one mark! The same point may be made of the multiple muzzles, legs etc. of other engraved figures cited (Kesslerloch, St. Eulalie, Fontanet): who is to say the artist did not experiment until he was satisfied with the positioning and line quality of his engraving? Any approach to Palaeolithic art must determine how great a degree of resolution between alternative theories the evidence allows. The alleged use of different ochre mixes in the spots on the Pech Merle horses is said to show they were applied over time, whereas at Combel it is differences in technique of application despite use of 'the same basic ochre' which is said to support the argument.

When Marshack refers to 'the angle or dart' engraved on the Vogelherd horse he juxtaposes a descriptive term with an inference concerning the mark's representational quality. Does the shape actually look like any extant Palaeolithic projectile? A 'multi-lined comet', a 'series of feathered darts' and another series of non-feathered 'darts' are all assimilated without question into the category of weapons; while among the motifs juxtaposed with horses at Lascaux 'darts' are uncritically distinguished from other simple geometric forms, 'these horses were used in still other ways by the addition of signs and symbols'. The term *ritual* is not defined: is it action in which the relationship between means and (pragmatic) end appears to the observer irrational or nonrational, or is it communication through standardised sequences of nonverbal signs? There is no definition of *art*, so we cannot answer Marshack's rhetorical question about the Kesslerloch horse.

Marshack is considerably more cautious in his conclusion that 'the data do not give us the meanings ... they do not tell us whether eyes, ears, muzzles, legs and tails had specialised meanings or ritual uses'.

Dr Robert Layton
Department of Anthropology
University of Durham
43 Old Elvet
Durham DH1 3HW
United Kingdom

By DAVID R. MOORE

During the past twenty years Marshack has opened up a whole series of new approaches to the interpretation of prehistoric art. Whatever one may think of his individual analyses (and I must confess to finding many of them unconvincing), the new methodologies he has inaugurated by microscopic examination of grooves and strokes in both parietal and mobiliary art have certainly provided fresh vistas into the cognitive processes of prehistoric man in many parts of the world. It is obvious that his data are extremely important, even if his interpretations of those data may sometimes seem farfetched.

The two new developments summarised in this paper are quite as intriguing as any of Marshack's earlier hypotheses regarding the calendrical and numerational meaning of the hitherto mysterious series of cuts and scratches found in so many examples of prehistoric art. His discovery of a wide range of artefacts where such marks appear to have been made at different times and by different instruments certainly opens up a new range of imaginative possibilities in interpretation. Similarly, his finding of many examples of re-engraving or repainting of both animal and human figures, also done by different tools at different times, has far-reaching implications regarding prehistoric ritual and cognition.

The second of these discoveries certainly has an Australian parallel, in the well-documented periodic repainting of Aboriginal art in rock shelters as a *ritual* act to honour the Ancestors of the Dreaming and to ensure the continuation of the cosmic *status quo*. This development in Marshack's research makes one wonder whether similar methods of reworking might have been applied also by the Australian Aborigines to rock engravings. It has often been suggested that the marked variations in the depth and breadth of grooving in the Sydney district engravings might be due to periodic ritual reworking of the grooves. However, the Hawkesbury sandstone on which the Sydney engravings are made is so soft that it is impossible to gauge whether

such variations are due to human or climatic agency. In other areas, though, where the medium is harder, it would certainly be worth taking a new look at engraved sites, with a binocular microscope, to see whether evidence can be found of reworking by different tools at different times.

However, a further complicating factor is the possibility (or perhaps the likelihood) that numbers of men may have worked on any given group of engravings at the time when they were first made. Although we have no direct evidence as to the rationale behind Aboriginal engraving, one cannot doubt that it was usually a ritual act, as was the painting of cave walls. In both cases the act may initially have been carried out either by one individual in a particular totemic relationship to the site, or by a group of men of a particular clan. Equally, either one man or many may have carried out ritual reworking on one or more subsequent occasions. All of which does not help matters much, but does mean that Marshack's marks were not necessarily done at different times just because they were made by different implements.

Marshack's new discovery regarding series of cuts and scratches on Palaeolithic mobiliary art suggests that it would be worth re-examining small Aboriginal artefacts such as *tjurunga*, cylcons, and message sticks to see whether different tools have been employed to produce the lines and symbols on them. It would seem logical that durable artefacts, such as *tjurunga*, might have been modified or added to by successive generations, just as have the cave paintings.

When Marshack was in Australia for the 1974 A.I.A.S. conference on 'Schematisation in Art', he requested access to the large collection of cylcons (conical stone artefacts from western New South Wales) in the Australian Museum. A selection of incised cylcons having been laid out for him, he immediately began interpreting the cuts and lines on them in terms of his calendrical theories on Palaeolithic European art. His enthusiasm and excitement were admirable, but such a hasty reaction to artefacts separated from the European specimens by many thousands of miles and many millennia produced a somewhat incredulous attitude in those present. The basic problem in the Marshack type of approach is that, just as one can manipulate statistical data to produce any desired result, equally it is always possible to interpret series of cuts or scratches according to the light in the eye of the beholder.

Nevertheless, this anecdote is not intended to detract in any way from Marshack's remarkable achievement. Therefore, I must again express my personal admiration for his unrelenting pursuit of his hypotheses in all parts of the world and for his prolific and elegant exposition of his theories. I have no doubt that other researchers will be following up his leads fruitfully for many generations to come. *The Roots of Civilisation* is still one of my favourite books for browsing, primarily because the fascinating play of Marshack's imagination in the text is a stimulus to one's own imagination, but no less for the delights provided by his magnificent photographs and line drawings.

David R. Moore
(Australian Museum)
13 Chester Street
Woollahra, N.S.W. 2025
Australia

By CLEMENT W. MEIGHAN

Artistic productions of prehistoric peoples have been interpreted through many approaches ranging from rampant speculation to actual interviews with the primitive artists. The direct ethnographic approach is not possible for ancient art, so it is necessary to apply other analytic methods. Marshack has made a major contribution through his many research papers showing that there is *physical evidence* in the artefacts which can provide insights into use and general meaning. An important observation, based on his microscopic analyses, is that Palaeolithic objects were used over a long period of time and that they bear physical marks applied at different times. The suggestion that this results from cyclical ritual use and/or ritual participation is compelling and has to be accepted even though it cannot be 'proven'.

Extension of the concept of periodic renewal to rock art is an exciting suggestion that deserves careful attention from students of rock art sites. It is all too common for rock art recorders to assume that all the rock art in a site was made in a relatively brief period of time and served only a single ritual. When it is looked for, however, there are many examples of individual rock art images which have been 'renewed' and many (perhaps most?) sites of any size do not represent a single episode but a succession of activities, some of which were devoted to the addition of new rock art elements and some of which left new physical evidences on existing rock art. I agree with Marshack that 'global' interpretations of art (e.g. hunting magic and the like) are too gross and that finer analytical study can greatly amplify the interpretive possibilities. This adds to the complexity of what is already a very difficult subject area, but it also adds to the intellectual challenge and forces us to recognise that the same artistic productions may have been used by different people for different purposes over a considerable period of time. Just as Marshack has been able to wring new conclusions out of museum specimens that have been available for generations, rock art researchers may well re-examine many of the published sites to make use of the new theoretical and methodological approaches outlined in this article.

Professor Clement W. Meighan
Department of Anthropology
University of California, Los Angeles
Los Angeles, CA 90024
U. S. A.

By JACK STEINBRING

Marshack's extensive and innovative experience (amply testified to by the insertion of what must be his nearly complete bibliography in reference to this article) has quite naturally led him to a new plateau in his focus on mobiliary art of the European Palaeolithic. While the title of this paper asserts a process beginning with 'theoretical concepts', he more accurately states the history behind this effort as starting with 'attempts to develop new analytical techniques'. It is important to isolate this procedural emphasis so that we may see Marshack's unique contribution and place it in a balanced, comparative perspective on the nature of early human culture.

As in certain theoretical findings on hybridisation, or in the source of historically significant ideas at the point of intercultural contact, Marshack and many others have brought profoundly potent combinations of thought and practice from finds totally external to the social science of prehistory. Marshack's interest in the physical sciences led him to an approach featuring mathematics and microscopy. While his work has never achieved full anthropological respectability, it has offered a wealth of fresh data and insights. These have provided students of culture issues for debate which are easily classed as of continuing historic character. The present article fits perfectly into this context, and illustrates a case of what might be called 'academic convergence'.

Marshack has, through his particular approach to objects of prehistoric art, arrived at considerations of differential in form, function and meaning. Reflection upon such differentials has been a preoccupation of anthropologists since the emergence of the discipline. From a temporal perspective, and exaggerated by transcultural potentials, any perceived act, as reflected in the prehistoric record, may undergo changes in any of the three listed categories, in both time and space. In other words, an idea may be differently symbolised through time and space, and a temporally and spatially persisting symbol may have variable meaning. The cultural mechanics of function may be equally variable. To cite a documented case: it was discovered that Ojibwa Indians were firing high-powered rifles at a rather large prehistoric rock painting of a moose on the Bloodvein River in central Canada (Steinbring 1968: 499). The initial conclusion was that this was blatant vandalism. Some careful interviewing showed that some of the shots were fired to achieve mimetic results!

Marshack's exhaustive comparative knowledge of his resource, combined with his penetrating analytical techniques are indeed bringing forward extremely valuable data in the study of symbol. That these kinds of information are arising is no surprise at all, especially to anthropologically-oriented archaeologists. Marshack, who reviews his background (1972: ii) as 'a journalist in Asia and Europe, a news writer, a book and drama reviewer, an art reporter, a photographer, a script writer, a producer-director of plays, and a science writer', joins the majority membership of the rock art research community. And, he shows once again that a nonanthropological approach may lead to the same kinds of conclusion. The process 'should' be quicker if formal practitioners did it, but . . . they don't.

To be perfectly fair to Marshack, in his current 'exchange' with Mundkur (Marshack 1985: 140) he cites several of his previous applications of cultural relativity, in a sound refutation of 'biological determinism'.

Of special interest to me in this paper was the seemingly well-documented process of adding dots to a figure, each at a different time, sometimes with entirely different pigment. In the Puna district of Hawaii, and in a few cases in the American Southwest, as well as in two very early petroglyph sites in central Canada, I have seen both enclosures with varying accumulations of dots, and varying accumulations of dots without enclosures. These too appear (megascopically) to be produced by different tools and to have experienced different levels of patination. The sites and loci are not numerous, and no microscopic study of them has been done. Marshack has given me an idea.

In some sense Marshack is also correct in asserting that Thomas' studies of mobiliary art at Gatecliff are a 'validation' of his 'theoretical and methodological' pursuits. This puts it rather strongly, but there is no question that the very long history of incising pebbles, along with some form correspondence with regional rock paintings and petroglyphs, makes the Gatecliff materials the most likely to produce a theoretical breakthrough in North American rock art. Whether microscopy and spectrometric analysis will alone bring this about would be quite uncertain at this time. They will assuredly help.

Marshack's final statements are about the uniqueness of questions raised by the new data, and that the uniformity of mode disclosed by them (the data) reflects 'symbol systems and cultural modes of symbol use'. I am content that there are modes, but the assertion of *system* is premature from the data presented in this paper. This is particularly so in light of the potentials for variability of form, function and meaning through time and the transcultural dimension. Also, systems were the rage at one time, easily found if you were looking for them—neat answers to essentially mathematical questions. As Marshack has once again convergently discovered, Man's acts often defy metrical order.

Professor Jack Steinbring
Department of Anthropology
University of Winnipeg
Winnipeg, R3B 2E9
Canada

[Further comments on Marshack's paper will be published in our May 1986 issue, and will be followed by the author's response.]

Résumé. *L'auteur a examiné de près plusieurs objets changeants et des compositions d'art des cavernes de la Haute période Paléolithique de l'Europe, concentrant son attention sur des traces d'usage. Il rapporte que beaucoup de sculptures et figurines portent la preuve d'un long terme de lissage et d'usure, et des marques intentionnelles qui ont été ajoutées pendant une période de temps.*

L'auteur a trouvé des preuves de pareils répétitions d'usages et de renouvellements dans les cavernes d'art. Plusieurs figures peintes ou gravées montrent des répétitions de details anatomiques dans la représentation animale, comme par exemple des museaux supplémentaires, des yeux, des oreilles et des pattes, ou ils comprennent des symboles cumulatifs abstraits. La répétition et possiblement l'usage périodique de la représentation de l'art est interpretée comme un marquage rituel de plus, une explication qui est d'une pertinence considérable pour comprendre les origines et les fonctions possibles de l'art de la Haute Paléolithique.

Zusammenfassung. *Der Autor unternahm zahlreiche gründliche Untersuchungen von mobiliären Gegenständen und Höhlenkunst-Kompositionen des Jungpaläolithikums in Europa, bei denen er Verwendungsspuren seine besondere Beachtung schenkte. Er berichtet, dasz viele Schnitzereien und Figurinen Beweise von Glättung und Abreibung zeigen, sowie absichtlich angebrachte Kerben, die über einen längeren Zeitraum hinzugefügt wurden.*

Der Autor fand auch Beweise ähnlicher Wiederverwendung und Erneuerung in Höhlenkunst. Viele gemalte und gravierte Figuren zeigen Nachbildung anatomischer Detaile in Tierdarstellungen, wie hinzugefügte Schnauzen, Augen, Ohren und Beine, oder sie schlieszen zusätzliche abstrakte Symbole ein. Die wiederholte und möglicherweise periodische Verwendung von figurativer Kunst wird als rituelles Überzeichnen interpretiert, eine Erklärung die von beträchtlicher Bedeutung für das Verstehen von möglichem Ursprung und Funktion der jungpaläolithischen Kunst ist.

REFERENCES

BÉGOUËN H. and H. BREUIL 1958. *Les Cavernes du Volp.* Arts et Métiers Graphiques, Paris.

BINFORD, L. R. 1972. *An Archaeological Perspective.* Seminar Press, New York and London.

CAPITAN, L. and J. BOUYSSONIE 1924. *Limeuil, Son Gisement a Gravures sur Pierres de l'Age du Renne.* Libraire Emile Nourry, Paris.

CLEGG, J. 1979. Science, theory and Australian prehistoric art. *Mankind* 12: 42-50.

CLEGG, J. 1984. Comments on M. Nobbs, 'Rock art in Olary Province, South Australia'. *Rock Art Research* 1: 111-8.

CONKEY, M. 1980. The identification of prehistoric aggregation sites: the case of Altamira. *Current Anthropology* 21: 609-20.

GAMBLE, C. 1982. Interaction and alliance in Palaeolithic society. *Man* (n.s.) 17: 92-107.

LEROI-GOURHAN, Arlette and J. ALLAIN 1979. *Lascaux Inconnu.* Éditions CNRS, Paris.

LORBLANCHET, M. 1973. La Grotte de Sainte-Eulalie a Espagnac (Lot). *Gallia Préhistoire* 16: 3-62.

MARSHACK, A. 1969. Polesini, a reexamination of the engraved Upper Paleolithic mobiliary materials of Italy by a new methodology. *Rivista di Scienze Preistoriche* 24: 219-81.

MARSHACK, A. 1970. *Notation dans les Gravures du Paléolithique Supérieur.* Mèm. 8, Institut de Préhistoire, Université de Bordeaux, F. Bordes, éd. Talence.

MARSHACK, A. 1972a. *The Roots Of Civilization.* McGraw-Hill, New York and Toronto; and Weidenfeld, London.

MARSHACK, A. 1972b. Upper Paleolithic notation and symbol. *Science* 178: 817-28.

MARSHACK, A. 1972c. Cognitive aspects of Upper Paleolithic engraving. *Current Anthropology* 13: 445-77.

MARSHACK, A. 1974. The Chamula calendar board: an internal and comparative analysis. In N. Hammond (ed.), *Mesoamerican Archaeology: New Approaches*, pp. 255-70. University of Texas Press.

MARSHACK, A. 1975a. An Olmec mosaic: internal analysis reveals prehistoric arithmetic, possibly calendric contents. In A. F. Aveni (ed.), *Archaeoastronomy in Pre-Columbian America*, pp. 341-77. University of Texas Press.

MARSHACK, A. 1975b. Exploring the mind of Ice Age Man. *National Geographic* 147: 62-89.

MARSHACK, A. 1977. The meander as a system: the analysis and recognition of iconographic units in Upper Palaeolithic compositions. In P. J. Ucko (ed.), *Form in Indigenous Art*, pp. 286-317. Duckworth, London.

MARSHACK, A. 1979. Upper Paleolithic symbol systems of the Russian Plain. *Current Anthropology* 20: 271-311.

MARSHACK, A. 1983. Nineteenth century Siberian and American Indian calendar sticks. *1st International Conference in Ethnoastronomy.* Smithsonian Institution, Washington, D.C. (proceedings in press).

MARSHACK, A. 1985. On the dangers of serpents in the mind. *Current Anthropology* 26: 139-52.

STEINBRING, J. 1968. A key pictograph from the Bloodvein River, Manitoba. *American Antiquity* 33: 499-501.

THOMAS, D. H. 1983. *The Archaeology of Monitor Valley: Gatecliff Shelter.* Vol. 59, part 1, Anthropological Papers of the American Museum of Natural History, New York.

KEYWORDS: Rock art protection - Tourists - Visitor behaviour

MONITORING VISITOR BEHAVIOUR AT ROCK ART SITES

Fay Gale

Abstract. The tremendous growth in the Australian tourist industry in recent years poses a significant threat to rock art sites in many parts of the continent. Rock art faces unprecedented conservation problems associated with the rapid increase in the number of visitors, and the author was requested by the Joint Academies' Committee for the Preservation of Prehistoric Places to conduct a major study of visitor behaviour. This covered two localities in Northern Territory, the Kakadu site complex and Ayers Rock. With hundreds of thousands of visitors annually these sites are among the most threatened in Australia.

The lack of major previous research on this topic necessitated the development of an experimental methodology initially. The paper describes this process, and the evolution of an objective-oriented research design. A general discussion of preliminary results is provided.

Undoubtedly one of the major threats to rock art in Australia today is the rapid increase in the number of tourists visiting art sites. Tourism in Australia is booming and the industry is being promoted by many interest groups. Valuable rock art of great age and artistic value which was once protected by distance and isolation is now being visited by increasing numbers of people. The rapid development of bitumen roads, motels and a highly organised tourist industry have combined to attract people into art sites which once were known only to the very few. Often these sites are being opened to the public without any protection or thought for the future.

Australia's unique heritage of Aboriginal rock art is now being seriously threatened. Whilst millions of dollars are being spent on attracting visitors to the major art sites there is virtually no money available to study or protect that art. The Australian tourist industry, heavily subsidised by all governments, has unwittingly moved headlong into a stage where it is 'killing the goose that laid the golden egg'.

It is this rapidly deteriorating scene which I have ventured to study at the instigation of the Joint Academies' Committee on the Protection of Prehistoric Places. In doing so I soon found that, in terms of scientific study, I had entered largely uncharted waters. My methodology, at least initially, could not even claim to be experimental. At the beginning my study efforts were largely a hit and miss affair. With little previous experience to guide me, and little comparable work, I formulated techniques as I went along.

MS received 20 March 1985

Methods of Study

I have, to date, carried out three field studies in areas of high and rapidly increasing visitor usage. The first two were undertaken at Kakadu National Park and the third at Uluru National Park (Northern Territory). This work was very much a case of learning on the job and as a result the third study was inevitably better planned and more sophisticated than was the first. Nevertheless, in spite of the almost arbitrariness of the research design, significant results were obtained in each case making it clear that more developed study in this area is warranted.

The work is primarily one of studying certain aspects of human behaviour in relation to very specific types of environments, that is, rock art sites. For this reason the well-recognised scientific method of observation was used and I attempted both unobtrusive and participant observation. In the first study we also made direct contact with the visitors by an interview procedure. No controls were attempted in the first study but these formed part of the research design in the third study.

Since this was a study of tourist behaviour *in situ* the research techniques had to be modified to suit each of the sites being studied. Some areas lend themselves to unobtrusive observation whilst in others this is not possible and participant

observation is the nearest method of camouflage available. As techniques must be adapted to suit each location it is preferable to run pilot studies prior to the actual period of observation, but because of the distances involved and the costs that such a procedure would necessitate, this was not done. However, I did make a reconnaissance visit to each site and as far as possible planned the study design in accordance with any site-specific characteristics.

This is not the kind of study which can be undertaken single-handed. It requires a relatively large group of field workers. In each of the three cases cited above I took assistants with me into the field. Primarily these consisted of staff and students from the Geography Department, University of Adelaide, since it was possible to give them some preliminary training prior to departure. It also proved to be the cheapest way of acquiring assistance since all participants worked in a voluntary capacity. We timed the work on each occasion to coincide with the visitor season at both Kakadu and Uluru. Clearly to study visitor behaviour it was necessary to be at these parks during periods of high visitor usage. Since both areas are very seasonal in their visitation patterns it was necessary to undertake the work during the southern winter. However, this meant that because of commitments for both staff and students at the University the amount of time in each location was limited to between a week and ten days.

The main aim of this research has been to assess the behaviour of visitors at rock art sites in order to isolate those sites which are most vulnerable to destruction and the kind of protective measures which would be the most appropriate to institute. At the present time it is the art sites in national parks which are the most threatened, because these areas are facing rapidly increasing numbers of visitors. Fortunately overt acts of vandalism are relatively rare but large numbers of even well-behaved visitors can damage rock art very quickly without any awareness of the detrimental nature of their presence. It is primarily the behaviour of this target group which my research has tried to measure. These are the visitors, the silent majority as it were, who are inadvertently doing a great deal of damage.

As Australian rock art is currently under most threat in the areas of rapidly booming national parks it seemed logical to study the two parks where considerable tourist development is taking place at present. For this reason the first field study was made at Kakadu National Park. Although visitors had been coming to Kakadu in increasing numbers over the last fifteen to twenty years the major influx began with the dedication of the area as a national park in 1979 and its widespread promotion as a tourist destination. Fortunately Kakadu was opened up with reasonably high levels of staffing in Australian terms and the allocation of one person, Dan Gillespie, to study the art sites and institute protective mechanisms.

My first study was made at the art sites at Ubirr in June 1982. At that time the visitor explosion in Kakadu was only just beginning and with a team of eleven people it was possible to test the feasibility of a range of techniques for monitoring visitor behaviour. In this first study we used interview schedules as well as unobtrusive and participant observation. The layout of the sites at Ubirr coupled with the level of visitor numbers at the time meant that all three techniques could be applied simultaneously. This was not so at the time of our second study at Ubirr nor was it possible at Uluru. It was also fortuitous that, at the time of the first study, there were no barriers or warning signs at the actual art faces in Ubirr. Just prior to our arrival in 1982 a display unit had been erected at the entrance to the Ubirr complex and a walking track had been marked out although it had not been fenced. The limited controls present during this first study provided valuable comparative data for the second study at Ubirr.

Interviewers with formal interview schedules sat at the entrance to the complex and recorded all persons as they entered the site and interviewed them as they left the area. These assistants formed the 'out front' or conspicuous members of the survey team. They acquired information such as place of origin, age and nature of the visitors and how they were travelling.

Inside the Ubirr complex several recorders were stationed. Some were completely hidden, this being made possible by the lushness of the vegetation and the layout of the rock faces. Others joined in with the larger groups of visitors or walked around the sites theoretically disguised as ordinary tourists. Both groups recorded behaviour, some from the vantage point of being hidden and able to record actions when people did not realise that they were being observed, and others from the open point of visitors knowing that there were other people present.

Each night the students worked together to co-ordinate the information obtained from these three sources and enter the three sets of information about each individual visitor on to one file per person. The numbers at the site were sufficiently low at this time to enable such co-ordination of data. Unfortunately this was not possible with subsequent studies. But this first study made it possible to determine information about the persons who touched or damaged the art such as where they came from, how they were travelling, why they came to Kakadu and what they thought of the art.

I decided initially that this kind of correlated personal information was necessary to decide who were the target groups who needed to be considered in planning any protective measures. The first study showed that this approach was extremely difficult and possible only with large numbers of recorders and relatively small groups of visitors. Furthermore the additional information acquired did not warrant the effort and threat to precision at the observation points. Observers tended to be so busy making sure that they could identify the persons by descriptive means such as age, sex, clothing etc. for later correlation

that the important areas of observation, namely the art faces, were liable to be neglected when there was any pressure of numbers. For these reasons the interview techniques were abandoned in later studies and efforts were concentrated on observation.

The second study of tourist behaviour at rock art sites was also located at Kakadu National Park. This time, August 1983, all three art sites open to the public, namely Ubirr, Nourlangie and Nawulandja (the Blue Paintings) were studied. Observers were placed as unobtrusively as possible. The degree to which observers could be quite hidden, and yet close enough to see, depended upon the particular site. The sites at Ubirr again lent themselves to such a method but not as easily as in 1982 when there were no fences or barriers and access was more open and varied. One of the sites at Nourlangie was easy to monitor without the recorders being seen but at the other site it was more difficult. In this case the observer had no alternative but to be obvious and therefore to act as a tourist, or a person sketching or a student of the art. At Nawulandja it was possible to record entry and exit from the adjacent burial ground without being noticed but this was more difficult at the two art sites. By regularly changing 'shifts' and locations it was possible to make the observers at least appear as *bona fide* tourists hoping that this would lessen their threatening or intervening impact on visitors.

The two periods of study undertaken at Ubirr, the one prior to the construction of barriers and fences and the other after their erection showed me that it is very valuable to be able to study behaviour at a site before too many restrictions are in force. This makes the study easier and therefore more accurate but it also makes possible an analysis of the success or otherwise of the protective measures that are later inserted. By recording behaviour at Ubirr both before and after the erection of the signs, fences and barriers we were able to evaluate the effectiveness of the devices that had been installed.

The third study I have undertaken was made at the two main groups of sites at the base of Ayers Rock in Uluru National Park. By this stage I had decided to rely totally on the observation technique. At some sites at Uluru, as in Kakadu, it was possible for the observers to monitor the behaviour of visitors without being detected. At other locations it was almost impossible to observe the visitors satisfactorily and remain out of sight. In such cases we tried to 'camouflage' as tourists or art students. Although this was accepted by most visitors it did mean that we were seen and that no doubt our presence encouraged some visitors to modify their behaviour.

Discussion of Results

Our activity had the most noticeable impact upon the local tour guides who soon became aware of the continued presence of the same faces. Regularly changing personnel at each site did little to alter this fact as far as the regular guides were concerned since the sites are close together and the same guides made several visits during our period of study. This was not so at Kakadu where the Ubirr and Nourlangie groups of art are much further apart, rarely visited by the same tour groups on the same day, and where the proportion of visitors coming with tour operators is relatively small. The reverse is the case at Uluru where a high proportion of tourists come in organised tour groups and a large percentage of these actually operate out of Yulara or Alice Springs.

However, in all sites where unobtrusive observation was not possible we must assume that we recorded the absolute minimum levels of detrimental behaviour. Since that in itself was very high it is not difficult to imagine that with the rapidly increasing numbers of visitors to art sites there will be little art remaining by the end of the century unless protective measures are introduced at all of the main tourist points.

It was more by accident than design that I was able to study the visitors at Ubirr both before the introduction of barriers and signs as well as after their installation. I therefore did not initially formulate the study to take account of the changes. It was quite by chance that I was able to record the substantial alteration in tourist behaviour after the erection of signs and barriers. However, I was not certain of the accuracy of the results because of my own inexperience and the limited number of assistants I had, as well as the fact that I had had no say in the design and location of the signs.

The Ubirr experience taught me that even with the lack of skill and the elementary level of recording achieved it was still obvious that protective measures can be effective in limiting adverse tourist behaviour. For this reason I decided to structure the Uluru study to make a more precise measurement of the effects of signs. It had not been possible at Ubirr to determine the relative effectiveness of the various measures used, namely warning signs, brochures, displays, designated paths, fences and interpretive posters. These had all been erected between the two study periods.

However, at Uluru there was no protection or interpretive material of any kind at either of the two main groups of art sites at the base of Ayers Rock. Even the paths were accidental and achieved by constant usage rather than design. The visitors had complete freedom to wander anywhere and to touch the art if they wished. I decided to divide the study period into two sections, so as to record the effectiveness of simple signs on their own. Thus observations were made in the first half of the survey just as the sites stand. Then for the second period of time we erected simple warning signs at two of the main art sites, one at the cave known as Hunters Cave at Maggie Springs and the other at a quite different shaped cave, known as Blackboard Cave just around from the point where visitors climb the rock. The warning signs read, 'Please do not touch the art', and were stood on the ground inside each of the two caves.

The number of people who touched the art

face purposely and accidentally is only one measure of the pressure the art sites are under from increasing visitor impact. However, touching is an easily observable and quantifiable aspect of tourist behaviour and thus it is a useful measure of attrition of the art face resulting from human presence. We attempted to measure a number of other aspects such as crowding and dust disturbance as well as the more overt acts of scratching, marking or picking at the paint surface. Nevertheless, simple touching is an activity which is easy to monitor. Thus we inserted signs designed solely to measure whether visitors modified their behaviour in this respect once the signs were inserted.

The results were quite spectacular. Evidently even very simple signs without any barriers or fences or other measures can have quite significant effects in reducing the actual touching of the art surfaces. But what was also evident was the fact that the signs had a differential rate of effect according to the precise location, shape and size of the cave in question.

It was also clear that some groups of people are more influenced by signs than are others. On the whole the private tourists behave and respond differently from large tour groups. There is also a considerable difference in the behaviour of tour group operators and this is reflected in the behaviour of the individuals in the various tour groups.

This area of research aims at studying visitor behaviour with the intention of developing measures to modify the detrimental aspects of that behaviour. As such it is a study very much in its infancy with survey techniques still being formulated. However, already some things are clear. One fact that is obvious is that sites vary both in their general location and in their particular siting within that location. Protective measures need to be designed to suit the actual position and siting of the art in question.

In general terms we all acknowledge that isolated sites are relatively safe for the time being if they are in remote regions far from developed roads or on pastoral properties where the art is respected and well guarded by the

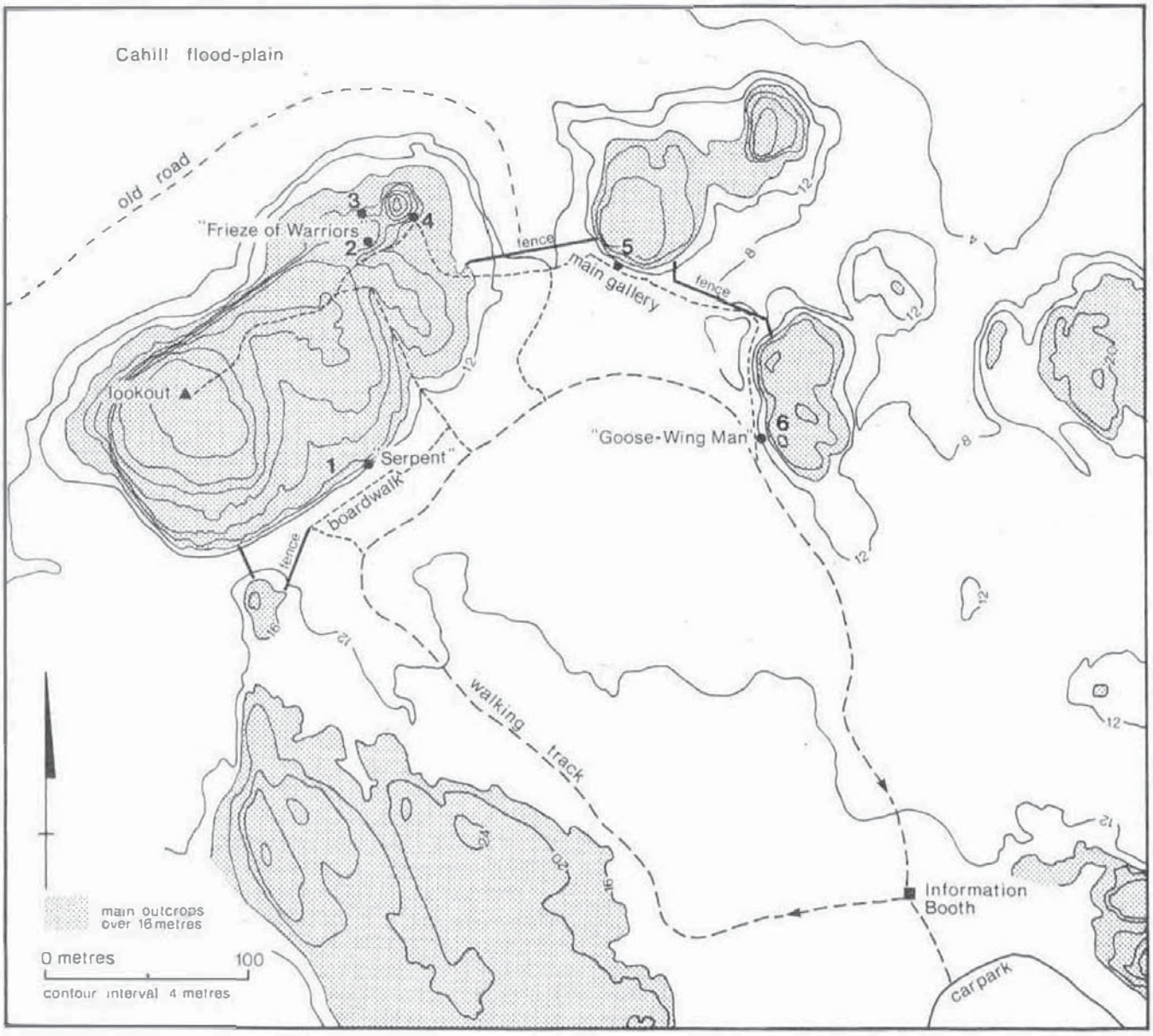


Figure 1. Ubirr rock art site, Kakadu National Park, Northern Territory.

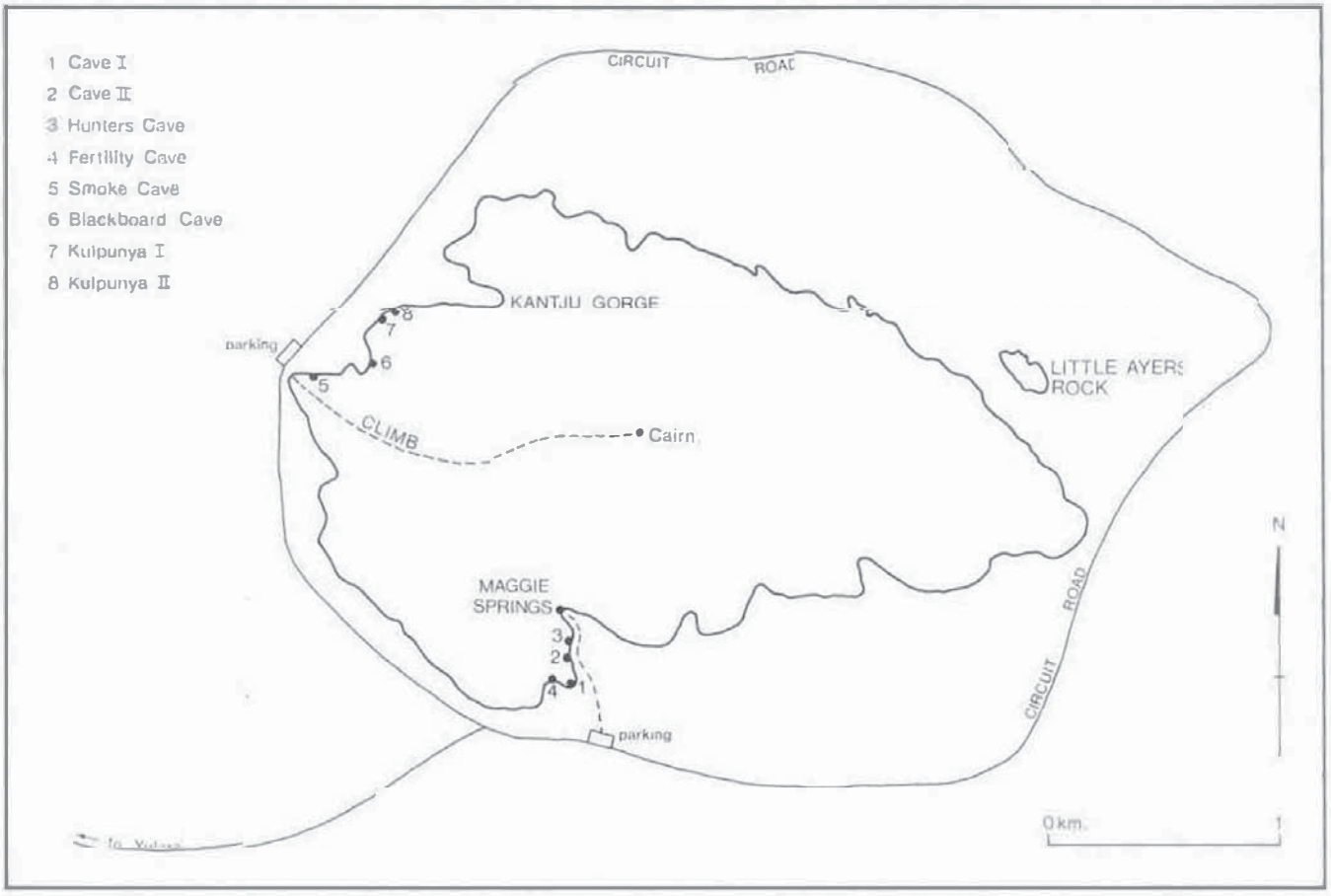


Figure 2. Rock art sites in Uluru National Park, Northern Territory.

station owners. In broad locational terms the art most at risk is that nearer to major cities or, ironically, that in national parks under the control of conservation authorities. But within such a broad classification of generally 'safe' and 'unsafe' sites there is also a considerable variation in the danger level at any one location related to the precise siting of the art.

Take the Ubirr complex for example. Before the advent of the fenced walkways, the timber boardwalk or the barriers it could be said that the lower sites at Ubirr, that is those on the flat ground, numbered 1, 5 and 6 in Fig. 1, attracted substantially more visitors than did the sites further up the hill to which visitors had to climb. Our study in 1982 showed that Site 1 received approximately one third more visitors than did Site 4. The art at Site 1 was being seriously threatened just from the amount of dust being kicked up without the added factor of people touching the art and picking up the paint or the one case we observed of beer being thrown from the cans at the art face.

Similarly the study of Ayers Rock showed the importance of understanding the precise situation of an art site within its general complex. For example almost two and a half times as many people visited Cave II and Hunters Cave in comparison with Cave I during our period of survey at Maggie Springs (see Fig. 2). Cave I is slightly off the direct path to the springs whereas the other two caves are obvious from the path. Even fewer people visited Fertility Cave which is further from the direct path. During our period of observation just over one sixth of the visitors to the major two caves in this complex also went to see the art in Fertility Cave, yet this is probably the most interesting and spectacular art in the area. Thus to a large extent art may be protected by its very particular position within any one group of sites.

The amount of damage being done will also depend on the art face as well as its general location and its particular siting. For example during our study period the art in Cave 4 at Ubirr received a great deal more touching than did the art faces at any of the other sites at Ubirr. During the 1982 study we recorded the fact that something like fifteen percent of the people to visit this site actually touched the art. The majority of this touching was accidental. It is a low-roofed cave with an opening at the back on to a magnificent viewing platform. People moved through the cave to see and photograph the view beyond and in so doing touched the roof with their heads and shoulders unconscious of the fact that they were rubbing a magnificent ceiling of elaborate art work.

The actual shape of the caves similarly influenced the amount of touching or brushing which the art walls received during our survey at Uluru. For example the closed cave with a low ceiling marked as Kulpunya II on Fig. 2 was found to be very vulnerable to accidental as well as purposeful touching. In fact the survey team recorded the fact that four times as many visitors to this

area touched the art in Kulpunya II as did so in Kulpunya I. Since these two are adjacent caves we are describing virtually the same people visiting at the same time. The substantial difference in the proportion of visitors who touched the art surface at Kulpunya II in comparison with Kulpunya I therefore must be due primarily to the different shapes of the respective caves. Kulpunya I is a large open cave where it is possible to view the art and indeed walk through the cave without touching the sides. It is much more difficult to do this in Kulpunya II.

Similarly in the Maggie Springs complex we found that over three times as many people touched the art in Cave I as was the case in Hunters Cave. Hunters is a larger, open cave where it is possible to view the art and photograph it without touching the walls. Thus, although fewer people entered Cave I, which is slightly off the direct path, than the numbers recorded visiting Hunters Cave, a much higher proportion of those who did visit Cave I would have caused some damage to the art.

These three factors of general location, particular siting and the precise position of the rock surface all appear to influence the kind of protective measures required. At some locations, and at particular sites, caves may need quite extensive controls but at others relatively simple mechanisms will be effective. A comparison of Hunters and Blackboard caves at Uluru will illustrate this. Both are in the same general location and both have comparable siting positions on direct pathways along flat walking tracks. Both attract comparable numbers of visitors, indeed for our survey period they had very closely the same actual individuals visiting both sites. Yet it was found that the simple sign saying, 'Please do not touch the art', was more than twice as successful as a deterrent at Blackboard Cave than it was at Hunters Cave. The contrast was undoubtedly due to the difference in the actual shape and construction of the two caves. In the survey situation the contrast between the two sites showed as a convincing example of the fact that protective measures should be designed to suit the precise nature of each art site. Furthermore the enormous difference in the potential of one site to be damaged in comparison with another, even adjacent site, illustrates the degree of planning required particularly in national parks where controlled access can be instituted.

There are a number of factors which we observed as detrimental to the art in addition to the physical touching by visitors. These other features also vary according to the location, siting and layout of the walls on which the art is portrayed. The type of the vegetation is one such aspect which can be readily recorded by the observation techniques used in this kind of study. Some species of vegetation, especially the prickly or woody kinds deter visitors and often act as natural barriers. Other kinds of vegetation virtually seem to ask to be trodden down. The accidental removal of such vegetation can lead to increased dust movement, wind abrasion and even the introduction of direct sunlight on to an art face. The art wall at Hunters Cave had clearly suffered from the accidental destruction of plant growth especially the removal of a large native fig tree at the entrance to the cave.

Our surveys suggest that early and careful planning of each site to be opened to the public can do much to limit damage. The beautiful stencil art in the shelters of the amphitheatre area at Mootwingie National Park (western New South Wales) illustrate the practicability of detailed planning. In this region, which is gradually being developed as a tourist area, some of the art sites are in caves which could, with a little adaptation and control, allow relatively large numbers of people to view the art sites without damaging the art itself. Other sections of the art at this location are situated in quite vulnerable positions where much more care and control would be needed to protect the art. Thus the problem of protecting the rock art from increasing visitor pressure is far from simple. But there are also hopeful signs that with careful study in the initial stages, followed up by suitable protective measures, the most common forms of damage might be prevented without detracting too greatly from the general aesthetics of sites.

Acknowledgements

These studies were undertaken with initial support from the Academy of the Social Sciences, the Australian Institute of Aboriginal Studies and the Northern Territory Conservation Commission. This pilot work was followed up with assistance from the Australian National Parks and Wildlife Service for work at Kakadu where Dan Gillespie and Hilary Sullivan gave considerable support. The work at Uluru was made possible by a grant from the Australian Heritage Commission and the on-site assistance of Derek Roff and Hilary Tabrett. Thanks to Josephine Flood and the Australian Heritage Commission it has been possible to employ Jane Jacobs to take a major responsibility for the collection of data and also to analyse the material from both sets of surveys.

Professor Fay Gale
Department of Geography
University of Adelaide
Box 498, G.P.O.
Adelaide, S.A. 5001
Australia

[No comments were sought for Professor Gale's article. Readers wishing to comment are invited to submit their reviews. A paper on specific aspects of this study is in preparation.]

Résumé. *L'énorme augmentation dans l'industrie touristique Australienne des années récentes pose une menace importante aux sites d'art rupestre dans plusieurs endroits du continent. L'art rupestre rencontre des problèmes de conservation sans précédents, associés avec l'augmentation rapide du nombre de visiteurs et en conséquence l'auteur a été requis par le Joint Academies' Committee for the Preservation of Prehistoric Places de procéder à une étude majeure du comportement des visiteurs. Ceci a couvert deux localités dans le Northern Territory, le site complexe du Kakadu et Ayers Rock. Avec des centaines de milliers de visiteurs annuellement, ces sites sont parmi les plus menacés en Australie.*

Le manque de recherche majeure au préalable à ce sujet a initialement nécessité le developement d'une méthodologie experimentale. Le papier décrit ce processus et l'évolution d'un projet d'un objectif orienté de recherche. Une discussion générale des résultats préliminaires est fournie.

Zusammenfassung. *Die enorme Entwicklung der australischen Touristik in den letzten Jahren bringt eine beträchtliche Gefährdung der Felskunststätten vieler Teile des Kontinents mit sich. Die rasche Erhöhung von Besucherzahlen verursacht Konservierungsprobleme beispielloser Ausmasze fur die Felskunst, und die Autorin wurde vom Joint Academies' Committee for the Preservation of Prehistoric Places beauftragt, eine umfangreiche Studie von Besucherverhalten einzuleiten. Diese schlosz zwei Lokalitäten des Northern Territory ein, den Kakadu Felskunstkomplex und Ayers Rock. Mit hunderttausenden von Besuchern im Jahr zählen beide Stätten zu den am meist gefährdeten von Australien.*

Der Mangel früherer umfangreicher Untersuchungen dieses Themas erforderte anfangs die Entwicklung einer experimentellen Methodik. Die vorliegende Abhandlung beschreibt diesen Vorgang, sowie die Entwicklung eines zielgerechten Studienplanes. Eine allgemeine Besprechung vorläufiger Resultate wird vorgelegt.

UCLA ROCK ART ARCHIVE

The Rock Art Archive at the Institute of Archaeology, University of California, Los Angeles, is one of the organisations with which AURA has formal information exchange arrangements. The Archive has a large collection of rock art documentation material, mostly from the United States, and would very much like to receive Australian contributions, including reprints, unpublished papers, reports, recordings and photographic material.

The Rock Art Archive is unique in that it is the only library of information specialising in rock art in the United States. Until its creation in 1977 information on rock art was scattered in different institutions and with different individuals. Lack of a centralised facility for the collection and maintenance of data on this aspect of ancient behaviour has been an obstacle to its study and understanding. Needless duplication of effort, gaping holes in the available data and the logistical difficulties of state-wide collaboration contributed to a sense of futility on the part of many researchers. It was in response to this situation that the Rock Art Archive was founded.

The Archive provides an opportunity for all scholars and rock art enthusiasts to place on file with the Archive their discoveries, records and reports on sites which have been previously recorded or only partially recorded. Although it is a repository for information on rock art throughout the world, the Archive's collections emphasise California, the Great Basin and the Southwest, and the data are maintained in a form which assists researchers; this information includes photographs, drawings and field notes, as well as published and unpublished manuscripts.

Readers willing to help are invited to contact for further particulars:

Helen Michaelis
Rock Art Archive
The Institute of Archaeology
University of California, Los Angeles
Los Angeles, CA 90024
U. S. A.

KEYWORDS: Open air sites - Geomorphology - Conservation - Standardisation

LES PAYSAGES DE L'ART RUPESTRE DE PLEIN AIR: VERS UNE NORMALISATION DES MÉTHODES D'ÉTUDE ET DE CONSERVATION

François Soleilhavoup

Abstract. The international standardisation of basic rock art research and conservation of open air sites must involve clear principles and ease of methodological replication, making allowance for any geoclimatic environment that is likely to be encountered. The author calls for the establishment of a committee for the creation of an international scientific and technical dictionary of a comprehensive format - a practical hand book for both field and laboratory, for the study and conservation of pre- and protohistoric rock art at open sites. This work should not be undertaken without agreement on semantics (conformity in concepts and language).

The author also provides a methodological example for the scientific analysis of this art, and for the determination of the original state of the site and rock surface. Finally he advocates the registration of variations in micro-climatic evidence in rock shelters.

Introduction

Une même volonté, sinon des règles de conduites homogènes prennent corps depuis plusieurs années dans la Communauté internationale, pour l'étude, l'enregistrement et la conservation de ce patrimoine universel et infiniment menacé que représente l'Art Rupestre de Plein Air (A.R.P.A., pour simplifier, dans le texte qui suit).

Partant des recommandations formulées et diffusées à la suite des précédentes rencontres ayant pour objet cet immense secteur du patrimoine commun de l'Humanité, et plus spécialement du texte de conclusion de la Réunion Internationale sur la Conservation et la Documentation de l'Art Rupestre de la Région Méditerranéenne, en Espagne, en 1983, on s'efforcera ici de mettre l'accent sur la nécessaire introduction de la Recherche dans les Sciences de la Terre et de la Vie, et sur le remarquable champ d'applications que ces dernières représentent pour la conservation de l'A.R.P.A.

Il faut, avant tout développement, et au moment où une normalisation des méthodes et des procédés voit progressivement le jour, que les bases déontologiques d'étude soient très clairement définies et très affirmées pour que la complexité croissante des problèmes scientifiques, culturels et politiques concernant l'Art Rupestre dans le Monde ne puisse jamais masquer l'objectif principal: la sauvegarde et la conservation d'un art fossile, première mémoire de l'Humanité est substratum de notre devenir par les enseignements qu'il nous donne maintenant.

Dans les relations de coopération scientifique et culturelles entre les états, pour l'A.R.P.A., il est devenu nécessaire, voire même urgent de déraciner complètement tout mouvement ou tout méthode qui tendent à montrer que certaines formes d'esprit ou d'action de type néo- ou pseudo-colonialiste perdurent encore parfois de nos jours, soit chez des personnes, soit dans des organismes ou instituts de recherche, au sens élargi du terme. Plus simplement; l'appropriation intellectuelle ou réelle de découvertes archéologiques et d'art rupestre par une personne physique ou morale, quelle que soit son objet ou sa finalité, et loin d'exclure la notion de propriété intellectuelle du découvreur ou de l'auteur, ne doit pas correspondre à une forme quelconque de 'pillage' de biens culturels ou scientifiques, dans son propre pays ou dans un pays d'accueil.

Au moins pour certaines catégories de recherches, tant sur le terrain qu'au laboratoire, un équilibre reste encore à trouver ou à consolider entre les notions de propriété nationale du patrimoine d'art rupestre, le bon fonctionnement et le bon rendement des équipes pluri- et transdisciplinaires, nationales et/ou internationales, et la liberté fondamentale du chercheur scientifique considéré comme cellule pensante, quelle que soit la nature du projet envisagé.

MS received 18 December 1984

LE VOCABULAIRE ET LES METHODES DE TRAVAIL: NÉCESSITÉ D'UNE COORDINATION INTERNATIONALE

Les études et les travaux sur le milieu karstique souterrain dans lequel se trouvent les grottes ornées d'âge surtout paléolithique, sont fort nombreuses. En Europe, malgré des difficultés ou des dissenssions entre les archéologues-interprétateurs et les scientifiques conservateurs, un bon rythme de croisière est actuellement atteint pour la conservation des parois. Des modèles exemplaires sont par exemple fournis par les très importants travaux réalisés dans les grottes de Lascaux et d'Altamira.

L'art rupestre de plein air gisant partout dans le monde, dans des milieux géoclimatiques et sur des roches support extrèmement variés, occupe des superficies beaucoup plus importantes que l'art des cavernes.

Par sa nature même, *l'A.R.P.A. ne peut et ne doit pas être traité comme l'art souterrain, même si une base méthodologique est commune aux deux domaines.*

L'urgence actuelle, après plusieurs réunions internationales depuis 1978, - réunions destinées à cerner les problèmes et à les répertorier avec précision -, est de trouver un langage et des méthodes communes pour l'A.R.P.A., secteur nettement déficitaire si on le compare aux autres éléments du patrimoine mondial: l'art monumental (architectural) et l'art des cavernes.

(1) Normalisation des concepts et du langage

C'est un gain de temps et d'énergie intellectuelle considérable que d'utiliser des mots sur la signification desquels il n'y ait aucune ambigüité entre les interlocuteurs. On sait que plus les mots sont utilisés, plus ils élargissent leurs acceptions et en définitive, ne veulent plus dire grand'chose de précis. En effet, en accumulant des significations de plus en plus divaguantes par rapport à son sens premier (éthymologique), un mot ne défini plus un concept, mais correspond alors à un éventail de concepts dans lequel un choix devient difficile à faire. On peut alors passer des heures à discuter vainement sur la signifiance d'un mot, en frôlant une définition, sans jamais la trouver réellement.

C'est bien un des voeux exprimés lors de la réunion en Espagne, de réaliser un *lexique international* permettant à la fois aux archéologues et aux conservateurs de pouvoir parler des mêmes problèmes en même temps, sans déviance possible quant à l'objet des discussions.

La conception et la rédaction d'un tel lexique suppose un programme génétiquement articulé, c'est-à-dire un plan, de façon à contenir dans un ensemble cohérent les principaux domaines scientifiques de connaissance pour l'A.R.P.A. C'est pourquoi nous proposons la constitution d'un groupe de travail dont l'objectif serait d'utiliser une thématique associant les termes descriptifs et les termes interprétatifs (ou explicatifs) selon les principaux axes suivants:

(a) le cadre physiographique et l'environnement naturel et anthropique passé et actuel de l'A.R.P.A.;
(b) le cadre géomorphologique général; l'état zéro des sites et des stations;
(c) la recherche fondamentale sur les causes et les effets des altérations de l'A.R.P.A.; l'état zéro des parois;
(d) l'enregistrement et l'archivage de l'A.R.P.A. et son étude palethnographique et/ou palethnologique;
(e) la conservation: prévention et intervention dans les sites et sur les parois.

(a) *Le cadre physiographique et l'environnement naturel et anthropique, passé et actuel de l'A.R.P.A.*

Une série d'articles en relation les uns avec les autres peut couvrir, dans ce premier chapitre, l'essentiel des termes et des données concernant la Géologie, la Paléo-Géographie, le milieu préhistorique, l'Ecologie générale, l'infrastructure actuelle (administration, planimétrie, ...), l'impact actuel de l'homme, l'urbanisation possible des sites, le dossier documentaire sur l'historique de la région, du site ou de l'abri, etc, etc ... En se référant à l'Annexe 1 sur le projet pilote d'étude d'une paroi préhistorique (Espagne 1983), on peut par exemple inclure ici les mots et expressions: milieu préhistorique, histoire, flore, faune, micro-flore, micro-faune, etc ...

(b) *Le cadre géomorphologique général (région et site rupestre) et particulier (stations).*

Il s'agit surtout ici de l'analyse sur le terrain des principales données de l'environnement rupestre fournies par la structure géologique et lithologique (*géomorphologie structurale*) et par les climats ou micro-climats passés et actuels (*géomorphologie climatique*). C'est donc de géomorphologie descriptive qu'il s'agit dans un premier temps, mais, bien entendu, on tendra vers la quantification des phénomènes par l'enregistrement des variations climatiques, micro-climatiques et géodynamiques. Cette *géomorphologie quantitative* est déjà bien avancée en France et dans les pays anglo-saxons.

On peut inclure dans ce chapitre la longue liste des termes descriptifs tels que: fissures, écailles, alvéoles, cupules, décollements, desquamations, désagrégations, pulvérisations, etc ...

(c) *La recherche fondamentale sur les causes et les effets des altérations de l'A.R.P.A.; l'état zéro des parois.*

On doit distinguer les macro-altérations, à l'échelle du site ou de la station et les micro-altérations à l'échelle de la paroi. D'autre part, sur le terrain, il est souvent possible de reconnaitre les paléo-altérations en s'aidant de la chronologie relative des oeuvres (peintures ou gravures) et les altérations sub-actuelles ou actuelles. Un certain entrainement dans l'observation est cependant nécessaire.

La recherche des causes initiales de macro- ou micro-altérations ou des phénomènes déclenchants est liée à l'enregistrement des variations thermiques et hydriques aux interfaces: air/roche;

surface/sub-surface de la roche. Cet enregistrement des variations micro-climatiques constitue également le point de départ du chapitre concernant les mesures et les procédés de conservation (e). Mais ici on traite surtout de l'analyse des mécanismes, de leur genèse, de leur évolution et de leurs rapports complexes avec le milieu naturel ou avec le milieu transformé par l'homme.

Dans ce chapitre, on peut donc regrouper des mots tels que: roche, ruissellement, eau, air, interface, réologie, géotechnique, cortex, vernis, patine, gradient, amplitude, etc ...

Signalons la publication périodique relativement récente d'une nouvelle revue spécialisée éditée en Angleterre: *Earth Surface Processes and Landforms; a Journal of Geomorphology*. Cette revue donne, depuis 1981, des études d'une très haute qualité sur les processus d'altération et d'érosion dans des milieux variés. Citons aussi les *Annales de Géomorphologie (Zeitschrift für Geomorphologie)*, publication bien connue des géologues et des spécialistes des sciences de la Terre.

(d) *L'enregistrement (= le relevé) et l'archivage de l'A.R.P.A. et son interprétation.*

Ce chapitre rassemble les mots et expressions sur les trois catégories principales de relevés de l'art rupestre, ainsi que la terminologie préhistorique et palethnologique de base. Il est bien évident que toute forme de relevé entraînant une quelconque dégradation (crypto-altération anthropique) est proscrite. Nous avons longuement exposé ailleurs les immenses dangers de toute intervention de cet ordre: mouillages des peintures, moulages des gravures ainsi que l'utilisation de produits de contraste sur ces dernières (Soleilhavoup 1978, 1979).

- *Les relevés archéologiques* destinés principalement à l'interprétation de l'art, mais qui tiennent compte, bien entendu, des relevés micromorphologiques, en particulier pour la détermination des chronologies relatives grâce aux corrélations qu'ils permettent souvent entre les superpositions des oeuvres et les phases paléo-climatiques d'altérations pariétales.

- *Les relevés micro-morphologiques* destinés à aider à la *cartographie de l'état zéro des parois* et à permettre l'analyse de certains processus passés et sub-actuels de micro-altérations qui les affectent. Ces relevés peuvent en outre fournir des éléments d'explication de l'art rupestre (voir figure 1).

- *Les relevés micro-climatiques* sont destinés à enregistrer les variations thermiques et hydriques ainsi que les processus radiatifs au sein des roches support, à leur surface et dans l'air au voisinage immédiat des parois. On aboutit à des *cartes micro-climatiques des surfaces ornées* utilisant les courbes iso-thermes ou iso-hyètes ou bien adaptant les mesures d'albédo ou radiamétriques. Ces cartes peuvent être établies pour des cycles quotidiens, saisonniers, annuels et éventuellement décennaux, avec des corrélations possibles des enregistrements des services météorologiques nationaux.

(e) *La conservation: prévention et intervention dans les sites et sur les parois.*

En se référant à l'éthymologie latine du mot conservation: conservare = garder, et tout en sachant qu'une longue chaîne de concepts et d'actions scientifiques s'attache à ce mot, on peut définir dans ce chapitre deux catégories de termes et expressions:

- ceux concernant l'action de l'homme sur les milieux rupestres: aménagement, déprédations touristiques, actes de vandalisme, graffitis actuels et culturellement dissociés, etc ...

- le vocabulaire technique et/ou spécialisé sur les interventions et les mesures générales de protection ou de sauvegarde. Exemples: refixage, nettoyage, entretien, gardiennage, etc ...

Les cinq chapitres que nous venons de définir brièvement permettent de répertorier la totalité des mots, expressions ou locutions se rapportant à l'A.R.P.A.

Il est logique de ne pas se contenter, lors de la préparation de ce travail de base, d'une simple liste de termes dont la définition ressortirait de l'esprit d'un dictionnaire. Bien davantage, nous pensons que la conception d'un tel ouvrage doive participer à la fois de l'esprit et de la forme d'une encyclopédie. Qu'on ne se méprenne pas cependant sur la signification de ce dernier terme qui peut paraître universaliste: si nous voulons par exemple définir le mot *température*, on doit nécessairement inclure sa signification première dans plusieurs catégories de données: climatologie générale, cycles des variations thermiques, microclimatologie stationnelle, reproduction expérimentale de processus thermiques au laboratoire, etc ... Il faut par conséquent, construire le lexique en partant d'une définition de base et en appliquant la *méthode des corrélats*. Les articles ainsi conçus pour définir les principales scientifiques des mots applicables à l'A.R.P.A., seront alors illustrés (cartes, photos, schémas, dessins, croquis, plans ...) pour permettre un bon équilibre entre la description et l'interprétation des faits concrets (faits d'observation) et leurs conséquences possibles (explication des processus, analyses, expérimentation de laboratoire, mesures de conservation).

On arrive donc à la notion d'un véritable *manuel pratique* pour l'enregistrement et l'étude des données de base sur l'A.R.P.A. - ouvrage fondé sur la double nécessité d'un accord sémantique et d'un finalité pratique -.

(2) Normalisation des systèmes documentaires

La recherche scientifique et ses applications dans le domaine de l'A.R.P.A. doit pouvoir bénéficier des développements actuels de la technologie, en particulier pour l'informatisation des systèmes documentaires. Il ne peut évidemment pas être question dans l'immédiat d'implanter partout, dans chaque pays, des banques de données pour l'art rupestre, - il y a d'autres priorités -, mais on peut au moins imaginer des perspectives d'avenir et préconiser des démarches dans notre domaine, comme dans les autres domaines de la connaissance scientifique. C'est en termes de *communication* qu'il faut raisonner et agir pour que l'A.R.P.A.

puisse émerger en tant qu'élément fondamental du Savoir scientifique et culturel de l'Humanité.

L'accélération remarquable du rythme d'enregistrement des données concrètes et des résultats scientifiques qui en découlent obligent à se tourner résolument vers les systèmes de traitements automatiques des observations et des faits de terrain ou de laboratoire.

S'agissant du projet pilote en Algérie, on peut envisager très concrètement, selon une procédure simple et dans des limites de crédits financiers raisonnables, une application quasi-immédiate de l'informatisation pour la recherche des causes d'altérations naturelles des oeuvres rupestres. Nous verrons plus loin cette question avec davantage de précision.

Le problème de la fiche-modèle d'inventaire de l'A.R.P.A. a été abordé une fois de plus en Espagne (1983). Il n'est pas encore résolu, compte-tenu des spécificités des milieux naturels, des codes et règlements administratifs dans chaque pays et compte-tenu aussi des objectifs visés par chacun dans l'inventaire des régions rupestres. Nous pensons d'ailleurs qu'il n'est pas souhaitable de rendre une fiche-modèle d'inventaire trop rigide, à la suite d'accords internationaux. Cependant on doit admettre que seule une fiche-modèle fondée sur le principe de la *compatibilité internationale* puisse apporter des éléments de connaissance sérieux, comparables d'un pays à l'autre et scientifiquement exploitables.

En Espagne, neuf catégories de données ont été définies et proposées pour utilisation par les pays participants. Rappelons-les: 1. Institution; 2. Numéro d'inventaire; 3. Localisation géographique et administrative; 4. Type de support; 5. Description du support; 6. Type d'art; 7. Description de l'art; 8. État de conservation; 9. Documentation.

Partant des banques de données à *traitement manuel* et destinées à des archivages régionaux, nationaux voire internationaux (listes de sites, fichiers iconographiques, fichiers mécanographiques de données techniques, etc ...), on comprend bien qu'il est assez facile d'aboutir à des banques de données mémorisées, à la seule condition, répétons-le que la compatibilité des systèmes soit effective, et, parconséquent qu'il y ait intercommunicabilité.

Sachant que dans un même pays les systèmes informatiques sont souvent clos à cause de la trop grande sectorisation des connaissances et à cause de la grande diversité commerciale des types de computeurs, on peut aisément concevoir la complexité future et les difficultés d'organisation pour appliquer l'informatique à l'A.R.P.A., à l'échelle internationale.

Pour en revenir à des préoccupations plus immédiates, envisageons dans ses grandes lignes les applications de quelques règles méthodologiques dont nous venons d'exposer les grands axes.

LES PROJETS PILOTES EN ALGÉRIE

(1) Le Tassili-n-Ajjer: genèse d'un Programme

Rappelons d'abord qu'après des études préliminaires ponctuelles (entre 1974 et 1977), - études synthétisées dans un petit ouvrage publié par l'Office du Parc National du Tassili -, et après une mission préparatoire sur le terrain en avril 1978, un séminaire international sur la conservation des peintures rupestres du Tassili, - le premier du genre -, a été organisé en octobre 1978 par l'O.P.N.T., sous l'égide du Ministère algérien de la Culture et avec l'aide de l'UNESCO et du PNUD. Par la suite, dans le cadre d'un contrat avec l'UNESCO, l'O.P.N.T. a fait appel à des spécialistes du Laboratoire de Recherche des Monuments Historiques de France (L.R.M.H.; Mm. J. Brunet et P. Vidal) pour l'installation d'une station d'enregistrement de certaines données micro-climatiques pariétales, sur le Plateau des Ajjers, à Timenzouzine. Deux rapports scientifiques ont été établis par Mm. Brunet et Vidal, qui correspondent respectivement à une période climatique à tendance froide (6 - 19 novembre 1979) et à une période plutôt chaude (3 - 24 avril 1982). Ces travaux réalisés dans quelques abris du secteur morphologique Nord-Est de Djanet fournissent une somme de renseignements hautement intéressants sur le comportement des parois peintes à l'interface roche/atmosphère.

C'est la première fois en Algérie, et sans doute dans le monde, que des mesures scientifiques ont été faites dans des abris sous-roche ornés de peintures néolithiques, parmi les plus belles qui existent dans les régions arides. Saluons au passage le véritable 'courage' de l'Algérie qui, en 1972, dix ans seulement après son Independance et malgré des contraintes économiques considérables, a lancé un programme de sauvegarde de son patrimoine préhistorique, archéologique et historique avec, entre autres, la création du Parc National du Tassili.

Pour l'A.R.P.A. en Algérie, on peut donc considérer que le séminaire international du Tassili a permis de lancer une action de conservation fortement structurée, dans laquelle la recherche scientifique est très étroitement liée à la maîtrise et à la protection des milieux naturels.

(2) Le projet pilote dans l'Atlas pré-saharien: mise en application d'un méthode d'étude et de recherche

Dans un rapport adressé a M. Kerzabi, directeur de l'O.P.N.T. et à Mlle Hachid du Centre de Recherche Anthropologique, Préhistorique et Ethnographique d'Algérie; C.R.A.P.E., nous définissons plusieurs critères d'ordre scientifique et logistique pour déterminer l'implantation d'un ou plusieurs sites rupestres dans le secteur atlasique.

Les critères scientifiques tiennent compte de la variété et de l'intérêt palethnologique des représentations rupestres, de l'intérêt et de la variété morpho-climatique et morpho-structurale des sites et des stations, de la variété des séquences de macro- et micro-altérations qu'on y trouve, des perspectives d'avenir, au-delà du projet, pour renforcer les bases méthodologiques d'étude de l'A.R.P.A. dans les différents milieux géo-climatiques du monde (zones arides, sub-arides, glaciaires, péri-glaciaires, tropicales humides, tempérées, de montagne, côtières, etc ...).

Les critères logistiques reposent sur la proximité géographique des sites depuis Alger, la rapidité et la facilité des accès en Land-Rover (ou même en voiture légère), la possibilité d'organiser à moindre frais des séjours sur le terrain (intendance, aires de campements, contrôle, entretien et maintenance du matérial d'enregistrement des données scientifiques, état des pistes, etc ...).

La définition des critères de choix d'un site, pour fonder un projet de conservation de l'A.R.P.A. n'est envisageable qu'après une assez longue pratique du terrain, car le simple examen de clichés aériens ou bien l'analyse cartographique de documents topogéologiques ne peuvent suffire à montrer la multiplicité des problèmes scientifiques et pratiques qu'on découvre, année après année, au campement et dans les stations.

Les objectifs principaux du projet pilote doivent correspondre bien évidemment aux différents axes d'inventaire, d'étude et de conservation définis plus haut. On peut les résumer brièvement comme suit, selon quatre séquences étroitement liées, mais dissociables pratiquement:

(A) les travaux préliminaires;
(B) les travaux de terrain;
(C) les travaux de laboratoire et l'expérimentation;
(D) la conservation: application simultanée ou disjointe des séquences B et C.

Examinons rapidement les grandes lignes de chacune de ces étapes.

(A) *Les travaux préliminaires*

Il s'agit de la préparation des missions de terrain: recherche documentaire et bibliographique aussi exhaustive que possible pour le ou les sites choisis. Cette recherche doit aboutir à la synthèse des données généralement très dispersées dans les ouvrages, les revues spécialisées ou sur des documents cartographiques au sens large. Elle peut comporter les éléments suivants:

- *l'analyse des documents cartographiques* (s'ils existent): photographies aériennes, cartes diverses (topogéologiques, pédologiques, d'aménagement du territoire, etc....); éventuellement, analyse des images de cartographie automatique par télédétection (type Landsat). Cette étude permet non seulement de comprendre les grandes lignes physiographiques, géologiques, morpho-structurales, topographiques, écologiques de la région choisie. Elle permet aussi d'établir un pré-inventaire des sites ou du moins des zones archéologiques pouvant recéler de l'art rupestre.

- *l'analyse et la synthèse de la bibliographie*. Ce travail suppose l'éxistence d'un solide fond bibliographique ou bien la possibilité d'utiliser des fichiers bibliographiques informatisés (du type Pascal, au CNRS à Paris).

(B) *Les travaux de terrain*

Pour ne pas alourdir le texte de cette communication en exposant le détail des opérations de recherche et des travaux, essayons simplement de regrouper ici les éléménts qui paraissent devoir être envisagés en priorité lors d'une mission de terrain, dans le cas où une équipe de deux a quatre personnes peut être constituée et travailler continuement pendant une à trois semaines. Cette équipe, nécessairement pluridisciplinaire et éventuellement transdisciplinaire, devrait compter *au minimum*: un archéologue, préhistorien spécialisé dans l'art rupestre de plein air, un chercheur habitué non seulement à travailler dans la ou les zones considérées (ou dans des zones géoclimatiques similaires), mais aussi dans l'analyse et l'étude des milieux naturels (sciences de la Terre et de la Vie), un conservateur ou un expert en conservation des milieux naturels (art monumental, art rupestre, ...). Le plus souvent, la présence sur le terrain d'un topographe, bon dessinateur s'avère indispensable pour lever les plans cotés des sites, des stations et des abris, et pour exécuter des dessins, croquis ou schémas morphologiques des secteurs étudiés.

(1) *L'étude des paysages rupestres et de leur transformation au cours du temps*: analyse morpho-structurale et recherche sur les paléo-environnements rupestres. Cette étude, fondée sur les critères de la géomorphologie, science dont les champs d'application seraient trop longs à développer ici, permet souvent de déceler en outre des relations Homme-Nature dans les sites rupestres. Nous avons expliqué ailleurs (Soleilhavoup 1978, 1979, 1980, 1983) les multiples intérêts de l'étude morpho-structurale et climatique générale des sites et des stations pour les importantes applications pratiques de protection et de conservation qu'elle permet.

(2) *L'étude micro-morphologique des parois et l'établissement de leur état zéro*. La réalisation de cartes micro-morphologiques des parois, selon des critères et avec une codification cartographique mormalisée, permet l'analyse des micro-altérations passées et actuelles. En même temps, les prélèvements en milieux septiques et aseptiques sont destinés à diverses analyses de laboratoire: pétrographie, micro-sonde, microscopie photonique, électronique à balayage, à transmission, en fluorescence U.V., rayons X, cultures bactériennes minéralisantes, reproduction expérimentale de patines, etc ... Par exemple, les stations rupestres du site de Boualem - El Ouidiane dans les monts du Djebel Amour (Atlas pré-saharien) font actuellement l'objet d'observation poussées et de travaux de laboratoire, depuis une mission personnelle en avril 1983 et après des observations de terrain échelonnées sur plusieurs années (depuis 1980). Voir figures 2 et 3.

(3) *Le relevé et l'étude des figurations rupestres*. Ce travail réalisé par un spécialiste de l'interprétation de l'art rupestre en Algérie est évidemment indissociable du précédent, au moins sur le terrain, devant la paroi.

(4) *L'installation d'un abri météorologique standard* (type météorologie nationale) dans une station représentative du méso-climat régional, comme cela a été fait au Tassili par l'Office National

Algérien de Météorologie (O.N.M.)

(5) *L'installation du matériel d'enregistrement des variations micro-climatiques* dans divers types morphologiques de stations. A la suite d'un récent stage de recherche au Centre de Géomorphologie du CNRS (Caen, France), - organisme où nous sommes accueilli avec beaucoup de sympathie depuis une dizaine d'années -, nous avons pu juger des immenses qualités et de la fiabilité d'un matériel d'enregistrement en continu ou en semi-continu des paramètres micro-climatiques sur les parois et dans les abris sous-roche. Cet appareillage utilisé depuis plusieurs années par les chercheurs du Centre de Caen, possède des avantages décisifs, non seulement à cause de ses caractéristiques pratiques de terrain, mais aussi et surtout par le traitement informatique des données numériques qu'il permet et donc par la possibilité d'obtenir rapidement des interprétations sérieuses sur les mécanismes micro-climatiques dans les environnements rupestres. Le conditionnement très miniaturisé (enregistreur à quatre piles alkalines du commerce, d'une autonomie de trois à quatre mois, sondes et câbles) et par conséquent le faible poids (environ trente kilogrammes) et enfin la très grande résistance à des conditions climatiques extrêmes: par exemple, dans les Andes péruviennes et boliviennes à 4500 mètres d'altitude; Jura et Haut Massif alpin français à plus de 3000 mètres; Colorado aux Etats-Unis; Spitzberg (cercle polaire), en font des appareils tout-à-fait adaptés à l'étude de l'A.R.P.A., sous toutes les latitudes.

Sachant que plusieurs marques d'enregistreurs possédant des caractéristiques similaires existent, nous précisons que l'infrastructure pour l'utilisation de l'appareillage décrit ci-dessus existe au CNRS de Caen, depuis sa mise en fonctionnement sur le terrain jusqu'à l'interprétation des résultats après traitement au centre de calcul.

(6) *Les études connexes dans les sites et stations d'art rupestre.* Dans la mesure où le temps disponible est suffisant, au cours d'une ou plusieurs missions de terrain, des renseignements très importants ou même fondamentaux doivent être recueillis:

(a) l'étude des structures d'habitat ou d'occupation préhistorique des sites;
(b) la fouille des foyers ou gisements archéologiques (dépôts, couches archéologiques dans les abris, par exemple);
(c) l'étude palynologique (pollens fossiles pour les reconstitutions paléoclimatiques) à partir de prélèvements dans les gisements ou dans les sols;
(d) l'étude écologique générale dans les sites et les stations ou les différents biotopes; étude pédologique; étude de la faune, de la flore, etc ...

Dans ces domaines spécialisés de l'archéologie préhistorique (a) et (b), de la palynologie (c), de la pédologie, de la zoologie et de la botanique (d), la présence sur le terrain d'un ou plusieurs chercheurs, au moins lors d'une des missions, si le programme en compte plusieurs, peut s'avérer utile, voire indispensable. Mais cela dépend des objectifs prioritaires qui sont définis.

(C) *Les travaux de laboratoire et l'expérimentation.*

Nous avons décrit ci-dessus (B: travaux de terrain, n° 2) quelques unes des observations et analyses qu'on doit mener sur les échantillons prélevés dans l'environnement des stations et sur les parois.

Grâce aux contacts pris dans divers laboratoires, et plus particulièrement à l'Université de Paris VI et au Centre de Géomorphologie du CNRS, il est possible d'envisager la modélisation de certains processus physico-chimiques permettant d'organiser la conservation des surfaces ornées, selon des critères objectifs.

Des protocoles d'expérimentation concernant les problèmes de couches-limites et de gradients ont déjà été réalisés sur diverses natures pétrographiques, sous diverses conditions thermiques et hydriques, pour les phénomènes d'altérations thermo-hydroclastiques et cryoclastiques. Nous envisageons de reproduire des cycles de thermo-migrations des sels minéraux ou des oxydes insolubles aboutissants à des ségrégations et des indurations en surface (vernis désertiques, patines, cortex, etc ...), sur des grès poreux provenant de l'Atlas pré-sahariens et du Tassili-n-Ajjer. Sur les mêmes roches, les processus haloclastiques (altérations par les sels minéraux, sulfatations, efflorescences, etc ...) seront évidemment étudiés.

(D) *La conservation des surfaces rupestres: applications pratiques des séquences B (terrain) et C (laboratoire).*

Pour la conservation du patrimoine monumental ou de l'art rupestre souterrain, de nombreuses études techniques et expertises ont été réalisées sous l'égide de l'UNESCO, dans le monde entier. On s'aperçoit cependant que les études scientifiques sur l'A.R.P.A. sont encore très dispersées, voire même disparates et qu'elles ne conduisent que rarement à des mesures pratiques de conservation.

Il est bien évident que l'articulation des séquences B et C, reposant sur la recherche fondamentale, est conçue dans le but principal de leurs applications à la conservation des sites, des stations et des parois.

CONCLUSION

Après une mission auto-financée, du 2 au 12 avril 1984, rentrant officieusement dans le cadre du Projet-Pilote 'ATLAS SAHARIEN' en Algérie et comportant les personnes suivantes: Mm. F. Cominardi, F. Rambeau et F. Soleilhavoup; MMmes S. Rambeau et Fr. Soleilhavoup, nous avons débuté la rédaction d'un petit livre intitulé: 'Étude et conservation de l'art rupestre en Algérie; guide pratique de terrain'.

Au bout de quelques seize années de recherches en géomorphologie climatique et structurale au Sahara, dont une dizaine dans les zones de l'A.R.P.A. (Atlas pré-saharien, Saoura, M'zab, Hoggar, Atakor, Tassili-n-Ajjer) et après d'autres

expériences dans des domaines géoclimatiques différents en Amérique Centrale et du Sud (Mexique, Colombie, Brésil) et en Europe (Alpes italiennes: Valcamonica et françaises: Val des Merveilles), il nous est apparu utile, voire même indispensable de proposer au Ministère Algérien de la Culture (O.P.N.T.; C.R.A.P.E.) un petit manuel de format réduit et d'utilisation aisée sur le terrain pour que des personnels algériens spécialisés ou non puissent enregistrer les données de base de l'A.R.P.A. selon les catégories minimales définies en Espagne (UNESCO, ICOM, ICCROM 1983). L'esprit de ce guide pratique est surtout fondé sur l'enchaînement logique des observations et des analyses scientifiques qui permettent de passer avec souplesse, mais aussi avec rigueur, des paysages rupestres aux parois ornées. Bien entendu un tel ouvrage s'adressera également aux personnels étrangers sollicités par l'Algérie pour l'étude et la conservation de son patrimoine rupestre, tels que les experts près l'UNESCO, les chercheurs, les résidants ayant depuis longtemps fait la preuve de leurs motivations et leur capacité à explorer, inventorier et étudier l'A.R.P.A., etc ...

Compte-tenu de la normalisation du langage et des méthodes de travail définis ci-dessus dans la présente communication, et à la suite d'une nouvelle et très fructueuse mission dans l'Atlas pré-saharien d'Algérie (région au Sud d'El-Bayadh), en avril 1984, nous avons acquis la certitude que des accords de travail devraient être passés entre le Ministère de la Culture à Alger et les autorités locales (chefs de Wilayas, chefs de Daïra, Présidents des Assemblées Populaires Communales), pour faciliter les démarches et les travaux concernant les inventaires sectoriels ou régionaux, les études archéologiques et les études de conservation (recherche fondamentale et appliquée), aussi bien dans l'Atlas ou ses abords que dans les autres régions rupestres du Sahara.

Nous sommes également persuadés, après de nombreuses missions dans l'Atlas et au Tassili, que le bon rendement de travail sur le terrain et l'exploitation efficace des données recueillies ne sont possibles que si l'on respecte certaines règles:

- des équipes mobiles, disposant au minimum d'un véhicule tout-terrain et d'un soutien logistique très souple, constituées de personnes aguerries, habituées à travailler dans des environnements sub-arides et arides dont les conditions climatiques parfois difficiles peuvent avoir des conséquences sur l'état physiologique des individus. Selon la nature et la finalité des missions, la *formation de spécialistes de terrain* (inventaire, étude, conservation) est possible, par exemple dans le cadre du Projet Pilote Atlas, lancé par l'Algérie en 1985.

- la spécialisation trop poussée est parfois un frein ou même un écueil au bon déroulement des missions, et surtout au traitement des informations qui en résultent. On doit considérer l'étude de l'A.R.P.A. comme faisant partie des Sciences de la Nature (Sciences de la Terre, Sciences de la Vie). Au moins sur le terrain, les observations du préhistorien doivent s'étendre à l'analyse technique minimale des sites, des stations, des surfaces ornées ou non; celle du conservateur, au sens le plus large du terme, doivent s'étendre à l'analyse archéologique. Ce n'est qu'au laboratoire que chacun reprend son activité spécifique et spécialisée.

Il est donc indispensable de pratiquer sur le terrain à la fois la trans-disciplinarité et l'inter-disciplinarité, les travaux postérieurs faisant l'objet soit de rapports ou de publications avec collectifs d'auteurs, soit de publication spécialisées individuelles ou co-signées.

- les travaux de recherche et les tâches de la vie pratique au campement ou au bivouac constituent un bloc qu'on peut difficilement dissocier. Le nombre de six à huit chercheurs dont l'autonomie individuelle peut éventuellement être assurée au campement, représente, selon nous, un optimum pour une mission de dix à quinze jours incluant une ou deux journées de repos (activités libres individuelles ou collectives).

- sur le terrain, enfin, les personnalités doivent s'accorder suffisamment pour que les missions recueillent dans les meilleures conditions les éléments programmés et recherchés. Le travail minimum de base, lors des phases d'inventaire et d'étude, dans les stations rupestres, doit être nécessairement la *rédaction des fiches techniques de données* permettant leur informatisation future. Outre le modèle minimal proposé par l'UNESCO pour l'A.R.P.A., nous avons déjà défini un modèle qui a été utilisé pour la préparation des dossiers scientifiques du Séminaire International du Tassili (Soleilhavoup 1979) et nous préparons un modèle plus spécifique pour l'Atlas dans le guide pratique de terrain mentionné ci-dessus.

L'étude de l'Art Rupestre de Plein Air nécessite d'une part des connaissances élargies dans les domaines de l'Inerte et du Vivant; elle oblige d'autre part à orienter son activité soit vers les sciences humaines (archéologie préhistorique, ethnopréhistoire), soit vers les sciences exactes ou approchées (géologie, géomorphologie, paléoclimatologie, géomicrobiologie, etc ...). Ce long cheminement intellectuel doit permettre enfin, - et c'est le but fondamental à atteindre - de trouver les moyens de transmettre aux générations futures un patrimoine sinon intact, du moins suffisamment bien conservé *in situ* ou bien, à défaut, sous forme d'*archives* de quelque manière que ce soit.

*

Appendix 1: Réunions internationales sur l'étude et la conservation de l'art rupestre. (International meetings for the study and conservation of rock art)

1978 - Séminaire international sur la conservation des peintures rupestres du Tassili (21 - 30 octobre 1978). UNESCO, ICCROM, PNUD. Ministère de la Culture, Alger, et OPNT.

1981 - International Consultation of Specialists on the Study, Documentation and Conservation of Rock Art, on behalf of UNESCO. Valcamonica, Italie, 3 - 5 septembre 1981.
1982 - Congrès 'Art Rupestre et Muséologie'. Milan, Italie, 29 - 31 octobre 1982. ICCROM et CCSP.
1982 - Sitges et Castellon, Espagne.
1983 - XIth International Congress of Anthropological and Ethnological Sciences. Pre-congress symposium c-100: Conservation, Recording and Interpretation of Rock Art. Vancouver B.C., Canada, 15 - 19 août 1983.
1983 - Réunion internationale sur la conservation et la documentation de l'art rupestre de la région méditerranéenne (Barcelone, Saragosse, Teruel et Peniscola, 28 novembre - 2 décembre 1983). UNESCO, ICOM, ICCROM.

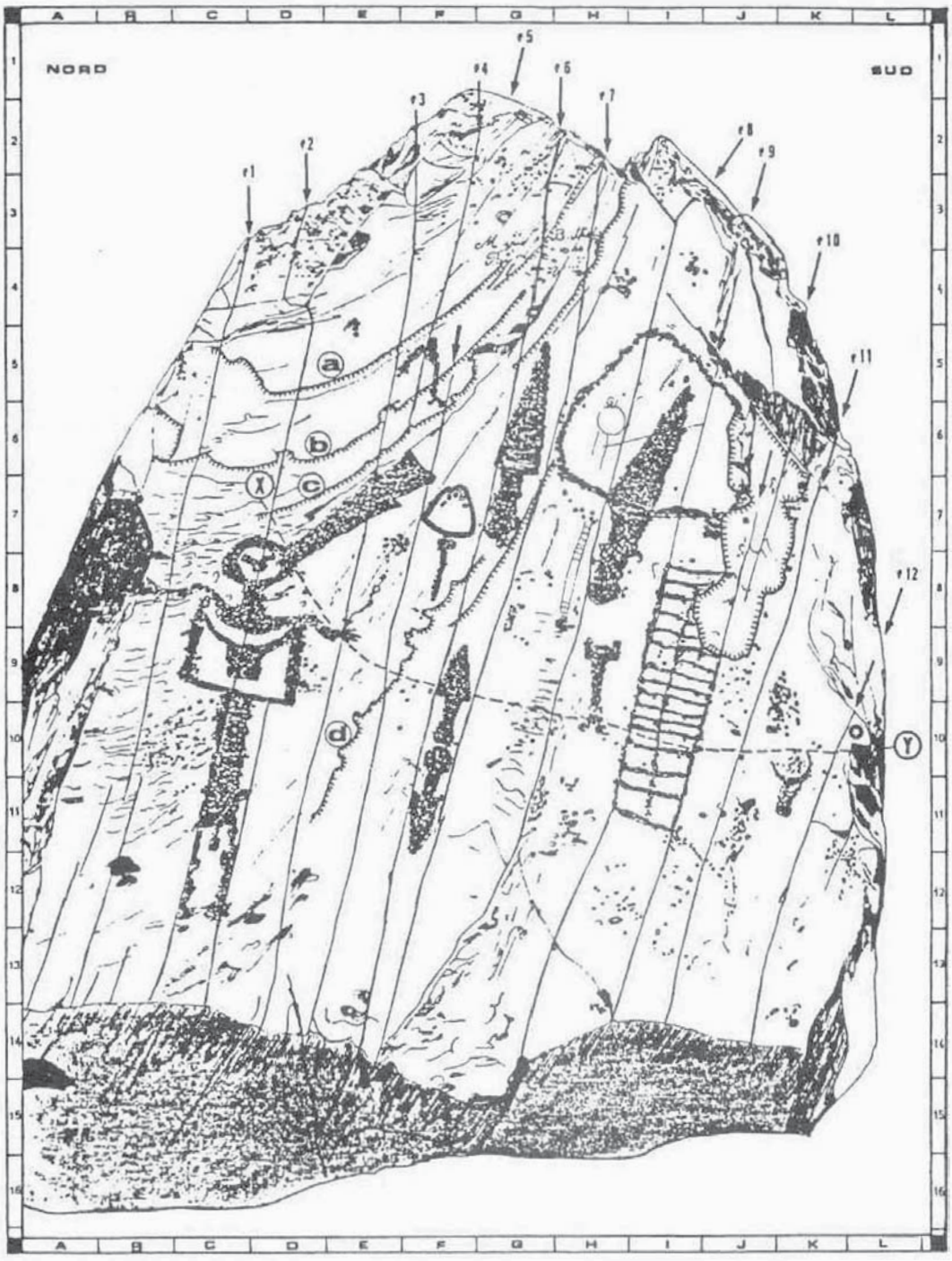


Figure 1. *Exemple d'application de l'analyse micromorphologique des surfaces à gravures pré- et proto-historiques: Val des Merveilles (Parc National du Mercantour, France).*

Figure 2.
Relevé micromorphologique de l'une des plus célèbres gravures néolithiques de l'Atlas pré-saharien d'Algérie, la paroi C du site de Boualem-el-Ouidiane. Les couples de chiffres 1 à 7 sont des repères de mensurations des zones altérées (desquamations des patines). Un contrôle (état zéro des altérations) a été effectué en avril 1983; un autre, actuellement en cours d'analyse a été effectué le 10 avril 1984. L'échelle du cadre est décimétrique.

Appendix 2: Exemple de fiche-technique pour l'étude et le prélèvement des patines ou autres états de surfaces (modèle simplifié utilisé par F. Soleilhavoup; mission Atlas pré-saharien d'Algérie en avril 1984).

I. ENVIRONNEMENT GÉNÉRAL, CADRE TOPO-GÉOLOGIQUE ET GÉOMORPHOLOGIQUE
- (A) Coordonnées Lambert (x, y, z);
- (B) *Type morphologique* du site ou de la station (voir figure 4);
- (C) *Croquis morphologique* (face; profil: voir figure 5) et *morphométrie.*

II. DONNÉES SUR LA ROCHE SUPPORT, ORNÉE OU NON
- (1) *Orientation* de la paroi; *exposition* de la surface (à la boussole);
- (2) *Nature pétrographique*;
- (3) *Texture, faciès* (aspect sédimentologique, pour les roches exogènes);
- (4) *Aspect granulométrique*: fin - moyen - grossier;
- (5) *Effervescence à HCl dilué*: faible - forte - nulle;

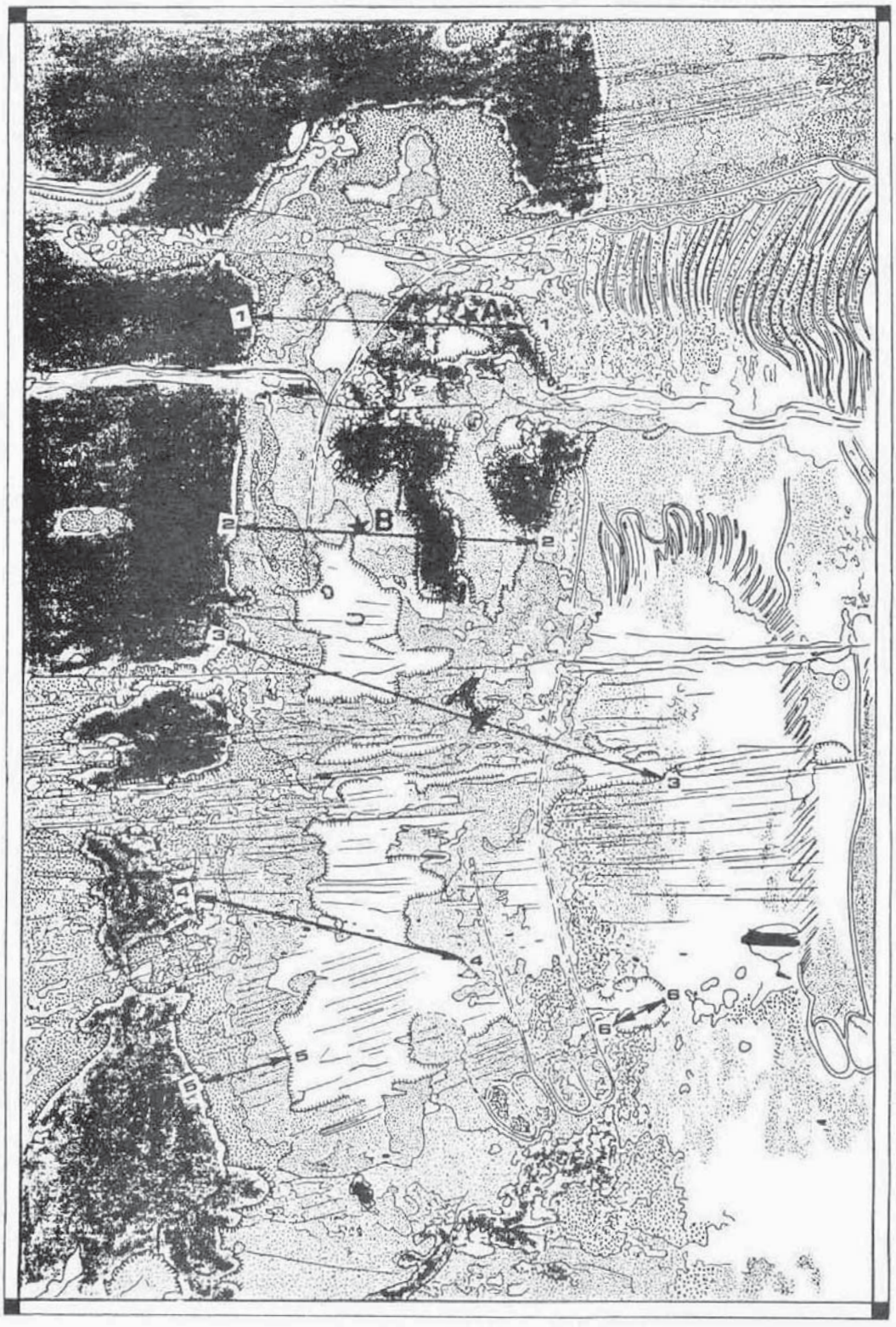


Figure 3. *Détail du train arrière du grand bélier de Boualem (relevé, 1983). Outre la desquamation ancienne de la patine primitive (brun-noir), trois plans de desquamation pelliculaire se* →

(6) *Couleur* (Code ExPolaire ou Munsell Colour Chart): surface de la roche - surface altérée - cassure de la roche.

III. ÉCHANTILLONNAGE

(1) *Localisation du prélèvement* (sur le croquis morphologique) et photo avec échelle;

(2) Prélèvement d'un *fragment* (type échantillon géologique);

(3) Prélèvement en *tube stérile*:

* description de l'état de la surface où sera pris l'échantillon en conditions aseptiques;
* à l'ouverture du tube (la plus brève possible), passer la flamme du briquet;
* avec une aiguille montée ou la lame d'un canif passée à la flamme, prélever quelques grains ou micro-écailles (patine desquamée, pigments de peintures rupestres, zones de ruissellements etc.); refermer *aussitôt*;
* éviter les journées très venteuses; ne pas respirer trop près du tube pendant le prélèvement;
* pour sécurité: entourer le bouchon du tube avec un ruban adhésif;
* marquer sur le tube, avec un feutre indélébile, les références de l'échantillon et: date, *heure* (paroi ou roche au soleil ou jamais au soleil).

Professor François Soleilhavoup
Laboratoire de Géomicrobiologie
Département de Géodynamique des Milieux Continentaux
Université Pierre et Marie Curie
4, Place Jussieu
75230 Paris
France

Comments

By JOSEPHINE FLOOD

I have been asked by the editor of *RAR* both to review and to summarise this paper for the benefit of those who have even more difficulty understanding French than I do. This task has vividly brought home to me the need for a 'glossary' or 'dictionary' of technical terms used in the study and conservation of rock art, since many of the terms used in this article are not to be found in any dictionary, and a working knowledge of the French language is not always sufficient to establish their meaning in this context. I therefore apologise to François Soleilhavoup and his colleagues whom I had the pleasure of meeting at the Congress on Conservation of Rock Art at Perigueux last November for any errors in my synopsis and also for its brevity, which inevitably does not do justice to the original article.

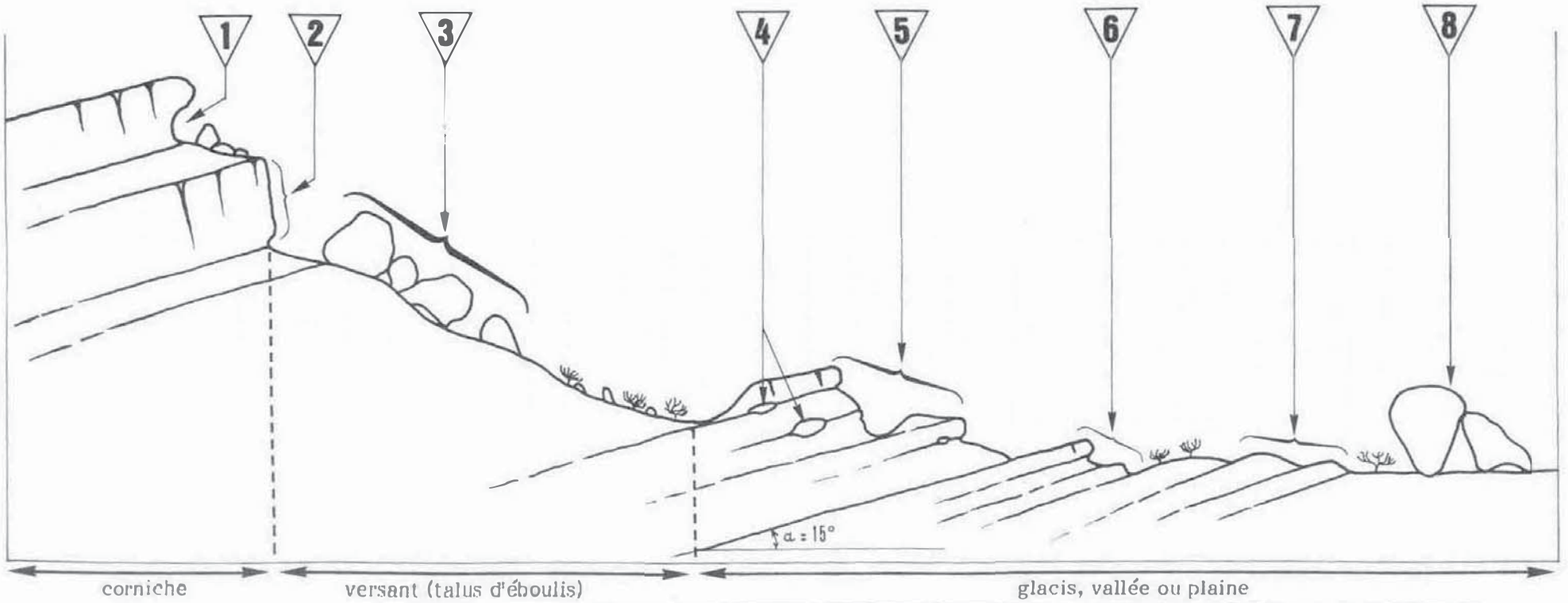
This paper is concerned with rock art in the open air (A.R.P.A. for short) a term which is used in French to embrace both painted rockshelters and engraving sites. This body of open air rock art is contrasted with cave art and described as neglected in comparison with it. While this is certainly the case in France, it is not true of Australia, since virtually the entire corpus of Australian rock art would be described as open air rock art under Soleilhavoup's definition. A classification of rock art into cave art and open air art may be meaningful in Europe but in Australia a more appropriate division would be into paintings and engravings. This initial problem with nomenclature points up the many difficulties in the way of development of uniform methods of recording and conserving rock art, difficulties which are discussed in the first half of this paper.

Professor Soleilhavoup begins by pointing out that in the international community for several years the same approach, if not uniform procedures, have been developing for the study, recording and conservation of this immense, universal, threatened heritage of open air rock art. Taking as his departure point the recommendations formulated at earlier conferences and particularly at the International Meeting on Conservation and Documentation of Rock Art in Spain in 1983, he attempts in this paper to emphasise the necessity of introducing research in earth and human sciences into open air rock art studies.

It is essential, he maintains, that at an early stage the ethical base of study should be very clearly defined and affirmed in order that the increasing complexity of scientific, cultural and political problems regarding rock art may never mask the principal objective: the protection and conservation of a fossil art, humanity's first memory. Intellectual or actual appropriation of archaeological discoveries or rock art must not lead to any form of 'pillage' of cultural or scientific property, whether in one's own country or abroad. A balance still remains to be found between the concepts of national ownership of the heritage of rock art, the effective functioning and output of multidisciplinary national

[Continued on page 132]

développent (depuis la patine brun-rouge, jusqu'à la patine jaunâtre). Les échantillons A (= BLM 3) et B (= BLM 1), correspondant à un léger grattage superficiel à l'aiguille lancéolée ou à des petits fragments d'écaille de desquamation, ont été prélevés en tube stérile sur milieu nutritif gélosé de transport (procédé Institut Pasteur). Une très riche flore microbienne, actuellement à l'étude s'est développée au laboratoire, dans des boîtes de Pétri, sur milieux spécifiques.
D'une façon générale les microorganismes sont responsables, soit de la formation des patines (bactéries minéralisantes, entre autres), soit de leur destruction (les Cyanophytes endolithiques, en particulier).



No.	Types de sites ou de stations rupestres	SYMBOLES	
1	Abri sous roche (souvent en corniche sommitale)		
2	Grande paroi sub-verticale		
	Front de cuesta		
3	Chaos de blocs éboulés (les gravures peuvent être renversée)		
4	Conduits pseudo-karstiques (boyaux, cavités, petites grottes)		
5	Buttes-témoin (en arabe, gour, singulier, gara)		
6	Affleurement de bancs (delaa, en arabe)		
7	Dalle rocheuse sub-horizontale		
8	Bloc ou monolithe isolé		

Figure 4.
Les principaux types de sites et de stations rupestres dans l'Atlas pré-saharien d'Algérie réunis le long d'un profil morphologique imaginaire.

À droit: symboles cartographiques des principaux types morphologiques des sites et stations rupestres dans l'Atlas.

[The above imaginary profile illustrates the principal types of rock art sites found in the Algerian Atlas region. At right, the proposed cartographic symbols for these types of sites.]

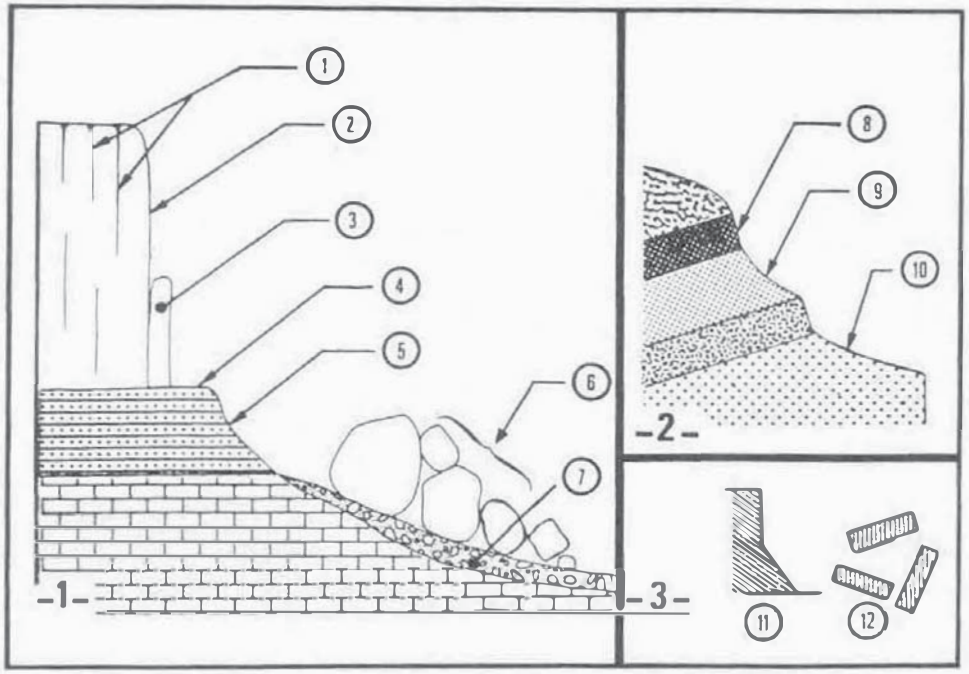
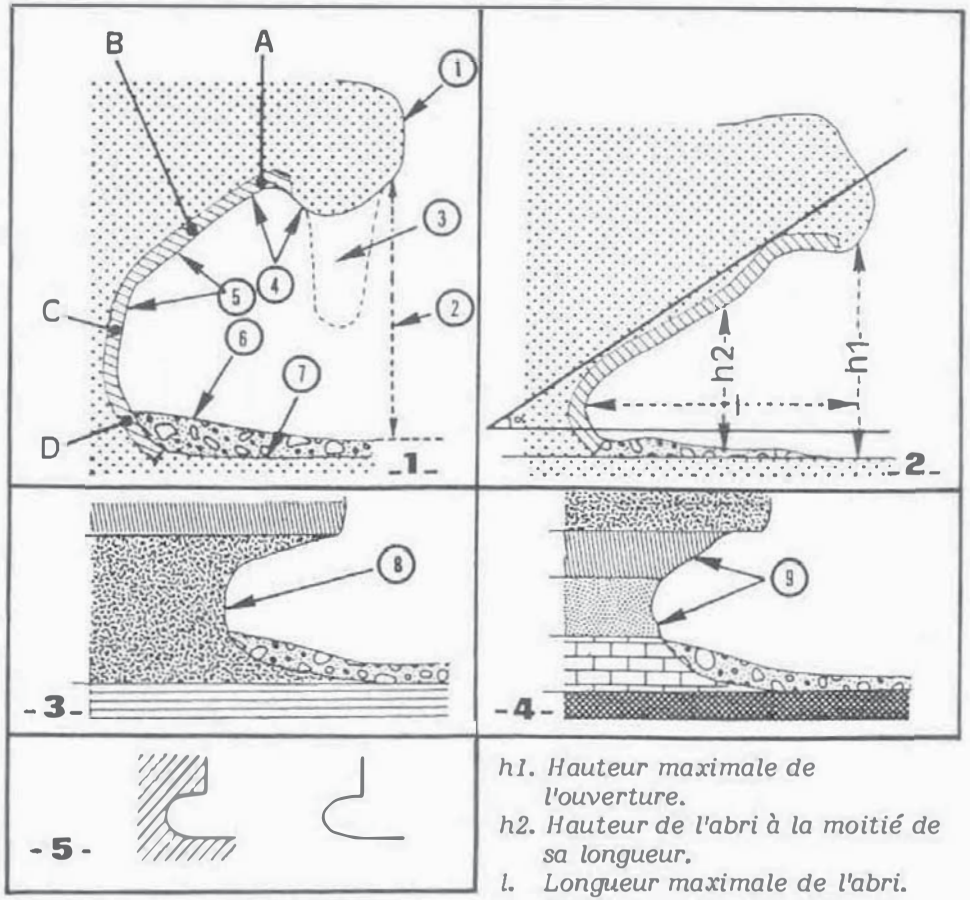


Figure 5.
Abrupts d'érosion et versants: morphologie

-1- Abrupt d'érosion, cuesta ou falaise; vocabulaire morphologique.
-2- Versant structural; morphologie.
-3- Symboles cartographiques.

1. *Diaclases.*
2. *Paroi verticale (abrupt d'érosion).*
3. *Macro-desquamation (épaisseur centimétrique à décimétrique).*
4. *Replat structural ou banquette d'érosion.*
5. *Escarpement.*
6. *Eboulement (chaos de blocs).*
7. *Talus d'éboulis (ou colluvions).*
8. *Ressaut (accentuation brusque de la pente).*
9. *Escarpement (versant rocheux à très forte pente, généralement supérieure à 45°).*
10. *Versant ou glacis d'érosion.*
11. *Symbole pour les abrupts d'érosion ou fronts de cuesta.*
12. *Symbole pour les chaos de blocs.*



h1. Hauteur maximale de l'ouverture.
h2. Hauteur de l'abri à la moitié de sa longueur.
l. Longueur maximale de l'abri.
α. Angle entre l'horizontale et l'inclinaison moyenne de la paroi.

Figure 6. Abri sous-roche
-1- Morphologie
-2- Morphométrie.
-3- Cavitation dans un seul banc.
-4- Cavitation dans plusieurs bancs.
-5- Symboles cartographiques.

Position des oeuvres rupestres (gravures ou peintures):
A. au plafond; B, C. sur la paroi; D. en bas de paroi (parfois enterrées).

1. Paroi extérieure ou surplomb 2. Ouverture de l'abri
3. Draperie rocheuse (facultative) 4. Plafond 5. Paroi
6. Plancher (remplissage sédimentaire ou couche archéologique
7. Plancher rocheux 8. Faciès homogène
9. Faciès et pétrologie hétérogènes

and/or international teams and the fundamental freedom of an individual scientific researcher. These remarks are pertinent to Australia, where much emphasis is now placed on the need for consultation with the relevant Aboriginal people before undertaking rock art projects.

The second section of the paper deals with the urgent necessity for international co-ordination in developing a common terminology and methodology for the study and conservation of open air rock art. This has been largely achieved in relation to the cave art of Europe, in spite of the disagreements between 'archaeologists — interpreters' and 'scientific conservators', and outstanding examples of this progress are furnished by the work carried out in the caves of Lascaux and Altamira.

Open air rock art should not be treated like cave art according to Soleilhavoup, even if the two fields of study have a common methodological base, for open air rock art is at the same time much more widespread in the world but given far less attention in comparison with both cave art and the monumental art of architecture.

Standardisation of concepts and terms is advocated in the next section of the paper. One of the resolutions passed at the conference in Spain was to produce an international glossary of terms used in the study and conservation of rock art. Such a work would avoid the ambiguity and lack of precision of discussions in the present confused situation. Soleilhavoup suggests the setting up of a working group to write a handbook on basic data and terminology concerning the following themes:

(1) The physiographic setting and natural and human environment, past and present, of open air rock art.
(2) The general and particular geomorphological setting and environment.
(3) Basic research on the causes and effects of weathering and changes in the condition of open air rock art.
(4) The recording for conservation or interpretation of open air rock art. This section contains a warning about the dangers of damaging rock art in the course of recording, and particularly of the immense danger of making casts.
(5) Conservation: methods of intervention and site protection.

It is proposed that this work would be more in the nature of a well-illustrated encyclopaedia than a dictionary; it would be a practical manual for the recording and study of basic data on open air rock art. While this project is clearly most worthwhile, the usefulness of such a manual would be doubled if it was in English as well as French, since the vast majority of the world's open air rock art lies in English-speaking rather than French-speaking countries (Australia, Canada, USA, India, South Africa). I would therefore suggest that the manual should be in English and French parallel texts, with equivalents of terms also given in other languages such as Spanish, Italian and German.

Standardisation of systems of documentation is also addressed, and it is pointed out that scientific research in the domain of open air rock art ought to be able to benefit from current technological developments such as computerised data banks. Two specific suggestions are made. Firstly, Soleilhavoup as a result of his pilot project in Algeria proposes that research data on causes of natural weathering of rock art could be computerised quite simply and at a reasonable cost. Secondly, the question is raised again of the development of a model standard form for recording open air rock art anywhere in the world. At the 1983 Congress in Spain this question was addressed in some detail and the following nine categories of data were defined and proposed for use by the participating countries:

(1) Institution
(2) Inventory number
(3) Location (geographical and administrative)
(4) Type of rock bearing the art
(5) Description of the rock
(6) Type of art
(7) Description of the art
(8) Conservation status
(9) Documentation

Starting from manual systems and regional archives, one could progress to national and international computerised data banks of lists of sites, technical and stylistic and other information. The main essential is that the system must be compatible to be effective and to achieve intercommunicability. However, there are many difficulties even within one country, of evolving compatible computerised site recording systems. A serious attempt has been made on this front in Australia, but with only limited success. In November 1983 the Australian Heritage Commission funded the Australian Archaeological Association to hold a workshop in Canberra to discuss site registers and site recording. The proceedings of this workshop are shortly to be published by the Australian Heritage Commission. What emerged is that most State authorities responsible for protection of sites are adopting a computerised summary form for general information and description of each site, but that detailed information on each site type is being recorded separately. Several different computerised recording forms have been developed for rock art sites, the most comprehensive being that developed by Grahame Walsh for recording painting, stencil and engraving sites for the Queensland National Parks and Wildlife Service. I would suggest that this whole topic of rock art recording forms should be the subject of a future paper, or even issue, of *RAR*.

The second part of this paper describes pilot projects on conservation of open air rock art in Algeria. This was a follow-up to the international seminar on conservation of the rock paintings of Tassili in 1978, and was partly funded by UNESCO. The principal scientists involved in this study were Francois Soleilhavoup, Jacques Brunet and Pierre Vidal, and some of their detailed

reports and publications on the project are listed in the bibliography. A most interesting video film was also made of the project.

The various steps in research design and methodology are described by Soleilhavoup in some detail. They comprised:

(a) Preliminary work: analysis of maps, air photos and landsat images, bibliographic analysis, criteria for selection of sites, logistical analysis etc.
(b) Field work: formation of a multidisciplinary team comprising at the minimum an archaeologist specialised in rock art studies, an earth scientist, a rock conservation expert, and a draughtsman/surveyor. Tasks involved were geomorphological studies, micromorphological analysis of the painted walls, recording and interpretation of the paintings, the installation of a meteorological recording station in the region and of microclimatic devices in certain rockshelters. The equipment used was lightweight (about thirty kilograms) and very practical, using batteries which last three or four months. (It was loaned by the Centre de Géomorphologie of CNRS [National Centre for Scientific Research] at Caen, France.) The next stage was the analysis of the data and some experimentation in the laboratory, aimed at gaining a better understanding of the processes at work in the weathering and deterioration of rock surfaces, formation of desert varnish and patina and so on.

The final stage is conservation, but Soleilhavoup observes that there have been comparatively few technical studies of conservation of open air rock art, and that the few studies that have been done rarely lead to practical conservation measures.

After sixteen years involvement in the field of rock art conservation in the Sahara, Professor Soleilhavoup believes that it is imperative that a small manual or field guide should be produced for both specialists and nonspecialists recording basic data on rock art sites in Algeria. Accordingly, the writing of a small practical field guide has been commenced, entitled 'Étude et conservation de l'art rupestre en Algérie: guide pratique de terrain'. He has also come to believe that for a successful project, certain rules must be observed:

(1) it is essential to have small-scale, mobile teams with off-road vehicles, flexible logistic support, and adaptable team members able to cope with difficult conditions;
(2) team members should not be too specialised; archaeologists should be able to make a basic technical analysis of sites and rock surfaces, and conservators likewise should be able to record rock art;
(3) a group of six to eight researchers represents an optimum size for a mission of ten to fifteen days, including one or two rest days. The personnel must be selected carefully so that there are no personality clashes;
(4) the minimum data output ought to be completion of site recording forms along the lines recommended by UNESCO for open air rock art as described above, or as in the field guide for Algeria now being prepared.

In conclusion, Professor Soleilhavoup points out that the study of open air rock art necessitates a broad knowledge of both the Arts and Sciences, together with specialisation in one particular discipline. Rock art study is therefore a long, difficult and rigorous intellectual endeavour, but one which has as its fundamental goal the finding of means to transmit to future generations a heritage which, if not intact, is at least sufficiently well conserved *in situ* or, failing that, in archival form.

This is a most useful article by one of France's leading conservators of rock art, and it is sincerely to be hoped that the suggestions made here will bear fruit in conserving this vital part of our global heritage.

Dr Josephine Flood
Australian Heritage Commission
P.O. Box 1567
Canberra City, A.C.T. 2601
Australia

EDITORIAL COMMENT

Concerning Dr Flood's suggestion that *Rock Art Research* should act as a vehicle for deliberating the topic of rock art recording forms we refer to our notice in the November 1984 issue, page 156, when we requested information on currently used rock art inventory forms and recording standards. We have since received numerous submissions from Australian and overseas sources, but we still require more input from people with extensive practical recording experience, concerning the pragmatic aspects of inventory forms, the types of pitfalls one experiences in the field.

It is also relevant to appreciate that similar endeavours are presently underway in other parts of the world, and that these efforts should be co-ordinated. Examples are the very detailed submission by Noxon and Marcus, Professor Swartz's minimum standard, the thesis by Dickman, and the effort by CAR. Overriding considerations are suitability for computerisation, and universal applicability; and it must be appreciated that once a recording standard is agreed upon internationally it would be extremely difficult to effect a revision of it. Consensus must therefore be reached on the broadest possible basis.

Most of the countries with major rock art research traditions are English-speaking, and the two major journals on rock art are predominantly in English. It is our opinion that—should one of these countries develop a comprehensive, authoritative standard—this might facilitate international conformity more than prolonged debate, as it would be likely to lead to the international adoption of such a standard. Australia is in a unique position to take such a lead: the country possesses a greater quantity and variety of rock art than any other, a great variety of geological and climatic conditions, and a research tradition that is just emerging as one of the most dynamic and innovative in the world. AURA maintains an extensive international network of contacts, and the majority of internationally acknowledged rock art specialists are among our members. The principal purpose of *Rock Art Research* has always been to provide a forum, and with the help of such organisations as the National Parks and Wildlife Service, the Northern Territory Museum and G. Walsh's Rock Art Research Centre, to name just a few, we should be able to proceed towards a suitable formula.

We propose to present in the 1986 volume of this journal a selection of the most expedient proposals; of extracts, ideas, considerations, objections, advice, warnings etc. Recorders,

archivists and inventory users (i.e., potentially all of us) would then have an opportunity to consider the consolidated submissions, and contribute to formulating draft proposals.

This is a cordial request to all members who have experience in the recording of rock art and rock art sites, or who can provide any constructive recommendation concerning the contents, format or scope of inventory forms, or the formulation of minimum recording standards in general. The contribution by Professor Soleilhavoup provides an excellent opening argument for the discussion of this subject, and the subsequent reviewers' comments result in a significant broadening of that basis. R. G. B.

By WHITNEY DAVIS

Professor Soleilhavoup presents a clear and cogent statement of the ambitions, scope, methods and possible results of multidisciplinary examination and conservation of rock art sites in the open air, using certain modern, 'scientific' methods.

The overall dimensions and many of the particulars of his statement will make sense to specialists and others with at least some interest or training in the methods he mentions. It is not his intention to discuss any of the methods (definitions, apparatus etc.) in detail, but to outline how a large-scale integrated research program might proceed; the outline is illustrated in part by remarks about recent 'pilot projects' in Algeria.

It is worth pointing out that throughout Soleilhavoup's paper there is a special stress on conservation and the need to integrate conservation work with other aspects of research on rock art. Soleilhavoup assumes conservation to be intrinsically valuable, perhaps more so than other kinds of work of a more interpretative nature (although *this* latter claim is not made explicitly). Although I appreciate Soleilhavoup's defence of this assumption—he stresses the need to preserve and pass on a national patrimony, in the interests of national and international knowledge, of future scholars, and so on—in a way I feel the defence is too idealistic. Those who believe in the goals of international co-operation and scientific understanding are already converted. We must find ways to convince budget-bound Ministers who surely already appreciate the humanistic or other intellectual rationales for conservation (intuitively I would guess the national governments making available most money for conservation are also the most interested in the development of tourist routes including rock art sites). Furthermore, in my view, it is important to recognise that it is conservation science which needs the help of interpretative work, and therefore there may be an argument for the *priority* of interpretation. Interpretative work which links with wider intellectual debates (for instance, about the nature of symbolism or communication) is just as likely to lead to the public awareness, sympathy and financing which will 'save the monuments' as the actual work in the laboratory on problems of surface and atmospheric chemistry. At the moment, laboratory work is so expensive, its application so limited, and its results so unintelligible to the public, that one must face the possibility that science is actually taking the longest route to the immediately desirable goals. All of these issues require more debate. For the further purposes of this review, I will go along with the general drift of Soleilhavoup's article and accept that at least some of our scarce financial resources should be allocated immediately to the development of new conservation procedures, in the field or in the laboratory.

Soleilhavoup begins his substantive discussion of a research program by pointing out the need to stabilise, codify, or otherwise homogenise the various languages and procedures employed by rock art researchers. The intelligibility of scientific work and the possibility of truly international communication at least in part depend upon such normalisation. Soleilhavoup believes that work has been frustrated by profound ambiguities in analytic languages, fruitless discussions of semantic problems, and the lack of consensus on terminology and reporting procedures. A good part of the remainder of his article is devoted to proposing some solutions. At stake is nothing less than the opportunity to acquire open and scientific knowledge, still threatened by 'neo- or pseudocolonialist attitudes' and the on-going destruction of sites.

The normalisation debates have time and again confused two separate problems—the *need for careful definitional statements by individual research teams*, explicitly justified and applied, and the *need for standardised recording/reporting procedures among many individual research teams.* In my opinion, the latter is easiest to obtain but less desirable; the former is highly desirable—cross-team standardisations must follow from it—but actually very difficult to obtain, at least in part because elementary definitions (of relevant metrics, analytic entities, and so on) are not theory-neutral. Soleilhavoup does not draw this distinction explicitly but seems to recognise it implicitly. For instance, he places great store by the possibility that a handbook could help clarify our theories and definitions (more on this momentarily), but at a later point seems to me to evince some suspicion about the feasibility and even the desirability of standardised coding procedures in automated data-processing.

As Soleilhavoup goes on to say, normalisation is not easy to achieve in practice. Cave art studies have been fairly successful, he feels, in part because of co-operation between archaeologists and conservators for a number of years. Rock art in the open air is both more plentiful and more diverse; normalisation is therefore more difficult.

As a first step, Soleilhavoup proposes the preparation of a *thématique*—a lexicon, handbook, or 'encyclopaedia'—by a working group of relevant specialists. The handbook would define and discuss various descriptive and explanatory terms used in rock art studies under five broad headings, physiographic and environmental data, geomorphological descriptions of sites and surfaces, research on the causes and effects of physical alterations in the state of petroglyphs, documentation and

archival storage, including palaeoethnographic analysis, and conservation.

Throughout his discussion of various terms and topics to be included in the handbook there is an emphasis on quantitative data and on distinctions between macro- and microenvironments (e.g. the climatic history of a region *vs* the actual interface of an oxidising surface with air). As far as I can determine, he does not envisage the production of a 'normalised' vocabulary for the formal description of images, at least beyond the elementary level (e.g. metric dimensions of forms, colours typed according to standard charts). Arguably, such a vocabulary might be very useful; all images described uniformly can be statistically evaluated, and compared with other images reported by other investigators. However, it is hard to imagine how one could standardise the rather subjective and variously nuanced terminologies employed to describe semiotic (syntactic and semantic) phenomena, especially given certain inherent qualities of iconic representation. Rather than attempting to eliminate the 'subjective', 'interpretative', 'art-critical' element in our studies—as some archaeologists believe would be desirable—it makes more sense, to my mind, for rock art researchers to educate themselves in the highly developed analytic (interpretative, critical, hermeneutic) languages of modern art history, textual criticism, and communication theory. At any rate, perhaps Soleilhavoup wishes to steer clear of formal and iconographic analysis, a tremendous pitfall for many studies in the past, but it would be interesting to hear his views about what has been a central element in the normalisation debates.

Soleilhavoup's handbook would contain appropriate cross-references, illustrations and bibliography. Insofar as it would not duplicate standard reference sources already known to specialists, it probably would be a useful tool. Although the project seems like a straightforward one, it involves many tricky issues of definition. For instance, what, exactly, is a rock art *site*, especially if images served in a wide territorial system of communication or were part of a 'code' never finding *total* embodiment at any *single* physical locus? Although he does not have space to go into these problems, Soleilhavoup apparently feels that essay-length entries in the handbook could usefully clear up some ambiguities and at least state the range of possibilities. For my part, I suspect the most interesting questions from my perspective are least likely to be handled well in a work of this kind, but it is not clear whether the handbook should really even attempt to deal with the art historian's stocks-in-trade, form, iconography, 'meaning' and 'communication'.

The handbook would only be a first step. Eventually, Soleilhavoup believes, data-banks of descriptive information and archival copies will be developed, using automated processing techniques. He rightly cautions against locking ourselves into too rigid coding categories, a problem which is beginning to arise in several 'high-tech' projects. As we know, information is only as unambiguous and useful as the programmer's instructions permit, and some codings merely make the computer internalise the observer's arbitrary and ideological assumptions about relevant features, elements worth indexing, analytic and metric entities, and so forth. There is some possibility that this is not just a *practical* problem—solved by having coders carefully define their procedures and defend their reductions—but also a *theoretical* problem, potentially *un*solvable: graphic representations, which are cognitively processed in parallel and are semiotically 'dense' (to use Goodman's term from *The Languages of Art*), are not easily susceptible to digital, serial processing, although some *information about* representations might be, if analytically reduced. I have discussed some aspects of this matter in another place (*South African Archaeological Bulletin*, June 1985) and will not consider it further here. Although he seems to believe strongly in the viability of the overall enterprise, Soleilhavoup reminds us of the problems related to the compatibility of computers and data languages and of the need for international consensus.

I confess to ambivalence about the need for and desirability of some large indexing and filing projects. Many *scientifically interesting* projects—which are more than data-catalogues, for they incorporate hypotheses and interpretative explanations—are still many years away from being instituted. Many are expensive and require specialised equipment. When intellectual and financial resources are scarce, it is necessary to ask whether the goals are worthwhile and the data truly revealing. Although no one disputes the value of the broadest possible goals—the preservation of rock art and its 'scientific' understanding—in practice the various more limited goals (testing new equipment, refining an analytic procedure) have to be evaluated individually. A researcher could be developing a detailed map of the chemistry of a petroglyphic surface *or* deploying ethnographic questionnaires on perceptual habits *or* analysing the articulation of a semiotic code *or* assessing symbolisms of power *or* reconstructing the movements of a vanished population; each might be a valuable task, but so are all the others. The possibilities must somehow be assigned degrees of priority, perhaps in relation to our overall interests in the coherence of culture or the nature of communication or the physical processes affecting the man-made universe. It is tempting to believe that prior to all of these studies there must be a basic corpus of evidence or 'hard data', just simply *there* waiting to be retrieved, worth acquiring and conserving for its own sake. However, to approach this data without *some* pretheorised aims and ambitions is like 'the man who throws away his metal detector and proceeds to dig by hand the three-acre field where he thinks treasure lies buried' (Derek Bickerton in *The Roots of Language*). Ironically, rock art research risks re-enacting an old tragedy in a new costume: just as we were plagued for years by doctrines insisting on 'art for art's sake', we are now plagued by insistence on 'data for data's sake'. Comprehen-

sive historical explanation or totalising anthropological interpretation are still endlessly deferred by the connoisseur or the scientific positivist, each in his own way asserting the primacy of 'fact' over 'theory' and 'description' over 'interpretation'. ('The program to which the various contemporary ideologies of pluralism are most passionately attached is a largely negative one: namely to forestall that systematic articulation and totalisation of interpretative results which can only lead to embarrassing questions about the relationship between them and in particular the place of history and the ultimate ground of narrative and textual production' [Frederic Jameson, *The Political Unconscious: Narrative as a socially symbolic act*].) It remains to be seen whether rock art studies will actually seize the opportunity to effect a synthesis between positivistic and interpretative research programs. None of these comments is meant directly as a criticism of Soleilhavoup's presentation; they are prompted by reflection on data collection carried to its extreme.

The practical and logistical aspects of a multidisciplinary program are reviewed by Soleilhavoup in his interesting sections on actual projects carried out at Tassili and sites in the Atlas, involving small teams for a few weeks. (One is tempted to see some irony in the contrast between calls for large international undertakings and the small, commando-like 'research raids' that are actually put into effect.) Initial surveys were followed by structured research and conservation work in the field and laboratory, including plans to install equipment for the measurement of microclimates and to model processes of change or degradation in the lab. Among the lessons learned, Soleilhavoup stresses the need for detailed reconnaissance and exploitation of existing data and for a carefully selected research team involving specialists but not too narrowly skilled. Discussion of specific results is presented in the context of an overall outline of what might be called an ideal or 'dream' project, which would involve the scientific analysis of the five broad areas of concern sketched initially.

I do not disagree with any of the positive, specific statements made in this report. Although I have some doubts about the feasibility of some plans or real usefulness of some results, the thorough and pragmatic tone of the article is compelling. One is carried along by the promise of new, solid knowledge and secure, testable techniques.

However, in my case Soleilhavoup is probably preaching to the converted. It will be interesting to see how widely shared his basic assumptions turn out to be. Training in many of the methods he discusses is still hard to come by. Many people engaged in the study of rock art have not acquired this training; they may be 'amateur' researchers, or administrators responsible for archaeological conservation in a wide district, or even park wardens and local guides. Some art historians and anthropologists will have different interests from Soleilhavoup's archaeological and natural-scientific interests. The author has done his part fairly and squarely by offering a programmatic outline and some actual examples, and it is perhaps a sign of the vigour of the field that other statements with a similar aim—like Lewis-Williams' in *New approaches to southern African rock art*, or my own, mentioned above—look almost completely different.

Dr Whitney Davis
Society of Fellows
Harvard University
78 Mount Auburn Street
Cambridge, MA 02138
U. S. A.

By F. L. VIRILI

In his excellent paper Professor Soleilhavoup highlights the necessity for international scientific and cultural co-operation and co-ordination in recording and conservation of A.R.P.A. ('open air rock art', as distinguished from Palaeolithic cave art).

As rock art is not only a national patrimony but indeed a universal heritage, international co-operation is indispensable for the interpretation and understanding of this form of expression and for its protection from deterioration and damage. Hence, the factor *communication* becomes a most important one, and as communication is the fundamental element of scientific and cultural knowledge, the author points out the dangers of ambiguity and misinterpretation that can be caused by the lack of uniformity in the terminology used in rock art research. He observes that the longer one word is used, the more its meaning is amplified, and it acquires therefore such a variety of concepts that, at the end, it does not have any more a precise signification. Accordingly, Professor Soleilhavoup proposes the redaction of an international lexicon, founded on the double necessity of semantic concordance and practical purpose. On this proposal I am not entirely in agreement with the author.

As lexical dissimilitudes concerning rock art terminology exist in most languages, the problem of nonuniformity starts *within* the same language group. Let us take the example of the term 'petroglyph' (Bednarik 1984), a term widely accepted as defining in general all A.R.P.A. executed by a 'subtractive' process, regardless of the techniques used. The French language, generally quite specific in its terminology, prefers the locution *gravures rupestres*: in fact there is no equivalent for the word 'petroglyph' in the authoritative dictionary *Petit Robert*. In Italy, the terms *petroglifi, incisioni su roccia* or *incisioni rupestri* are equally adopted, and I have even found a barbarism such as *istoriazioni (superfici istoriate, rocce istoriate)* being used by a well-known prehistorian.

In Australia, F. D. McCarthy (1968) and Lesley Maynard (1977) have exhaustively discussed all aspects of terminology concerning Australian rock art; yet, in 1985, we are still bickering

on whether we should call petroglyphs *carvings* or *engravings* (let alone 'peckings'!).

Without belittling the merit of Soleilhavoup's proposition, I believe that a consensus should be reached firstly on a 'national' uniform terminology, within each language family. An international lexicon would be premature at this stage, and until the issue of national uniformity has been settled once and for all.

Soleilhavoup raises then the question of international conventionalisation of site recording data, in order to facilitate comparative studies on an international scale. He explains that the reasons why this issue has not yet been resolved are due to the specific characteristics of most rock art sites, the different administrative regulations applying in various countries and the different purposes for which recordings and inventories are made.

In spite of the fact that rock art sites, especially in Australia, are widely scattered and are located in areas totally different in all aspects, it should not be too difficult to achieve international uniformity on both the structure and the terminology of the 'technical' side of site documentation, that is to say the physiographical, geomorphological, meteorological and environmental aspects of the sites. The five points proposed by Soleilhavoup as a guideline for the international lexicon could well form the basis for that.

Why not start then from the end and introduce a site card containing only the technical information of the rock art site? That would be an important step towards interdisciplinary scientific co-operation on a crucial topic: the study and the adoption of appropriate practical measures for the protection of rock art sites against atmospheric deterioration. On this point, the Algerian pilot project described in the second part of Soleilhavoup's paper is a perfect example of what can be achieved by international co-operation.

In our search for knowledge we are sometimes inclined to transpose the order of priorities. We sooner concentrate our studies on the interpretation, the significance, the styles and techniques of rock art, not making sufficient efforts towards its conservation. We are not thinking of conservation as a *fundamental* objective.

It has taken little more than a century for archaeological amateurishness to become archaeological science. With the continuous, rapid development of technological means in the research field, future generations of scholars will be better equipped to answer questions and elucidate problems that we find difficult to resolve today. Hence, in Professor Soleilhavoup's words, we should adopt all possible measures to transmit to our posterity the rock art patrimony in a good state of conservation.

F. L. Virili
43, rue Laffitte
75009 Paris
France

By ANDRÉE ROSENFELD

Soleilhavoup's paper may be considered in two parts: the first is a plea and a proposal for more effective international communication about the conservation of rock art, and the second is an outline of a conservation project currently underway in the Tassili massif in Algeria.

Soleilhavoup begins by stressing the universality of the world's rock art heritage and the urgent need for its protection. He warns against the dangers of allowing sectarian interests to prevail, be they scientific, cultural or national. These should never be allowed to override our ultimate goal: that of preserving this 'fossil art'—the cultural heritage of all humanity. A bland and idealistic statement by the author! An Australian readership, and prehistorians in particular, will recognise the highly contentious nature of such a stance. Rock art, among all archaeological sites is and remains one of the most emotive facets of the Aboriginal cultural heritage. The very real conflict of ethics which can arise in questions of cultural ownership, let alone scientific interest is a familiar problem. That this is not restricted to Australian researchers is abundantly clear from some of the papers in McBryde's recent publication *Who Owns the Past* (1985).

This theme is not, however, taken up in the body of the paper. In the first section, Soleilhavoup stresses the desirability of international agreement on methodologies and on a terminology relating to rock art conservation. Here he emphasises that despite significant developments in the conservation of Franco-Cantabrian cave art, the nature of these sites is so different from 'open air' sites, that a direct transfer of the methods and terms is often inappropriate. This is a conclusion that I also reached in a report on Australian rock art conservation (Rosenfeld 1985).

As a means of arriving at a generally acceptable definition of methods and of terminology for the conservation of open air rock art sites, Soleilhavoup proposes that a working party be set up, to examine and report on the issue under the following headings:

a) physiography and natural environment, including man-induced environmental factors;
b) geomorphology of the site, including effects of palaeoclimatic changes;
c) fundamental research on the alteration processes at a rock surface;
d) archiving and palaeoethnography and palaeoethnology (for which we might more appropriately substitute prehistory and contemporary ethnography;
e) preservation and conservation.

Each of these parameters is examined in turn, with suggestions for how papers under each heading might be distributed. He considers that there is already a considerable body of information under headings a) and b), particularly in the scientific literature of the French and English-speaking

world. For section c) he points to an important new British journal, *Earth Surface Processes and Landforms: a Journal of Geomorphology* as well as the long established *Zeitschrift für Geomorphologie* as important sources of relevant data. However, he omits reference to the more directly relevant literature which relates explicitly to rock art deterioration studies. Although this still forms a relatively restricted body of literature, the work of John Clarke, Philip Hughes, and especially of Alan Watchman in Australia is some of the most detailed and professional work in this sphere. In Canada, Ian Wainwright and others have published some extremely valuable work.

It seems the archival section would deal primarily with the standardisation of nondestructive recording procedures. His emphasis that the recording requirements of prehistory and ethnography may differ from those of conservation is a point well taken. It should, however, be stressed that even within these broad areas of interest (or at least within the first two) the precise nature of the data base, and hence of recording priorities will be affected by the scientific nature of the enquiry. Broadly defined criteria of site recording requirements may well be appropriate, as surely is a discussion of the potential and limitations of various methods available. Any attempt to impose too high a degree of site recording standardisation risks imposing a blinkered approach to the data — the intellectual stagnation which can be engendered by rigid typological approaches is a familiar *'bête noire'* of prehistorians.

Conservation, he suggests, may best be treated under two sections: natural processes and humanly induced processes respectively. This may be a useful heuristic device in the evaluation of decay processes. It corresponds closely to the one adopted by the Joint Academies' Committee for the Protection of Prehistoric Places when they sponsored two reports on rock art conservation: *Rock Art Conservation in Australia* (Rosenfeld 1985) and an analysis of tourist behaviour at rock art sites by Professor F. Gale (in this issue). Ultimately, the two are interrelated, especially in devising solutions to the damaging processes. It is not possible, for instance, to design tourist management structures, such as walkways, grids, or barriers without careful evaluation of their impact on the natural microenvironment of a site. Long term maintenance procedures of cleaning, graffiti removal or graffiti minimisation require a thorough understanding of tourist behaviour as well as of the technical issues of rock surface processes.

Soleilhavoup concludes that such a report would represent a veritable practical manual of encyclopaedic coverage in which all relevant concepts and terminologies would receive comprehensive discussion and definition. It is questionable whether such a vast project is feasible given the present diversity of views and the embryonic stage of our understanding of rock art deterioration. Equally problematical is the question of its priority, given the realities of financial and personnel constraints. Research on rock art conservation, and especially on open site conservation is in its early stages. Most recent research focuses on problems of rock art decay. The complexity of this issue is becoming increasingly apparent, and research into remedial procedures is, of necessity, still at an elementary and experimental stage. I would wholeheartedly support Soleilhavoup's plea for a greater degree of international communication. Some of the generalisations of his paper, as well as some of its omissions surely highlight the need for a greater immediacy of exchange of research information in the sphere of rock art conservation. However, my own conclusion after writing a survey of Australian rock art conservation was that the writing of a reference manual, even for our own continent, is premature.

Given the need for increased communication of rock art conservation research across geographical and language barriers, the second part of Soleilhavoup's paper is disappointing. He gives a rapid overview of the initiation of the Tassili conservation project in 1978 and of the criteria and principles considered in its design and in the selection of sites for investigation. Whereas these are not without interest, a more specific, case study approach would enable his readers to share in the benefits (and surely also the disappointments) of the Tassili experience. In view of the not inconsiderable time since this project was initiated, the absence of results or at least interim data is disappointing. To be told that they are interesting merely whets the appetite. Will we be regaled in his forthcoming monograph currently under preparation *Étude et Conservation de l'Art Rupestre en Algérie, Guide Pratique de Terrain*? A detailed and fully documented report on the conservation research in this important rock art region should be a significant contribution to the literature on rock art conservation. I believe it to be of far greater promise than the encyclopaedic volume proposed in the first part of this paper.

Dr Andrée Rosenfeld
Department of Prehistory and Anthropology
Australian National University
G.P.O. Box 4
Canberra, A.C.T. 2601
Australia

[Professor Soleilhavoup's response will appear in our May 1986 issue. All readers are invited to participate in the continuation of this debate on inventory forms and recording standards in rock art research.]

Résumé. *La normalisation des recherches scientifiques fondamentales et appliquées à l'Art Rupestre de Plein Air (A.R.P.A.) dans le monde, pour sa conservation, doit reposer sur des principes clairs et sur la reproductibilité aisée des méthodes qu'on adoptera pour l'étudier et le protéger, quels que soient les milieux géoclimatiques dans lesquels on le rencontre. L'auteur propose ici la constitution d'un groupe de travail pour la réalisation d'un lexique scientifique et technique international, de nature encyclopédique, un véritable manuel pratique de terrain et de laboratoire, pour l'étude et la conservation de l'art pré- et proto-historique à l'air libre. Ce travail ne peut être réalisé que sur des accords sémantiques (normalisation des concepts et du langage).*

L'auteur donne également un exemple de schéma directeur pour l'analyse scientifique de cet art dans la nature et pour la détermination de l'état zéro des sites, stations et parois rupestres. Il propose enfin l'utilisation de matériels d'enregistrement des variations micro-climatiques aux interfaces, dans les abris et sur les parois.

Zusammenfassung. *Die weltweite Standardisierung der fundamentalen Felskunstforschung und Konservierung von Freilandstationen soll auf klaren Prinzipien und auf der leichten Wiederholbarkeit der Methoden beruhen, welcher Art auch immer das geoklimatische Milieu, in dem man die Kunst antrifft, ist. Der Autor schlägt hier die Gründung einer Arbeitsgruppe für die Realisierung eines internationalen wissenschaftlichen und technischen Lexikons von enzyklopädischer Natur vor - ein praktisches Handbuch für Gelände und Laboratorium, für das Studium und die Erhaltung von vor- und protohistorischer Felskunst in Freilandstationen. Dieses Werk soll nicht ohne Übereinstimmung der Semantik (Konformität der Konzepte und der Sprache) verwirklicht werden.*

Der Autor gibt ebenfalls ein methodisches Beispiel für die wissenschaftliche Analyse dieser Kunst, und für die Ermittlung des ursprünglichen Zustands von Fundort und Felswand. Schliesslich schlägt er die Registrierung von Variationen in mikro-klimatischen Anhaltspunkten in den Abris vor.

REFERENCES

BEDNARIK, R. G. 1984. Terminology. *Rock Art Research* 1: 70.

GALE, F. 1985. Monitoring visitor behaviour at rock art sites. *Rock Art Research* 2: 112-8.

MAYNARD, L. 1977. Classification and terminology in Australian rock art. In P. J. Ucko (ed.), *Form in Indigenous Art*, pp. 387-402. A.I.A.S., Canberra.

McBRYDE, I. 1985. *Who Owns the Past.*

McCARTHY, F. D. 1968. Recording art on rock surfaces. In D. J. Mulvaney (ed.), *Australian Archaeology, a Guide to Field Techniques*, pp. 57-72. A.I.A.S., Canberra.

ROSENFELD, A. 1985. *Rock Art Conservation in Australia.* Special Australian Heritage Publication Series No. 2, Canberra.

SOLEILHAVOUP, F. 1978. *Les oeuvres rupestres sahariennes—sont elles menacées?* Publications de l'Office du Parc National du Tassili. SNED édit., Alger.

SOLEILHAVOUP, F. 1979. *Morphologie des sites rupestres et altérations pariétales du Tassili-n-Ajjer (Sahara algérien).* Actes du Séminaire International sur la conservation des peintures rupestres du Tassili. Ministère de l'Information et de la Culture; publications de l'OPNT; Alger.

SOLEILHAVOUP, F. 1980. Les altérations des gravures rupestres et leur intérêt pour l'étude des environnements pré- et proto-historiques dans l'Atlas saharien (Algérie). *L'Anthropologie*, Masson et Cie édit., Paris 84: 535-61.

SOLEILHAVOUP, F. 1983. Une approche géomorphologique de l'art rupestre en Algérie: problèmes de méthode pour l'étude des sites de plein air. Premier Symposium International d'Archéologie Africaine et Sciences de la Natures appliquée à l'Archéologie. Agence de Coopération Culturelle et Technique (A.C.C.T.); Ecole Internationale de Bordeaux (France), 25 - 30 septembre 1983.

KEYWORDS: Petroglyphs - Rock paintings - Recording - Queensland

FACTS AND FIGURES: NOTES ON ROCK ART IN THE MT ISA AREA, NORTHWESTERN QUEENSLAND

M. J. Morwood

Abstract. Little information has so far been published on the rock art of the Mt Isa region. Two representative sites are briefly described in the present paper, one being a painting site, the other a major petroglyph assemblage. The author considers relevant ethnographic information and emphasises the potential of rock art in illuminating the prehistory of the area. He presents statistical data on motif frequencies in support of such an approach.

Published information on the Aboriginal rock art in northwestern Queensland is sparse and mainly restricted to general accounts in newspapers and magazines. For instance, Eussen (1975) wrote a brief account on the Carbine Creek site for the *Sunday Mail Column* while two articles on aspects of Aboriginal culture have appeared in *Mimag*, a magazine produced by Mount Isa Mines. General introductions to the region, such as Horton's (1970) *Around Mt Isa* and Armstrong's *The Kalkadoons* also feature brief sections on Aboriginal sites, including rock art, but provide no more than an impression of the range of art sites in the area. Complementing these general sources are the reports of fieldworkers (e.g. Rowlands and Rowlands 1976; Morwood 1978; Hill 1981) which tend to be brief, selective and restricted in access.

The paucity of information on Aboriginal art in the region is surprising given that there are excellent ethnographies for the area which provide detailed descriptions of most aspects of Aboriginal culture. This mainly reflects the work of Walter Roth, an early Chief Protector of Aborigines in Queensland who also made extensive collections of Aboriginal material culture. However, Roth has little to say on the rock art of the area and knew of only two localities where art occurred. Describing one of these sites on the old Normanton-Cloncurry Road, he says:

> At the latter, these consist of a saurian type of figure, varying from about twelve inches to over six feet in length, and hence possibly representing a lizard, an iguana, or crocodile, painted in red ochre upon the blocks of granite. I counted seven or eight of these figures in January 1896 (Roth 1897: 116).

This is the earliest and still one of the most detailed published descriptions of rock art in the region. The only other rock art known to Roth was an engraved circle in a shelter on Glenormiston Station well to the south. It is interesting, given that circles are the most common motif found on the numerous rock engraving sites of the Mt Isa region that Roth (1897: 116) reports:

> The representation of a circle is only met with on ornaments and implements coming from and to the west of the upper Georgina district.

The paucity of published information on the rock art of northwestern Queensland is not a reflection of the absence of sites. In fact the area contains a large and diverse body of art sites with good evidence for both geographical and chronological variation in a wide range of techniques, colours and motifs (Queensland State Archaeology Branch records).

Northwestern Queensland has a rich archaeological as well as ethnographic record but serious study of this has only just commenced (e.g. Hiscock 1984). Even so, the known prehistory of the general region spans a minimum of 17 000 years with good geomorphic evidence from the Colless Creek site of a 30 000 year occupational sequence (Magee and Hughes 1982). Rock art assemblages have potential to add a new 'social' dimension to the prehistory of the region. This paper is intended to put two interesting rock art sites on record as a means for encouraging future work in the area and to allow other researchers access to comparative data from a 'little-known' area. In a recent paper Clegg (1984) has eloquently demonstrated the value of such data. The two sites have been selected because they illustrate something of the diversity of Mt Isa art.

MS received 26 March 1985

Carbine Creek

This is an extensive engraving site at the head of Carbine Creek near Dajarra (Fig. 1). The site occurs in a gorge in the east side of the Carbine Creek valley. The gorge runs east at 203°N, is 47 metres long, 13.5 metres wide (at the mouth) and 45 metres high. From the bed of the gorge rugged talus slopes of varying length rise steeply up to the walls of the gorge which are sheer. The rock matrix is of vertically bedded, stressed sandstone, with quartzite in places. Engravings usually occur on rock faces which are transverse to the schistose structure

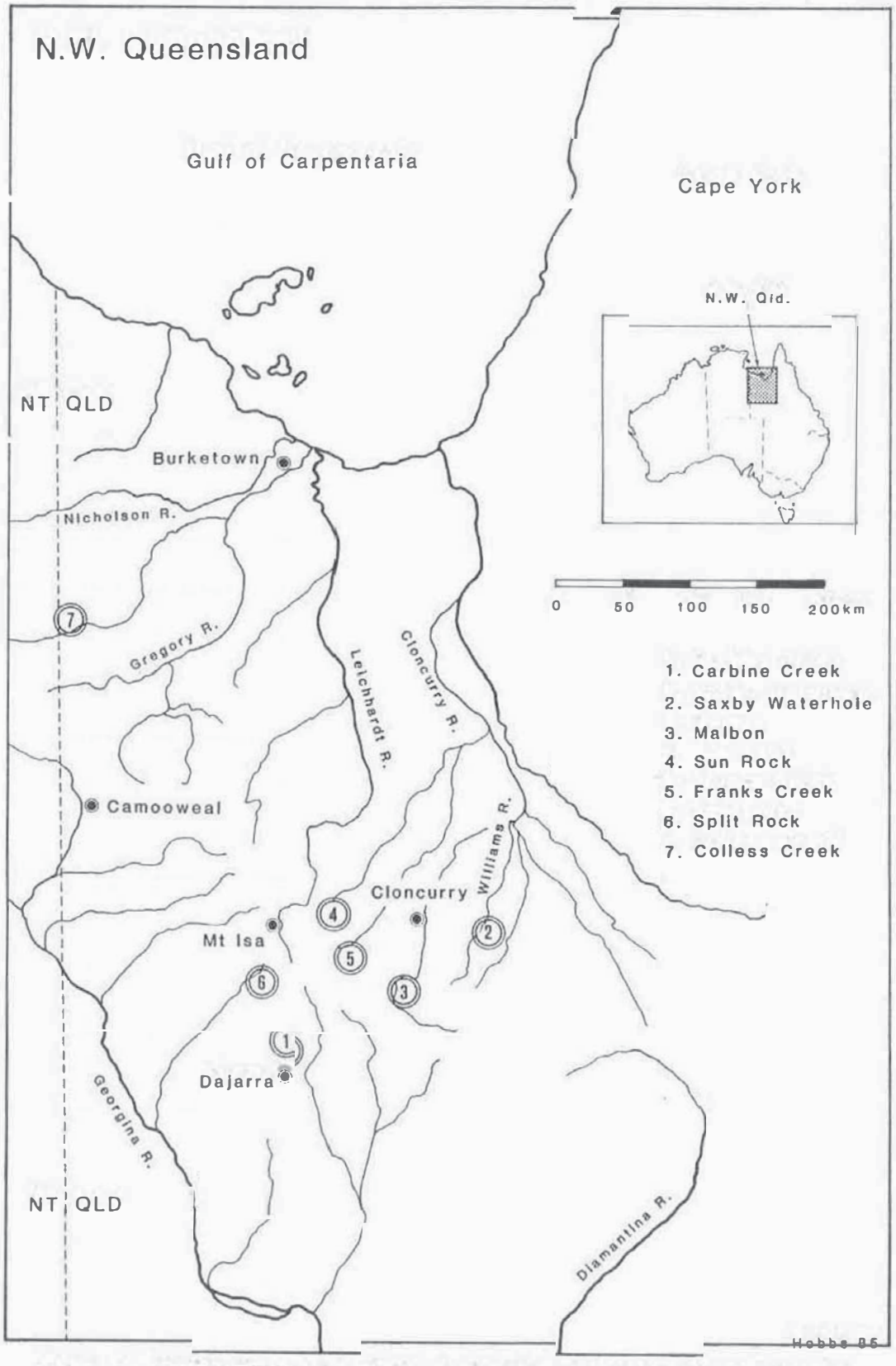
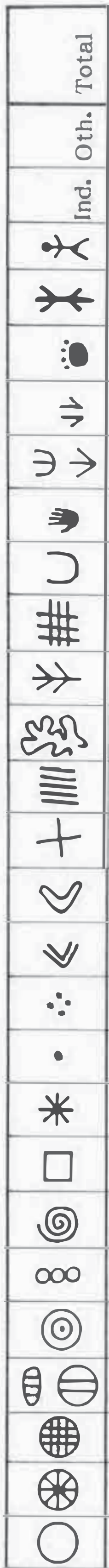


Figure 1. *Northwestern Queensland, showing the distribution of rock art sites mentioned in the text.*



																									Ind.	Oth.	Total
Area 1	9	4	3	22	4	1	3		2	2	7	3	2	1	13	7	6	7			18	2			1	19	1	137
Area 2	24	14	2	20	10				2	1	2	1	4		13	29	2				4				1	2	9	140
Area 3	10	5	2	14	1		3	1	2	5	6	4	6	1	6	10				3	8	3	4				17	111
Area 4	4	3	2	8	4		2	4	4	1	4	4	4	2	3	3					11				4	1	2	70
Area 5	31	3	6	23	5	4		2		3	1	15	7		7	9	2		2		14	5		2	5	10	8	164
Area 7	14	9	3	18			2	1	4		20	5	6		11	22	5	2	3	6	20	2	4	4	1	20	5	187
TOTAL	92	38	18	105	24	5	10	8	14	12	40	32	29	4	53	80	15	9	5	9	75	12	8	6	12	94		809
Motif %	13%	5%	3%	15%	3%	1%	1%	1%	2%	2%	6%	4%	4%	1%	7%	11%	2%	1%	1%	1%	10%	2%	1%	1%	2%			(715)
Group %				41%										42%							15%			2%				

Table 1. Motif frequencies at the Carbine Creek engraving site.

which is very stable (Phil Hughes: pers. comm.). At the eastern end water enters the gorge via a waterfall about fifteen metres in height. At the base of the fall there is a scoured-out waterhole while at the top there is a large rock hole, four metres deep, in the bed of the creek. This is probably a permanent water source.

The impression when entering the gorge is that every suitable rock surface bears engravings. These occur at the base of the gorge on the talus slopes around the scour zone, around the rock hole and on the walls of the gorge to a height of forty-five metres. Some examples occur in almost inaccessible sections of the cliff. Their manufacture would have been a highly dangerous procedure, as would their recording be.

Carbine Creek is a 'Declared Site' under the Aboriginal Relics Act of 1967 and has been listed as a site of national significance by the Australian Heritage Commission. Despite this, there was minimal information available on the number and range of engravings at the site. In 1980 a recording program was initiated to provide useful information for site management purposes and as a data base for rock art research.

To systemise recording, the site was divided into eight sections and two or three recorders assigned to each section. Each panel of engravings was sketched freehand, checked under different conditions and photographed. Notes were also made on the presence of red ochre, patination state etc. At night the sections were examined again using a quartziodine floodlight and generator lent for the occasion by Mt Isa Mines. Some panels were also traced.

Altogether six of the eight sections were fully recorded yielding a total of 806 engravings. The highest (inaccessible) cliff-line (Section 6) was also extensively photographed from opposite sides of the gorge with a telephoto lens. The talus slope on the southern side of the gorge is a mass of engraved boulders and will require a major recording exercise at some future date.

The preliminary analysis of the results has features of interest. The majority of identifiable motifs (eighty-three percent) are of geometric designs - circles, dots, stars, arcs, line series and grids (Table 1). These may be shown individually but are often elements in elaborate composites connected by line mazes and making quantification difficult and arbitrary. Despite Roth's comment regarding the use of circles on local ornaments and implements, simple, barred, gridded, concentric, linked and spiral circles are the most commonly represented designs (forty-one percent) while figurative engravings of 'humans', lizards etc. comprise a mere three percent. Although such figurative motifs are uncommon at this site they are varied (Fig. 2). Of particular interest is an engraved face in a style reminiscent of those at the famed Cleland Hills site west of Alice Springs in Central Australia (Edwards 1968) and Dampier on the northwest coast of Western Australia (Dix 1977). The example at Carbine Creek is on a prominent panel at the entrance to the gorge and is both patinated and physically weathered, implying it is of some antiquity.

The engravings vary in degree of weathering and patination - some motifs are so weathered as to be barely visible while others are fresh and unpatinated in appearance. It is clear that both geometric and figurative engravings span the history of site use. For instance, the most recent engravings at the site have been lightly battered through the rock patina to expose the underlying bright-yellow sandstone and these include both geometric and figurative motifs. On the other hand many of the older motifs have been deeply pecked into the rock and again these include both geometric and figurative motifs.

Saxby Waterhole

This site comprises a series of painted panels stretching for 300 metres along the granite cliffs surrounding Saxby Waterhole at the head of the Williams River, east of Cloncurry. The paintings have been executed in red, white and cream, with some examples being bichrome. They include both figurative and geometric motifs but these general categories tend to be spatially discrete in their intrasite distribution (Table 2). In fact both figurative and geometric paintings appear not only to be clustered but are also composed. For instance, the main panel in Section 3 comprises a dynamic composition of figures with bird-like characteristics (Fig. 3a). This theme is even more explicit in a large, isolated figure in Section 2. It is 167 centimetres long, bichrome, 'winged', and has a bird track motif for the head (Fig. 3b).

Discussion

Both the Carbine Creek and Saxby Waterhole sites have considerable aesthetic appeal, as well as research potential if integrated into a regional research program. The sites are similar in context (both are directly associated with water sources) but are significantly different in content. Carbine Creek has evidence for use over a considerable time period and detailed study of patination differences, superimpositions, and intrasite clustering could yield information on the regional art sequence. Other large engraving sites in the region have similar potential including the Frank's Creek and Split Rock sites (BH: A10, 11). In contrast, Saxby Waterhole almost certainly repre-

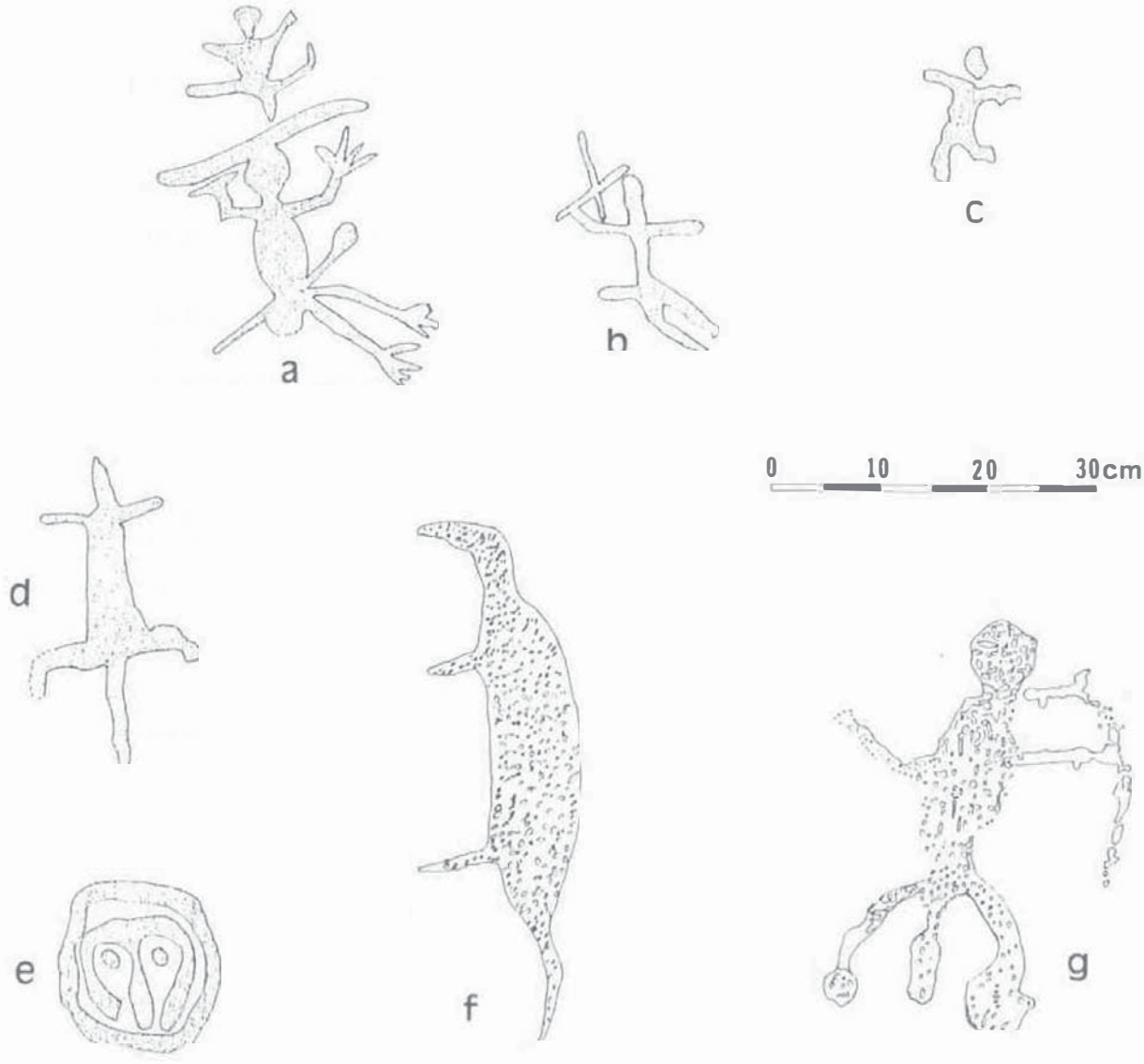


Figure 2. Examples of figurative motifs at the Carbine Creek engraving site.

	○	<	IIII	≷	≶				↓			Other	Total
Section 1										4			4
Section 2 Main panel	9	3	8		1	2	9		3			2	37
Remainder			1	1			1		1	1	3	2	10
Section 3 Main panel			1				2	2		3	8		16
Remainder					1					2	1	2	6
TOTAL	9	3	10	1	2	2	12	2	4	10	12	6	73
Motif %	12%	4%	14%	1%	3%	3%	16%	3%	6%	14%	16%	8%	

Table 2. *Motif frequencies at the Saxby Waterhole painting site.*

sents a single 'functional' entity in which the painted panels are all broadly contemporaneous.

Both the figurative and geometric panels at Saxby can be closely matched with painted panels from other sites. For instance Sun Rock (BJ: A4) has a panel of painted figures with reptilian characteristics as does Painted Rock. In contrast the main panel at Malbon Rock in the Cloncurry River district (BH: A5) is exclusively of line series, sinuous lines, arcs and 'bird tracks'. The intrasite differences in figurative and geometric motif emphasis at a number of sites, including Saxby Waterhole, indicate that synchronic as well as diachronic variation is responsible for the considerable intersite differences in the rock art of northwestern Queensland.

Although the complexity of factors causing variability in Mt Isa rock art is a complicating factor, this same complexity adds significantly to the potential of these assemblages for reflecting social processes and change. For instance, both the Carbine Creek and Saxby Waterhole sites contain very distinctive motifs which may be diachronic and/or synchronic 'markers' (e.g. Cleland Hills faces, 'birdman' figures). Some distinctive art motifs in the Mt Isa area appear to be patterned in their intersite distribution and such patterning has 'social' implications. To take

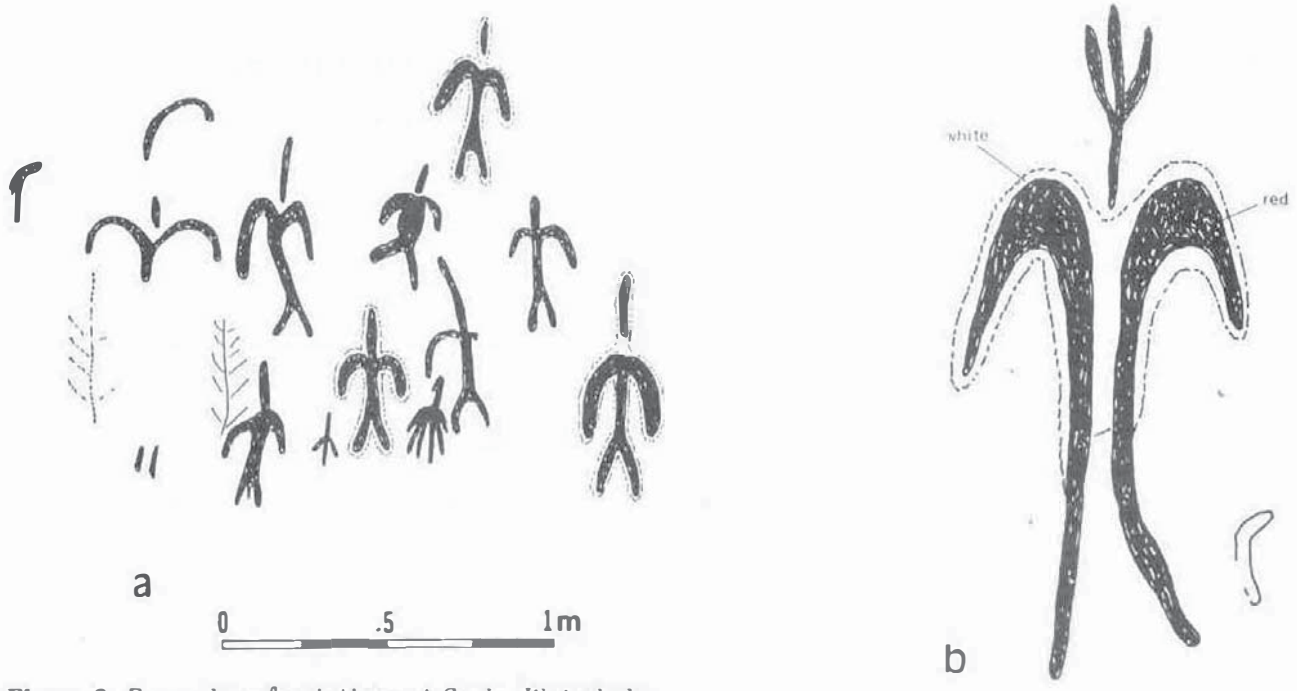


Figure 3. *Examples of paintings at Saxby Waterhole.*

a few examples - a linear intersite distribution could relate to the movement of particular ancestral beings across the landscape in a way characteristic of patrilineal cult-totemism. The well-known Nappamerrie engraving site on Cooper Creek to the south of Mt Isa is known to be associated with such a myth (Elkin 1949/50: 141). In contrast, localised or relatively homogeneous, intersite distributions of motifs would have different implications for the role of rock art in an area where there is little specific information on the cultural, mythological or chronological context of Aboriginal art (cf. Morwood and Gibson 1984: 566; Morwood 1984: 367).

Acknowledgements:

This work was undertaken under the auspices of the Queensland State Archaeology Branch. I wish to thank Kate Sutcliffe and Merve Gibson for introducing me to the area and for their considerable assistance. The Carbine Creek site recording was only possible with the enthusiastic involvement of the Honorary Warders of the Mt Isa area - especially John Prince, Pamela Sellors, Bob Forsyth, John Marchant, Eddie Camenzind, Ron Miller, Gae Rayner, Ron Atwell, Phil Holden, Bob Poppel and June Davis. I thank them all.

Dr M. J. Morwood
Prehistory Department
University of New England
Armidale, N.S.W. 2351
Australia

[No comments were sought for Dr Morwood's article. Readers wishing to comment are invited to submit their reviews.]

Résumé. *Peu d'information a été publiée jusqu'à présent sur l'art rupestre de la région de Mt Isa. Deux sites représentatifs sont brièvement decrits dans le présent papier, l'un étant un site de peinture, l'autre, un assemblage majeur de pétroglyphes. L'auteur prend en considération l'information ethnographique utile et met l'accent sur les possibilités de l'art rupestre en illuminant la préhistoire du territoire en question. Il présente des données statistiques sur des fréquences de motifs pour soutenir un tel approche.*

Zusammenfassung. *Wenig Information ist bisher über die Felskunst des Mt Isa Gebietes veröffentlicht worden. Zwei typische Gallerien werden hier kurz beschrieben, von denen eine aus Felsmalereien besteht, die andere eine gröeszere Ansammlung von Petroglyphen darstellt. Der Autor bespricht sachdienliche ethnographische Information und hebt die potentielle Verwendung von Felskunst in der Erläuterung lokaler Vorgeschichte hervor. Als Demonstration einer solchen Methodik bringt er statistische Unterlagen über Motivhäufigkeit.*

REFERENCES

ARMSTRONG, R. E. M., n.d. *The Kalkadoons: a Study of an Aboriginal Tribe of the Queensland Frontier*. William Brooks and Co., Brisbane.

CLEGG, J. 1984. Comments on 'Rock art in the Olary Province, South Australia'. *Rock Art Research* 1: 111-8.

DIX, W. 1977. Facial representations in Pilbara rock engravings. In P. J. Ucko (ed.), *Form in Indigenous Art*, pp. 277-85. A.I.A.S., Canberra.

EDWARDS, R. 1968. Prehistoric rock engravings at Thomas Reservoir, Cleland Hills, western central Australia. *Records of the South Australian Museum* 15: 647-70.

ELKIN, A. P. 1949/50. The origin and interpretation of petroglyphs in southeast Australia. *Oceania* 20: 119-57.

EUSSEN, D. 1975. Lost art of the Aborigines. *Sunday Mail Colour*, Dec. 28.

HILL, I. W. 1981. An Aboriginal art site in north-west Queensland. *Cultural Resource Management Archaeology Notes* 1: 5-14.

HISCOCK, P. 1984. Preliminary report on the stone artefacts from Colless Creek Cave, northwest Queensland. *Queensland Archaeological Research* 1: 120-52.

HORTON, H. 1970. *Around Mt Isa*. University of Queensland Press.

MAGEE, J. W. and P. J. HUGHES 1982. Thin-section analysis and the geomorphic history of the Colless Creek archaeological site in northwestern Queensland. In W. Ambrose and P. Duerden (eds), *Archaeometry*, pp. 120-8. A.N.U., Canberra.

MORWOOD, M. J. 1978. Report on Fieldwork in the Mount Isa Area, North-western Queensland. Queensland State Archaeology Branch files.

MORWOOD, M. J. 1984. The prehistory of the central Queensland highlands. In *Advances in World Archaeology*, Vol. 3, pp. 325-80. Academic Press.

MORWOOD, M. J. and M. GIBSON 1984. Incised stones from Glenormiston Station, S.W. Queensland. *Memoirs of the Queensland Museum* 21: 561-5.

ROTH, W. E. 1897. *Ethnological Studies among the North-west-central Queensland Aborigines*. Government Printer, Brisbane.

ROWLANDS, R. J. and M. J. ROWLANDS 1976. Report on Fieldwork in western New South Wales and western Queensland. Unpublished report. A.I.A.S. files. Restricted access.

KEYWORDS: Rock paintings - Hand prints - Motif distribution - Demography

THE ORIGIN OF CERTAIN IMAGES IN THE ROCK ART OF SOUTHERN AFRICA

W. J. J. van Ryssen

Abstract. Rock art in southern Africa has long been credited to one particular group of indigenous inhabitants. The Bushmen (San) have been cited as authors of this incredible collection of prehistoric art which degenerated into smears, hand prints and other nonrepresentational art after the arrival of the herding peoples, the black Africans and the white colonists. A new analysis of the images and careful assessment of their occurrence shows that it is most likely that two groups of people produced the images - the San hunter-gatherers being responsible for the 'recognisable' figures, both human and animals, and the herder groups for the nonrepresentational images and imprints of hands.

Introduction

There have been long and often heated debates on the subject of rock art in southern Africa. One of the most often discussed and disputed topics is that of the origin of some of the many thousands of paintings found throughout the region. In most instances the question who the artists were is easily answered - the Bushman (San) produced by far the majority of the paintings. However, on the western, southwestern and southern margins of the subcontinent are many previously unexplained images. Figure 1 shows the setting of the area under discussion within the larger southern African region.

There have been sporadic attempts at a systematic study of various elements in southern African art (e.g. Cooke 1964; Maggs 1967a, 1967 b, 1971; van Rijssen 1980 and Mazel 1981) and the current emphasis is on the search for meaning in a sociological context. Many ethnographically derived hypotheses depend for their formulation on the application of San mythology to the interpretation of the paintings. Lewis-Williams (1981, 1983), for example, has argued that many beliefs encoded in the ritual were explained in trance, the mental images evoked during this state were then sometimes expressed visually in the form of rock paintings. These depicted images of human beings, therianthropes (part animal, part human), animals and, occasionally, 'mythical creatures'. There are, however, some aspects of the art which perhaps cannot be interpreted through mythology but which, when considered in conjunction with distributional data, may give some clue to the identity of their authors.

Since 1978 there has been a program of comprehensive site recording in segments of the western Cape and to date about 800 rock art sites have been located and recorded. By plotting the distribution of specific motifs it has been found that rock art can inform about a number of issues such as movement and settlement patterns of various groups, changes in group size, and even specific activities (Manhire *et al.* 1983: 29). By plotting specific motifs on regional maps, localised or contrasting distributions can be illustrated even though field surveys may not be complete. Figure 2 illustrates the topography of the research region.

The aspects of the art which are considered in this paper are : hand prints, sematographs (abstract or nonrealistic paintings, excluding trance and trance-related scenes) and paintings of domestic sheep. Figures 3 and 4 illustrate the typical hand prints and Figure 5 shows part of a scene in which domestic sheep are portrayed. Figure 6 shows the more usually accepted form of hunter-gatherer art - human figures depicted in various ways.

Archaeology

It is necessary to digress slightly from a discussion on the purely rock art aspect and examine the archaeological evidence for the movement of peoples in this region so that a fuller understanding of the situation is possible.

Recent research into the prehistory of the western Cape has concentrated on the subsistence patterns and settlement arrangements of hunter-gatherers and pastoralists, particularly in the Holocene period. Excavations of numbers of sites over a long period of time have led to the development of more specific hypotheses and it is now clear that there have been marked environmental changes in the western Cape over the past 15 000 years, and that these have influenced subsistence and settlement to a considerable

MS received 31 January 1985

extent (Deacon and Deacon 1963; Deacon H. J. 1969; Parkington 1972, 1976, 1977, 1980; and Schweitzer 1974). The pattern of settlement change in the western Cape suggests hypotheses to which rock art data can be related. Excavations at the coast and in the Cape Folded Belt imply increasingly that early Holocene settlement was restricted to the wetter areas of the mountains and intermontane valleys with little movement to the coastal regions. Between about 8000 to 4000 years ago higher sea levels and lower rainfall made many coastal locations - especially those on the western seaboard - relatively inhospitable. It is thought that at this time populations survived by adapting to the animal and plant foods of the mountains, although evidence for this is sparse (Manhire *et al.* 1983). As conditions improved and approached those of the present, patterns of seasonal movement were established which linked the mountains and the coast. Then, about 2000 years ago, the hunter-gatherer systems were put under more stress by the appearance of pastoralists who competed for resources and whose lifestyle introduced a previously unknown factor - domestic animals - into the environment. A part of the wild animal biomass was replaced by sheep and some cattle, and by the time the first white colonists arrived in the mid-seventeenth century, herds of cattle numbering thousands were observed in this region (Thom 1952). The large numbers of sites dated to the last two millennia in the more isolated parts of the mountains may reflect a reorganisation of the hunter-gatherer subsistence in the face of these incursions. The situation on the coast seems to have been more complex and the pattern of movement of the hunter-gatherer peoples was probably arranged to coincide with the absence of the pastoralist groups. This pattern may be discernible in the rock art of the region.

Hand Prints Data

Willcox (1954) studied the available information regarding the distribution of hand prints, their types and sizes. These were found mostly in the western and southwestern Cape with only a few examples in other parts of the country. Willcox compared measurements of hand prints with the hand lengths from records made in the early part of this century of hunter-gatherers and pastoralists, and subjected the data to a comparative statistical test (students t). He found that there was no statistically significant difference between the lengths of the hand prints and those of the hands of the hunter-gatherers, while the lengths of the pastoralists' hands differed to a highly significant degree from those of the hand prints. On the basis of similarity of length, the colour of the pigments used for both hand prints and representational paintings, the occurrence of rock paintings in rock shelters which had deposits containing late Stone Age artefacts, and the results of the statistical text, Willcox (1959: 297) concluded that 'the study of handprints makes it practically certain

a) that the rock paintings of the southern

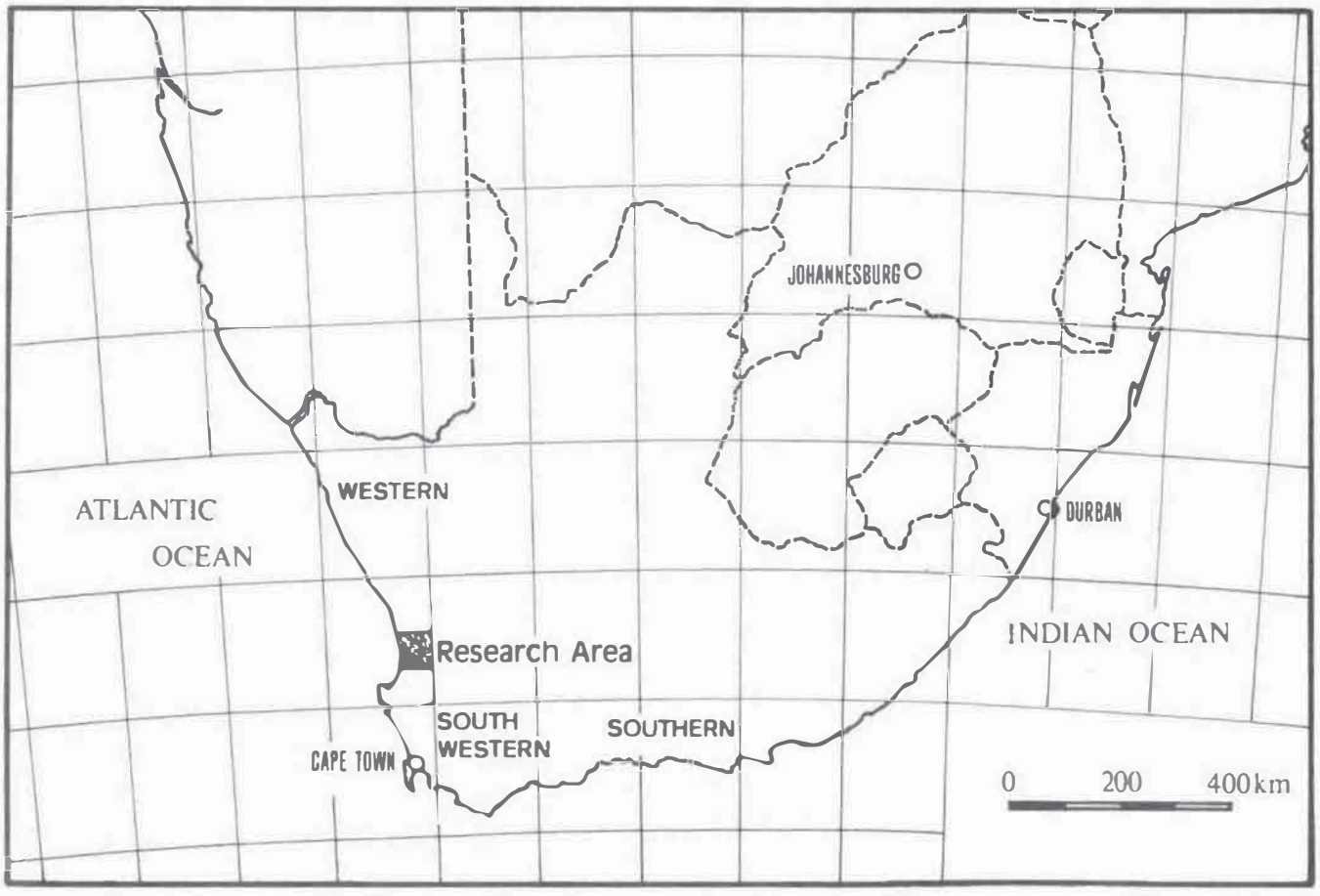


Figure 1. Southern Africa, indicating Cape regions and research area mentioned in the text.

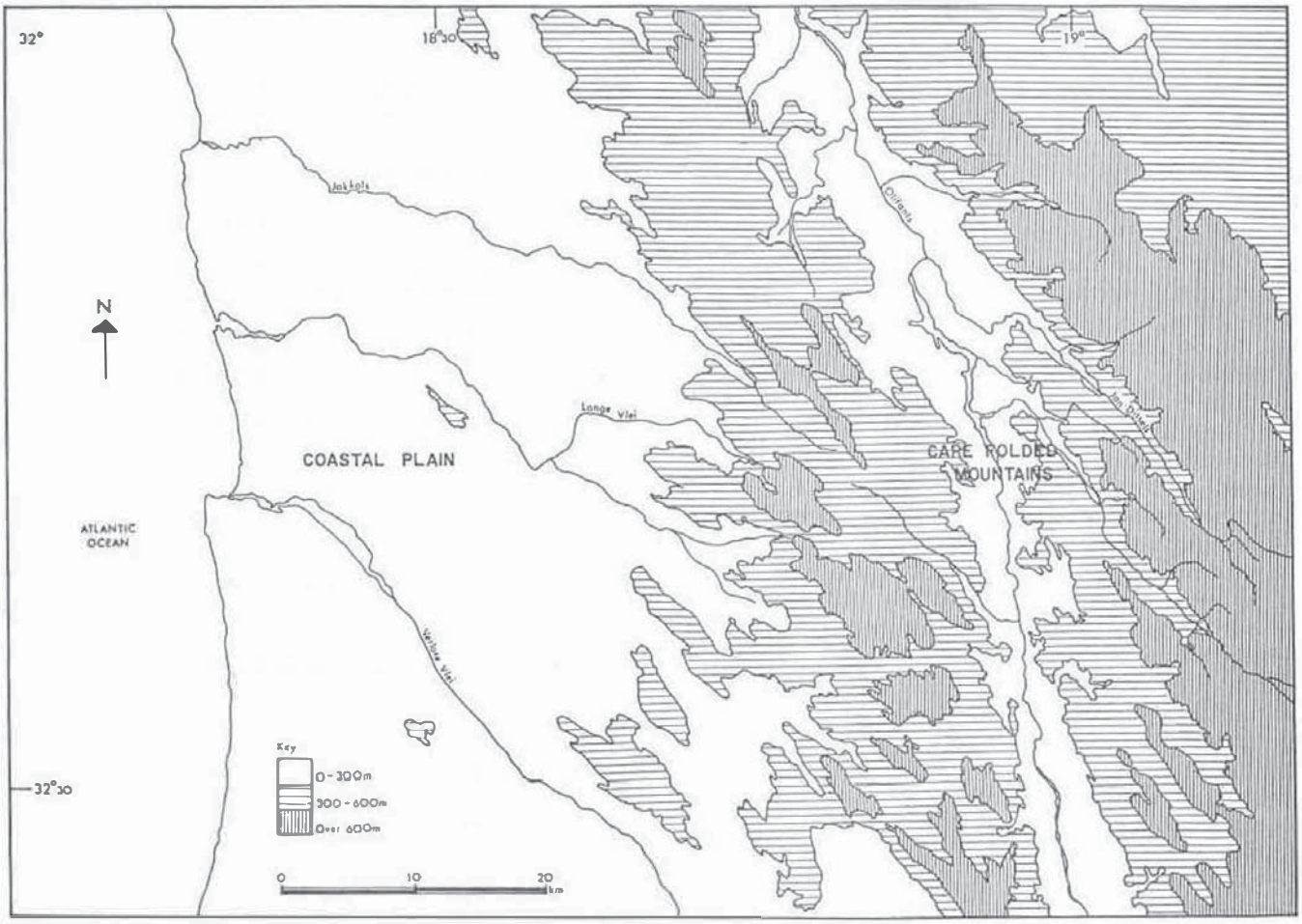


Figure 2. Detail of the research area.

and southeastern Cape and those of the western Cape were the work of the same people, and

b) that these people were Bushmen physically, whether or not they were so culturally'.

Aspects of Willcox's statistical analysis are questionable, however: he compared the lengths of hand prints only with those of hands of adult male hunter-gatherers and pastoralists, without having any indication of the age and sex of the makers of the hand prints; he apparently did not consider the possibility that there might have been changes in stature between the time that the hand prints were made and when the hands of the living persons were measured; he excluded the sample of the largest hunter-gatherer hand lengths from his statistical comparison on the grounds that 'this sample is of !Kung Bushmen from a place too remote from the Cape for valid comparison' (Willcox 1959: 246), notwithstanding the fact that all the other hunter-gatherer samples came from central Botswana and the pastoralist samples from Namibia; he also assumed that the hand imprints were all the work of adult males. Moreover, Willcox did not apply the statistical test to the lengths of hunter-gatherer and pastoralist *hands*: doing so reveals no significant difference between the two samples ($p = 0{,}8$). The mean and standard deviations for the three samples overlap considerably and the three samples can be seen as parts of a continuous range. Measurements of approximately 100 hand prints taken by the author show them to range from 100.0 millimetres to 176.0 millimetres while Willcox's measured lengths (Willcox 1959: 294, Table 1) have a narrower range for the Cape hand prints of 133.3 to 158.7 millimetres.

More recently, Willcox (1984: 245-7) has again examined the question of hand prints in the context of rock art in Africa and has suggested that symbolism may be one of the reasons why the imprints were made, but finally suggests that 'art for art's sake' is probably the most reasonable answer. Other writers have either ignored the question of hand prints or suggested that they represented the 'signature' of the artist(s) concerned (Rudner pers. comm. 1982).

More than 120 of the over 800 rock art sites in the southwestern Cape sample area contain hand prints and their distribution is shown in Figure 7. It will be apparent immediately that the great majority of these sites are located in, or close to, areas situated at 300 metres or less above sea level, and principally on the coastal plain and in the major river valley. The few sites in high mountainous areas are all in valleys that were most likely access routes to other regions (personal observation).

Other aspects not evident from the distribution map are:

(1) Sites in the coastal and near-coastal regions contain considerably more hand prints per site than those in the inland areas. Table I shows the number of hand prints compared

REGION	Total number of images	Total number of hand prints	Hand prints as % of total	Number of sites with hand prints
Coastal plain (after Manhire 1981)	6963	2218	31.9	51
Escarpment	1275	165	12.9	9
Olifants River mountains	2601	93	3.6	13
Olifants River valley	9158	252	2.8	48

Table 1. Comparison of numbers of hand prints and other painted images for each region.

to all the paintings in each region.

(2) In the few cases where superimpositioning occurs in these sites, hand prints are always over figures of humans or animals.

(3) Smears and finger dots (finger paintings) are more often associated with hand prints than with other images.

Sematographs

Sematographs are marks, signs or symbols. The term can be used to describe all the nonrealistic images but, for the purposes of this paper, paintings of trance and trance-related scenes are not termed 'sematographs' as these are 'recognisable images' which may be interpreted as being associated with the work of the medicine men. It has not been demonstrated yet that there is any relationship between sematographs and the trance state although hand prints may have had a symbolic meaning to the pastoralist peoples rather than the hunter-gatherers.

Cooke (1957: 65) believes that the circle-and-dot paintings of Zimbabwe were the work of people with a hunting-and-gathering lifestyle rather than of pastoralists, but does not provide any evidence in support of this theory.

There is, in fact, a great paucity of records relating to these sematographs as many researchers have concentrated on the recognisable, often 'artistic' images. As a result many records either omit mention of them or fail to categorise them. Manhire (1981: 46-52) has discussed the occurrence of what he termed 'inanimate objects' and noted that 31.9 percent of the paintings in the coastal region of the southwestern Cape fell into this class. However, his category included images of bows, arrows, bags and other representational items which are not here classed as sematographs. Because of the differences in categorisation in existing records, and the general scarcity of records of nonrealistic paintings, it is difficult to establish the exact percentage of their occurrence in the region.

Manhire (1981: 48) also noted that grids, circles and 'cross-in-a-square' motifs are boldly executed and often found in association with finger dots and/or hand prints.

During the mid-seventeenth century when the Dutch Colony at the Cape of Good Hope was slowly expanding, many travellers ventured into the interior or along the coasts in search of people with whom to barter, or raw materials to exploit. Some came into contact with both hunter-gatherer and pastoralist peoples and a few were sufficiently interested to record their observations of the life and customs of these people.

In 1655, Schouten (Raven-Hart 1971: 84) recorded the use by the pastoralist peoples of caves or similar places for what seems to have been some sort of ceremony, during which with 'a red stone' they made 'stripes and crosses on each other's foreheads'. Rudner (1982: Tables 20, 30 and 45) has given details of the patterns made with cosmetic pigments by the pastoralists and their present-day descendents as well as the hunter-gatherer groups, and the rock paintings themselves also provide evidence of body and facial decoration of the people depicted. It is possible to speculate, however, that at least

Figure 3. A typical example of a positive hand impression attributed to the pastoralist/herder peoples.

Figure 4. A site in which hand prints outnumber and overlay 'realistic' hunter-gatherer art.

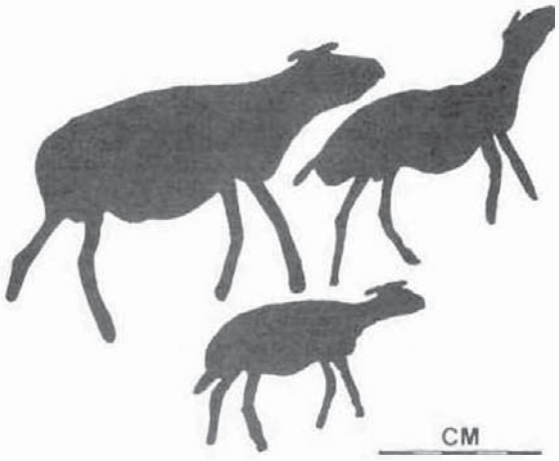


Figure 5. Sheep - painted by the hunter-gatherer artist, but the possessions of the pastoralist/herder people.

some of the sematographs may have been signs of individuals or groups who visited the sites, perhaps as territorial markers or merely to record their visits. However, these signs may also have had a symbolic meaning as well as being related to some form of ceremony.

Manhire (1981: 153-6) has suggested that hand prints, finger dots and 'smears' are to be associated with the Khoi herders, a suggestion received with scepticism by some researchers (Manhire pers. comm. 1983).

Sheep

Rudner and Rudner (1959: 106) suggest that many of the paintings of the southwestern Cape were executed by the pastoral peoples and that certain elements, such as paintings of fat-tail sheep, are evidence of this. Parkington (pers. comm. 1982) also considers that paintings of sheep were the work of their owners. Figure 5 shows part of a group of fat-tail sheep at one of the seven sites in the research area where such paintings are found. These sites are indicated in Figure 8. Only two of these sites also contain sematographs and they are both in areas that are relatively inaccessible and without good grazing and water. It would, moreover, have been impossible to confine many sheep in the shelters in which sheep paintings occur, nor could sheep grazing in the vicinity of these shelters have been efficiently protected by people occupying the shelters. Accounts of the early voyagers and settlers (e.g. Raven-Hart 1967: 23; Thom 1954: 367) show that the pastoralists possessed large flocks of sheep as well as herds of cattle, but nowhere is it indicated that the livestock were pastured or moved in small numbers, except perhaps when animals were being moved to 'the Cape' for barter with the colonists. Indeed, the picture for the western and southwestern Cape, as exemplified by the Cochoqua or Saldanhars (Thom 1952: 125-8) is of movement of large numbers of people and even larger numbers of livestock in an annual round primarily motivated by the need for adequate pasturage. This picture is inconsistent with the localities in which the paintings of the sheep occur; even more so when it is recalled that there are shelters in more suitable areas (Figure 7) that do not contain paintings of domestic stock of any kind.

Discussion

Rudner and Rudner (1959: 108) have stated that 'to any student of the South African rock paintings it has long been evident that there are two main schools of painters, differing from each other not only in style but also in physical type and culture'. Willcox (1960: 23-5), after examining the Rudners' arguments, cites his comparison (Willcox 1959) of hand prints with the lengths of hands of pastoralists and hunter-gatherers as evidence that the paintings were all the work of the same people, i.e. those who made the hand prints. In his later discussion Willcox (1984: 245-7) is still of the opinion that the hand prints are the work of the hunter-gatherers. However, the reasons for making the hand prints do not necessarily help to identify the authors any more positively. If, as Lewis-Williams (1981, 1983: 3-11), Biesele (1983: 54-9) and Huffman (1983: 49-53) argue, there was a 'pan-Bushman' (hunter-gatherer) cognitive system, then it would be reasonable to expect to find hand prints throughout the rock art in southern Africa. Rudner (1982: 255) observes that hand prints are not as common elsewhere in southern Africa as in the southwestern Cape and Mazel (pers. comm. 1983) has found only six hand prints out of close on 19 000 images recorded in the Drakensberg areas of Natal. Other images such as eland, rhebuck, human figures and trance scenes, are found

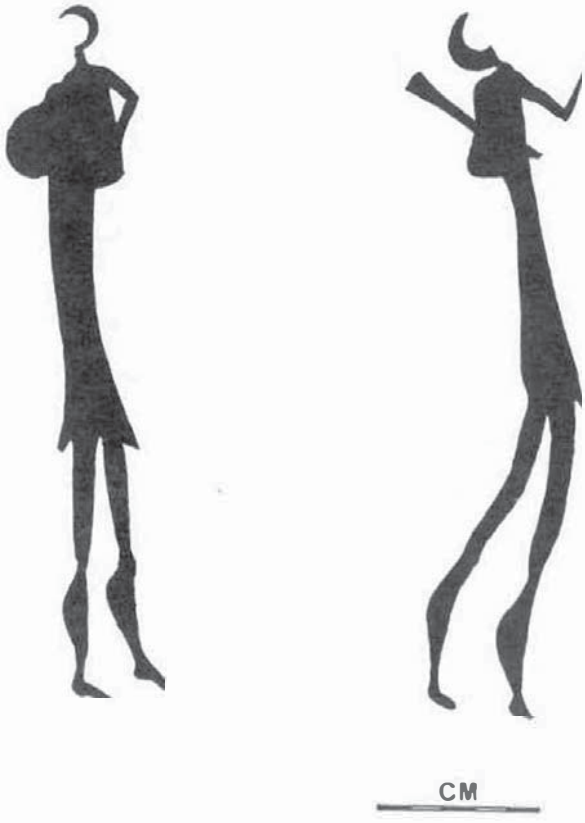


Figure 6. Typical hunter-gatherer art.

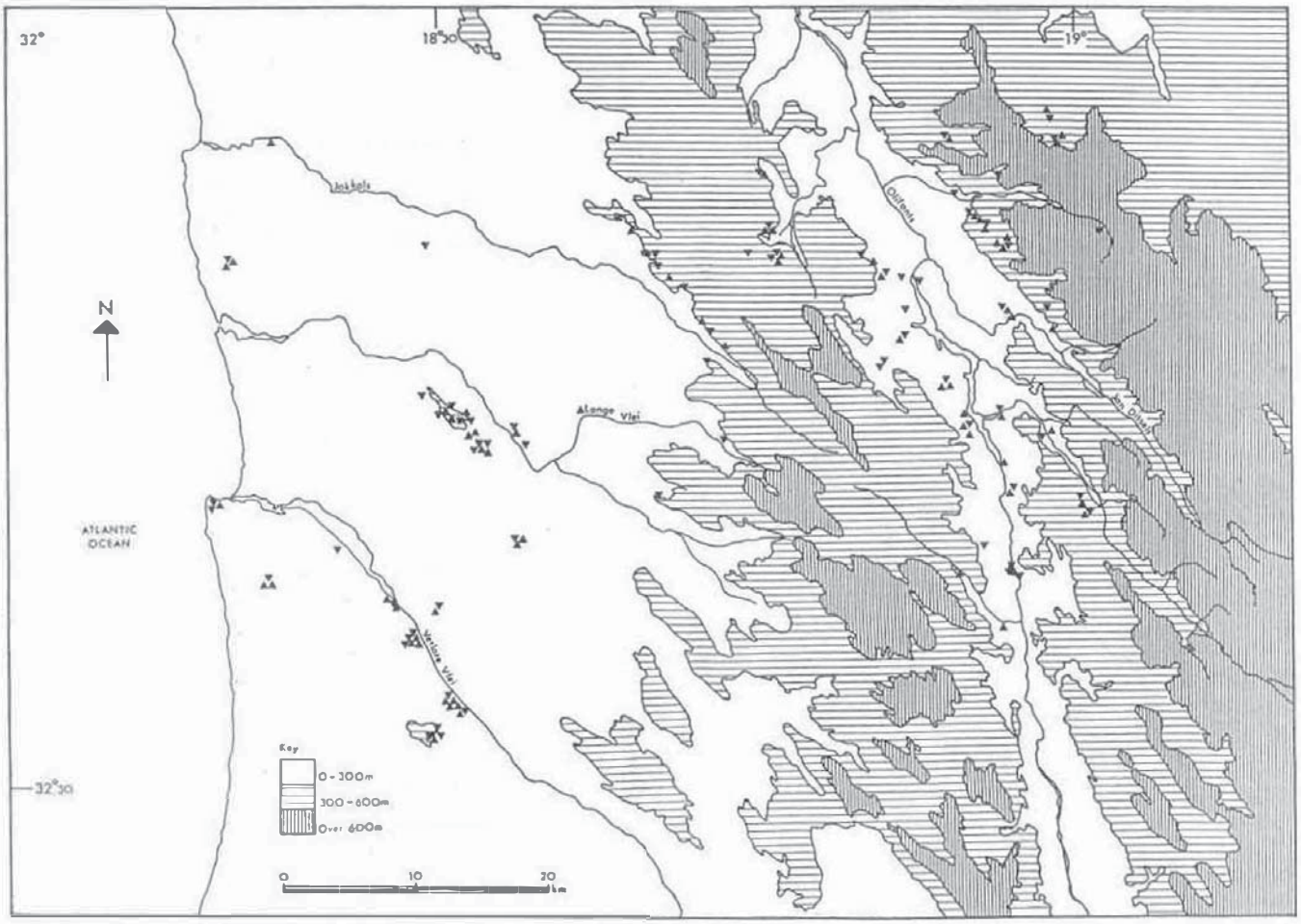


Figure 7. Distribution of hand print sites within the research area.

in all regions, albeit differing in detail and execution, but all clearly recognisable. Hand prints and sematographs are largely restricted to the western and southern margins of the subcontinent, an area historically and archaeologically known to have been occupied by the pastoralist groups.

Manhire *et al.* (1983: 32) have suggested that as the hand prints postdate the local appearance of the herder groups, they possibly represent a local hunter-gatherer response to this incursion. The effect of this incursion by the herders and their livestock on the ecology of the hunter-gatherers of the southwestern Cape can be discerned only dimly from the early records, but it seems that a necessary response of the hunters was not only to avoid the herder encampments but also to view the livestock as justifiably to be preyed upon in recompense for the disruption of the indigenous fauna. If sheep were viewed as desiderata, or it was desired to celebrate a 'victory' over the invading herders by the theft of their stock, it would not have been unnatural for the hunter-gatherers to depict the sheep in the same way as they had depicted other animals and perhaps people as well. It seems unlikely that the making of hand prints would have been a sudden result of the arrival of the herding people unless the herders themselves were the originators of the imprints.

There are patterns emerging in the distribution of paintings, and these reflect a number of superimposed phenomena. A point of particular interest is that the distributions seem to be either coastal lowland or mountainous upland, a dichotomy which reinforces an impression gained during the fieldwork. The distributions in the high-lying areas seem consistent with the archaeologically derived patterns of hunter-gatherer movement and settlement, but these become more complex with overlying and intermingled patterns of movement by other groups on the coastal plains, especially during the last 2000 years.

Conclusion

The historical evidence for the co-occupation of certain parts of the southwestern Cape, albeit probably at different times, by the hunter-gatherers and pastoralist/herder groups is incontrovertible. There seems also to be good evidence for suggesting that certain aspects of the rock art, notably hand prints and sematographs, are not merely indications of the deterioration of a more elaborate early form of painting in which humans and animals were depicted, but these two types (hand prints/sematographs and 'realistic' paintings) represent the work of different groups of painters. The distribution of the nonrealistic images is largely restricted to areas that would, seasonally, have been attractive to the herders who needed adequate pasturage and water for their livestock. Since the representational paintings, however they are interpreted, are more widespread throughout southern Africa, most can be attributed with confidence to the widely distributed hunter-

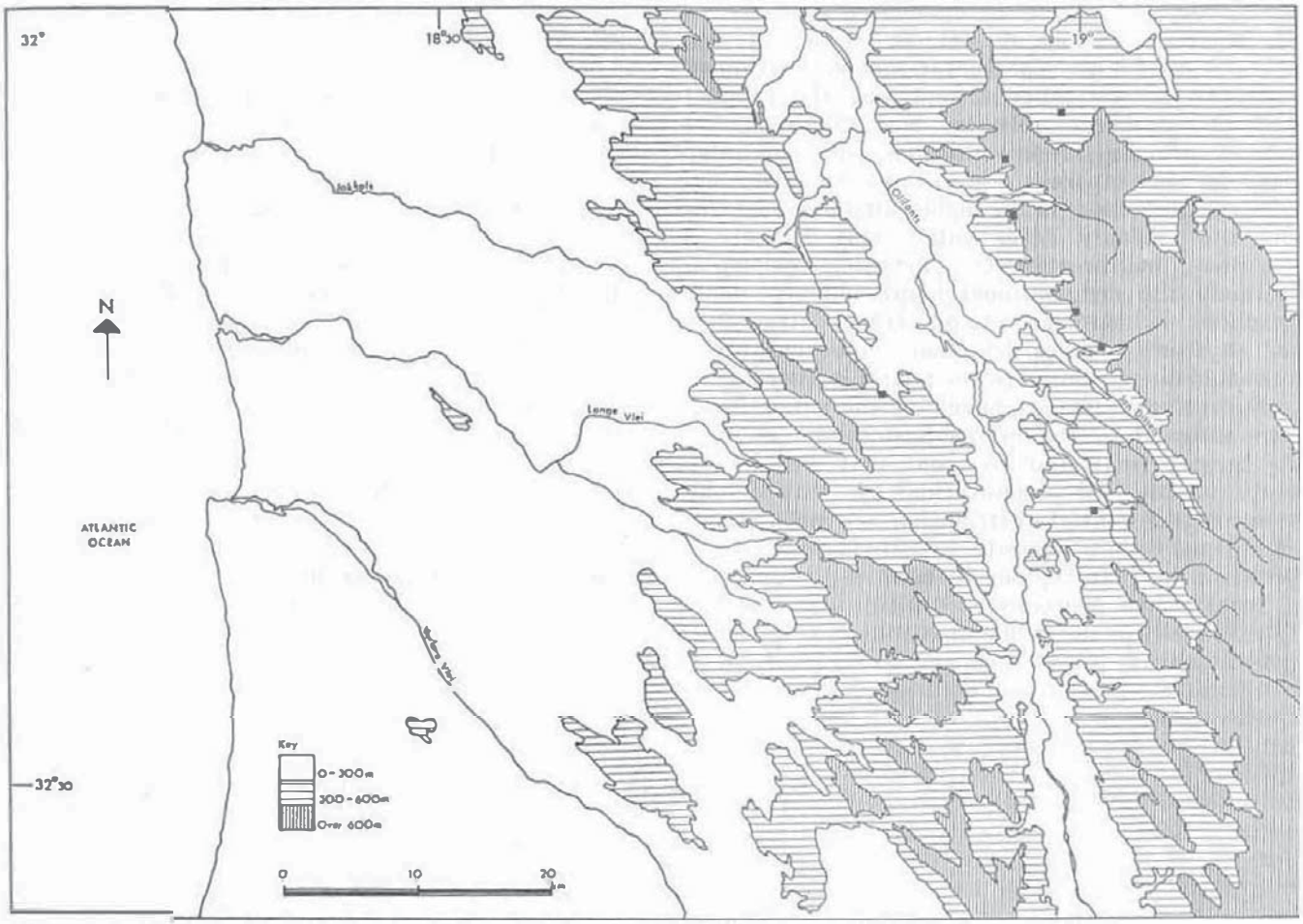


Figure 8. *Distribution of sites in the research area in which images of fat-tail sheep occur.*

gatherers. This leads to the conclusion that sematographs and hand prints must be the work of the herder/pastoralists. On the other hand, the location of paintings of fat-tailed sheep in areas not suitable for access by large groups of people with even larger flocks and herds, together with the fact that these paintings are representational, suggests that they are the work of the hunter-gatherers and not the herders (van Rijssen 1984: 128).

W. J. J. van Ryssen
Archaeological Data Recording Centre
South African Museum
P.O. Box 61
Cape Town 8000
South Africa

Comments

By B. WRIGHT

With an increasing number of researchers turning their attention to the analysis and interpretation of rock art, Willcox (1983: 27) suggested that the study of art should be a separate discipline. In contrast, Jochim (1983: 212) highlighted the advantages that may accrue when art and archaeological research is integrated. Rock art may be a partial record of social responses to biotic and climatic modifications, as well as reflect population movements. In the western Cape region of the southern African subcontinent, Manhire *et al.* (1983) have maintained a continuing program of locating and examining art sites in conjunction with archaeological reconnaissance. Despite some success in integrating the two disciplines, one problem has remained. To what extent were separate hunter-gatherer and herder-pastoralist groups involved in the production of the art? Van Ryssen has now addressed that problem.

By plotting the spatial distribution of each motif type and considering associated environmental and archaeological evidence, van Ryssen has concluded that representational art, including portrayals of fat-tailed sheep, was the product of hunter-gatherer activity. Not only are the sites containing representations of fat-tailed sheep located in areas not suitable for pasturing, but their placement in the higher altitudes surrounding the Olifants River valley may indicate a localised hunter-gatherer artistic emphasis. Certainly the distributional maps and arguments presented in Manhire *et al.* (1983) strengthen van Ryssen's suggestion that representational art should be attributed to the hunter-gatherers.

Nonrealistic images have, on the other hand, been assigned to the herder-pastoralists as they are 'largely restricted' to areas that would have been suitable for exploitation by that group. While a differential distribution of motif types might imply that separate artistic systems were operative in that region, it must be noted that at least *some* nonrealistic images are reported to be located in the same sites that display representational art. Those sites have also been reported to be situated in areas that were not suitable for the pasturing and watering of herds. Consequently the nonrealistic images may have been produced by hunter-gatherers rather than herder-pastoralists. Despite the complexity of the archaeological record, could van Ryssen advise whether there is any indication that the sites containing both motif types may have been aggregation centres? Conversely, could the distribution of sites containing only nonrealistic images represent the particular artistic emphasis of a hunter-gatherer group during the seasonal dispersion?

Van Ryssen also exonerates the hunter-gatherers from any involvement in the portrayal of hand prints. Van Ryssen's case for accrediting the production of hand prints to the herder-pastoralists involves several steps. As a first step, he questions the validity of the analysis previously conducted by Willcox (1959). Van Ryssen is correct. My own experiments have shown that, through varying the degree of palm pressure, the length of successive prints of the same hand may differ by up to ten millimetres and still not accurately reflect the actual hand length. It is therefore not unreasonable to suggest that the comparison of actual hand sizes with hand print measurements is an inefficient method for assigning authorship for those motifs. With Willcox's analysis disposed of, van Ryssen turns his attention to the distributional frequency of hand prints to other motifs.

Hand prints, prolific on the coastal plains, were found to decrease markedly along the escarpment before reducing to minimal proportions in the Montane and Olifants River valleys. As the high montane valleys could have served as access routes to alternate pastoral regions, van Ryssen's conclusion that the hand prints were made by herder-pastoralists gains support. However, all these areas were accessible to the hunter-gatherers and, as hand prints have been reported to be superimposed on representational art at some sites, a possible intentional compositional association by hunter-gatherers cannot be ruled out. Could those sites in which only hand motifs appear (Maggs 1967: 103) represent the artistic emphasis of a dispersed hunter-gatherer group or, alternatively, indicate that some specific meaning was associated with that motif? Again it is imperative that the context of site use (see Wright 1985) be considered before production of that motif group is assigned to either the hunter-gatherers or the herder-pastoralists. Nevertheless, as further support for his case, van Ryssen suggests that the proliferation of hand prints in coastal regions where they are often found in association with shell middens and potsherds implies that those motifs were part of an intrusive artistic system which accompanied the movement of herder-pastoralists into the region. Van Ryssen's case would be enhanced if archaeological reconnaissance could demonstrate that no hand print site, coastal or montane, contained an archaeological sequence which extended to an earlier phase or was restricted to hunter-gatherer activities.

In summary, van Ryssen has conducted a thoughtful and comprehensive analysis of the spatial distribution of motif categories in the western Cape region of the southern African subcontinent. If the points raised in this review could be suitably addressed, then the findings presented by van Ryssen would gain considerable strength.

Bruce Wright
81 Cowper Street
Glebe, N.S.W. 2037
Australia

By L. G. A. SMITS

Van Ryssen clearly equates the origin of certain images in the rock art of southern Africa with the question of authorship. He has dealt with this problem before (van Rijssen 1984). In fact, the present article is a verbatim repeat of the 1984 version. Only the more elaborate introduction, the section archaeology, Figures 1 to 6, and a few other minor changes make it possible to distinguish between both articles.

His 1984 conclusions, that in the southwestern Cape the hand prints and 'sematographs' are the work of (Khoi/Hottentot) herder-pastoralists and that the paintings of fat-tailed sheep have been produced by (San/Bushmen) hunter-gatherers, are not extended to the whole of southern Africa, nor have any arguments that could warrant such an extension been submitted.

The term sematograph, introduced by van Ryssen for an abstract or nonrealistic painting, is an unworkable concept if trance and trance-related scenes are to be excluded. By definition we do not know what abstract and nonrealistic paintings refer to and thus we do not know whether they refer to trance or are trance-related. It is actually impossible to demonstrate that a

rock painting is not trance-related. Apart from the trance hypothesis, no verifiable explanation is at present available to account for the wealth of rock art in southern Africa, and thus no criterion exists as yet that enables us to identify a rock painting in southern Africa as being 'not trance-related'. Van Ryssen actually comes close to a similar conclusion in his brief speculation on the function and meaning of the sematographs, while excluding the paintings of trance and trance-related scenes, when he suggests that these signs may well be related to some form of ceremony. There is no reason to assume that such a ceremony could not be trance-related. We can thus never be certain that all trance-related paintings have been excluded. Unless of course we know that they have been painted by members of a culture in which the trance dance, with its associated beliefs and concepts, is not known or occupies no place of great importance. In that case the argument would, however, become a circular one: a discussion of the authorship of such sematographs would require prior information on the culture that produced them.

Van Ryssen's discussion of the authorship of 'previously unexplained' rock paintings still leaves much unexplained. So far, we have, at the most, an explanation of their spatial distribution within the southwestern Cape region of the Republic of South Africa. And, while a map of the distribution of the 'sematographs' might have been an interesting addition to the article, a comparison of the distribution of the nearly 680 rock painting sites that do not contain hand prints with that of the more than 120 sites that do, is certainly required in view of van Ryssen's conclusion concerning their authorship. The number of sites with hand prints in the southwestern Cape is indeed very striking, for hand prints are clearly not part of the 'conventional' subject matter of rock art everywhere in southern Africa: e.g. in the more than 15 000 rock paintings recorded by the ARAL project in some 650 sites in Lesotho, the first indisputable hand print has yet to be identified. Some rock paintings of hand prints do, however, occur elsewhere, e.g. in the eastern Cape, the Transvaal Province, in Namibia, Botswana and Zimbabwe. But van Ryssen's identification of the Khoi as the authors of hand prints in the southwestern Cape cannot be extended to other regions in southern Africa until the historical distribution of the Khoi has been compared to the occurrence of hand prints in the rock art, and unless an acceptable hypothesis has been proposed to explain the presence of hand prints in areas where those distributions do not coincide, trusting that this will not undermine van Ryssen's conclusion concerning the authorship of the southwestern Cape hand prints. His statement, that 'the reasons for making the hand prints do not necessarily help to identify the authors any more positively', I find rather puzzling, as the authorship has to be known before the reasons for making the hand prints can be investigated. However, it does not seem to matter much for those reasons are not really known anyway.

As van Ryssen's arguments concerning the authorship of the rock paintings of sheep are based on the location of the sites in which they occur, his conclusion cannot be regarded as definite, in the light of the fact that the total number of such sites within the southwestern Cape is rather limited.

Drs L. G. A. Smits, Assoc. Prof.
Rock Art Research Project ARAL
National University of Lesotho
Roma 180
Lesotho

By OSAGA ODAK

I have read with great interest W. J. J. van Ryssen's paper and agree with him in some of his conclusions. I am particularly impressed by his subjection to rigorous criticism of the conclusions based on Willcox's comparative and statistical study of hand prints. I also support his conclusion that realistic paintings might be the work of hunter-gatherers while hand prints and 'nonrealistic' art would refer to herders-pastoralists. Based on the historical process of settlements and migrations in certain regions of Africa, it would be concluded that the realistic paintings are older than hand prints and nonrealistic art. This might be so, but is not necessarily universal.

Van Ryssen's paper discusses three themes, namely hand prints, depictions of sheep, and what he calls *sematographs*. According to him 'Sematographs are marks, signs or symbols'. This term (i.e. sematograph), he continues, can be used to describe all nonrealistic images. It appears to me that rock art specialists need to agree upon terminologies. This is because proliferation of many terms which mean more or less the same thing is likely to lead to confusion, generally to the detriment of rock art studies. From the definition I understand sematograph to imply 'abstract', 'schematic' and 'nonrepresentational' art. Anati would regard sematographs as 'ideograms' or 'psychograms'. According to Professor Anati, ideograms are 'repetitive and synthetic signs that are sometimes interpreted as arrows, sticks, tree shapes, phallic or vulva signs, discs etc.' (Anati 1981: 206). Van Ryssen clarifies the definition of sematographs as not including 'recognisable images' which would exclude ideograms, because they include signs likely to be interpreted as sticks, arrows etc. But interpretation is not synonymous with recognition and what Anati includes under ideograms are definitely all the nonrepresentational, 'abstract' signs such as meanders etc. which cannot be recognised as representing particular known objects. Sematographs apparently also encompass Anati's 'psychograms' which, according to his definition, are 'signs which are not recognisable as, and do not seem to represent either objects or symbols. They are strokes, violent outpourings of energy, that may perhaps express sensations such as heat or cold, life or death, love or hate or even more subtle perceptions'. In other words, psycho-

grams would be much closer to sematographs but, viewed as a whole both psychograms and ideograms together would imply what van Ryssen sees as sematographs.

Van Ryssen writes 'In most instances the question who the artists were is easily answered—the *Bushman* (San) produced by far the majority of the paintings' (my italics). Here the accent is on Bushman, shown in bracket also to mean 'San', another name for the Bushman. Towards the end of the paper he writes that 'If . . . there was a *pan-Bushman* (hunter-gatherer) cognitive system, then it would be reasonable to expect to find hand prints throughout the rock art of southern Africa' (again my italics). In both the quoted passages the author confidently labels the San people 'Bushmen'. Yet it is now obvious that the term is offensive as the San themselves have their own ethnonym to which they would expect others to refer to. I think it is high time scholars learn to respect the people they study!

Turning to the question of the distribution of hand prints, these images are not very common in the rock art of east Africa. The one site in Kenya where there are indisputable hand prints is Kavea (Odak 1973). Here, besides the prints, there are pictures relating to other parts of the human body, including footprints, human faces, male and female genital organs and others.

This site is unique in that it is a shrine, intimately associated with traditional religion, and where several ceremonies used to be held by the contemporary Akamba people. The sacredness of the site could account for the existence of pictures of human body parts separately depicted. This would imply that the painting of each such part, including hand prints, was associated with some type of religious or other rite. The study of oral traditions of the local people in relation to the site would open up new dimensions to the interpretation of hand prints within particular contexts—a subject which Kenya Archaeological and Ethnographic Research Agency is bent on pursuing.

Dr Osaga Odak
Associate Director
Kenya Archaeological and Ethnographic Research Agency
P. O. Box 10614
Nairobi
Kenya

By DAVID R. MOORE

In this interesting paper, van Ryssen has plunged us right into the middle of what is obviously a hot controversy in current South African prehistoric research. The situation presented is one that is outside the range of our experience in Australia, for we can be reasonably confident that all our rock paintings were done by hunter-gatherers (except for European defacements and graffiti, of course). New Guinea might have presented a parallel, since in many areas there hunter-gatherers were obviously invaded or supplanted by horticulturalists and pig keepers, but unfortunately the few examples of rock paintings that have been reported are so scanty and widely scattered that no conclusions can be drawn from them.

In Australia, the tribal territories as at first contact are well established, but it is a mistake to assume, as has sometimes been done in the past, that these territorial boundaries were necessarily ancient and enduring. There were obviously major population movements here during the late Pleistocene rise in sea level and such movements may well have continued well into the Holocene, as climatic change made areas in the interior habitable for the first time during the long human occupation of the continent. In the future it may become possible to chart these early tribal movements from changes in rock art styles throughout the continent.

Great migrations due to climatic changes also took place in southwestern Africa, as van Ryssen makes clear in his paper. Although the situation here is very different, some factors in the Australian experience may be relevant. Firstly there are many paintings (and also a few engravings) of European animals—cows, sheep, and horses—as well as of European ships, riders, guns and so on. Some of these have been interpreted as magical attempts to overthrow the invaders (see Trezise 1985). Also there are well-attested cases where Aboriginal tribes assumed their right to hunt the stock of the white settlers on their lands, which had supplanted the natural game that traditionally provided their sustenance. It is much more logical to assume that hunter-gatherers painted the strange new creatures invading their traditional territories than to suppose that pastoralists would depict their own animals on cave walls.

There is a European parallel for a deterioration in the quality of rock art on the advent of pastoralists and agriculturalists. After the wonderful efflorescence of Magdalenian art, there is a rapid decline into sketchy symbols and simplified figures that are assumed to have been executed by the herders and croppers.

The matter of hand stencils and hand prints is by no means as simple in Australia as it appears to be in South Africa. Some of our earliest art consists of finger markings in soft limestone and hand stencils and prints appear in most periods of Aboriginal art. Van Ryssen mentions only hand prints. Do hand stencils not occur in the area he has studied? In Australia and many other parts of the world the stencil is much more common than the print. As articles in the last few issues of *Rock Art Research* have shown, hand stencils and prints have had a far wider application and rationale than that provided by the simplistic 'signature' explanation, which seems to have been accepted without question in South Africa. However, none of this necessarily invalidates the author's theory that the southwest African hand prints and symbols represent the art of the herding tribesmen who invaded the territories of the hunter-gatherers.

To summarise, van Ryssen's hypothesis on the rock paintings of the western Cape area seems logical and convincing to this reviewer, and evidence from both Australia and Europe would seem to support it.

David R. Moore
(Australian Museum)
13 Chester Street
Woollahra, N.S.W. 2025
Australia

[Mr van Ryssen's response to these comments has not been received in time to be included in this issue.]

Résumé. *Le crédit de l'art rupestre en Afrique du sud a été longtemps attribué à un groupe particulier d'habitants indigènes. Les Bushmen (San) ont été cités comme étant les auteurs de cette collection incroyable d'art préhistorique qui a degenerée en barbouillages, empreintes de mains et d'autres figures d'art abstraits après l'arrivée en masse des Africains noirs et des colons blancs. Une nouvelle analyse des images et une détermination attentive de leurs occurrences montre qu'il est très possible que deux groupes de peuples aient produits ces images—les chasseurs en groupe San étant responsables pour les figures 'reconnaissables', toutes deux humaines et animales, et les autres groupes vivant en commun, pour les images abstraites et les empreintes de mains.*

Zusammenfassung. *Die Felskunst im südlichen Afrika wurde schon seit langem einer bestimmten Gruppe indigener Bewohner zugeschrieben. Das Volk der San wurde als die Urheber dieser unglaublichen Ansammlung urgeschichtlicher Kunst anerkannt, die nach Ankunft der afrikanischen und europäischen Viehzüchter zu Schmierereien, Handpositiven und nichtfigurativer Kunst überging. Eine neue Analyse der Felsbilder und ihrer räumlichen Verbreitung zeigt, dasz wahrscheinlich zwei verschiedene Gruppen die Kunst hervorbrachten - die San, die Jäger und Sammler, und für die figurativen Bilder verantwortlich sind; und die Viehzüchter, die Urheber der nichtfigurativen Zeichen und Handpositive.*

REFERENCES

ANATI, E. 1981. The origins of art. *Museum* 33: 200-10.

BIESELE, M. 1983. Interpretation in rock art and folklore: communications systems in evolutionary perspective. *South African Archaeological Society Goodwin Series* 4: 54-9.

COOKE, C. K. 1957. The occurrence of circle and dot in southern Rhodesian art. *South African Archaeological Bulletin* 15: 23-5.

COOKE, C. K. 1964. Animals in southern Rhodesian rock art. *Arnoldia* (Rhod.) 1: 1-22.

DEACON, H. J. 1969. Melkhoutboom Cave, Alexandria District, Cape Province: a report on the 1967 investigation. *Annales of the Cape Province Museum* 6: 141-69.

DEACON, H. J. and J. DEACON 1963. Scott's Cave: a late Stone Age site in the Gamtoos Valley. *Annales of the Cape Province Museum* 3: 96-121.

HUFFMANN, T. N. 1983. The trance hypothesis and the rock art of Zimbabwe. *South African Archaeological Society Goodwin Series* 4: 49-53.

JOCHIM, M. A. 1983. Palaeolithic cave art in ecological perspective. In G. Bailey (ed.), *Hunter-Gatherer Economy in Prehistory: a European Perspective*, pp. 212-9. Cambridge University Press, Cambridge.

LEWIS-WILLIAMS, J. D. 1981. *Believing and Seeing: Symbolic Meanings in Southern San Rock Paintings*. Academic Press, London.

LEWIS-WILLIAMS, J. D. 1983. Introductory essay. *South African Archaeological Society Goodwin Series* 4: 3-13.

MAGGS, T. M. O'C. 1967a. A quantitative analysis of the rock art from a sample area in the western Cape. *South African Journal of Science* 63: 100-6.

MAGGS, T. M. O'C. 1967b. Microdistribution of typologically linked rock paintings from the western Cape. In J. J. Hugot (ed.), *Proc. Sixieme Congrés Panafricain de Préhistoire*, pp. 218-20. Dakar.

MAGGS, T. M. O'C. 1971. Some observations on the size of human groups during the late Stone Age. *South African Journal of Science Special Publication* 2: 49-53.

MANHIRE, A. H. 1981. Rock Art of the Sandveld. Unpubl. BSc(Hons) thesis. University of Cape Town.

MANHIRE, A. H., J. E. PARKINGTON and W. J. J. VAN RIJSSEN 1983. A distributional approach to the interpretation of rock art in the southwestern Cape. *South African Archaeological Society Goodwin Series* 4: 29-33.

ODAK, O. 1973. A Trip to some Archaeological Sites in Kitui District, Kenya. Unpublished field reports, Institute of African Studies, University of Nairobi.

PARKINGTON, J. E. 1972. Seasonal mobility in the Late Stone Age. *African Studies* 31: 223-43.

PARKINGTON, J. E. 1976. Coastal settlement between the mouths of the Bog and Olifants Rivers, Cape Province. *South African Archaeological Bulletin* 31: 127-40.

PARKINGTON, J. E. 1977. Soaqua: hunter-fisher-gatherers of the Olifants River, Western Cape. *South African Archaeological Bulletin* 32: 150-7.

PARKINGTON, J. E. 1980. Time and place: some observations on spatial and temporal patterning in the later Stone Age sequence in southern Africa. *South African Archaeological Bulletin* 35: 75-83.

RAVEN-HART, R. 1967. *Before Van Riebeeck.* Struik, Cape Town.

RAVEN-HART, R. 1971. *Cape of Good Hope 1652-1703: the first fifty Years of Dutch Colonisation as seen by Callers.* Balkema, Cape Town.

RUDNER, I. 1982. Khoisan pigments and paints and their relationship to rock paintings. *Annales of the South African Museum* 87: 1-281.

RUDNER, I. and J. RUDNER 1959. Who were the artists? *South African Archaeological Bulletin* 14: 106-8.

SCHWEITZER, F. R. 1974. Archaeological evidence for sheep at the Cape. *South African Archaeological Bulletin* 29: 75-82.

THOM, H. B. (ed.) 1952. *Journal of Jan van Riebeeck*, Vol. 1. Balkema for the van Riebeeck Society, Cape Town.

THOM, H. B. (ed.) 1954. *Journal of Jan van Riebeeck*, Vol. 2. Balkema for the van Riebeeck Society, Cape Town.

TREZISE, P. J. 1985. Crocodile I Gallery, Laura. *Rock Art Research* 2: 74-7.

VAN RIJSSEN, W. J. J. 1980. Ways of Seeing. Unpublished BSc(Hons) thesis. University of Cape Town.

VAN RIJSSEN, W. J. J. 1984. Southwestern Cape rock art - who painted what? *South African Archaeological Bulletin* 39: 125-9.

WILLCOX, A. R. 1959. Hand imprints in rock paintings. *South African Journal of Science* 55: 292-8.

WILLCOX, A. R. 1960. Who were the artists?: another opinion. *South African Archaeological Bulletin* 15: 23-5.

WILLCOX, A. R. 1983. Rock art studies: towards more rigour in hypothesis and description. *South African Archaeological Society Goodwin Series* 4: 27-8.

WILLCOX, A. R. 1984. *The Rock Art of Africa.* MacMillan, Johannesburg.

WRIGHT, B. 1985. The significance of hand motif variations in the stencilled art of the Australian Aborigines. *Rock Art Research* 2: 3-19.

BRIEF REPORTS

Sydney Basin Aboriginal Heritage Study, Stage 1: Rock Engraving, Painting and Drawing Sites

JOSEPHINE MCDONALD

The Sydney Basin Aboriginal Heritage Study is a National Parks and Wildlife Service project, funded by a National Estate grant.

The overall aim of this project is to define the nature and distribution of rock engraving sites and shelter art sites in the Sydney Basin. The development of a framework for site assessment and management is the main purpose of this.

Developments in the aims and methods of archaeologically investigating Aboriginal art assemblages have made such a project viable. Over the last twenty years, mainly in the form of BA Honours theses (McMah 1965; Konecny 1981; McDonald 1982; Smith 1983; Franklin 1984), research projects have investigated both the art in the Sydney region and methods of investigating art bodies as purely archaeological assemblages.

Lesley Maynard (then McMah) paved the way in both respects. Her work in 1965 indicated that one could not only make use of art for which there was no specific meaning, but by using statistical techniques, large amounts of data could be sorted into a form that was readily interpretable.

Maynard identified a certain amount of heterogeneity in the Sydney area. There were trends observable both north to south and east to west, within and across her typology. The presence and style of anthropomorphs, and the increase in the proportion of fish towards the coast were two such trends.

Stage 1 of the project is intended to provide a detailed assessment of the existing data base.

The formulation of appropriate site variables or characteristics, for integration onto the recently computerised N.P.W.S. Site Register, and application of computer analyses to this existing data base are two aspects of this assessment. It is proposed also to develop a revised recording format so that future work on art sites will provide information commensurate with the 'ideal' level proposed for computerisation.

While the main aims of the project are management-oriented, the research potential for this data base is high, and the project is being approached in such a fashion to accommodate this potential.

The boundaries of the study area have been arbitrarily decided, and are the extremities of the Sydney and Wollongong 1:250 000 map sheets and the extent of Hawkesbury sandstone on these. There are a total of 1450 engraving sites on these two map sheets and 1370 shelters with art.

The sum art body in the Sydney area accounts for over fifty-two percent of the archaeological data base. Individually, each component has a higher frequency than any other site type in this area. These percentages indicate that art sites in the Sydney area are an important archaeological resource. It is considered that they also indicate a recorder bias for these types of sites - the more spectacular and readily visible - by interested and energetic enthusiasts, who have been recording the presence of Aboriginal art in this region since the late 1800s.

For the purpose of any analyses in this assessment stage of the project, a preliminary assessment of what proportion of the existing data base contained information which was usable was necessary. In other words how many site records, without further field work, contained the sort of information which could immediately be put to use.

It was decided that the cut off point would be illustrations - that is scale drawings, or detailed sketches.

In this initial inspection of the site register, then, sites were classified as 'usable' or 'unusable' on the presence or absence of a pictorial record of their respective assemblages. This cut off point was decided on the basis that every recorder or analyst interprets art differently. The definitions to be used for motif categories in this study are to be based on observable characteristics.

It is acknowledged that every recorder makes interpretive judgment in the recording process as well, and that drawings are often as much subject to this interpretation. At this stage of the project, this problem is unavoidable.

The Engraving Sites

An initial inspection of the site register indicated that 61.9 percent of the recordings of engraving sites in the Sydney area have been made by four men - Campbell, McCarthy, Sim and Lough. Not all of these recordings have been scale-drawn and/or published, and at the time of the original inspection of the register, thirty-nine percent of these usable recordings were not with the site cards.

The location of these recordings, and their addition to the site files is one task already completed in this first stage of the project. This has increased the proportion of 'usable' engraving sites in the site register by the four abovementioned sources to 77.1 percent (693 sites) while of the entire data base, 58.4 percent is usable

- some 847 sites.

At this stage it has not been decided whether the usable data base in its entirety should be utilised, or whether analysis should be restricted in some way. It is considered that the areal distribution of sites should be investigated next, since a representative sample of as wide an area as possible is required.

Shelters with Art - Paintings, Drawings and Stencils

The initial inspection of the data base with this art component also involved the assessment of which sites had 'usable' or 'unusable' data. Again the criteria for 'usable' sites was the presence of scale drawings or detailed sketches. A further aspect of this component involved discovering the proportions of different *techniques* used in the shelter art, that is drawings, paintings and stencils, the combinations of these, and their associations with other site types.

The recording pattern for shelter sites with art varies considerably from the engraving assemblage. The majority of the usable sites with *this* component have been recorded in conjunction with systematic surveys undertaken over the last ten years, most of these related to research and environmental impact work. The Illawarra and Sydney Prehistory Groups have systematically recorded in detail the largest number of shelter art sites in the Sydney Basin, around Minto/Campbelltown and Woronora.

The percentage of usable sites on the Sydney and Wollongong map sheets varies, largely due to the activities of the two prehistory groups in the southern areas of Sydney. On the Sydney map sheet there are 696 shelters with art. Only 19.5 percent of these, or 136, have drawings. On the Wollongong map sheet, however, there are 630 shelters with art, and 32.7 percent of these (or 206 sites) can be used.

Limitations on the Project Induced by the State of the Data Base

It is clear that the feasibility of a balanced analysis of the engraving sites in the Sydney Basin is much greater than it is for the shelter art sites. While the number of sites in each component is roughly equal, the initial examination of the site register has indicated that over half the known engraving sites can be used in analysis, while only twenty-seven percent of the shelter art sites are usable.

If an overall analysis of the usable sites from the whole Sydney Basin is undertaken, an assessment of the geographic distribution of the usable sites will also need to be made. A likely strategy for the shelter art component is the *specific* comparison of a selection of sites from designated areas around Sydney - Mangrove Creek, Canoelands, Minto/Campbelltown, and Woronora being four such likely areas.

Different research questions and answers would result from such an analysis and it is considered that this approach would probably be more useful considering the present state of the data base.

The Analysis - Stage 1

In this preliminary stage of the project, limited quantitative analysis will be undertaken. The purpose of this analysis will be to achieve the aims of data base assessment, and to fulfil several research-directed requirements.

Principal Components Analysis and Correspondence Analysis are two S.P.S.S. (Statistical Programs for the Social Sciences) tools which are being considered in this preliminary stage. Both tools are techniques of multivariate analysis, which involve the comparison of variables and/or objects in a data matrix. Both are descriptive techniques which summarise or reduce data into a more manageable form, with no explicit assumptions being made about the underlying structure of the data.

The major difference between the two is that PCA can deal only with measurements and ordinal numbers, while CA deals with counts and/or presence and absence variables. Another difference is that PCA works first on the variables and the objects separately, while CA calculates distance on the objects and variables simultaneously.

It is considered that Correspondence Analysis will be the most appropriate tool for this initial and overall stage of analysis, as it is intended to compare the data base for the Sydney Basin, on the basis of the presence and frequency of particular motif types at sites across the area.

PCA may be used also in investigating intrasite variability, either in resulting groups of sites from the CA, or based on arbitrary site groupings - based for instance on Aboriginal Land Council boundaries or N.P.W.S. Metropolitan boundaries. This analysis, however, will be undertaken in a later stage of the project.

Engraving Sites

In the overall analysis, the objects in the data set will be the usable sites located in the site register. A set of twenty-five variables have been decided upon for counting in this initial stage. It is also intended to include in this analysis topographic and possibly site association information, though it may be necessary to complete a second analysis to cover this aspect.

The main aims of statistically describing and comparing sites in the area are to:

1) formulate a statement of what is the 'average' engraving site in the area, and conversely, which sites are unusual;
2) investigate whether sites across the entire area are similar, or whether, as Lesley Maynard found, there are stylistic trends observable in the region; and
3) if there *are* distinct areas of particular site types or stylistic areas, to formulate average site descriptions for each of those types or areas.

There are several differences between the methods, if not the aims, of this project and the work carried out by Lesley McMah (1965). The aims of McMah's project were 'to produce, first a typology of the engravings, and second

a spatial distribution of traits, based on the typology ...' (*op. cit:* 7). The aims of this project are similar with the additional, specific management requirement for present and future individual site assessment.

In terms of sheer numbers, this analysis will be a lot more comprehensive than the analysis undertaken in 1965. Lesley Maynard analysed 285 engraving sites, while this project could expect to look at almost 850 sites. In this stage of the project however, the analysis will not be as detailed as McMah's. There will be no analysis of motif variation: only overall site variation across the study area.

It is considered that the analytical power of the quantitative techniques being employed will allow for the investigation of areas beyond the patterns observed and conclusions reached in 1965. Two such areas are the amalgamation of the two mediums on a large scale, and interactive site associations across the area.

Shelter Art Sites

While the aims and methods for this art component will be similar, the analysis of the shelters with art will be more complex, and will break new ground. There have been previous analyses which have variation in the presence and distribution of parietal art - for instance Konecny (1981) and Smith (1983). Neither of these analyses was solely concerned with shelter art sites and in both cases this component was fairly restricted in size.

This component of the art body will involve an analysis not only of motif types and counts, but also of technique, colour and composition.

The motifs counted for the shelter site should be comparable with the engraving assemblage, so that a comparison of the two can be made. For this overall comparison it may be necessary to modify slightly the full motif (or variable) lists for the two mediums after their individual analyses.

Results

This stage of the project is not intended to produce conclusive results, either for research or management. Its purpose is to assess whether the data base is in a form which can, in the following stages, come up with the goods.

The preliminary assessment of the site register has indicated that a usable data base does exist. Progress made in the last twenty years in the methods and aims of rock art research would suggest that this data base can provide not only results that can be interpreted for management purposes, but that can also be directed towards numerous research questions.

The proposed brief for Stage 2 of the project deals with issues of style boundaries, site distribution in the landscape, and spatial and functional relationships between different site types.

It is considered that the methodology being employed in this first stage will provide the necessary data matrices, and preliminary statistical descriptions of the engraving and shelter art components to allow the proposed theoretical areas to be investigated in the later stages.

Josephine McDonald
40 Railway Avenue
Stanmore, N.S.W. 2048
Australia

REFERENCES

FRANKLIN, N. R. 1984. Of !Macropods and !Men: an Analysis of the Simple Figurative Style. Unpubl. BA(Hons) thesis. University of Sydney.

KONECNY, T. A. 1981. What could it all mean: Conclusions on an Enigmatic Subject. Unpubl. BA(Hons) thesis. University of Sydney.

McDONALD, J. J. 1982. On the Write Track. Unpubl. BA(Hons) thesis. University of Sydney.

McMAH, L. 1965. A Quantitative Analysis of the Aboriginal Rock Carvings in the District of Sydney and the Hawkesbury River. Unpubl. BA(Hons) thesis. University of Sydney.

SMITH, L. 1983. What's in the Size of a Macropod? A Study of Variance in Prehistoric Pictures from the Mangrove Creek Area. Unpubl. BA(Hons) thesis. University of Sydney.

Mooraa Cave – a preliminary Report

G. D. ASLIN AND R. G. BEDNARIK

The Parietal Markings Project has in recent years resulted in the discovery of the largest regional corpus of cave art in the world. At the time of writing, prehistoric markings have been found in twenty-two caves within a radius of forty kilometres of Mt Gambier, in southeastern South Australia.

The region's natural environment has been briefly considered by us (Aslin and Bednarik 1984a) and is more comprehensively described in Luebbers (1978) and Bednarik (in press a). Many of the several hundred caves in the Mt Gambier Tertiary limestone karst are large systems, and many connect to the district's huge phreatic reservoir. Animal markings occur in practically all of the more than 140 caves we have examined so far in this region, but prehistoric human markings are very rare by comparison. Yet parietal petroglyphs are still less common elsewhere in Australia. There are only four confirmed sites of cave art in Australia besides those at Mt Gambier: Orchestra Shell, Mandurah, Koonalda and New Guinea 2 Caves (the red hand stencils described by Lane and Richards (1966) and others from three caves on the Nullarbor, and by Morse (1984) from Old Kudardup Cave, Augusta, are not considered here, they are restricted to the entrance parts of these caves and do not constitute cave art *per se*).

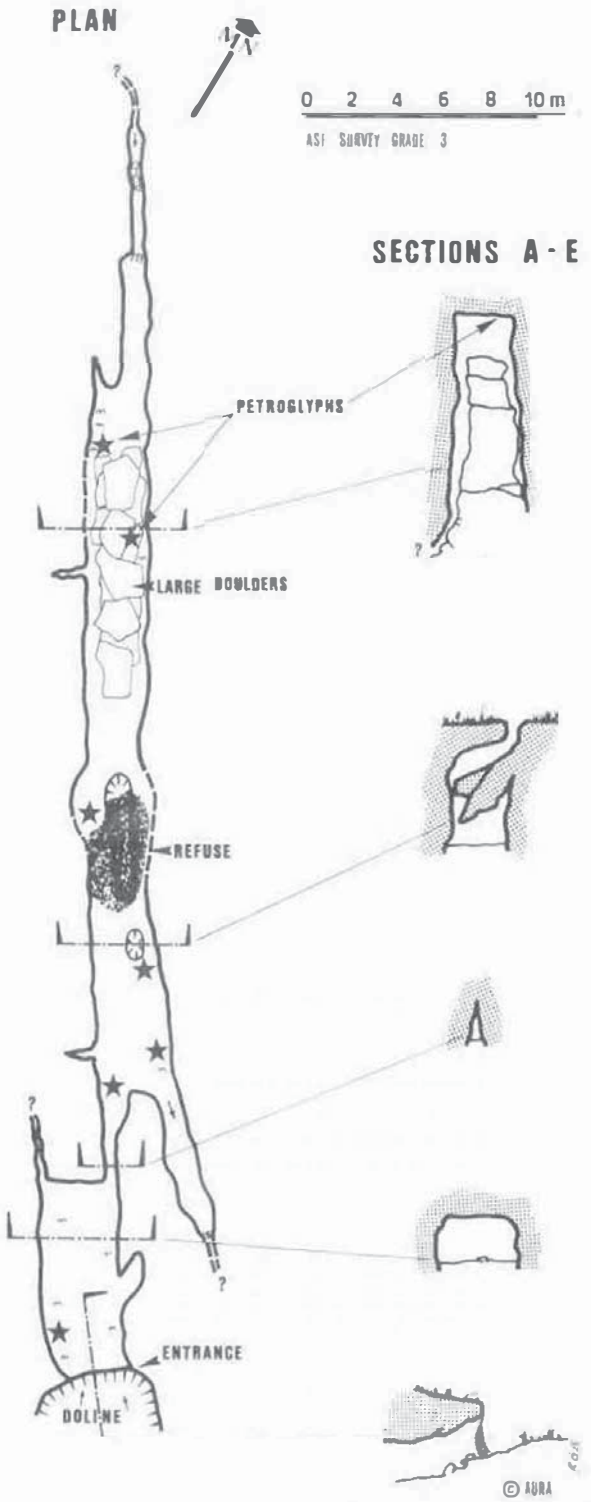


Figure 1. Plan and sections of Mooraa Cave, South Australia. After P. Horne, CEGSA.

The cave

Mooraa Cave (CEGSA No. L67) is located on a sheep grazing property within a few kilometres of Mt Gambier, only a few metres from the land owners' residence. The cave had not been examined by speleologists in any detail until 1984, and remained unnamed. The proposed name, chosen by the property owners, is derived from *moo-raa*, the Buandik word for wombat (*Vombatus ursinus*) as listed by Smith (1880). It refers to the once plentiful animal that inhabited the lush stringybark (*Eucalyptus obliqua* and *baxteri*) forests which covered the area prior to land clearing.

The cave follows one of several pronounced, roughly parallel fault lines in the general vicinity. Its linear main passage is accessible to humans for a length of fifty-two metres. The cave's general morphology and NW—SE direction (Fig. 1) are typical of the area and have been observed in many other caves: generally horizontal except where modified by roof falls, extending for considerable distance in some cases, these caves are always so close to the surface that solution openings or collapses have often perforated the thin roof, connecting the passages to the surface. The correlation between this proximity of cave passages to the surface, and the formation of *Montmilch* deposits which are necessary for both the execution and the survival of parietal finger lines, has been considered in detail (Bednarik in press b).

The present main entrance to Mooraa Cave is at its SE end, consisting of a walk-in opening in the side of a doline. Through it a small hall of almost rectangular section is entered, which once had abundant *Montmilch* formations. Extensive exfoliation of this deposit has occurred, especially from the flat, horizontal ceiling. Only a few sets of finger lines have survived this process as well as others which have rendered the markings barely discernible.

A narrow passage leads to the second chamber. Just at the end of this squeeze, on the vertical SW wall, is a prominent group of engraved V-figures (Plate 1). Although this chamber measures only a few metres it contains a great variety of markings: engraved circles, finger lines, and

Plate 1. Group of engraved 'converging lines' motifs, on vertical wall in Mooraa Cave.

animal scratches of various species, including possible megafaunal markings.

Further progress is impeded by rubbish with which it has been attempted to fill two openings in the cave roof. This refuse consists mostly of coils of rusty fencing wire and is likely to conceal further petroglyphs. Access to the north-western part of the cave is gained by entering from the surface just north of the rubbish deposit. This can only be done with the help of caving equipment and demands appropriate skills.

The remaining part of the cave is spacious, the passage is two to three metres wide and up to ten metres high, but much of its cross section is taken up by huge boulders which reach to within two metres of the ceiling in some places. Extensive finger flutings and tool markings occur on the walls and ceiling of this dark part of the cave system.

No chert seams are exposed in Mooraa Cave and prehistoric chert mining, as evidenced in several other decorated caves, was therefore not possible, but a chert artefact was observed on the surface, a short distance from the cave. The walk-in entrance chamber would have provided an ideal shelter for prehistoric inhabitants. Its floor sediments are likely to contain well-stratified occupation layers.

The Markings

Four basic types of petroglyph have been distinguished at the Mt Gambier cave sites (Aslin and Bednarik 1984b). It has been established beyond doubt that they represent at least three temporally discrete traditions (Bednarik in press a) of which two occur in Mooraa Cave. They are the Karake Style (Aslin and Bednarik 1984c) and the multiple finger flutings on formerly soft surfaces (Bednarik 1985).

Karake Style petroglyphs were discovered by AURA member Kevin Mott, together with Jean Turner, John Johnson and other members of the Cave Exploration Group of South Australia, on 6 October 1984. Unsure of the authenticity of their find they consulted one of us (GDA) who confirmed the following day that the markings are both human and prehistoric. A preliminary survey of the cave and its markings was conducted on 4 November 1984, involving five AURA members and several others, and on 3 August 1985 another AURA member, Margaret Nobbs, applied her considerable recording experience to the task of assisting GDA in recording three small but prominent panels of petroglyphs.

Undisputedly anthropic markings occur in at least seven locations within Mooraa Cave. Our preliminary work has not revealed any criteria that would assist in interpreting the chronological relationship of design elements, or that could conceivably assist in dating the art. However, we have noted several aspects which warrant further research and it is our intention to continue this study as our time permits.

The Karake Style is represented by a conspicuous group of 'converging lines' motifs (Plate 1), engraved circle arrangements and mazes of curved lines and circular elements (Figs 2 and 3). The first group reminds us of two things: the motifs of converging lines, which may consist of between two and five lines, occur usually in groups, e.g. in the lower part of Karlie-ngoin-pool Cave, Karake Cave and Koongine Cave; and the lines always seem to converge at the bottom end, except, of course, when one such motif is superimposed over another, as in Karake Cave. The conspicuous features of the group illustrated in Fig. 2 are the smallness of the circles (they are less than half the average diameter of Karake Style circles at other cave sites), and the oblong, cigar-shaped figure.

The markings in the dark part of the cave, the northwestern part, are far more complex, and difficult to analyse. Consisting of a combination of finger flutings and linear grooves shaped with tools, they occur on both ceiling and walls, and they resemble markings in Orchestra Shell and Mandurah Caves, Western Australia (Bednarik in press c); New Guinea 2 Cave, Victoria; and especially the markings in Nung-kol Cave—a recently discovered site exactly ten kilometres away. Although most of their surfaces are deteriorated by corrosion some of the finger lines have survived comparatively well, and fine striations can be discerned in some of the tooled grooves. Such striations are so well preserved in a few other caves that it has been attempted to determine by experiment the kind of material used to create them, and it has been found that aeolian (grained) limestone was in all probability used.

A remarkable aspect of the linear petroglyphs in Mooraa Cave is the arrangement of many of them in relation to the topography of the

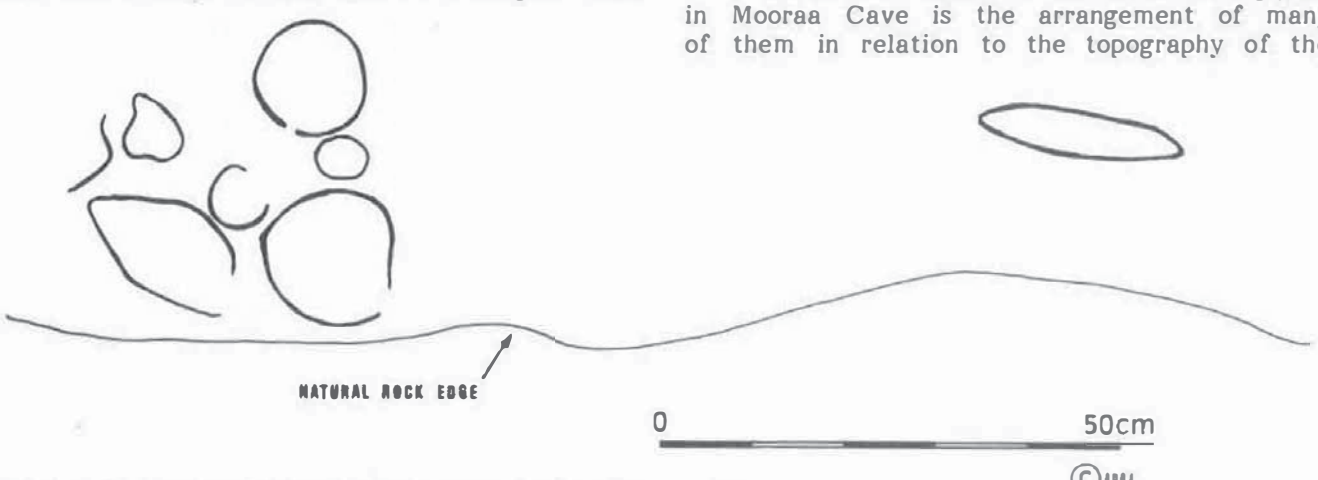


Figure 2. Engraved Karake Style petroglyphs, Mooraa Cave.

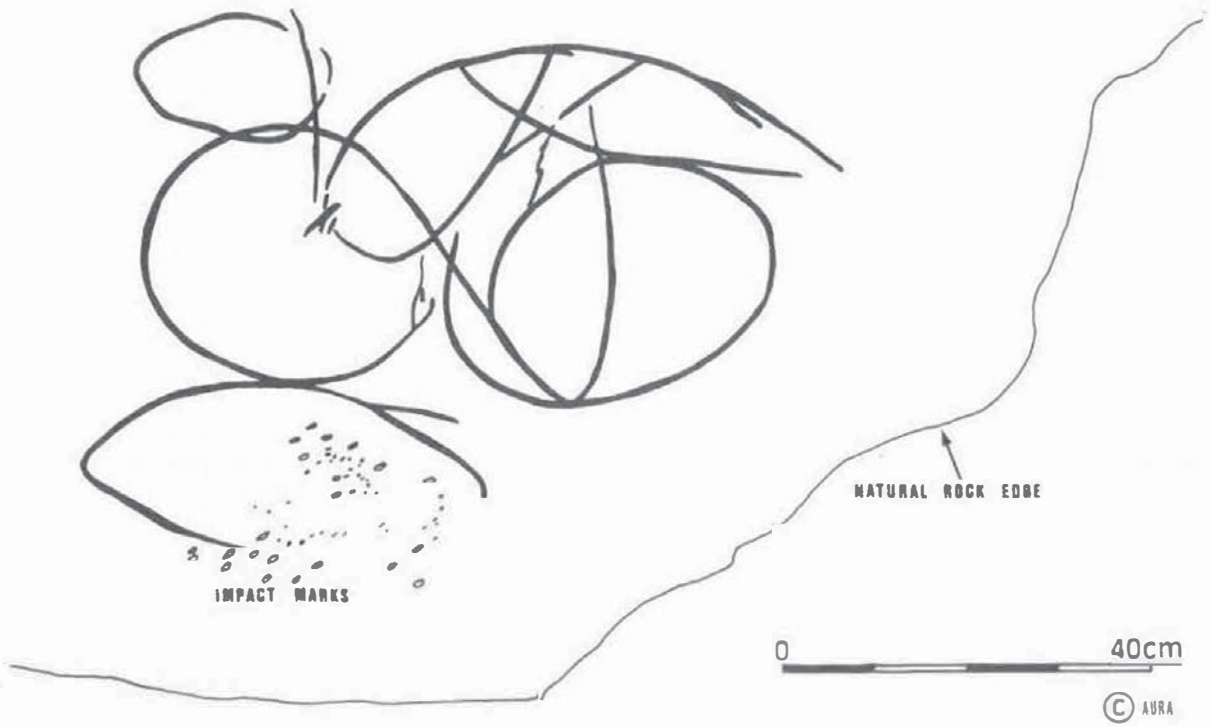


Figure 3. Engraved Karake Style petroglyphs, Mooraa Cave.

cave ceiling. The tendency of finger flutings to follow and emphasise topographical features has been observed by us at several sites, but at Mooraa Cave the tooled marks present the same characteristic. This is well illustrated by the fringed design emphasising a pronounced ceiling protuberance (Plates 2, 3).

We should stress here that we have no conclusive evidence that the generally short, tooled markings are contemporaneous with the finger flutings with which they are usually found. Where superimposition occurs the finger lines always precede the tooled marks. The latter's appearance often indicates an element of impact besides abrasion which has prompted a comparison with the gash marks at Malangine Cave (also near Mt Gambier) and with the 'behavioural pattern evidenced by the densely scored panels of rock that take on monumental dimensions in Karliengoinpool Cave' (Bednarik in press c). Much more detailed research is required to determine whether the tool marks are contemporary with the finger flutings, or represent a reaction to them by later people.

Numerous animal scratch marks are superimposed over these last-described petroglyphs and in some cases their claw spacing suggests the involvement of megafaunal species. This is a significant observation because the petroglyphs are of very corroded appearance throughout the cave, whereas the superimposed claw marks appear almost fresh. While this may not be a reliable indication of relative age (the deterioration processes may have been less effective following the production of the animal marks) it certainly establishes the lapse of a considerable period of time between the execution of the two forms of marking. The human marks are clearly very much older, and probably several times as old as the animal scratches (Plate 4).

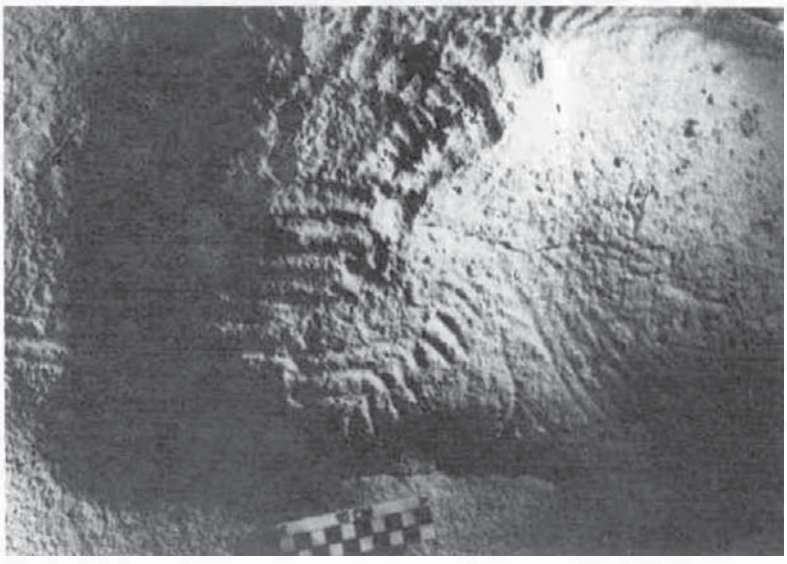


Plate 2.
Corroded petroglyphs on the ceiling of Mooraa Cave, northern part. They consist of short, tooled marks which are superimposed over finger markings. The finger flutings frequently follow depressions in the surface, as do the grooves approaching the lower right hand corner in this photograph. Some of the short tool marks are arranged so as to emphasise the pronounced ceiling protuberance, providing it with a fringed design.

Conversely, megafaunal markings are very numerous in many caves of the Mt Gambier district, while completely lacking in others.

Mooraa Cave has tremendous potential for further research, especially in the area of internal analysis of the archaic markings described last. We believe that the practice of depositing refuse in the cave has been discontinued and we commend the owner's action of closing the main entrance with wire netting to keep out livestock. We should add that the practice of filling caves with rubbish, which is widespread in the region, has had a very positive effect in the area of rock art conservation. The refuse has at many sites acted as a deterrent to visitors and stock. This is certainly borne out at Mooraa Cave, which is devoid of the historical and vandalistic rock markings so commonly encountered in the more accessible caves of the Mt Gambier district.

Acknowledgements

The preliminary exploration of Mooraa Cave provides a fine example of what can be achieved through the co-operation of two organisations such as CEGSA and AURA. The authors wish to express their gratitude to CEGSA President Kevin Mott, and to all other CEGSA members who have been involved in this work, especially Peter Horne.

The assistance of the following AURA members in the field work is gratefully acknowledged: Elfriede Bednarik, Kevin Mott, Margaret Nobbs and Bridget Wilkinson. We also like to thank another AURA member, Heather Carthew, for her help in preparing this report. Mrs Carthew is a great-granddaughter of Christina Smith, who wrote the only detailed ethnographical work on the now extinct Buandik language group, the last Aboriginal group that occupied the region.

Lastly, very special thanks to the property owners, for their friendship and co-operation. They wish to remain anonymous because they are well known in the district and publication of their name would be analogous to disclosing the cave's location—which would be premature.

G. D. Aslin
7 Campbell Street
Millicent, S.A. 5280
Australia

R. G. Bednarik
3 Buxton Street
Elsternwick, Vic. 3185
Australia

Plate 3.
Petroglyphs on the formerly soft ceiling of Mooraa Cave. The protuberance in Plate 2 is on the left. Most markings in this photograph were produced with tools.

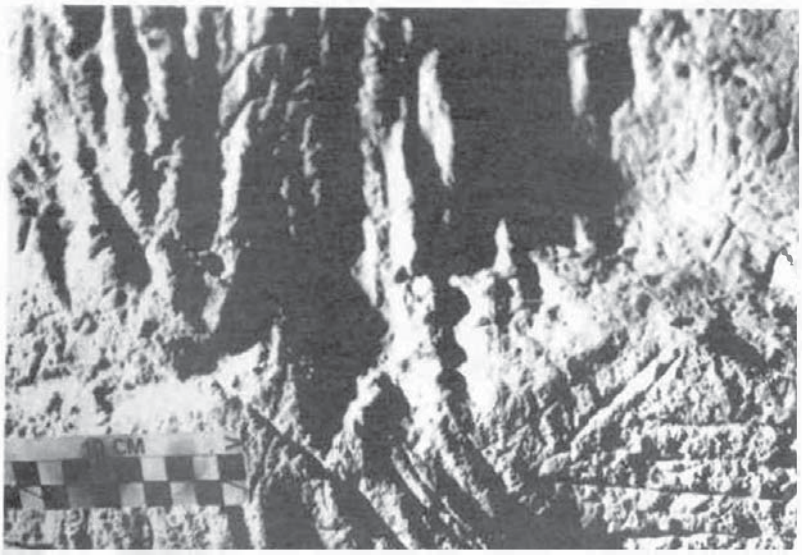


Plate 4.
Presumed animal scratch marks, superimposed over much earlier tool marks.

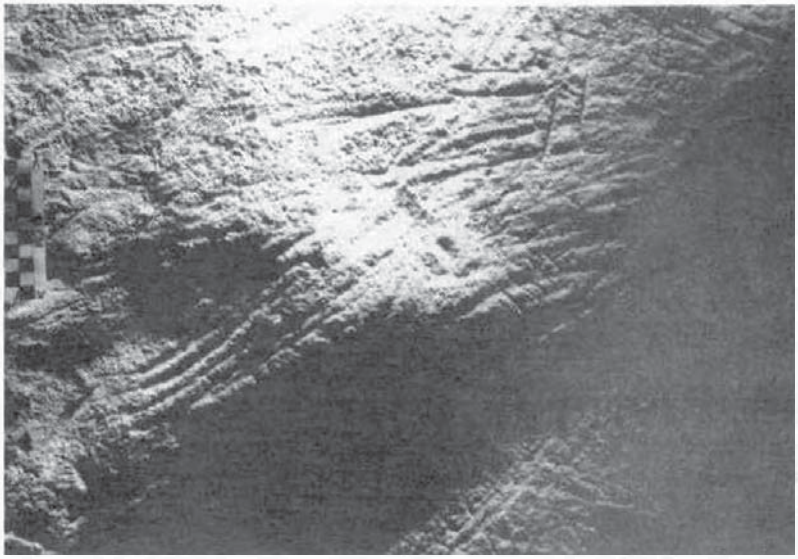


Plate 5.
Extensively marked ceiling in the northern part of Mooraa Cave. Varying degrees of corrosion are evident, the finger flutings being the most corroded component. Some of the subparallel, narrow incisions, which are superimposed over all other markings, may pertain to megafaunal species.

Figure 4.
The cave sites mentioned in this article:

1 - Orchestra Shell Cave
2 - Mandurah Cave
3 - Old Kudardup Cave
4 - Koonalda Cave
*5 - **Mooraa Cave***
Malangine Cave
Koongine Cave
Karake Cave
Karlie-ngoinpool Cave
6 - New Guinea 2 Cave

REFERENCES

ASLIN, G. D. and R. G. BEDNARIK 1984a. Koorine Cave, South Australia. *Rock Art Research* 1: 142-4.

ASLIN, G. D. and R. G. BEDNARIK 1984b. Karlie-ngoinpool Cave: a preliminary report. *Rock Art Research* 1: 36-45.

ASLIN, G. D. and R. G. BEDNARIK 1984c. Karake Cave — a preliminary report. *The Artefact* 8: 33-5.

BEDNARIK, R. G. 1985. Parietal finger markings in Australia. *Bollettino del Centro Camuno di Studi Preistorici* 22: 83-8.

BEDNARIK, R. G. in press a. Malangine and Koongine Caves, South Australia. In K. J. Sharpe (ed.), *The Australian Meander Tradition.*

BEDNARIK, R. G. in press b. Finger lines, their medium, and their dating. In K. J. Sharpe, *op. cit.*

BEDNARIK, R. G. in press c. The cave art of Western Australia.

LANE, E. A. and A. M. RICHARDS 1966. Hand paintings in caves. *Helictite* 4: 33-50.

LUEBBERS, R. A. 1978. Meals and Menus: a Study of Change in Prehistoric Coastal Settlements in South Australia. PhD thesis, Australian National University, Canberra.

MORSE, K. 1984. First record of painted Aboriginal rock art in a south-western Australian limestone cave. *Records of the Western Australian Museum* 11: 197-9.

SMITH, C. 1880. *Booandik Tribe.* E. Spiller, Adelaide.

REVIEWS & ABSTRACTS

Rock Art Research 1985, Vol. 2, No. 1, pp. 20-47.

THE INTERPRETATION OF PREHISTORIC ART
Reply

By **DAVID GROENFELDT**

First I would like to thank the commentators for their thoughtful responses to the points raised in my article. I am somewhat disappointed that more suggestions were not forthcoming concerning alternative approaches to interpreting prehistoric art, but this reflects the inherent difficulties of the topic.

Sieveking suggests that we turn to artists as our informants for understanding how they think and hence how prehistoric artists thought. She is making two fundamental assumptions here: (1) that the mental processes of prehistoric *Homo sapiens* were not significantly different from contemporary humans and (2) that the socio-cultural role of artists in prehistoric societies was functionally similar to that of artists in contemporary societies. I am not particularly concerned about the first assumption (though Gallus believes it to be crucial for Upper Palaeolithic art, at least), but the second is much more difficult to swallow. The concept of 'artist' as a specialised occupation is not found in most traditional societies; not only the artists but also the art they produce are qualitatively different and attempting analogies between the two is bound to be misleading. Her suggestion that representational art be distinguished from nonrepresentational is an interesting one which makes intuitive sense, but I am not sure where it leads. Of more evident utility is her inclusion of 'quality' as a variable, albeit a slippery one, that has interpretive potential.

Terminological problems are mentioned in all the comments, as is to be expected in a theoretical discussion where terms take on a special importance as signposts along the conceptual path. A number of flags were raised at my use of the term, 'art'. Brook suggests that the term 'representation' would do nicely for the sense in which I use 'art'. I have no substantive objections, but for ease of reference, I find the term 'art' much handier, and not confusing as long as it is agreed that the makers of the prehistoric art we are dealing with are not 'artists' in the contemporary sense of the term. This seems a small semantic price for the privilege of using the term 'rock art' rather than 'rock representations' or 'rock pictures'.

Both Gallus and Clegg object to my usage of 'interpretation', for different reasons. Gallus sees a confusion with 'understanding' which, he suggests, is what we should be trying to do. I have difficulty with the suggestion that we can claim to 'understand' lines drawn 25 000 years ago on a cave wall. Even if the neuropsychology of graphic expression can provide eventual clues to the thought processes of the prehistoric makers, we cannot claim to understand the art; we can merely propose interpretations which provide *an* understanding, or *some* understanding, but never the *full* understanding which must remain an unattainable goal. If we follow Clegg's suggestions for the text-free mode, we would be even safer from interpretive error, by not assuming anything: just because it looks like an anthropomorph does not mean that was what was intended. Call me an ethnoarchaeologist if you must, but I prefer to take the risk.

Gallus provides an example of interpretation in citing the pictorial mazes found in Pech Merle and Gargas. The position of the images randomly superimposed on each other leads him to suggest that these are not images to be contemplated but were drawn for the purpose of the act itself, with the image a fortuitous byproduct. Having made this interpretation, he now 'understands' something about the context in which the figures were made - always with the proviso that the interpretation is not mistaken.

To expand our understanding of the cultural context in which the images were made, we can turn to other archaeological evidence. Was the cave used for domestic activities or was it probably a ritualistic site? What do we know about the probable makers of the images: subsistence strategies, seasonality, other artefacts, burial customs that can add to our understanding or suggest other interpretations?

The end purpose of all this is to understand something about the people who made the art, but because our powers of directly understanding the messages they have left for us are severely limited, we must adopt an indirect route to understanding: (1) describe and interpret the art itself, (2) apply any other knowledge about the socio-cultural and environmental context of the art which can help us to interpret the art and (3) apply these interpretations of the art to help in an understanding of the prehistoric makers. The primary topic of my article is #1, though #2 cannot be easily separated; the two steps

comprise a dynamic process of interpretation and reinterpretation leading to, or at least allowing for, a better understanding of the people through their art (#3).

Finally, my concept of style provoked several comments. Dickman notes the overlap between style and structure, and suggests the term 'style' be dropped altogether. I think of 'style' and 'art' as being similarly vague and singularly irreplaceable as broad categories. While certain structural arrangements might be characteristic of a particular style, what the term 'structure' refers to is not the pieces but the relations between pieces. An example could be a cluster of hand prints surrounding a representation of a man. If we want to refer to the placement of these motifs we could use the term 'composition'; but to refer to the spatial relations between the hands and the man, and to a conceptual connection between the (unknown) attributes of the hand prints and attributes of the person depicted, we need the term 'structure'. Clegg objects to the use of this 'anthropologically-laden word' with its 'very slippery meanings' but it seems to me that we require terms that address subtle concepts if we are to learn very much from prehistoric art.

The concept of style seems to lie at the root of several other criticisms raised by Clegg, *viz:* '... it is the picture that helps the communication, not the style it is in'. He is referring to the communication of myths, and with reference to myths as stories he is probably correct. It is a different matter altogether to suggest that style does not communicate *anything*. The very existence of recognisable art styles demonstrates that stylistic information is communicated; each artist working in the same style does not invent it independently. When a style persists for some time, it is quite safe to deduce that the normative behaviour of producing a certain style of art has been communicated from completed works (e.g. figures on a cave wall) to the maker of new works (more figures on the cave wall). The interesting question is what other information is communicated through style. The attention given to graphic design in advertising is based on the premise that information is communicated apart from the motifs, figures, or language which comprise an advertisement. The anthropological theory of symbols provides a framework for understanding how this process works: the style of print, for example, can symbolise high technology (in the case of computer print styles) or traditional religious values (in the case of liturgical print styles). An art style can communicate normative values to the extent that the style is conceptually linked, or 'stands for' (consciously or unconsciously) a larger corpus of values shared by the majority. The consistency of art styles within a given prehistoric social group (e.g. pottery styles of the Anasazi in the southwestern United States) suggests that any values communicated were normative ones, but as for precisely what the values were, we cannot say. What we can say is that the result of exhibiting these consistent, normative visual messages was undoubtedly a strengthening of group identity and hence, the much abused term, 'social solidarity'.

Since Dr Sieveking has noted that my bibliography stops after 1977, I should explain that the article was first written in 1978 with the last major revision in 1980. An article on prehistoric art that includes neither new data nor a full-blown theory had no natural home in the scientific journals until *Rock Art Research* was launched. I am grateful to AURA for providing a forum where concepts can be debated and, perhaps, new methodologies can be born.

Dr David Groenfeldt
Staff Anthropologist
International Irrigation Management Institute
Digana Village (via Kandy)
Sri Lanka

BOOKS

Hovenweep Rock Art: An Anasazi Visual Communication System by NANCY OLSEN. 1985. Institute of Archaeology, University of California Los Angeles, Occasional Paper 14. 155 pages, maps, photographs, tables, illustrations, bibliography. Paper, US$15.00.

By its very nature, the discipline of archaeology is concerned with aspects of material culture. Through this material evidence, archaeologists attempt to reconstruct past environments, societies, and human adaptations. The systematic study of artefacts has successfully provided insight into various elements of prehistory. However, traditional scientific archaeology, concerned strictly with 'digging up the past', has done little to enhance our knowledge of the more cognitive aspects of prehistoric cultures.

Through an interdisciplinary approach to archaeological methods, we have begun to greatly increase our understanding of the past, and have expanded our knowledge further into the realms of aesthetics, belief-systems, and perceptions. This new archaeology has allowed us to delve into theoretical issues related to the more interpretive aspects of cultural systems.

Perhaps no area of archaeological investigation allows for more interpretive research than the study of rock art. Through its iconographic structuring, rock art provides insight into the symbolic modeling and thought of its creators. The holistic examination of rock art requires that a wide variety of issues be addressed and integrated. To fully grasp the cultural vitality of rock art, we must consult the disciplines of art, ethnology and cultural anthropology, archaeology, and philosophy. This is what Nancy Olsen has indirectly stressed in *Hovenweep Rock Art*, and she has attempted to illustrate its applicability

by applying a dynamic view of cultural use in an attempt to understand the social function and patterning of Anasazi rock art.

Working from the perspective that rock art motifs function as mnemonics and combine to constitute a visual communication system, Olsen examines Hovenweep/Mesa Verde rock art in an effort to elicit cognitive patterns of association. Utilising the ethnographic present as a resource base, Olsen analyses the iconography of the Western Pueblo peoples in order to justify the application of contemporary categories of iconography to prehistoric rock art. Olsen's portrayal of the modern lexicon of graphic symbolism among the Hopi and Zuni is quite generous, but her discussion is unfortunately convoluted. Olsen makes use of data on modern motifs and their contexts in order to investigate the statistical probabilities of where we could expect the prehistoric equivalents to occur, in what numbers, and in what combinations.

From the perspective that the contemporary Hopi and Zuni are likely to share a common and continuous coding system with their Anasazi ancestors, Olsen utilises the rich sources of ethnographic information to formulate test questions concerning the distribution of motifs. She argues that motifs function across mediums, such that symbols will display similar organising patterns regardless of the media. On this ground, she draws evidence on the use of motifs from their distribution on shrines, masks, kiva murals, and from other non-rock art contexts.

Olsen attempts to show that clan symbols are likely to be found in agricultural and other multi-use contexts, as they serve as boundary markers. Religious symbols, according to Olsen, function less as mnemonics and more as receptacles of spiritual power, and are found in more restricted contexts. Olsen proposes that archaeological test implications can allow one to predict, on the basis of site types, where rock art is likely to be found, in what concentrations, and with what categories of motifs represented.

Olsen defines Hopi and Zuni iconographies as operants of a visual communication system that reaffirms oral traditions. She argues that the communicative capacity of these symbols allows us to grasp the 'conceptual structure by which the Hopi and Zuni regulate the tangible world and bring it into functional relationship with their cognitive realm'. It is from this ground that she utilises a semiotic method of analysis in the study of Anasazi rock art. Olsen feels that the visual symbols may be counterparts of a verbal language, and may therefore be similarly structured.

Olsen sees the chronological study of Anasazi rock art as a potential data source for understanding the technological and socio-religious evolution of the Anasazi. She suggests that the rock art of Hovenweep can be viewed as a prehistoric farming subsistence strategy which, when studied systematically, can help to develop an understanding of the economic processes of growth and maintenance of Anasazi farming communities. Olsen believes that semantic intent exists in the structuring of rock art, and that localised and regional patterns of use can be ascertained.

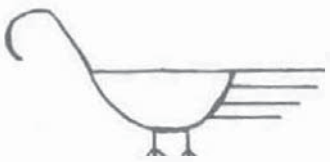
What Olsen is really getting at is that Hovenweep/Mesa Verde rock art motifs are distributed in an organised and predictable way. She argues that there is a relationship between site usage and motif which is structured, and by investigating the relationships between the symbols and their contexts we may be able to elicit some of the mechanisms that were at work in the transformation of the Anasazi into the Pueblo culture.

Although *Hovenweep Rock Art* succeeds in raising some interesting questions for inquiry, it fails in providing convincing answers to many of these questions. Olsen glosses over some interesting topics which could have benefited her thesis had she elaborated them. Overall, the text is dry, which is unfortunate since Olsen has ventured into intriguing theoretical territory. Of undeniable value, however, is how Olsen has demonstrated that rock art analysis can be integrated into statistical, systematic archaeological studies. Indeed, Olsen seems to be primarily concerned with formulating a direction for further integrative fieldwork.

The book is profusely illustrated with photographs and sketches, but the quality of many of the pictures is very poor. Some of the photographs are out of focus and in others I was unable to discern the rock art motif which was supposed to have been recorded. Photographing rock art can admittedly be a difficult assignment. One expects, however, to have quality and workable photos in a publication. As research tools, photographs must function as accurate visual records.

The American Southwest exhibits a strong continuity of traditional ways between the prehistoric inhabitants and the region's modern cultures. Olsen's application of ethnographic analogy to the analysis of prehistoric rock art is worthwhile, albeit controversial. The complexity of time-depth studies, combined with the esoteric nature of symbolic systems, makes such a goal challenging and complex. Although aspects of the thesis presented in this volume may stand unsubstantiated, the direction which Olsen has pursued is worthy of further investigation. As a means, rather than an end in itself, *Hovenweep Rock Art* is a useful study which has moved archaeology a little closer to understanding the function of rock art in Anasazi society.

Paul Faulstich
(Southwest Museum, Los Angeles)



From Palaeoart to Casual Paintings. By GEORGE CHALOUPKA (1984). 60 pp., 25 illustrations, including 2 maps and 13 black and white plates. Number 1, Monograph Series of the Northern Territory Museum of Arts and Sciences, Darwin.

Rock art is the most common, the most varied and, also, the most complex prehistoric Australian artefact. Whereas in the majority of excavated sites, stone tools, used pieces of ochre, bone remnants and traces of charcoal only partially reveal man's early pursuits and technologies, rock art documents the ephemeral objects of his material culture and portrays modes of human experience, behaviour and relationships. A study of rock art can provide some of the missing chapters of Australia's prehistory, as the representations of given subjects depict recognisable changes in the artist's physical, social and cultural environment. This monograph outlines a proposed chronological sequence for the rock art of the Arnhem Land Plateau, correlated with other aspects of Australian prehistory. The proposed rock art periods, phases and styles are related to climatological, geomorphological, archaeological and historical data and zoological and botanical evidence.

The most complex body of Australian rock art is found in the tropical area located north of a line between Derby in the west and Cairns in the east.

Within this area lie three major rock art regions:

(a) The Kimberley in Western Australia,
(b) the Arnhem Land Plateau in the Northern Territory, and
(c) the sandstone plateau of southern Cape York in Queensland, as well as a number of intermediate locales with additional rock art sites. The total number of shelters and sites with rock paintings and rock engravings in this northern area is very considerable, some 1420 sites having been recorded in the Arnhem Land Plateau region alone, and clearly many more await discovery.

The most recent rock art styles of the three regions share similar forms. The subjects of this period are large, multicoloured representations with internal subdivisions and decoration. In Kimberley these are the mythologically based Wandjina figures with associated animals and plants. In the Arnhem Land Plateau they are the X-ray Style depictions of animals, men and even inanimate objects, with internal organs and structures shown within their external features. In Cape York they are the stylised forms of animals and man. The author suggests that only the rock paintings of Kimberley and those of Arnhem Land Plateau are of the same antiquity and may, indeed, have common origins, as some of the early rock art styles depict similar subjects, share similar forms of expression and development, and were, perhaps, contemporaneous and culturally related.

The book begins with a synopsis of the prehistoric colonisation of Australia, followed by brief chapters on the physical setting, geology and prehistory of the Arnhem Land Plateau. A detailed discussion of Chaloupka's chronology of the region's rock art follows, describing the following general sequence:

(1) Hand prints, grass prints, pigment imprints of objects thrown against the surface.
(2) Large naturalistic zoomorphs and anthropomorphs.
(3) Dynamic figures.
(4) Postdynamic figures.
(5) Simple figures with boomerangs.
(6) Yam figures.
(7) X-ray, descriptive.
(8) X-ray, decorative.
(9) Contact period.

Finally, there is a chapter on rock art conservation which gives special attention to the natural silica skins that often protect rock paintings in this region.

ABSTRACTS

Introductory essay: science and rock art, by J. D. LEWIS-WILLIAMS. In J. D. Lewis-Williams (ed.), *New Approaches to Southern African Rock Art*. South African Archaeological Society, Goodwin Series, 1983, Volume 4, pp. 3-13.

Rock art studies have never been considered a fully acceptable branch of professional southern African archaeology. This essay argues that a long-standing empiricist emphasis on data collection and inference from those data has inhibited understanding of the art. An alternative model which seeks metaphorical links between the art and San myth and ritual is more explanatory and testable; many linking metaphors are associated with the trance performance of medicine men in the ritual curing dance. A rock painting from the Drakensberg is analysed in detail to demonstrate the explanatory power of the metaphorical model.

Cation-ratio dating of petroglyphs from the Western Great Basin, North America, by RONALD I. DORN and DAVID S. WHITLEY. *Nature*, 1983, Volume 302, pp. 816-8.

Using a new age-determination technique for rock varnish, cation-ratio dating, the authors have obtained absolute dates for varnishes within the pecked surfaces of five petroglyphs from the Coso Range, Inyo County, California. Their age determinations, based on analytical data gathered directly from petroglyphs, revise previously proposed chronologies and suggest a greater antiquity for Great Basin rock art in the western United States.

A lunar-solar year calendar stick from North America, by A. MARSHACK. *American Antiquity*, 1985, Volume 50, pp. 27-51.

The microscopic and sequential analysis of an early nineteenth-century American Indian calendar stick documents the notation of a precise, nonarithmetic, observational lunar year of twelve months with the evidence for added, subsidiary months suggesting the use of a thirteenth intercalary month every three years to bring the calendar into phase with the solar tropical year. The calendar stick is the most complex astronomical-calendric, problem-solving device known from the Americas outside of the high Mesoamerican and Andean civilisations, but it is not derived from these late traditions. The analysis suggests the presence of an underlying observational conceptual base that may have come into the Americas from Asia.

Paints of the Khoisan rock artists, by IONE RUDNER. In J. D. Lewis-Williams (ed.), *New Approaches to Southern African Rock Art*. South African Archaeological Society, Goodwin Series, 1983, Volume 4, pp. 14-20.

Ethno-archaeological methods are used to ascertain the ingredients used for rock paints. Past theories, statements and experiments are examined and evaluated; information on traditional paints obtained from historical and contemporary literature and from ethnographical and archaeological fieldwork is examined and correlated. Much of the recorded information, particularly in regard to binders, is found to have been based on plagiarism and speculation. The most likely binders would have been fat and perhaps water. Mainly earth pigments would have been used and possibly plant pigments, which might not have lasted.

Art pariétal paléolithique Ariégeois, by DENIS VIALOU. *L'Anthropologie*, 1983, Volume 87, pp. 83-97.

This paper presents some general data, related to the Magdalenian engraved and painted art in Ariège, France, the subject of the author's doctoral thesis (1981). Some of the parietal art considered in this article is new, especially that of Fontanet which was only discovered in 1972. The categories of animal motifs, anthropomorphs and 'abstract' figures are discussed. The study proceeds by analysing spatial or thematic liaisons of the representations, and proposing 'symbolic constructions'.

*

Australian rock art and archaeology by J. CLEGG. *Bollettino del Centro Camuno di Studi Preistorici*, 1983, Volume 20, pp. 55-80.

The author's express aim is to demonstrate how fruitful the study of prehistoric rock art purely as archaeological data has become. He concludes that if the prehistoric pictures are ignored, an opportunity to include a comprehensive selection of types from most of the spheres of cultural activity has been passed over, and another chance to understand prehistory has been missed.

Clegg has previously documented his difficulties in convincing Australian archaeologists of the utility and relevance of rock art studies to their work. However, the readers of Professor Anati's *BCSP*, now the 'World Journal of Rock Art Studies', are likely to have a significantly different outlook and should have no difficulty accepting these premises.

The paper is possibly hard to read for someone not familiar with Clegg's ideas. From the *BCSP* reader's point of view, one of the more important observations made by the author is that ethnographic information and analogy are irrelevant to a large part of Australian rock art.

Parts of this article correspond with the much shorter paper Clegg published about the same time in *Australian Archaeology* (Number 16, p. 87). He relies again heavily on Maynard's 'landmark' work, as he calls it, particularly on her hypothesis of a tripartite Australian rock art sequence. His espousal of this model detracts from the value of the paper, although he does acknowledge that 'several styles and numerous individual sites' cannot be fitted into Maynard's system.

R.G.B.

ORIENTATION

THE 1985 ARARA SYMPOSIUM
Santa Barbara, California, 25 to 28 May 1985

R. G. BEDNARIK

AURA's counterpart in the United States, the American Rock Art Research Association, has held annual symposia for the past twelve years. With the exception of the 1981 symposium, convened at Winnipeg, Canada, all of these meetings were held in western States of the United States, and the 1985 symposium was no exception.

Santa Barbara is a pleasant coastal resort town, some 150 kilometres northwest of Los Angeles. The conference facilities were provided by the Santa Barbara Museum of Natural History, located on a hillside overlooking the town, and next to an eighteenth century Spanish mission.

The symposium and the associated activities were exceedingly well planned and the organisers are to be congratulated. I have attended few conventions that were as well prepared and conducted. This applies also to the several large field excursions which must have involved much logistic planning. The symposium was hosted by Campbell Grant, and chaired by Kathi Conti and William Hyder. Kay Sanger, Frank Bock, Helen Crotty and William Hyder acted as moderators, and Helen Crotty is now responsible for the publication of the symposium papers. In the following list of these papers the names of presenters who are AURA members are emphasised by bold type.

On the evening preceding the two days of actual lectures a pre-symposium meeting took place at the University of Santa Barbara. Demonstrations of several makes of computers were preceded by two lectures:

An extended digitised Data Base for Rock Art Research, William Olmstead.
The value of Rock Art Repositories and their Applications, Jeff **Dickman.** Jeff was one of the first to explore the utilisation of digital techniques in rock art studies (refer *Rock Art Research* 1: 25-35), but this tends to overshadow his important work on rock art epistemology, recording and interpretation.

The following two days, 25 and 26 May, were occupied with the presentation of papers and several other events:

Alder Cave, Ventura County, California (VEN 437), Campbell Grant.
Symbol and the Importance of Place: the Painted Rock of Carrizo Plain, Georgia **Lee** and William **Hyder.** Georgia is well known from her work on Easter Island, and both she and Bill are acknowledged authorities in the field of Chumash rock art.
Transformations, Arlene Benson and Tom Hoskinson.
Historic and Ethnographic Rock Art Sites from Tulare County, California, Gay Weinberger.
Research Approaches in studying the enigmatic Shingletown Paintings of Northern California, Eric **Ritter** and Brendan McMahon. Dr Ritter, an anthropologist with twenty-nine years of experience in rock art studies, has recently returned from field work in Peru.
Uvas Creek (CA-SCI-111): a unique Petroglyph Site in the San Francisco Bay Area, California, Robert **Mark** and Evelyn **Newman.** Dr Mark, a geologist with the U.S. Geological Survey, and Evelyn Newman, a research scientist, both joined AURA at Santa Barbara.
The Depiction of Food in Petroglyphs, Wilson Turner.
The Lake County, Oregon Rock Art Inventory: Data Bases for Rock Art Research, William J. Cannon and Mary F. Ricks.
The Archer Motif in Western Rock Art, Ken **Hedges.** Ken's work as Curator of Ethnology and Archaeology at the Museum of Man, San Diego, and as the president of ARARA, has still left him enough time to conduct a series of annual rock art symposia at his museum. He has recently published the first monograph of papers from one of these symposia, in his Volume 1 of *Rock Art Papers*. This is a very well-produced book which will be reviewed by us in due course.
Navajo Star Ceilings, Von Del Chamberlain.
Preliminary Report on two unrecorded Rock Art Sites from North Central Baja California, Eve **Ewing**, who demonstrates her long-standing interest in the rock art of the Californian peninsula (Mexico). She is presently concentrating her efforts on the little-known regions of central Baja.
Animation in Baja's Aboriginal Murals, Elanie A. Moore.
Rock Art at Parras (Coahuila) and its Ethnohistoric Context, William B. Murray.
The Pahranagat Anthropomorphs, Lincoln County, Nevada, Eileen M. **Green.** Ms Green, another member AURA gained at Santa Barbara, has been engaged in the study of Nevada rock art since 1975. Her thesis on the cultural ecology of rock art sites is in progress.
Rock Art of Southern Nevada: Vandalism and Environmental Education as Issues, Stanton D. Rolf.
The Corn Maidens of Canyon de Chelly and Canyon del Muerto, James R. Harris.

Harald Pager 1923 - 1985

Harald Pager, a Founding Member of AURA, died in the Windhoek State Hospital, Namibia, on 1 July following an illness.

Known and valued by rock art researchers throughout the world for his meticulous study methods and detailed recordings, his untimely death is a great loss, not only to his family and friends, but to Namibia as a country and to world rock art research as a whole.

Since 1977 Harald Pager lived and worked on the Brandberg, discovering and systematically recording the region's rock paintings in the most detailed study of rock art ever carried out by one single researcher. During eight years he documented nearly a thousand rock art sites and painstakingly copied 30 000 figures, using the methods he had himself developed. His sheets of copies alone measure eight and a half kilometres. He also surveyed the sites archaeologically and drew plans of them, besides recording and illustrating the fauna, flora, geology and meteorology of the Brandberg.

Pager almost completed this great project, in spite of the illness that weakened him during the last two years of his life. His dedication and perseverance have always been an example to others, as was his great enthusiasm. During his work on the Brandberg, the highest mountain massif of Namibia, he experienced much hardship in the field, including drought, lack of water, and the difficulty of having to negotiate very inaccessible, mountainous country. He returned to his home, his wife Shirley-Ann and his small daughter periodically, usually after months of solitude, during which he was either alone or accompanied only by his two faithful Owambo companions. When he broke his leg in 1978, they carried him down from the mountain, in a 24-hour journey that must have been a terrifying experience. It did not deter Pager from returning to his great task as soon as he could.

No newcomer to the recording of rock paintings on a large scale, Pager brought to the Brandberg project the expertise and proficient knowledge acquired during his first big project, in the Ndedema Gorge, Natal Drakensberg, South Africa. This took place during the 1960s and he employed then an interesting technique: black and white prints were made in the natural size of the art and the paintings were coloured in, using oil paint. This method was not suitable on the curved granite boulders of the Brandberg, which necessitated the use of tracing foil and Munsell Chart.

Harald Pager's first published work, the superb volume *Ndedema - A Documentation of the Rock Paintings of the Ndedema Gorge*, is after fourteen years still the only publication of its kind. His second book, *Stone Age Myth and Magic*, is an extension of this work and provides information on possible motivations in South African rock art. Pager's early training in art and art history, in Graz, Austria, where he was born, had not only awakened in him a fascination for prehistoric art, it has also been an invaluable help to him in capturing the spirit of the prehistoric artists in his painstaking copies. This capacity of artistic communication, combined with an analytical, observing mind, and his ability to study his subject objectively were among the attributes that made him the outstanding rock art researcher that he was.

Pager's work on the Brandberg was conducted for the University of Cologne. Shirley-Ann Pager, with the help of her husband's colleagues at that university, will prepare the monumental result of the Brandberg study for posthumous publication.

This will consist of twenty volumes, the first of which is expected to appear within three years.

In addition to his books, Pager has written many papers for scientific journals. He was awarded the Durban Medal in 1973, by the South African Association for the Advancement of Science. Pager travelled widely and has studied rock art in many parts of Africa and Europe. In 1980 he attended the World Wilderness Congress in Australia, and he gave lectures on his work at several universities in Europe. Some of the numerous international colleagues he communicated with are Australians, who will miss him sadly, as indeed will all rock art specialists in the world.

Pager's friends and colleagues around the world intend to build a monument for the outstanding scholar, a monument of a very special kind. It will be a *hiatse ibeb*, in the Namibia tradition: in a personal tribute to a great man, every visiting colleague, especially from overseas, will bring a stone from his or her own country to lay upon Pager's grave. A plaque will be erected on the Brandberg, where a valley has just been named after him.

Shirley-Ann Pager will complete her husband's work and she has taken his place as a member of AURA. She intends to build a study centre for rock art researchers with the enormous wealth of study material left by her husband. His friends and colleagues plan to take this idea further and establish a rock art research foundation in his name.

The rock paintings Harald Pager loved so much are among the finest art humanity has ever produced, yet they will fade with time and eventually disappear. His legacy, however, will live on for ever.

R.G.B.

INTRODUCING:

THE INTERNATIONAL COMMITTEE ON ROCK ART (CAR) (Comite International pour l'Art Rupestre)

At the ICOMOS Executive and Advisory Committee meetings held in Warsaw and Cracow, 10 to 19 October 1980, the ICOMOS International Committee on Rock Art (CAR) was formed. ICOMOS, the International Council on Monuments and Sites, is the UNESCO organisation responsible for the safeguarding, preservation and rehabilitation of man's cultural heritage.

With the goal of co-ordinating worldwide action towards the knowledge and the protection of the world's rock art heritage, the CAR proposes among its objectives to create a world inventory of rock art; to facilitate the awareness of legislators to this heritage; and to advance knowledge and education in this field. Professor Emmanuel Anati, the Director of the Centro Camuno di Studi Preistorici (Italy), has been nominated as the first chairman of the CAR.

This committee is an organ of UNESCO/ICOMOS, and its principal purpose is to provide the parent organisation with the expertise and advice needed to formulate global policies on the study, preservation and management of prehistoric cultural resources. To this end, the CAR has been provided with statutes which consist of twelve Articles:

Article 1. The ICOMOS International Committee on Rock Art (hereinafter designated as 'CAR') is established in accordance with Article 14 of the ICOMOS Statutes and by the Executive Committee of ICOMOS in October 1980, in Warsaw. CAR activities are ruled by ICOMOS Statutes and by any amendments that come to be.

Article 2. The particular object of the CAR is to promote international co-operation in the field of rock art and to counsel ICOMOS organs in the elaboration of its program in this field.

To accomplish its objectives, the CAR provides a forum for the exchange of experiences, ideas, knowledge and results of research, between archaeologists, anthropologists, ethnologists, prehistorians, art historians, religion historians, historians, restorers and curators, administrators and legislators; the co-ordination of existing studies; the promotion of new studies; the development of technical co-operation. The CAR also pursues its goals by establishing links with specialised institutions and industrial organisations in appropriate fields in order to extend technical co-operation.

The activities of the CAR, which is one of the international organs of ICOMOS, will be in accordance with the objectives and the goals of ICOMOS, as established or defined by the Executive Committee of ICOMOS.

Article 3. The Chairman of the CAR is designated by the Executive Committee of ICOMOS. After the first such period of up to three years, the Chairman is elected by the members of the CAR. In accordance with Article 12 of the ICOMOS Statutes, the Chairman is an ex-officio member of the ICOMOS Advisory Committee.

Article 4. During the first three years, the members of the CAR are nominated by the Chairman and these nominations are subject to ratification by the Executive Committee of ICOMOS, at its next meeting. If possible, they shall be chosen among ICOMOS members and representing, insofar as it is possible, different regions. The CAR may co-opt persons who are not ICOMOS members but having relevant specialist qualification in a precise field, and may form a group of corresponding members who practise in a related field of activities.

Article 5. There are three categories of members: active members, corresponding members and adherent members. The number of active members, having the right to vote, is limited to fifty.

Corresponding members are specialists who actively collaborate with the CAR. The adherent members may be researchers, technicians, students and amateurs, whose specialisation is not necessarily rock art. After the first three years, nomination of new members shall be subject to the members of the Council of Direction's approval.

Article 6. Three years after the constitution of the CAR, the Chairman and the Council of Direction will be elected by active members.

The Council of Direction is composed of the Chairman and four members and can nominate a Secretary. The members of the Council of Direction and the Chairman can not hold office for more than nine consecutive years.

Article 7. The CAR shall meet at least once a year in full session. The Chairman shall present a report on its activities and a list of its members to the ICOMOS International Secretariat.

Article 8. The activities of the CAR are financed by:

a) Funds allocated by ICOMOS from its annual budget;
b) Subsidies, contributions, grants etc. obtained by the CAR's own initiative in conjunction with its members, national or international institutions (comprised of the National Committees of ICOMOS and countries concerned);
c) Contracts entered into by ICOMOS, on behalf of the CAR, for the performance of specific tasks within its fields, as the above-mentioned definition.
d) Any other sources of income.

The members of the CAR do their best to obtain the necessary funds and ensure their personal participation in the activities.

Article 9. The activities of the CAR can include organisation of meetings, preparation of publications, collection and dissemination of information, either directly or through the International Centre of Documentation UNESCO/ICOMOS, Paris, and any action of progress of international co-operation, the formation of researchers and scientific research in the field of rock art. The CAR shall undertake regional activities.

Article 10. Every three years and during the year of the ICOMOS General Assembly, the CAR shall draw up a program for the forthcoming three-year period. This program shall be forwarded to the ICOMOS Secretariat at least three months before the date of the Assembly, for incorporation into the Council's program for the forthcoming three years.

Article 11. Representatives of other organisations may be invited to participate in meetings organised by the CAR. UNESCO, ICOM and ICCROM will be invited to the open meetings of the CAR. This will also include the President and/or a representative of the ICOMOS International Secretariat.

Article 12. The working languages of the Committee are French and English.

One of the first steps taken by the CAR was to compile a worldwide index of specialists who are actively engaged in rock art research or related disciplines, such as geomorphology or archaeology. This *Who's Who in Rock Art* was first expected to be published in late 1984, but the number of listings continued to increase considerably. It was decided to publish the list as it was by mid 1985 (it includes, we believe, in the order of 350 entries), which means that it should be available shortly. Each entry covers field works, theoretical or compilatory works and current research projects of the researcher listed, besides brief personal details. This 'catalogue of rock art specialists' will be an enormous help for all concerned with the study of prehistoric art.

The establishment of the World Inventory of Rock Art is a far more ambitious undertaking and will take a very long time to realise. It is intended that reports on the progress of this enormous enterprise be published annually. However, the problems associated with a project of this magnitude may easily be underestimated. By definition this endeavour can only succeed with the full participation of all those interested in, and involved with rock art studies around the world.

In accordance with its statutes, the CAR has had to elect its executive council during 1984, for a three-year term. The council is now composed of the following scholars (three of which are AURA members):

President:	Emmanuel Anati (Italy)
Secretary:	Antonio Beltran (Spain)
Councillors:	Jarl Nordbladh (Sweden)
	Juan Schobinger (Argentine)
	L. G. A. Smits (Lesotho)

Article 7 of the statutes requires that full annual meetings must be held by the CAR. The 1985 meeting was held in Saragossa, Spain, from 30 October to 2 November, and was chaired by Professor A. Beltran.

Several Australians are members of the International Committee on Rock Art, and they are required to submit annual research reports to its president. AURA maintains a close liaison with this international organisation.

PROPOSED AURA FIELD TRIP TO FRANCE AND SPAIN

The XIth Congress of the Union Internationale des Sciences Préhistoriques et Protohistoriques will be held at Southampton and London from 1 to 7 September 1986. Its major rock art symposium will be entitled 'Cultural Contexts of Rock Art', and will be chaired by Professor H.-G. Bandi, University of Bern. AURA will be well-represented at this important event, and our members will present many of the papers.

Bruce Wright has suggested that AURA could organise an excursion to French and Spanish sites of cave art after the congress. Serious consideration is being given to this proposal. We request that all members who will attend the congress, or are considering to do so, contact the Editor if they are interested in participating in such a Franco-Cantabrian rock art excursion.

In response to a notice in the *AURA Newsletter*, five members have so far registered as potential participants, should this field trip go ahead. Detailed plans and an itinerary would still have to be arranged, but at this stage the Santander district, French Pyrenees and Dordogne are likely to be included.

Letter to the Editor

Comments on Coastal Limestone, and on Dating and Destruction of Petroglyphs

The 'Parietal Markings Project' outlined by G. D. Aslin, E. K. Bednarik and R. G. Bednarik (*Rock Art Research* 2: 71-4) gives an exciting glimpse at new dating possibilities for Australia's rock art where it is associated with limestone. Malangine Cave in the Mt Gambier region of South Australia is described as being in a region of Tertiary limestone. Petroglyphs are described — and dating by radiocarbon and uranium/thorium has been mentioned for this sequence. The new finds fit neatly with the evidence for early settlement of the Australian continent.

Coastal shorelines and reefs have been recognised for disclosing evidence of Quaternary sea level changes, but their possible significance in recognising the antiquity of rock art has not been widely studied. I enclose a photograph of a limestone piece found on the shore line of Depuch Island, Western Australia — not far from petroglyphs. The value of this isolated find may be minimal, but it raised for me the question of the value of limestone in helping to date archaeological material.

H. P. McNickle (*Rock .ArtResearch* 2: 64) says that 'during the development of the iron ore mines in the 1960s ... some five kilometres of a limestone ridge at Port Hedland that was covered with engravings' was destroyed. McNickle's concern for other engravings in the area is understandable. I visited the Burrup Peninsula last year and saw some of the destruction wrought by the North West Gas Project - rocky hills, previously covered with engravings, reduced to rubble, or removed altogether. Some areas still have rock art *in situ*, and give some idea of the area's significance and what we have lost. While I know that the Burrup Peninsula was subjected to 'salvage archaeology', and that some engravings and midden finds were removed for safety, I feel we will come to regret decisions made on the Burrup. Nothing can replace the situation as it was. An outstanding rock art region was destroyed, a region where art and environment were wholly representative of thousands of years of exploitation - ruined, in part, so swiftly.

S. E. Minchin, Vasse, Western Australia

EDITOR'S RESPONSE

Thank you for your comments on our brief report. I quite agree with you that the dating methodology being developed for the cave art sequence of Malangine Cave could prove very valuable. 'Direct', nonarchaeological dating of rock art has hardly ever been attempted anywhere. Some 'plausible' minimum dates were only recently obtained for Californian petroglyphs by geochemical means (by Dr D. Whitley) but the method is still embryonic, involving many potential sources of error. Besides, *minimum* dates have been provided by archaeological, 'associative' dating in many countries, including Australia. Our methods, if successful, will provide *absolute* dating with comparatively small error margins.

There is one point I must emphasise. Whilst the occurrence of a limestone piece on Depuch Island (an island which consists entirely of dolerite) is indeed intriguing, limestone as such cannot be dated by our methods, and even if its age were determined it would be archaeologically irrelevant. What we *can* date, with luck, is *reprecipitated* limestone, i.e. a migratory calcium carbonate that has been precipitated as a speleothem. Such secondary calcite deposits contain radiocarbon; they often contain small traces of other radioactive elements; and they contain both isotopes of oxygen. The first two types of indices may, under favourable conditions, yield absolute ages, while palaeoclimatic information can be inferred from the isotope ratio of $^{18}O/^{16}O$. Since the petroglyphs in Malangine Cave are sandwiched between layers of such limestone deposits their ages must lie between the ages of the underlying and overlying rock laminae. Later comparison with the rich archaeological sequence in the floor deposits of the cave might assist in 'fine tuning', as will an organic deposit on the cave ceiling (soot), and isolated flakes of calcite lamina which have fallen from the ceiling and become embedded in the sedimentary stratigraphy. Sounds simple really, but in practice there are many problems to overcome.

Since a similar sequence of rock art and calcite deposits is not known to exist anywhere else, and since there are only two other caves known in the world where even one layer of art is sandwiched between layers of redeposited limestone (one such site was found by us in Europe, the other is at Mt Gambier, where Malangine Cave is) our dating methodology will be of very limited applicability.

Your perceptive comment about Australian evidence of Holocene sea level changes (such evidence occurs in many Australian regions) reminds me that I have also emphasised the archaeological significance of this phenomenon. In a still unpublished major report I discussed the observation that in certain areas deflated living floors occur frequently on the landward side of the high watermark of the early Holocene transgression. Conversely, I have observed that many petroglyph sites along the west coast of Canada seem to relate to a slightly lower sea level than the present one, and I have recently drawn Professor Steinbring's (the leading Canadian rock art specialist) attention to this important matter. This is one of several reasons why I have for some time thought that the oldest petroglyphs on America's west coast are of Pleistocene age—a hunch now supported by the latest dates Whitley has obtained. Incidentally, Whitley's latest article will be published in the forthcoming issue of this journal.

R. G. Bednarik

Petroglyph on the limestone ridge at Port Hedland, Western Australia, located on a horizontal rock pavement. The motif closely resembles a wooden spear thrower. Recorded by R. G. Bednarik on 31 March 1968.

AURA NEWS

In each November issue of *Rock Art Research* we will publish a list of the new members the Australian Rock Art Research Association has gained during the previous twelve months.

We welcome the following new members:

Ms Josephine McDonald, Stanmore, New South Wales
Mr Daniel Leen, Kirkland, U.S.A.
Natal Museum, Pietermaritzburg, South Africa
International Committee on Rock Art, Capo di Ponte, Italy
Dr A. L. Brown, Nathan, Queensland
Mr Ross A. Ellis, Telopea, New South Wales
Dr Karl Heinz Striedter, Frankfurt/Main, West Germany
Mr W. T. Bluff, Mortdale, New South Wales
Mr F. L. Virili, Paris, France
Dr R. Sengupta, New Delhi, India
Mr Elery Hamilton-Smith, Carlton South, Victoria
Mr James W. Royle, Jr, San Diego, U.S.A.
Dr Peter Hiscock, Kenmore, Queensland
National Parks and Wildlife Service, Broken Hill, New South Wales
Ms Siri C. Omberg, Eltham, Victoria
Dr Karen M. Nissen, Belmont, U.S.A.
Mr Chris Ballard, Turner, A.C.T.
Professor Fay Gale, Adelaide, South Australia
Moravské Museum, Brno, Czechoslovakia
Dr V. S. Wakankar, Ujjain, India
Mr Denis O'Meara, Perth, Western Australia
Mr Alexander Marshack, New York, U.S.A.
South Australian Museum, Adelaide, South Australia
Mr José Ceballos Del Moral, Santander, Spain
Dr G. Alexander, Kenthurst, New South Wales
Mr Kelvin L. C. Officer, Belconnen, A.C.T.
Dr Josephine Flood, Garran, A.C.T.
Ms Joy Lee, Umina, New South Wales
Queen Victoria Museum, Causeway, Zimbabwe
Native American Rock Art Research Associates, Monticello, U.S.A.
Ms Laurajane Smith, Annandale, New South Wales
State Reference Library of the Northern Territory, Darwin, Northern Territory
Miss Natalie R. Franklin, Artarmon, New South Wales
Dr Colin I. Busby, Hayward, U.S.A.
Mrs Frances Quiroz, Norwalk, U.S.A.
M. Koettig, Glebe, New South Wales
Dr Robert Mark, Menlo Park, U.S.A.
Mrs Evelyn B. Newman, Sunnyvale, U.S.A.
Mr William D. Hyder, Santa Barbara, U.S.A.
Ms Joyce Antorietto, Chula Vista, U.S.A.
Mr Mark Massie, Fresno, U.S.A.
Mr Ken Hedges, San Diego, U.S.A.
San Diego Museum of Man, San Diego, U.S.A.
Dr Eric W. Ritter, Redding, U.S.A.
Ms Eve Ewing, San Diego, U.S.A.
Ms Eileen M. Green, North Las Vegas, U.S.A.
Mr Mark Oliver, Santa Barbara, U.S.A.
Ms Carolyn P. Martin, Cambria, U.S.A.
Mr Frederick Boehme, Glen Waverley, Victoria
Mr Anthony Casoar, Oak Park, Victoria
Professor Jack Steinbring, Winnipeg, Canada
Dr Stephen Graves, Elsternwick, Victoria
Mrs Ilse M. Reindl, Judenburg, Austria
Mr Gerhard A. Bednarik, Balga, Western Australia
Mrs Margot Wellman-Scharpenberg, New York, U.S.A.
Instituto Nacionale Antropologia y Historia, Hermosillo, Mexico
Professor P. J. Ucko, Southampton, England
Canterbury Museum, Christchurch, New Zealand
Professor H.-G. Bandi, Berne, Switzerland
El Museo Canario, Las Palmas, Canary Islands
Mr Thor Conway, Sault Ste. Marie, U.S.A.
Dr Deirdre Dragovich, Sydney, New South Wales
Dr Hugh C. Cairns, Sydney, New South Wales
Professor Sylvia J. Hallam, Nedlands, Western Australia
Mr C. N. Dubelaar, At Haren, Netherlands
Ms Jane Jacobs, Adelaide, South Australia
Flinders University of South Australia, Bedford Park, South Australia

Accordingly, our membership now stands at 201. In response to the recent slow-down in growth we have already commenced a major recruiting program. The first stage of this involves the individual approach of potential members: approximately 600 rock art specialists will be approached in this way.

In addition we are also hoping that you will assist in expanding our membership. Expansion is necessary to eliminate our reliance on subsidy. In the first year of operation AURA had a funding shortfall of about $ 7000 (which was met by the editor). Although the second year's result will be significantly better, a considerable increase in subscription numbers is still required before AURA can become self-supporting. There are two ways in which you can greatly assist us: by forwarding to us the names and addresses of anyone who in your opinion could be interested in becoming a member or subscriber; and by arranging for institutional subscription/membership of the institution you are associated with.

With Christmas just around the corner, perhaps you could contemplate a gift subscription for an acquaintance or associate? It might just solve your problem of having to find a thoughtful gift; it would alleviate our problem; and it would serve rock art studies by raising awareness.

*

Further to the suggestion that AURA should produce promotional material such as stickers, badges or T-shirts we report that, although considerable interest was expressed, it was not sufficient to proceed with this proposal for the time being. We will revive the idea at a later stage, when our membership has grown further.

Recent Lectures

'Aboriginal Rock Art in Olary Province' was the title of an address given by Margaret Nobbs on 2 August 1985 to the Millicent Field Naturalists Society meeting held in the National Trust Complex, Millicent. The text followed the article in *Rock Art Research* (November 1984). Slides were shown of nine shelter painting sites in the granite areas of the northern part of the Province, and of seven petroglyph sites in the southern part of the area. The sites were discussed with reference to the art surfaces and their suitability, and to the environment present and inferred from the past. The slides were comprehensive for each painting site, and in the case of the petroglyph sites they illustrated the more unusual motifs present. Answers to questions after the slides filled out the different facets of the rock art in Olary Province.

*

In addition to the lecture 'The Cave Art of Australia', presented at the XIIth ARARA Symposium, Robert G. Bednarik gave another talk during his most recent study tour of North America. He had been requested by the University of California, Los Angeles, to deliver a lecture on 'Current Developments in Australian Rock Art Research'. UCLA is now the principal academic centre for rock art studies in the United States, and the lecture was presented by its Institute of Archaeology, in conjunction with the Art Department Museum of Cultural History, and cosponsored by the Friends of Archaeology Archaeological Society. It was held on 4 June 1985 and very well attended.

Bednarik began by outlining the massive wealth of rock art in Australia, and reviewing the various past Australian approaches to rock art. A more detailed discussion of current epistemological models followed, leading to comments about several specific and pragmatic recent developments in conservation, site management, public awareness and research orientation. The discourse was followed by a presentation of film material (some of which was produced by AURA member J. Ondracek), and a question period lasting almost one and a half hours. The length of this question time is indicative of the interest in Australian rock art that now exists overseas.

*

A lecture on prehistoric research in the Mt Gambier region, presented by Geoffrey Aslin and Peter Penney on 5 July 1985 at the Millicent National Trust Building, included much information on the recently-discovered cave art of the district. Geoffrey related his early reconnaissance work during the 1950s and 1960s, the period that saw large scale artefact collecting in the region. Through the intervention of Graeme Pretty, he and Peter joined the Parietal Markings Project, a move that has greatly accelerated the program of locating cave art sites in the Mt Gambier region. Geoffrey and Peter concluded their presentation by showing a selection of their excellent slides, illustrating with them the sites described in the lecture.

*

Elizabeth Hatte presented a lecture on 'The Rock Art of the Peak Range' at Melbourne University on 1 August 1985. It summarised research carried out on the art in the five recorded rock art shelters in the Peak Range, part of the Central Queensland Highlands. The art comprises hand stencils in four shelters and painted red linear and track figures in the fifth. The discussion focused in particular on issues of regional comparison, site usage and a population analysis of the hand stencils. The art lies within the boundaries of the 'Central Highlands Tradition' of rock art. Evidence also suggests an association between the stencilled shelters and living/working centres; and for the fifth site, an association with ritual activity of some kind. Lastly, analysis suggested that the hand stencil population, while showing considerable variation in size and shape, consists in almost sixty percent of cases of small children's hands.

*

'Current Trends in Rock Art Studies' was the title of a lecture in the Seminar Series of the Department of Archaeology, La Trobe University, given by Robert G. Bednarik on 29 July 1985. The address illuminated the organisational structure that supports rock art research, comparing Australia with the rest of the world. It also included an examination of the research approaches that have evolved in Australia, how they compare with each other, and with those currently in use in other countries possessing major traditions of rock art studies. The address was followed by a film presentation, showing selected art sites in many parts of Europe, America and Australia, including some of the recently-discovered cave sites in South Australia and Western Australia. The following, lengthy question and discussion period soon departed from the lecture theme and then centred on Australian cave art.

* * *

Many other AURA members have recently given extracurricular lectures on rock art. For example, a series of such presentations are listed in our report of the XIIth ARARA Symposium (in this issue of *Rock Art Research*). We would appreciate receiving abstracts of further lectures by AURA members, which should be published to provide a guide to prevailing research orientation, to facilitate the co-ordination of research projects, and to provide a permanent record.

CANADIAN ROCK ART SPECIALIST TO BE INVITED BY AURA

One of the foremost rock art specialists of North America, Dr Jack Steinbring (Professor of Anthropology, University of Winnipeg), is being invited by AURA to visit Australia. Steinbring, a past director of the Manitoba Pictograph Survey, has recently secured minimum dating for Canadian rock art at his Mud Portage site, northwestern Ontario. We believe that this is one of only two successful attempts so far to date North American rock art by credible, scientific means.

A highly innovative approach to rock art has also been recently pioneered by Professor Steinbring, together with psychologist Gary Granzberg. Their paper 'Ideological and cosmological inferences from North American rock art: an exploratory discussion' will be published through the San Diego Museum of Man. At present Steinbring is planning a textbook on rock art studies—a project that should create much interest among Australian rock art specialists.

The visit of this distinguished Canadian scholar is tentatively planned for early 1987 but no details have yet been established. Prehistory departments and other organisations are invited to register their interest in securing lectures, or in having the visitor participate in some other, rock art-related event. Professor Steinbring has indicated that he would be glad to give illustrated lectures on the following topics:

(1) Early Rock Art in North America.
(2) The Origin and Development of Prehistoric Metal Technology in North America.
(3) The Impact of Television on Native Communities in Canada.
(4) Other suitable topics related to rock art.

Please submit proposals to the editor.

NOTICES AND REQUESTS

AURA has been nominated as an information resource by the National Referral Center, U.S.A., on the subject of rock art research. This referral service is part of the Library of Congress, in Washington, D.C. It directs those who have questions concerning any subject to organisations that can provide the answer.

The National Referral Center handles referrals in virtually all subject areas, including the arts and humanities. While it maintains systematic coverage only for resources in the United States, its computerised file of 13 000 organisations also includes some international resources.

Rock Art Research is now listed by international periodical directories, and our major papers are regularly covered by abstracting services. We receive information-oriented and other enquiries from vastly differing sources, ranging from people who wish to visit sites to the publishers of the *Guinness Book of Records*.

•

We draw the attention of our readers to the request on pp. 133-4, inviting recommendations and comments on the subject of rock art inventory forms, and on the formulation of minimum recording standards in general.

•

We are pleased to announce that John Clegg and David R. Moore have been included in the editorial board. Both scholars are so prominent in Australian rock art research that they need no introduction here.

•

Back issues of this journal are available, at the normal subscription price per volume.

•

Further notices and requests are on pages 118 (Rock Art Archive), 173 (forthcoming events) and 176 (field trip).

aura

ERRATA

Volume 2, No. 1 (1985), p. 4, column 2, line 8:

'is limited to the central Queensland highlands'
SHOULD READ
'is limited in the central Queensland highlands'

Volume 2, No. 1 (1985), p. 86, second paragraph of Josephine Flood's report:

Dr Flood states that only two overseas representatives were present at the International Conference on Palaeolithic Rock Art at Perigueux: Professor Ucko and herself. Dr Ann de G. Sieveking reports that two more Englishmen attended the conference: her husband, Dr G. de G. Sieveking, who chaired one of the opening sessions; and Dr P. G. Bahn. Ann Sieveking failed to attend due to temporary illness, but did contribute a paper.

While this does not significantly alter the point made by Dr Flood it does demonstrate that English interest in Palaeolithic art is greater than could be inferred from her report.

NOTES FOR CONTRIBUTORS

Manuscripts of research papers should preferably be from 2000 to 5000 words. Longer articles will be considered on the basis of merit. Submissions should contain the original, together with one copy, typed in double-space, with a five centimetre margin on one side of each page. Please underline words to be italicised, and identify each page by number and the author's surname. The content of the paper should be outlined by three to five key words (e.g., 'Petroglyphs - patination - style - Pilbara') placed above the title.

Footnotes ought to be avoided where possible. The bibliography and references in the text should follow the conventions established in most Australian archaeological and anthropological journals, following the style indicated in this issue.

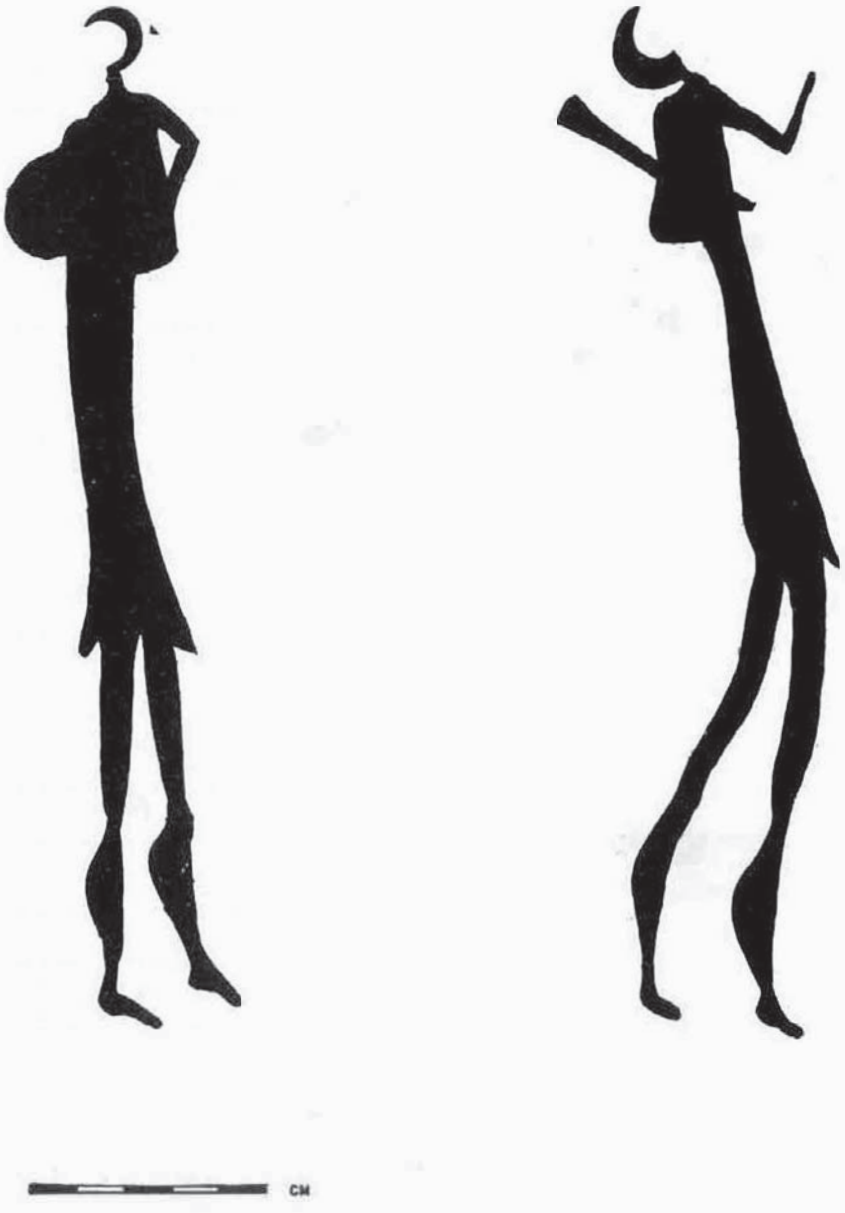
If line drawings are included, they must be larger than the intended published size (by a factor of about 1.5 to 2) and line thicknesses, stippling, lettering sizes, etc. must be selected accordingly. Photographs should be black and white gloss prints of high contrast. Captions (on a separate sheet) 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.

There are no formal deadlines, but material intended for a particular issue ought to be available about three months before publication. Galley proofs will not be issued. Each author, or group of co-authors, will receive thirty free copies of their article; additional copies are available at cost.

All correspondence should be directed to:

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

Typesetting by Elfriede K. Bednarik, Archaeological Publications
Printed by Complete Print Shop, Melbourne



South African rock paintings of anthropomorphs (see article by W.J.J. van Ryssen)