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Tasselled Bradshaw figures with paunches and fingers shown, approximately 100 cm tall. Light reddish-brown, Kimberley, Australia.
(Refer to article by D. Welch, Figure 1, page 24.)

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

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

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THE ARCHAEOLOGY OF UPPER PALAEOLITHIC ART: ASPECTS OF UNIFORMITARIANISM

David W. Cameron

Abstract. This paper demonstrates that archaeological studies, particularly those concerned with the study of rock art, cannot invoke a general principle of uniformitarianism in order to explain the past. Nor will a more detailed understanding of substantive and methodological uniformitarianism enable archaeologists to interpret the past through rock art studies. In uncritically borrowing distinct principles of uniformity from the earth sciences, archaeologists have failed to identify a principle of uniformity that is unique to archaeology - a 'uniformity' of association.

Introduction

The recognition of two distinct principles of uniformity within the general term of 'uniformitarianism' by geologists (Hooykaas 1963; Gould 1965; Simpson 1970; Shea 1982) has recently been adopted by some archaeologists in order to help define a scientific methodology for archaeology (Bailey 1983, 1986; Fletcher 1986; Foley 1987; Gould 1980; Isaac 1986; Murray and Walker 1988). The adoption of substantive and methodological uniformitarian principles (using Gould's 1965 terminology) by some archaeologists has tended to hinder the development of a scientific paradigm for archaeological interpretation. This is because no distinction is made between interpretations that are based on associative and substantive uniformitarian principles. Methodological uniformitarian principles, defined as 'processual principles asserting spatial and temporal invariance of natural laws' (Gould 1965: 223), are a basic premise to any scientific analysis. Methodological uniformitarianism is thus concerned with connecting processes to past and present material conditions. These principles, when applied to the archaeological record, will enable archaeologists to analyse the past without depending on particular ethnographic examples. This is particularly true for the interpretation of prehistoric art.

The second principle, substantive uniformitarianism, is a testable theory of change postulating a uniformity of rates or material conditions (Gould 1965: 223). A distinction, however, must be made between these propositions and *associative* principles. Principles of associative uniformitarianism are not subject to a uniformity of rates or material conditions and thus they cannot adequately identify processes. It is suggested here that, if interpretations of archaeological data, and of prehistoric art in particular, are to escape from the oft-proclaimed unscientific approach, then we must acknowledge that archaeology has its own unique form of uniformitarianism. It is a uniformity principle based on associative evidence and ethnographically derived analogues, which cannot adequately explain processes. Although a 'uniformity' of association is not necessarily a uniformity as such, it is maintained as a general principle of uniformity as the association between prehistoric process and observed extant result in many cases cannot be refuted.

Recent discussions concerning the use of analogy within archaeological studies (Bailey 1983, 1986; Binford 1981, 1983; Gould 1980; Gould and Watson 1982; Gamble 1986; Isaac 1986; Murray and Walker 1988; Walker 1984a, 1984b; Wylie 1985) usually conclude that the use of analogy through ethnography is unavoidable and acceptable given the general principle of uniformitarianism. It is also frequently argued that by invoking uniformitarian principles, analogies can be tested through a 'best-fit' correlation between the archaeological record and extant behavioural debris (Salmon 1982; Watson in Gould and Watson 1982; Wylie 1985). Aspects of this can also be seen in Huchet's C/R model which uses both confirmationism and refutation in order to 'test' hypotheses (Huchet 1990a, 1991). As with the 'best-fit' model the most parsimonious model is accepted. This is not only due to an emphasis on confirmationism but also due to the reliance on a 'uniformity of association' rather than invoking substantivism.

The only way that analogies can be tested within the archaeological record is to distinguish between those analogies that invoke substantivism and those that invoke interpretation through association. While substantive uniformitarian principles are always testable, those that rely on associative evidence are often untestable. In using the term 'testable' I refer to testing through refutation and *not* best fit. Testability in this paper is based on refutation as defined by Murray and Walker (1988), and Tangri (1988, 1989a, 1989b, 1990). That is, when first proposing a theory we must define exactly the empirical process that we are using to explain a prehistoric result. After this criterion has been defined, we must then define the sort of data or result that we would expect to be present if the empirical process is valid. If we find data within the archaeological record which contradict the use of the empirical process to explain the prehistoric result, then the extant process is refuted as a cause. Thus the original hypothesis must be modified, or another hypothesis must be proposed and tested in order to ascertain the course of the result. While refutation can be used against substantivism, it

cannot usually be used against associative evidence, because there is no uniformity in process and result and consequently no way of confirming or refuting a hypothesis.

Uniformitarianism and its early historical development

When Charles Lyell first published his first volume of *Principles of Geology* in 1830, he was attempting to explain existing geological formations in terms of observable processes rather than biblical catastrophism. Lyell was by no means the first to propose that existing conditions, rates and processes should be used to help explain present-day geological formations. Such concepts had been broached already by Herodotos (484 B.C.?-425 B.C.?), Leonardo da Vinci (1452-1519), Nicolaus Steno (1638-1686), Robert Hooke (1635-1703), Abbé Lazzaro Moro (1687-1740), Georges Buffon (1707-1788) and of course James Hutton (1726-1797) who is most often incorrectly quoted as having been the first to propose uniformitarian principles (Gould 1987; Shea 1982). All to some degree suggested that existing conditions, rates and processes should be used to help explain the geological history of the earth.

Lyell's principal aim was to remove the then dominant *biblical* catastrophist theory by arguing that there was an 'undeviating conformity of secondary causes' (Lyell 1830: 76) which were responsible for geological change, thus negating the need to call upon supernatural or spiritual origins for geological formations.

> Those geologists who are not averse to presume that the course of Nature has been uniform from the earliest ages, and that causes now in action have produced the former changes of the earth's surface, will consult the ancient strata for instruction in regard to the reproductive effects of tides and currents. It will be enough for them to perceive clearly that great effects now annually result from the operations of these agents, in the inaccessible depths of lakes, seas, and the ocean; and they will then search the ancient lacustrine and marine strata for manifestations of analogous effects in times past (Lyell 1830: 311).

Lyell argued that the geological forces that shaped the earth's surface during the past are the same geological processes that can be observed today. Lyell argued, as did Hutton before him, that the stratification seen in numerous geological deposits was not the result of the biblical flood but of 'cumulative slow changes produced by natural processes operating at relatively constant rates' (Gould 1965: 223), and could readily be observed operating today. For Lyell, while new mountains may form and older ones decay, there is no difference in their basic structure or complexity through time. They are not only uniform in their structure, but also in the processes used to explain their formation and eventual decay.

The development of uniformitarianism was crucial in removing *biblical* catastrophist theory from geology and was largely responsible for placing geology within the hard sciences. The principle of uniformitarianism enabled geologists to test theories of geologic change using empiricism. However, while Lyell accepted that there were two distinct principles within uniformitarianism, he failed to specify these and freely moved from one principle to the other to help explain his 'principles of geology'. This is indeed unfortunate, because if Lyell had specified these two principles the subsequent debate, which was to continue for over a century, could have largely been avoided.

It was not until the 1960s, with the work of Hooykaas (1963), Gould (1965) and Simpson (1970), that these two distinct principles of uniformity were finally identified and succinctly defined. Lyell's first principle of uniformity (substantive uniformitarianism using S. J. Gould's 1965 definition) was concerned with establishing empirically testable rates and conditions which could be used to help explain the past. Substantivism thus leads to hypotheses or statements about the real world that are testable using empiricism. It also distinguishes between speculated past and future 'spiritually' induced conditions and rates from those that are present today. Geologists must explain past and future conditions within the confines of empiricism.

In order to refute *biblical* catastrophist theory Lyell needed to explain how geological phenomena are formed. Lyell proposed a second uniformity principle (methodological uniformitarianism, using Gould's 1965 definition) which asserted the invariance of present day geological processes but not necessarily rates, in space and time. This second principle of uniformity was then used to identify geological processes that gave rise to past and present geological formations. Gould (1965: 226) has defined the difference between the two principles as,

> The present is a key either because we can extrapolate observed rates or conditions to past times (substantive uniformitarianism) or because we establish our natural laws by observing present processes and then extrapolating the laws (methodological uniformitarianism). Both postulate uniformity, but, according to whether this be a uniformity of rates of the material processes themselves or the abstract laws by which they operate, two distinct concepts arise.

Substantive uniformitarianism is concerned with establishing the 'terms of reference' for geologists. This was achieved through the use of present-day material conditions and rates or intensities of process as the testable 'theory' for geologic change. Methodological uniformitarianism is concerned with the identification of universal laws of processes that can be used to explain the development of past and future conditions. Methodological uniformitarianism is thus vital in the way we organise our knowledge of the real world; it is not concerned with making dogmatic statements about how it must be (see Rymer 1978).

Archaeology and uniformitarianism

Recently there has been a great deal of discussion regarding the use of uniformitarianism within the archaeological literature (Bailey 1983, 1986; Binford 1981; Fletcher in press; Gamble 1982; Gould 1980; Gould and Watson 1982; Isaac 1986; Murray and Walker 1988; Wylie 1985). It is unfortunate, however, that very few archaeologists make the distinction between the principles within the general term uniformitarianism. While Bailey (1983, 1986) and Murray and Walker (1988) do differentiate between methodological and substantive uniformitarianism, they both give a uniformity of association as an example of substantivism (Cameron in press). R. A. Gould (1980, Gould in Gould and Watson 1980), Isaac (1986) and Fletcher (in press) define succinctly the difference between methodological and substantive principles, but it is only Fletcher (in press) that makes a further distinction between what he calls 'operative' and 'non-operative' uniformitarian principles that should be recognised when discussing the available archaeological evidence.

The current use of substantive and methodological principles within archaeology can be seen in the development and use of relative dating techniques. For example, in dating prehistoric pictures, it can be demonstrated that given the differential rate at which particular figures were

applied (substantivism), we can ascertain that those figures beneath are chronologically earlier than those that overlie them. Thus we can propose the methodological principle of superpositioning in order to relatively date art. This can also apply to rock art found within archaeological deposits. For example, at Roc de Sers in the Charente valley of France, a low relief frieze depicting ibexes, horses, bison and men has been dated to be no later than the Solutrean (about 17 000 BP). This date has been established because the frieze had fallen from its original position during prehistory and was found between two dated stratigraphic horizons (Leroi-Gourhan 1982). Hence it can be no later than the overlying deposits. These chronological propositions are clearly methodological in nature.

Another example of substantive and methodological propositions currently used in archaeology can be seen in the study of faunal material from open air sites. The identification of bone fragments within a 15 000 year-old archaeological deposit will enable the methodological proposition of sexual reproduction to tell us that this bone is from a species of reindeer. This implies that at some time in the past the rest of the reindeer skeleton was attached to this bone. The species identification, however, is based on the substantive proposition of a slow, gradual rate of evolutionary transition which enables us to identify the biological constant of past and present reindeer species. From this one bone we can infer that reindeer was present in this general location 15 000 years ago (Gamble 1986: 18). While the presence of this one bone within the deposits may be useless for ethnographic reconstructions, such material, scattered across a long time span and a wide spatial distribution, can be extremely informative for the study of large-scale process (Fletcher in press). This form of methodological uniformitarianism is currently widely applied to the archaeological record, particularly when invoking the use of MNI (Minimum Number of Individuals) in archaeological analyses.

A major problem arises in archaeology, however, when archaeologists try to explain how this single reindeer bone found its way into the archaeological record. The explanations often rely on associative evidence. While the presence of the bone will not change our conclusion regarding the presence of at least one reindeer from the single reindeer bone found in the archaeological deposits, the human behavioural activities associated with it (butchering etc.) can alter dramatically given these same factors. Gamble proposes that inferences about past human behaviour can be gained through the use of 'uniformitarianism by which the present provides observational data on processes which let us unlock the information contained in the records of the past' (1986: 18). This statement is clearly based on methodological propositions. Gamble's subsequent insight, however, into 'the set of decisions that were made with regard to unlocking the energy in that animal carcass' (1986: 18) is largely based on *associative* uniformities founded on the stone tools associated with the skeletal material, spatial distribution and extant analogies. The 'set of decisions' involved in the butchering of the carcass is dependent largely on associative uniformities regarding the processes involved in the formation of the archaeological material condition, which cannot easily be tested.

Currently many archaeological interpretations are based on associative uniformities. Archaeologists using extant analogies may identify similar patterns in the archaeological record to those observed in the present, but there is no way of ascertaining whether the contemporary process which results in the contemporary material condition is also responsible for the prehistoric material condition. Similar patterns observed in the ethnographic and archaeological record need not be a result of a similar behavioural process. Archaeology cannot define a constant correlation between process and material condition. It can only correlate prehistoric archaeological material conditions to contemporary material conditions through the use of association/analogy. This type of approach cannot deal satisfactorily with cultural change through time and/or space. The problem with this type of approach is best summed up by Gould (Gould, in Gould and Watson 1982: 371):

> ... detailed similarities of form in class of historic and prehistoric artifacts, like ground and polished stone axes, may turn out to have been produced by widely differing lithic reduction and shaping processes ... they remain only interesting coincidences. What we are concerned with here is the interconnectedness of things, not merely their correlation.

The identification of similarities between past and contemporary behavioural patterns and the subsequent confirmation of the contemporary process to explain the prehistoric result must be viewed with some caution. Archaeological statements which are based on such untestable associative correlations between contemporary and prehistoric material conditions are distinct from testable substantive principles. This is one of the major problems with Lewis-Williams' 'neurological bridge' between historic shamanistic imagery and its applicability to the interpretation of Upper Palaeolithic art (to be discussed presently).

The use by archaeologists of ethnographic data has often resulted in the confirmation of extant processes and results as explanations for the past. For example, Marshack's interpretive analysis of Upper Palaeolithic art as a component of 'ritual' practice (1972, 1977, 1985, 1989), Lewis-Williams' (1980, 1981, 1983, 1984, 1987), Lewis-Williams and Dowson's (1988, 1989) and Lewin's (1991) 'shamanistic religious' interpretations are examples of uniformities based on ethnographic analogies. A similar scheme is put forward by Huchet (1990b) in his discussion of cicatrices depicted on anthropomorphs in the Laura region of north Queensland. He argues that his 'visual comparative approach' suggests that these depictions give support to the ritual/ceremonial significance of the art. All of these themes, however, rely on an association between extant behavioural process-result and their projection onto the archaeological record for a means of explanation. Indeed, Marshack (1989) justifies (see below) his uniformity of ethnographic association based on a 'best-fit' confirmationism, similar to the scheme proposed by Salmon (1982) and Wylie (1985). The problem with these methodological interpretations is that they are based on untestable associative propositions rather then testable substantive principles.

Gould (1965) has suggested that it is no longer necessary to invoke substantivism, as its very premise (uniformity in rate and material condition) has been refuted in almost all aspects of geology. He also argues that methodological uniformitarianism should be dropped because it is merely a definition of science. However, if we reject testable substantivism we are in danger of proposing methodological statements about the past which are based on untestable associative principles (Cameron in press). By definition, substantivism is testable and because of this it must be considered vital to any methodological proposal that attempts to explain past material conditions in terms

of contemporary processes. For example, the recent analysis of the Upper Palaeolithic paints used at Niaux has demonstrated that four paint recipes were used at this site, and that each recipe displays a technological homogeneity (Clottes et al. 1990). This conclusion is based on the substantive principle that the rates at which ingredients were mixed were constant. It enables the methodological proposition to be proposed that the differential proportions of ingredients in each recipe, if duplicated at any time, will always result in the same paint being obtained. In order to determine the scientific value of a methodological proposition we must maintain a distinction between testable substantive principles and untestable associative principles.

In summary, because no clear distinction has previously been made regarding the distinction between substantive and associative uniformities, a pseudo-debate has occurred regarding the testability of analogies within archaeology. Substantivism is concerned with continuity between past and present material conditions and argues that constant rates have produced the result (e.g. a constant rate of ^{14}C decay). These uniformities are testable. Methodological proposals are concerned with connecting processes to material conditions by arguing that processes have never changed (e.g. ^{14}C decay enables us to use this constant process to formulate radiocarbon dating). In other words, only one process can have produced one particular condition. While this hypothesised correlation between a particular process and material condition must remain uncertain, we can concentrate on the implications of that process and try to refute it. Associative uniformities are like methodological propositions in presuming one process results in one material condition and they are also like substantivism in that they presume a constant correlation between contemporary and past material conditions. Associative uniformitarian principles, however, are based on untestable correlations between the past and present material conditions and the processes used to explain their formation.

Associative uniformitarianism and the analysis of Upper Palaeolithic art

The work of Marshack (1972, 1977, 1985, 1989, 1992) invokes both methodological and associative propositions in his analysis of the function of Upper Palaeolithic art. Marshack does not draw any distinction between these uniformities and usually calls on a 'best-fit' confirmationist paradigm to 'test' his results. Marshack's microscopic analysis of the Blanchard plaque, for example, enabled him to identify that a number of the incised lines were distinct and were the result of differential rates of applied pressure. The substantive correlation between past and present conditions enabled Marshack to identify a number of 'different cross-section prints', which led him to the methodological proposition that a number of tool points were used in the manufacture of the incised lines on the plaque.

This type of analysis can readily be tested using the empirical data-base by trying to reproduce similar 'cross-section prints' from a number of differing engraving points. Marshack's microscopic analysis of the Blanchard plaque has revealed that different engraving points may have been used. Marshack argues that differing tool points can be identified as having been used as a result of distinct incision morphologies. The presence of these morphologies are reflected in the distinct 'style of stroke and pressure' (1972: 447) that can be observed. Marshack argues that the image on the plaque was *not* conceived and executed at a single moment, as twenty-four morphologies or styles of 'stroke and pressure' can be identified. Hence he concludes that the Blanchard plaque represents at least twenty-four different periods of execution. He then goes on to argue that this time-factoring interpretation most likely represents primitive tallying/arithmetic, and/or a calendrical device, indicating the complexity of the cognitive abilities of the maker.

While Marshack's calendrical proposition for the Blanchard plaque may indeed be correct, it is just as likely that the marks could have been produced in one brief moment of time by a group of people sitting around a fire. The association between 'different marks/points equals time depth' is no more valid than 'different marks/points equalling communal activity'. A number of similar results can be achieved by a number of different processes. Marshack's interpretation is scientifically meaningless in the sense that it is based on an untestable associative principle.

While Marshack's morphology of tool points may be open to question (see d'Errico 1991, 1992, discussed below) he has, however, shown using substantivism that Upper Palaeolithic people did indeed produce time-factored art. By invoking the substantive proposition that weathering rates remain constant, given particular conditions, Marshack has identified a number of differential rates of wear and erosion and over-engraving on numerous artefacts (Marshack 1972: 447, 1979: 278, 1985: 95, 1989: 23). Hence in accepting this proposition (which can be empirically tested), Marshack can identify time depth in the creation of a number of art objects.

D'Errico (1991, 1992) and Bednarik (1991) have come to similar conclusions and confirmed some of Marshack's substantive propositions in their microscopic analyses. However, they have shown aspects of Marshack's substantive commentary to be inaccurate. D'Errico's objections are based on Marshack's reliance on identifying modes of production through interpreting the direction of the incisions and the use of differing tools through a description of morphology. The interpretation of many of these 'distinct' morphologies have been shown by d'Errico (1992) to be questionable. A number of Marshack's distinct morphologies can be shown to be the result of the same tool. For example, d'Errico (1992) has presented evidence that marks on the La Marche bone which Marshack attributes to differing morphologies, and thus tool points (hence time-factoring), are the results of the same tool being rotated or the user exerting differing degrees of pressure to inscribe the lines. As stated by d'Errico (1992: 62),

> The engraver, in effect, aimed to produce *the largest number of morphological differences between the sets while using a minimal number of tools* (highlighting by d'Errico).

While d'Errico would perhaps be the first to suggest that this does not refute Marshack's calendrical thesis, it is the substantive method outlined by d'Errico (1991, 1992) that will help us identify such events. The identifications of such events, however, still do not confirm Marshack's calendrical proposition. At most, all it indicates is that various engravings were done at different times. Hence Marshack's methodological proposition which is based on an associative assumption that 'time lapse equals calendrical device' and thus complex cognitive abilities, must be viewed with some caution.

The numerous interpretations of Upper Palaeolithic paintings and engravings as representative of particular social functions (such as hunting, fertility, religion, language etc.) also largely rely on associative uniformities that underline an association between prehistoric images and their prehistoric and extant 'meaning'. These include Collins and Onians (1978), Conkey (1983), Davidson and Noble (1989), Gamble (1982, 1986), Graindor (1987), Huchet (1990b), Lewis-Williams (1980, 1981, 1987), Lewis-Williams and Dowson (1988) Marshack (1972, 1977, 1979, 1985, 1989) and Rosenfeld (1977). Collins and Onians' discussion of the 'origins of art' is closely aligned with other 'characteristic marks of his humanity' (1978: 1). These include burials, 'cave bear cults' and human migration. It is this collective association between a number of archaeological and evolutionary behavioural events (including the emergence of 'modern man', especially by Onians 1978: 17) that are used to help 'explain' the emergence of art. In using such associations, however, nothing is explained, only confirmed.

The interpretation of Upper Palaeolithic paintings and engravings as representative or schematic figures of human, animal or geographical images is also based on an associative uniformity, one which underlines an association between prehistoric images and their prehistoric and extant 'meaning'. In some cases, the function of these images is also considered given their extant and archaeological association. For example, Lewis-Williams (1980, 1981, 1987) and Lewis-Williams and Dowson (1988) imply that Upper Palaeolithic art should, from their examination, be considered as representative of shamanistic religious practices. This conclusion is based on an implied similarity between the postulated extant trance imagery of San rock art and Upper Palaeolithic rock art. Even if there were such similarities, we would have no way of knowing whether the correlation with shamanism applied in the past. The implied methodological proposition that shamanistic imagery will result in a similar depiction throughout time and space (their 'neurological bridge') cannot be maintained. A number of social, cultural, trance-like or non-trance-like episodes may or may not result in similar depictions. The similarity between past and present material conditions is not based on substantivism, but is based rather on associative evidence. Thus we cannot invoke the present process to explain the formation of the prehistoric material condition. Hence the associative correlation between Upper Palaeolithic and Holocene shamanism cannot be maintained.

As discussed previously, the emphasis placed upon association by archaeologists fails to account for process, causes or results. This is the problem with the 'neurological bridge' of Lewis-Williams: archaeologists using extant analogy may identify similar patterns in the archaeological record to those observed in the present, but similar patterns need not be the result of a similar behavioural process. Ethnoarchaeology in most cases is unable to identify what is a constant behavioural result because it cannot define varying behavioural processes through time. This type of approach cannot deal satisfactorily with cultural change through time and/or space because analogy is used to confirm the extant process involved in the prehistoric result or to confirm the constancy of behaviour, rather than to refute it.

This very same criticism of Lewis-Williams' interpretations can also be aimed at Marshack's religious and symbolic interpretations of Upper Palaeolithic art (1972, 1977, 1979, 1985, 1989). Marshack interprets the often depicted Upper Palaeolithic zigzag meanders as representing water or streams, based on their association with some very schematic 'fish' and 'water birds' (1979: 272, 1989: 26). This interpretation of water, however, becomes less convincing when another schematisation of a 'fish' is associated with dots, which are then also argued to represent water (1989: 25). Such uniformities appear to be the product of the identification of fish 'schematisation', which then result in associative patterning being interpreted as water. Again, Marshack's interpretations may or may not be accurate. But the very degree of variability displayed in the representation of water during the Upper Palaeolithic shows that interpretation through association is unable to demonstrate prehistoric intent or meaning. Such interpretations are beyond the realms of substantive or methodological uniformitarianism.

Gamble (1982, 1986) interprets Upper Palaeolithic art in terms of its differential production, in order to identify potential behavioural change. He suggests (1982: 101) that the difference between Neanderthal and Cro-Magnon populations was that Cro-Magnons had the ability to form strong social and cultural alliances based on passive communication, which was founded on a shared emphasis on female figurines. This, coupled with a deterioration in climatic conditions, resulted in a reduced demographic viability for Neanderthal populations. While this search for a general factor of behavioural norms and anomalies is a distinct advance, in that it does not invoke interpretative discussions of individual artefacts and particular events, a major problem is his assumed association of female figurines to Co-Magnon populations as well as a correlation between 'climatic deterioration' and a decrease in Neanderthal populations. These correlations are based on associative evidence. This interpretation is at the mercy of sampling and differential preservation biases. Indeed, the very mobility of the art involved in Gamble's analysis suggests that any such association is tenuous, at best.

Conkey (1978, 1980, 1983) also invokes an interpretation of Upper Palaeolithic art through an examination of differential reproduction. As with Gamble, Conkey's approach is a distinct advance, in her application of statistical techniques in her search for uniformities and anomalies. While there may be problems in relation to the availability of a sufficient sample size, this is a problem in almost all analyses of the archaeological record. Conkey argues against Gamble's biological association between modern *Homo sapiens* and Upper Palaeolithic art. She suggests that early developments during the Mousterian may have 'gelled', or 'come together' *after* the emergence of *Homo sapiens*. Conkey bases her argument on the 'explosion' of differing behavioural directions within the Würm III/IV Solutreo-Magdalenian. Conkey's analysis, like Gamble's interpretation, is based largely on negative evidence. Thus, rather than examining differential reproduction, we may be seeing differential preservation and sampling; as Conkey herself warns, this period is the only stadial (pleni-glacial) for which we have a relatively full and 'complete' record (1983: 221).

Rosenfeld (1977), in her discussion of the engraved 'female' torso figures from the Magdalenian site of Gönnersdorf, states that it was only after the discovery and interpretations of the Gönnersdorf figures that 'similar' figures from other sites could be interpreted.

> Indeed it is largely from the Gönnersdorf material that the anthropomorphic identity of most of these other figures can be suggested

> with some degree of certainty. Their previous identification as 'human' was largely intuitive (1977: 93).

The interpretation of the Gönnersdorf figures as representing profile female torsos is based on a number of criteria that are considered collectively to identify anthropomorphous figures, which are based entirely on diagnostic biological characters. Rosenfeld specifies that, before any comparison can be made between figures, it is necessary to make explicit the assumptions that underline such an interpretation. Thus, in order to come to any meaningful conclusions, one must take into account the degree to which schematisation differs between figures. Therefore, for valid comparisons to be made, the figure must portray a similar manner of schematisation. Another consideration is the extent to which selected characters are either emphasised and/or reduced. She uses the figures to ascertain whether or not suggested similar figures from other contemporary sites can also be considered to represent profile female torso figures, depending on their similarity to the Gönnersdorf figures.

Rosenfeld's methodology is sound in the sense that she specifies what attributes constitute her specified style. Thus it is possible to examine individual objects and allocate them as female torso figures according to the presence/absence of certain attributes. The style is acknowledged as not representing an ontological statement, but reflects a working parameter. Rosenfeld argues that the previously suggested female torso engraving from Rondu du Barry can no longer be considered as such, because it does not emphasise the same morphological characters as those portrayed at Gönnersdorf. A similar conclusion is also reached concerning the figures from Gouy (1977: 98-100). Rosenfeld's model, however, cannot be used to identify 'female' schematisation in Palaeolithic art in the sense that the objects do not necessarily represent female schematisation. This component of Rosenfeld's discussion is based on associative evidence. The very interpretation of the Gönnersdorf figures as representing female torsos is based on a similarity in form between female profiles and some of the representations present at Gönnersdorf. Indeed, the interpretation of the Hohlenstein figures is based on a further association of the schematisation and character emphasis between them and the Gönnersdorf figures. Thus Rosenfeld's characterisation of these figures as female cannot be confirmed or refuted as it is based on associative evidence which cannot be tested. While the interpretation of dissimilar objects as *not* female is untestable, Rosenfeld's scheme will allow similar objects to be compared to a defined style based on a number of attributes. This will enable her model to be tested, within the confines of her suggested style. In order to test the model we must look for anomalies within the representations.

So far I have concentrated on those associative uniformities that cannot be tested. There are, however, some associative uniformities that can be tested by examining the empirical evidence. These associative propositions are distinct from the above propositions in the sense that they are not explanatory. That is to say that while suggested unique correlations between present material conditions can be refuted, they cannot identify a testable correlation between past and present material conditions and thus they cannot underpin methodological statements which examine processes.

Leroi-Gourhan examined statistically the internal spatial distribution of prehistoric paintings within a number of particular sites. This enabled him to analyse the spatial relationship of painting clusters within particular caves. The association of particular depictions could then be analysed statistically, with no need to invoke interpretations of cultural or ritual significance of the art (even though Leroi-Gourhan did indulge in such interpretations). For example, Leroi-Gourhan (1979) has demonstrated that within individual caves there is usually a cluster of representative 'animals' — 'bison, wild oxen and horses' — that appear within the central position of the cave, while the next most prominent 'animals' — 'deer, ibex and mammoth' — appear in positions other than a central 'panel'. The last three, less representative pictures of 'animals' — 'lion, rhinoceros and bear' — are always found in the deepest part of the cave. This scheme is open to refutation by examining available cave sites and identifying other similar clusters, which may identify anomalies and 'norms' within the spatial distribution of cave art. While such analyses are testable, they do not result in the *identification of uniformities between contemporary and prehistoric material conditions*, and thus we are not able to develop meaningful methodological propositions because we cannot identify the processes involved in the differential distribution of the art.

Davidson and Noble (1989) invoke a refutable associative uniformity (even though they do not believe that their hypothesis is testable). They correlate the development of language to an increase in 'perception' as displayed by Upper Palaeolithic art. Their scheme suffers from an association between art and modern *Homo sapiens* very similar to that argued by Gamble (1982, 1986), the result being that art is treated as a prerequisite for the development of language rather than as a consequence of a general factor of behavioural evolution. Davidson and Noble argue that it is the development of depiction through images resembling things that transforms such communication into language, during the Upper Palaeolithic. The perception of similarities between objects is considered paramount in the development of language. They state:

> The human capacity to 'see a resemblance' that is to say, to *take note of* the fact an appearance shares features within something else, already depends on a capacity to reflect upon what is perceived. And such reflections can only be delivered through language, or at least some system of simulation (1989: 130).

This interpretation is not based on any methodological principle as it is clear that such capacities are present from at least the Lower/Middle Palaeolithic with the Acheulian tool complex. Indeed, it was not too long ago that the same tautology was being used to associate the increased complexity of stone tool manufacture with the 'origin of modern *Homo sapiens* cognitive abilities' (Brodrick 1960; Campbell 1966; Clark 1962; Von Koenigswald 1956; Washburn and Lancaster 1971). Also, as Bednarik (1992) states, there can be no doubt that the Laetoli child who followed in the footprints of another individual must have been visually co-ordinated, and clearly displays some form of intent. Potts (1987) has also stressed the behavioural traditions of chimpanzees and macaques, which include patterns of tool use and food preparation and their subsequent transmission of these behavioural patterns across generations, indicating that language is not the only means of explaining various cultural traditions (also see Bednarik 1992). Just as these schemes have had to be revised, given the evidence relating to chimpanzee tool manufacture and usage (Leakey and Goodall 1970: 4; Goodall 1971: 83), there is also evidence that chimpanzees have the ability to

'reflect upon what is perceived'. Goodall gives us an example:

> She [Lucy] selected a glossy magazine from the table ... Occasionally, as she leafed through the magazine she identified something she saw, using the signs of ASL, the American Sign Language used by the deaf ... 'That dog', Lucy commented, pausing at a photo of a small white poodle. She turned the page. 'Blue', she declared, pointing then signing as she gazed at a picture of a lady advertising some kind of soap powder and wearing a brilliant blue dress. And finally, after some vague hand movements - perhaps signed mutterings - 'This Lucy's, this mine', as she closed the magazine and laid it on her lap (1990: 10).

There is also evidence that wild chimpanzees have this same ability to reflect upon what is perceived (see Boehm 1989: 38-59; de Waal 1989: 83-7; Goodall 1986: 114-45). Further evidence that refutes Davidson and Noble's model is supplied by Bednarik (1992) who points out that a belief in memory and language being reliant upon the association of gestures and 'meaning' resulting in art is refuted by the fact that vervet monkeys have been attributed with particular vocal patterns that differentiate between species. Thus the association between perception, recognition and Upper Palaeolithic art has been refuted.

Davidson and Noble's hypothesis, however, has the benefit of testability through refutation by extant record (chimpanzee ethology). This is an example of an associative uniformity open to testing, as it proposes a uniformity that can be refuted against the extant record, while arguing for an ability that is unique to *Homo*. While no amount of confirmation will confirm their associative uniformity as it applies to the Upper Palaeolithic, it will only take one example of an extant species that also possesses these abilities to refute their model. Because we can see cognitive abilities (as defined by Davidson and Noble) that are argued to be specific to modern *Homo sapiens* within modern chimpanzees we are able to refute their associative uniformity.

We may never know whether 'Neanderthal' or 'Cro-Magnon' populations were both involved in the development of art, based on the association between fossil hominid types and art, but we can ascertain from substantive and methodological principles used to date archaeological material that by 30 000 years ago hominids were producing art. As already stated, uniformities of association are unable to identify a testable correlation between contemporary and prehistoric material conditions and thus any methodological proposition which is based on association will not adequately explain the process involved in the formation of the material condition.

Conclusion

The above discussion of Upper Palaeolithic art has demonstrated the need to distinguish between methodological, substantive and associative principles. Substantivism results in testable uniformities. It is concerned with identifying testable correlations between past and present material conditions. It argues that a constant rate has produced a particular material condition (e.g. the rate at which paint ingredients were added and mixed remains constant). Methodological uniformitarian principles are vital in the organisation of our knowledge. They connect material conditions to processes by arguing that the processes have never changed, in other words, only one process can produce a particular material condition (e.g. the particular ingredients used will always result in a particular colour, thus this will enable archaeologists to examine cultural continuity based on paint recipes and thus help develop important methodological propositions regarding the Upper Palaeolithic). While the idea that only one process is possible is uncertain, we can concentrate on the implications of the process and try to refute it. Associative uniformities are usually based on untestable correlations between process and material conditions. They also presume a constant correlation between past and present material conditions, as well as using the process which resulted in a particular contemporary condition to identify the process used in the prehistoric condition (certain prehistoric painting styles and content are similar to contemporary shamanistic style and content, thus the processes that resulted in shamanistic art are also argued to be responsible for the prehistoric material condition). Such correlations are, however, untestable, as it is at least conceivable that a number of processes could result in a similar material condition.

It is argued here that if we are ever to create any meaningful interpretations of the Upper Palaeolithic in relation to the archaeology of Upper Palaeolithic art, archaeologists must not make conclusions which are based largely on untestable associative uniformities. Archaeologists must rely on substantivism and thus help invoke operational methodological propositions in order to understand the past. We must also, however, be careful in acknowledging the differential degree of resolution within the archaeological record. We should refrain from making grand sweeping theoretical statements which are based on untestable associative uniformities as they will not adequately enable us to understand the processes involved in the formation of the prehistoric material condition.

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COMMENTS

Confirmation and refutation can be complementary

By BERNARD M. J. HUCHET

The epistemological issues dealt with in this paper have important implications for rock art studies. I found this paper thought-provoking and useful. There are both positive and critical points I would like to make.

As Cameron clearly shows, arguments based on associations can be very misleading. This is particularly a problem with the so-called 'archaeology of art' approach (e.g. Lorblanchet 1992; Morwood 1992), whereby researchers try to relate *all* available archaeological and environmental data to the rock art evidence in order to produce a model. In archaeology, this all-encompassing approach may produce questionable results, since *space* is the only variable which can be ascertained as shared by all elements studied at a given site or in a specific region. We have no guarantee that all recorded cultural and environmental data operated contemporaneously and in a systemic manner in relation to one another. Morwood (1992), for instance,

argued for a systemic relationship between rock art, stone artefact technology, economy, environment and social aspects in his account of the prehistory of the upper Flinders region (Queensland). But why argue for a systemic relationship between these elements, when there are as yet no demonstrated principles derived from Aboriginal ethnographic contexts which can ascertain a link between all the variables modelled by Morwood. Bednarik (1989) has made very pertinent comments on a similar association problem at Koongine Cave: a problem resulting from Frankel's uncritical claim of an association between art, occupation debris and dates. There are many other examples of presumed but undemonstrated associations in the literature, some of which are clearly documented in Cameron's paper. It may well be that few or no other archaeological remains can or should be related to rock art and that, as a result, we may be forced to treat art as an independent archaeological text. This is an epistemological problem worth reflecting on for the benefit of the future of rock art studies as a scientific discipline.

However, I believe there is a problem with Cameron's notion that we should rely only on laws, and dismiss associative uniformitarianism, because there are many aspects of human behaviour which do not conform to universal laws. In such cases, associative uniformitarianism is the only avenue for identifying, interpreting or explaining past behaviour, through contextual analysis. This is where the use of ethnographic analogies that rely on associations can be useful, provided these analogies are treated as hypotheses to be tested, and other procedures are followed, as I have explained elsewhere (Huchet 1991a). If we were to dispense with the use of analogic arguments it is doubtful that the function of any art figure or art site could be established beyond reasonable doubt, since all arguments to do with function of the art are based on associative evidence. This is because the function is never the art, rather, the art *performs* one or several functions. To further complicate matters, these functions are likely to change through time and space (Huchet 1992a). Thus, laws cannot be applied to establish the function of rock art. In short, I challenge Cameron to cite one work which has, according to his scientific standards, established beyond doubt the function of any body of prehistoric art. Yet, establishing the function of art is important if we are to say anything about various social aspects of past societies (Huchet 1992a).

For an essay on refutationism, Cameron's paper is as good as they come in the archaeological literature. But when using refutationism in archaeology (even though, theoretically, refutationism is a very powerful concept) it is no safer than confirmation as it is generally impossible to ascertain that something has been adequately refuted or confirmed, due to the imperfect nature of the archaeological record as well as other factors (Huchet 1991b). It is thus impractical to expect archaeologists to rely on refutationism only. The confirmation of hypotheses is relevant because archaeologists need at least some answers, some confirmed hypotheses. The problem, of course, lies in the biased attitude of many researchers who only ever try to confirm one hypothesis — an approach known as 'strict empiricism'. A more adequate approach is that whereby several alternative hypotheses are tested and evaluated in relation to one another and the available evidence. This approach was initially proposed by many of the New Archaeologists and I have described it as the C/R approach (Huchet 1990a, 1991b). Since we do need temporarily corroborated hypotheses to organise, describe, classify and explain our data, confirmation of hypotheses is a necessary part of archaeology, provided the hypotheses have been put through a 'rigorous' process of evaluation. Certainly, it is advantageous to eliminate some hypotheses through refutation.

Overall, the level of scientificity in archaeology is very low, compared to Cameron's expectations (see Huchet 1992b), even though some steady process has been made since the 1960s (Huchet 1990a, in press). The level of scientificity set by Cameron (see also Tangri 1989a) is too high. This may have the unfortunate effect of discouraging many researchers from even attempting to rely on scientific empiricist methodology. I agree that the standards of our discipline need to be raised, but a more moderate form of scientific empiricism is called for (Huchet 1992b). Nevertheless, I do not deny that Cameron's and Tangri's views on science are very pure and based on the sound epistemological theory of refutationism.

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The assumptions we use
By DANIEL TANGRI

The article by Cameron on uniformitarianism and prehistoric art is one that provides much food for thought. I must declare here that I talked about the paper with Cameron; indeed, I am acknowledged by him for having done so. Consequently, I cannot claim the luxury of being impartial. This is not to say that our views completely coincide. There are areas on which we broadly agree, but there are nonetheless matters on which our views diverge. One such matter is Cameron's claim that not all associative principles are testable or, more specifically, refutable.

It is unfortunate that Cameron's discussion of associative principles is rather brief. I felt that a clearer definition of these principles would have been helpful. For example, my vision of such instances is of analogues whose validity lies in a posited association between material debris and a reconstruction based on ethnographic evidence. As the analogues are based on an association between object and interpretation, rather than a methodological proposition about the causes of things, or a substantive proposition about the rates at which events occur, I think it is worthwhile adding this extra dimension to our understanding of uniformitarianism. I believe that Cameron sees such analogues as being seldom refutable. His belief stems from the age-old problem of underdeterminism, in which conflicting interpretations may be entailed by the same evidence. For example, Cameron notes that Lewis-Williams' claims about shamanistic depictions in ancient art from southern Africa are based on associative principles, and the difficulty in testing these lies in the possibility of there being several equally likely explanations of the images.

My major point here is that not all theories or hypotheses with the same *positive* instances have the same *confirming* instances. Two theories or hypotheses which may be entailed by identical evidence may nonetheless have different tests. One might be able to prefer one association over others by finding separate evidence that

refutes those others. The major case of this sort in archaeology is the refutation of diffusionism in Europe, in part by separate radiocarbon evidence that was not entailed by the evidence on which diffusionism was based. In relation to Cameron's example used above, I would argue that Lewis-Williams' claims about the antiquity of shamanistic depictions in southern Africa may indeed be subjected to some form of test. It is clear that there is (as Cameron points out) no logical reason why modern shamanistic imagery should be identical to ancient. Yet all this really means is that we can never prove Lewis-Williams' claims to be true. It does not mean that we cannot test those interpretations. If one were to note all the images connected with shamanism in modern or ethnographic San art, the contexts in which those images occur and their co-occurrence or uniqueness, and compare that data with the ancient evidence, one might be able to check whether or not the ancient depictions do or do not fit the associated pattern. If they do, the antiquity of shamanism would not be proved but would, in Popper's terms, be corroborated. If they do not, then clearly the difference must be explained, and the theory modified or rejected. Consequently, if it is accepted that the truth of our interpretations is irrelevant and that what matters is the degree to which they match available evidence, one might be able to test various beliefs even if they are based on associative analogues.

Despite this beef that I have I must emphasise my view that there is much in Cameron's paper that is both useful and productive. The clear delineation between methodological, substantive and associative principles of uniformitarianism is a much-needed clarification, especially given Bailey's (1983) and Murray and Walker's (1988) inability to use Stephen Jay Gould's original definitions correctly. My one wish would be that archaeologists would one day go beyond endless clarifications and arguments about meaning and semantics and look at the assumptions we use and operate with, to see whether it is these rather than our terminology or epistemology that renders us incapable of learning anything new or useful about the past. Obviously, though, we are all equally guilty of this sin.

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Refutability and taphonomy: touchstones of palaeoart studies

By ROBERT G. BEDNARIK

Refutation is the most rigorous epistemological tool we have, whatever its shortcomings may be, and it is Cameron's preferred approach as much as it is mine. I find his paper thoroughly convincing. A few rather unimportant points are mentioned in passing, before I will try to develop his arguments a little further:

a. Dating by archaeological stratification is by no means reliable. The dictum that the lower of two strata must always be the older is not true in geology, nor in archaeology, and the notion that the objects occurring in one stratigraphical unit must all be of the same period is often a fallacy (consider deflation phenomena).

b. A single reindeer bone does not necessarily entitle us to infer that reindeer were present in the general location at a particular time. Many finds have been displaced, by a great variety of post-depositional processes, not all of which are likely to be apparent to most excavators.

c. Zigzags and dots are not the only patterns Marshack identifies as depicting water in Palaeolithic imagery. He has suggested that long, subparallel lines indicate water (Marshack 1989: Figs 14, 20), as do meandering lines, festoon lines, stippling, or even just vacant space. If stippling occurs in an animal outline, he says it depicts fur, and if a zigzag line occurs there, he does not define it as water. Marshack's notion that certain marks depict water is in part attributable to his belief that he can identify iconic outlines of water creatures, such as the three animals he perceives on the Kirillovskaya tusk. There is in fact no kingfisher on that tusk, nor a fish, nor a turtle. While some of Marshack's iconic interpretations may well be correct, within an epistemologically sound framework they should be disregarded.

d. Cameron raises the subject of the Gönnersdorf female figures, and the question of their similarity with the female profile. It seems to me that there is an enormous range in contemporary female physique, and there may have been a similar range in Palaeolithic times. Therefore it might be preferable to reformulate the proposition thus: there are a number of motifs which, if our taxonomic designation is correct, are intended to depict the same object, and which resemble the profile of *some* human females. Classifications of artefacts are, after all, themselves artefacts, especially those of archaeologists, and are not objective entities by any standards (Adams and Adams 1991).

The concept of 'behavioural debris' perceived in archaeology is a useful starting point for debate. The question of how this so-called archaeological record relates to what really happened in the past is of course the crux of all archaeological interpretation. It is primarily a taphonomic question, because nearly all quantifiable characteristics of archaeological 'data' are the result of taphonomic processes (I use the term in its extended sense, including primary and secondary taphonomic processes; Bednarik 1993a), in rock art as in archaeology. The prospects of scientific study of palaeoart will remain very slim without the *coherent identification of that part of the extant characteristics of the evidence that is not the result of taphonomic processes*. This first prerequisite for a scientific study of rock art has remained largely ignored for the past hundred years and we need have no illusions of scientific rigour in this discipline until we come to terms with it. Without such reconciliation the scientific discipline of palaeoart studies will remain restricted to simple empiricist tasks: direct dating, paint analysis etc., i.e. safe, repeatable and readily falsifiable procedures.

Cameron raises several interesting subjects which serve to illustrate how a bias in archaeology can consistently select in favour of hypotheses that are unlikely to be correct. For instance, during the 1980s, a tendency developed among certain prominent archaeologists to view sceptically earlier claims for the cognitive or intellectual faculties of hominids. It became fashionable to question early fire use, dwelling building, language, hunting, non-utilitarian behaviour and self-consciousness. The hominids of the Lower Palaeolithic became once again wild beasts,

scavengers without home bases, and ultimately, the Neanderthals' ability of speech was disputed. The result was an unproductive debate about the role of the hyoid bone and Broca's area, and at least one bold claim that the Neanderthals really belong to the apes rather than the humans.

This is not a new argument but it has been a very long time since we heard it previously. On close examination, these New Archaeology arguments were not about evidence, but about the perceived lack of it. Often the protagonists were inadequately informed about the subject, for instance the arguments about cognitive faculties such as human 'consciousness' could benefit from a much less humanistic emphasis. After all, ethological evidence of self-consciousness among apes is not new. We know that if paint is dabbed on the forehead of young chimpanzees, they will touch it when viewing themselves in a mirror. Humans recognise their own image at the age of about 18 months, gorillas take perhaps twice as long. To claim that bead manufacture in the Szeletian is the first evidence of human self-consciousness is not only based on inadequate archaeological facts (beads were produced much earlier, possibly up to 300 000 years ago; Bednarik 1992b: 34), it suggests also ignorance about primate ethology, which in contrast to archaeology is a science.

Confirmationism is itself an epistemologically unsound philosophy of science, but when it is based on negative evidence (the argument 'we have not yet found it, hence it does not exist') it is devoid of any value, unless a current absence of evidence is cited as part of a refutationist proposition. For instance, until 1990 it was correct to state that there is no evidence that art was practised in Pleistocene China; this is a refutable claim and it was duly refuted (Bednarik and You 1991). However, it would not have entitled one to postulate that Ice Age art did not exist in China, and then incorporate this claim into a model, for instance, a map of the world distribution of Pleistocene art. As soon as it is published, such a model is taken as gospel and will be included in all kinds of further models, hypotheses and theories, the authors of which have no regard for the tentative nature of most of the evidence they base their notions on. A great deal of what passes for 'archaeological knowledge' is based on negative evidence.

It is fairly self-evident that the objective study of contemporary human societies is not entirely without difficulties, and yet one would assume that in the case of living cultures, all the phenomena, rules and processes defining them are knowable. (The endless controversies of anthropologically reported meanings among non-Western peoples suggest that one could question Davidson and Noble's naive belief that language clarifies shared meanings. It would be easy to construct a viable argument that the communication between ethologists and apes is scientifically more precise than the communication between anthropological interviewers and subjects.) When examining pre-Historic societies, more than 99.99% of all the variables one would need to be familiar with are not accessible to us, and most are unlikely to ever become knowable by empirical deduction. Primary taphonomic processes have erased them from the record, and since these processes are far from random it is obvious that they selected in favour of certain phenomena. Archaeologists often treat what they regard as data as if they conveyed evidence approaching a one-to-one relationship with the circumstances of their historical context. This is not being said as a criticism of archaeology, rather I use archaeology as a metaphor for the reality-building processes of humans: through imposing taxonomies on the physical world accessible to human sensory faculties, humans have constructed a confirmationist framework of reality (Bednarik 1990/91). In both cases, all we really have are artificial constructs: both archaeological interpretation and anthropocentric reality are conceptual artefacts (Bednarik 1992b). Provided that they are couched in self-confirming systems of knowledge, they confer confidence, but that is no proof for their validity.

Of particular concern should be the tendency of some confirmationists to oppose contradictory evidence, not because of some objective arguments, but simply because it tends to refute their favoured theories (usually their own). Motivated by human vanity, some scholars go to extraordinary lengths to discredit data which they had not been aware of at the time they presented their theory, and rather than conceding that they were inadequately informed they retreat to a strategy of trying to reject any contradicting data — not because they favour refutation, but because they are unable to accept the effects of their own superficiality. As I have said before, the dynamics of academe are at fault, not the individuals concerned: if academe rewarded those who excel in self-critique, rather than those who strive most to be 'right', science would gain enormously.

Cameron clearly favours a philosophy championed by Karl Popper (e.g. 1968) and Imré Lakatos (1970), who believed that a scientific methodology for judging when one set of empirical beliefs is better than another is possible. I do agree with him in principle, but not without cautioning that my personal experiences in science suggest Thomas S. Kuhn's model to be probably closest to the truth. Kuhn (1962) has examined episodes in the history of science, which led him to argue that change from one theory to another is essentially non-rational: there is no method in it, and science is itself a contingent social activity. Choice of paradigm is presupposed by scientific rationality, not founded upon it, and Kuhn distinguishes between 'normal' and 'revolutionary science'. Feyerabend (1975) goes even one step further, denying that there is a 'scientific method' and arguing that scientific establishments are as effective in closing minds as were the religious powers of past centuries (though, admittedly, they are not at liberty to use physical torture nowadays). A courageous statesman among rock art specialists, Professor Jack Steinbring, has recently addressed the role of personal weaknesses and faulty, often weak, egos of influential academics, and of how the academic setting facilitates their influence (Steinbring 1992).

Both Kuhn's and Feyerabend's propositions are fundamentally correct in my experience. In the sense of the former's terminology, palaeoart studies have recently reached a 'crisis point' and are now undergoing a scientific 'revolution'. There is no method in this revolution, nor can academe control it (although it seeks to), changes are not due to some conscious program, but are affected by random factors: the predispositions and priorities of some individuals, personal enmities and alliances, various classes of external factors, social and intellectual currents in society, to name just a few. The visible manifestations of the current revolution in palaeoart studies are conspicuous enough: from a ludicrously backwards sphere of interest just ten years ago, a fully fledged discipline is emerging. It is my hope that it will adopt a refutationist philosophy, combined with a taphonomically guided methodology (Bednarik 1993b). If it does, it will become

as scientific as any of the hard sciences. To preserve its integrity it will be necessary for the discipline to be under the aegis not of academe, but of a body lacking vested interests and seeking no power of its own. Power corrupts, and the power of academe is enormous. If it cannot be moderated by scholarly societies in the future, it will continue its march towards a universal technocracy ruled by academic mediocrity (academic excellence derives from individual initiative, while the dynamics of academic institutions favour mediocrity and compliance).

Robert G. Bednarik
Editor, *RAR*

Sharing meaning with chimpanzees and scientists

By JOHN HALVERSON

This seems to me largely an exercise in futility. Reducing archaeology to physics and chemistry is not a proposal that is likely to elicit much enthusiasm. It might make archaeology more 'scientific', but would certainly take most of the fun out of it. Surely for most archaeologists, 'interpretation', that is, the reconstruction of human lives from artefacts, is the only real purpose of the discipline. Substantive and methodological uniformitarianism are indispensably foundational, but by themselves will not take archaeologists where they want to go.

In any case, the problems and perils of 'associative uniformitarianism', especially ethnographic analogy, are well known to everyone, perhaps too well known to need reiteration. Indeed, the present article seems like a replay of Tangri (1989). And Faulstich's (1989) eloquent concluding comments on that article hold as well for this one. Recently Lewis-Williams has discussed the problem very cogently in an essay aptly titled 'Wrestling with analogy' (Lewis-Williams 1991); he knows, as we all do, that analogy is not proof, that it is at best a hypothesis-generating heuristic. However, the 'entoptic hypothesis' does not depend on analogy alone, but invokes what could be called biological uniformitarianism, the assumption that the human species has always had the same basic physiology. This also cannot be 'proved' but it is 'substantive' enough to be a practically necessary presupposition, securely based on what we think we know about evolution. There is nothing wrong, then, with the notion of a 'neurological bridge', which in this case means that the human brain has always been capable of generating hallucinations and entoptic phenomena. Lewis-Williams' notion was preceded by Bednarik's (1984: 28) similar proposal of 'phylogenetic longevity of the phosphene types'.

Lewis-Williams is also fully aware that similar archaeological remains can be produced by dissimilar activities' (1991: 153), that 'altered states of consciousness can be experienced in a variety of circumstances other than shamanism' (ibid.: 158), and that shamanism itself is culture-specific and variable (ibid.: 159-60). Hence the resort to a 'best-fit' criterion of judgment — plausibility where proof is not possible — which seems inevitable if there is to be any interpretation at all. It is also a scientific criterion in a practical sense, for the basic question of most scientific investigation is what theory best explains, or fits, the data. Ptolemy or Copernicus? Creationism or evolution? To be sure, what constitutes 'best' is a philosophical bottomless pit, but it is a philosophical pit, not a scientific one, and 'best fit' can be argued intelligently and productively. In this arena what matters is the quality of arguments as much as the facts in the case, which are often not in dispute. Refutability is an excellent criterion, but is not restricted to empirical counter-evidence. Arguments can also be refuted. Of course, strictly speaking, no hypothesis is disproved by being badly argued, but its acceptability can be undermined to the point where the effect is much the same. In fact, this seems to be just what Cameron is attempting in his brief criticisms of Marshack, Gamble and others.

In the case of Davidson and Noble, Cameron believes he has found a testable hypothesis and has refuted it. I doubt they will agree. As for the Temerlins' Lucy, who was obviously familiar with depictions and had some (signed) language, they might well claim that her performance actually constitutes an experimental *confirmation* of their position. Lucy was, so to speak, an artificially humanised ape; Cameron claims evidence for reflection among untutored apes as well. Since this is presented as the decisive empirical evidence that refutes the Davidson-Noble hypothesis, he might have given the reader something more than just some page references. For my part, I could find little in the passages cited that clearly suggests chimpanzee reflection in the sense that Davidson and Noble use the term. Perhaps Cameron would be willing to elaborate a little on what he found in these reports that he interprets as reflective behaviour. Not that I think evidence is necessarily wanting; the classic experimental observations of Köhler (1927) and Menzel (1972), for example, seem to reveal episodes of reflection (that is, mentally rehearsing recent events) and subsequent actions based on such reflection.

However, none of this may matter much to Davidson and Noble, for they seem persuaded that we cannot know whether chimpanzees without language reflect because they have no way of telling us: 'nothing can be exchanged with them via a system of shared meanings' (Davidson and Noble 1989: 126). A chimpanzee *with* language (of a sort) is not a product of natural evolution and hardly relevant to an evolutionary argument. According to their premises, then, their hypothesis is not refuted by Cameron's putative counter-evidence.

Of course, their premises may be, and probably are, wrong. If we really had no shared meanings with other species (dogs, for example, as well as chimpanzees), they would be totally alien and inaccessible to us, which they clearly are not. Indeed, the chief vulnerability of their hypothesis is that the argument for it is not coherent. There is, for example, the consistent petitio principii that identifies 'seeing resemblance' with the linguistic implication of 'taking note of', or explicitly, the ability 'to make claims' (Noble and Davidson 1989: 339). Such a gratuitous identification immunises the hypothesis from the obvious empirical objection that other species, including pigeons, apparently see resemblances very well, though they make no claims about it. But at the same time, it erodes credibility. And what does it mean to say that reflections 'can only be delivered through language'? That they can exist or operate only in a linguistic medium? That they can only be expressed in language? But reflection can certainly operate as a visual rehearsal of events via mental imagery without verbal language. And Davidson and Noble themselves apparently leave open the possibility that, besides language, 'some system of simulation' could express

reflection. What that might be, or even mean, is not explained, but another, nonlinguistic system of *representation* would belie their thesis. Perhaps they are thinking here of some kind of gestural language as a system of simulation. But who knows what they are talking about?

The rather hard Popperian line Cameron advocates has the danger of throwing baby out with the bath water. Some of the elements of Popper's theory have undoubted value, such as the requirement of framing hypotheses carefully to allow for the *possibility* of disconfirmation. But other elements are dubious and appear to some to be at odds with scientific practice and progress (see, for example, Kuhn 1970 and Gregory 1981). Bednarik (1992) takes a somewhat softer (if I dare use such a word about our esteemed editor) line, though still much in the Popper spirit. In the context of a critique of Davidson and Noble and others, he makes the commonsense suggestion that 'all relevant data' should be taken into account to be sure no disconfirming evidence is overlooked. Prudent advice certainly, but in this case another difficult question is raised: just what constitutes disconfirming evidence or relevant data? Bednarik has compiled a long and useful list of pre-Upper Palaeolithic markings that some interpret (no doubt correctly) as non-utilitarian and therefore (incorrectly) as evidence of 'symbolic behaviour'. Clearly there is no a priori reason to divide the corpus of Palaeolithic markings into an exhaustive dichotomy of either-utilitarian-or-symbolic, as if there were not other possible motives. Davidson and Noble could scrutinise all eighty-four items, as Bednarik advises, yet easily conclude the data are not relevant at all, let alone disconfirming. Once again, their hypothesis seems immune to Popperian testing.

In sum, it may be doubted that any foolproof rigorous methodology is available for the interpretation of prehistoric data, but good sense can go a long way. In the meantime, 'risky hypotheses', which Popper so strongly advocated, have on the whole probably been more enriching than detrimental in our ongoing dialectic.

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REPLY

By D. W. CAMERON

The above Comments are mostly constructive and as such offer much 'food for thought'. They have also made clear to me that in some cases I have not been totally successful in expressing in writing my views on uniformitarianism, and thus this short Reply gives me a second chance to make my position more clear.

There is much in Huchet's discussion that has made me sit down and review my previous argument relating to uniformitarianism and refutation. For this I am grateful. There are aspects of Huchet's Comment that I would agree with and others which I do not. I fully agree with Huchet's statement relating to the futility of confirming a proposed systemic relationship between prehistoric pictures and a number of cultural functions including stone artefact technology, economy, environment and other social aspects. It is for this reason that I was critical of Lewis-Williams' reliance upon associative uniformitarian principles. I must agree with Tangri who has taken me to task, correctly pointing out that the associative principle that Lewis-Williams invokes is indeed testable and thus aspects of such a systemic approach are open to refutation. I did not mean, however, to imply that associative principles are seldom refutable, as Tangri suggests. On reflecting upon Tangri's contribution I must admit that I am more prone to accept an increased degree to which associative principles can be tested, compared to my original views. My modified views in relation to this matter are not based on a modification or a revision of associative uniformitarian principles, but are rather the result of Tangri's and Bednarik's comments regarding the confines or operative limits in which our hypothesis and data must operate. While aware of such confines, I failed to fully express and reflect upon the subsequent implications that these limitations have upon the testability of associative principles. Tangri and Bednarik correctly emphasise that if we accept the limited universe in which our hypotheses and data operate, then we must also acknowledge that there is no dogmatic statement of truth. Accepting this we can concentrate on testing our hypothesis within this limited universe. This will apply to associative principles as much as it will to substantive principles. Tangri successfully emphasises this point with his proposed criteria for refuting Lewis-Williams' shamanistic interpretations of Palaeolithic art. Thus I would agree with Tangri in that we can never prove Lewis-Williams correct, but we can refute his hypothesis, given the available extant cultural evidence and the confines or 'state of reference' for our investigation. If a non-shamanistic culture is indeed seen to reflect similar artistic depictions as seen in southern Africa, then the associative uniformitarian principle that Lewis-Williams invokes to support his model will be shown to be inappropriate and thus his model must be modified or rejected.

One point on which I do not agree with Huchet is his comment in regards to the need to accept untestable associative principles because human behaviour is not governed by universal laws. I would fully agree that it is impossible nor desirable to try to construct laws of human behaviour as to do so would have to be based on extant behaviour which is clearly inappropriate, given that we as archaeologists and/or palaeoanthropologists are concerned with past human behaviour. Where I disagree with Huchet (and much of the previous and current comments is appropriate to Halverson's obvious misunderstanding) is that we should only rely upon *testable* associative uniformitarian principles, which I suggest do exist. In this way we can dismiss or modify a proposed hypothesis which is shown to conflict with the available data. This will further our knowledge of the past based on some fundamental understanding, rather than a proposed scenario based on untestable associative evidence. The most interesting data are those that do not fit our proposed model. However, we must be aware of our proposed 'laws' in order to see when they are being broken. From this observation we will learn something new about the past. In order to do this we must be aware of the uniformitarian principles that we are invoking and the degree to which they are, or are not, open to testing. While it may or may not enable Huchet to identify the 'function' of the art that he is examining, testable substantive and associative principles will help us at the

very least propose appropriate questions. This may mean that questions we would like to answer are currently unanswerable and if we do propose an answer based on untestable associative uniformitarian principles, then we at the very least should be aware of the tentative criteria on which our conclusion is based.

It is for the above reasons that I must also question Huchet's view that refutation is of limited value to archaeologists, given the imperfect nature of the archaeological record. Bednarik in his Comment also successfully argues against such a position, as he points out the dangers of relying on negative evidence and confirmationism. Huchet's position would be a valid one if we are searching for some ultimate truth, but as archaeologists we must be aware of the way we organise our knowledge of the real world, and that in no way will this enable us to make dogmatic statements about 'truth' or 'how it really was'. While Cameron (in press b) and Cameron and Groves (submitted) refute Binford's 'scavenging hypothesis' and Potts' 'stone caching hypothesis' in a cladistic analysis of extant ape behaviour using 30 variables, who is to say that, given 35 variables or an additional ape genera or an additional early hominid model, that Isaac's 'central place foraging hypothesis' (which was not refuted by the available evidence) would not also have been refuted! This point is further emphasised by Bednarik's comments regarding the examination of pre-Historic societies in which case we are lucky to have less than 0.01% of the appropriate variables for study. Thus any search for 'truth' must be seen as futile.

Bednarik raises a fundamental concern for the future study of rock art as he states that we must be concerned with a '*coherent identification of that part of the extant characteristics of the evidence that is not the result of taphonomic processes*' (Bednarik's emphasis). I cannot agree more and would suggest that such a belief underlies my paper, as we cannot possibly achieve such an identification without coming to terms with the three basic principles within uniformitarianism. It is the use of substantive and methodological principles which will enable us to gain such insights, while conclusions based on associative principles may merely 'muddy the water' if they are not based on firm refutational grounds. For example, Bednarik correctly takes me to task on my discussion of the Roc de Sers frieze through archaeological stratification. As archaeological deposits are clearly prone to taphonomic processes such conclusions are readily refuted, given the available substantive and methodological principles used to examine and explain taphonomic process.

I am more than a little puzzled by the comments of Halverson. It appears that he is concerned about archaeological studies becoming 'too scientific'. I do not think that the status quo of archaeological research should be maintained because to go any further may take the fun out of the profession, and may mean placing archaeological studies within an accountable framework similar to that which is currently enjoyed by physics and chemistry. I think that this is a disappointing and potentially dangerous position to take. Given Halverson's comments it would seem that he is in favour of the Shanks and Tilley approach of what Tangri (1989) refers to as a 'nihilistic solipsisms'. Halverson states that while methodological and substantive uniformitarianism are indispensably foundational, they by themselves will 'not take archaeologists where they want to go'. I would argue that if we do not become familiar with the distinction between these principles as well as the third principle of associative evidence, then archaeologists are in great danger of going the WRONG WAY! Halverson displays a naive understanding of scientific and archaeological theory and method and should be aware that archaeologists cannot, and should not, try to fit 'round data' into 'square holes', merely because that is the stated interest of the archaeologists. While I fully agree that most archaeologists are interested in interpretation, I would suggest that such interpretation must be based on first uniformitarian principles, which by definition must be testable. I feel that such an approach need not remove the 'fun' from the profession, but would rather add to the ability of archaeologists to say something meaningful about the past and thus contribute to ongoing research.

It is clear from Halverson's comments that he does not agree with the basic premise of my paper, nor with the recent contribution by Tangri (1989), as he suggests that Lewis-Williams' approach can be accepted on the grounds that the 'basic question of most scientific investigation is what theory best explains, or fits, the data'. This is precisely the opposite to my understanding of how science works, or should work: hypotheses are proposed and then the data are examined with the aim of refuting the hypothesis. A critique of Halverson's confirmationist approach is given elsewhere (Cameron above; Tangri 1989) and needs not be repeated or expanded here.

Halverson suggests that because Lucy was able to perform sign language, this may be considered to confirm Davidson and Noble's position. Does Halverson suggest that it was the teaching of sign language to Lucy by the Temerlins that enabled her to suddenly develop the ability to reflect! I thought that she must have had that ability in the first place in order to learn sign language. Halverson also suggests that Lucy's ability to reflect is of no real consequence in an evolutionary sense because Lucy is not a product of 'natural' evolution. This is a rather curious concept. One would think that the importance of Lucy is not *how* she developed the ability to communicate, but rather the fact that she is able to *do* so. Thus it must be of interest from an evolutionary standpoint. There are a number of examples of chimpanzees that passed on what they had learned, not only from other chimpanzees but also from humans.

Bednarik gives further examples of the ability of chimpanzees to reflect upon options and surroundings. Goodall (1986) and Boehm (1989) present evidence that chimpanzees have the ability to identify a number of individuals through their vocal communication and can do so even when well beyond the range of sight of that individual. Added to this is the ability of chimpanzees to recognise and ignore the most simple imitation calls made by experienced fieldworkers when they are also well out of sight. Also, Goodall gives examples of accepted modes of communication for sex by males, but then observes the large range of options that are available to the female who may or may not comply. This implies decision making which is based on the reflection of the numerous options that are available to any given request. Options are certainly available to other non-ape species, but given the close biological (genetic, anatomical and behavioural) ties between humans and chimpanzees this further implies the complex strategies involved in decision making by the great apes in general. It is inappropriate to explain and interpret great ape behaviour by a comparison to the behaviour of dogs and cats. There are numerous further

examples of the complex cognitive abilities of chimpanzees which I need not repeat here, but again refer those interested to the references given.

In conclusion I would like to thank the reviewers for taking the time to read my paper and to make critical comments. In doing so they have given me the chance to better express my views and see some aspects from a different vantage point, and for this I am grateful.

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Résumé. *Cet article démontre que les recherches archéologiques, en particulier celles concernant l'étude de l'art rupestre, ne peuvent pas invoquer un principe général d'uniformitarianisme pour expliquer le passé. Une compréhension plus approfondie de l'uniformitarianisme substantif et méthodologique sera aussi incapable d'aider les archéologues à interpréter le passé par l'étude de l'art rupestre. Dû à l'emprunt non critique de certains principes d'uniformité aux sciences de la terre, les archéologues ont manqué d'identifier un principe d'uniformité unique à l'archéologie — une 'uniformité' d'association.*

Zusammenfassung. *Dieser Artikel demonstriert, daß archäologische Studien, besonders jene, die sich mit Felskunst befassen, sich nicht auf ein allgemeines Prinzip von Uniformitarianismus berufen können, um die Vergangenheit zu erklären. Ebenso wird ein mehr detailliertes Verstehen von substantiellem und methodologischem Uniformitarianismus Archäologen befähigen, die Vorwelt durch Felskunst zu deuten. Mit dem unkritischen Borgen ausgeprägter Prinzipien von Uniformität in den Erdwissenschaften haben Archäologen versagt, ein Prinzip der Uniformität zu identifizieren, das einzigartig für Archäologie ist — eine 'Uniformität' von Assoziation.*

Resumen. *Este artículo demuestra que los estudios arqueológicos, particularmente aquellos relacionados con el estudio del arte rupestre, no pueden invocar el principio general de uniformidad a objeto de explicar el pasado. Tampoco, una más detallada comprensión de una uniformidad real y sistemática, permitirá a los arqueólogos interpretar el pasado a través de estudios de arte rupestre. Al copiar, sin rigor crítico las distintos principios de uniformidad de las ciencias de la tierra, los arqueólogos no han logrado identificar el principio de uniformidad que es único para la arqueología — una 'uniformidad' por asociación.*

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KEYWORDS: **Petroglyphs - Pecking technique - Iron Age - Gabon - Western Africa**

ROCK ART IN GABON: PETROGLYPHS IN THE OGOOUÉ RIVER VALLEY

Richard Oslisly

Abstract. Rock art was first discovered in Gabon in 1987 when the site of Elarmékora was found. Since then, a systematic search for petroglyphs on the numerous rock outcrops along the valley of the Ogooué river has resulted in the discovery of numerous new sites. Preliminary studies suggest that these petroglyphs are contemporary with the Iron Age, being chronologically close to the beginning of the Christian Era.

This paper reports the discovery of a form of open air rock art in the upper and middle stretches of the Ogooué valley, Gabon, where it is found engraved on ovoid boulders and flat outcrops. Previously this form of art was only known from the borders of the Congo Basin (Fig. 1): the Bidzar petroglyphs in Cameroun (Marliac 1981: 212), the Calola, Bambala and Capelo rock art assemblages in the upper valley of the Zambezi in Angola (Ervedosa 1980: 445), the engraved rocks of Kwilu site in Lower Congo (Nenquin 1959), together with Mpatou, Lengo, Bambari and Bangassou sites in the Central African Republic (Bayle des Hermens 1975: 343). The Elarmékora site, Gabon, was discovered in 1987 (Oslisly 1987), at the end of a long research program on Iron Age sites in the Otoumbi region. In central Africa, a Copper Age is unknown and the Neolithic period is immediately followed by the Iron Age, about 2400-2300 years BP. Thanks to a systematic search of the paragneiss outcrops in the Ogooué river valley, many further sites have been found (Fig. 2): Epona in the Otoumbi region, Kongo Boumba and Lindili in the Lopé-Okanda Reserve. We heard of the Kaya Kaya site on the upper Ogooué only twenty years after its discovery.

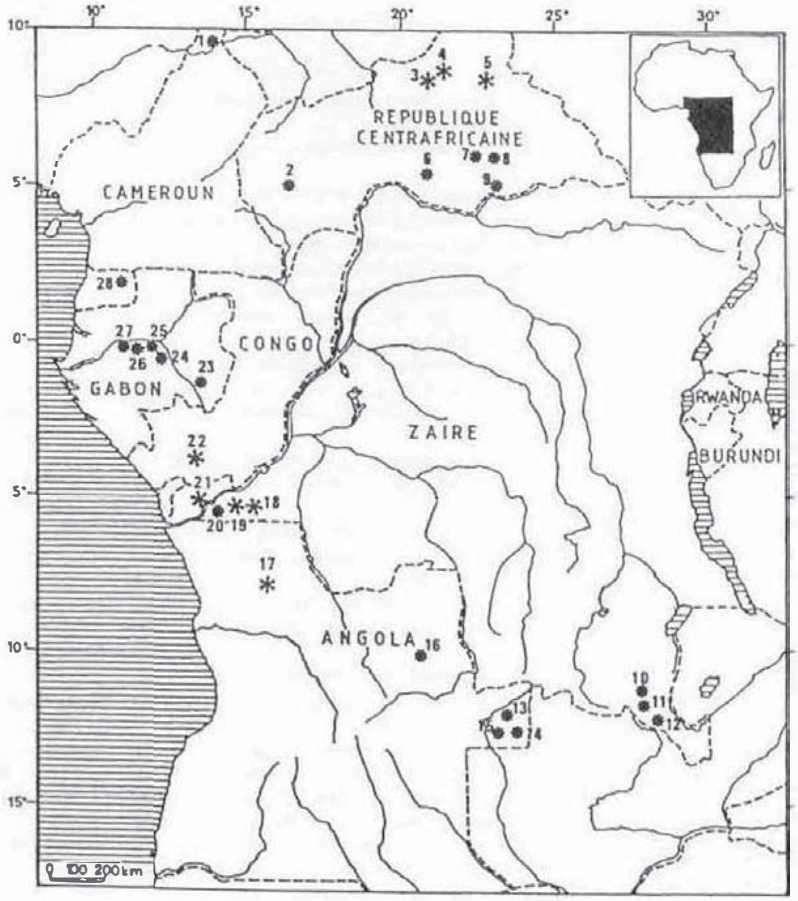

Figure 1. Map of rock art sites on the margins of the Congo Basin in Atlantic central Africa.

* *Paintings* ● *Petroglyphs*

1 Bidzar
2 Bwalé Cave
3 Toulou Cave
4 Koumbala Cave
5 Djébel Méla Cave
6 Bambari
7 Mpatou
8 Lengo
9 Bangassou
10 Kiamakonde Cave
11 Kiantapo Cave
12 Kasaolwa
13 Calola
14 Capelo
15 Bambala
16 Musseque Cave
17 Quissadi Cave
18 Lovo Cave
19 Mbafu Cave
20 Kwilu
21 Mvangui Cave
22 Bouenza Caves
23 Kaya Kaya
24 Lindili
25 Kongo Boumba
26 Elarmékora
27 Epona
28 Ave Maria Cave

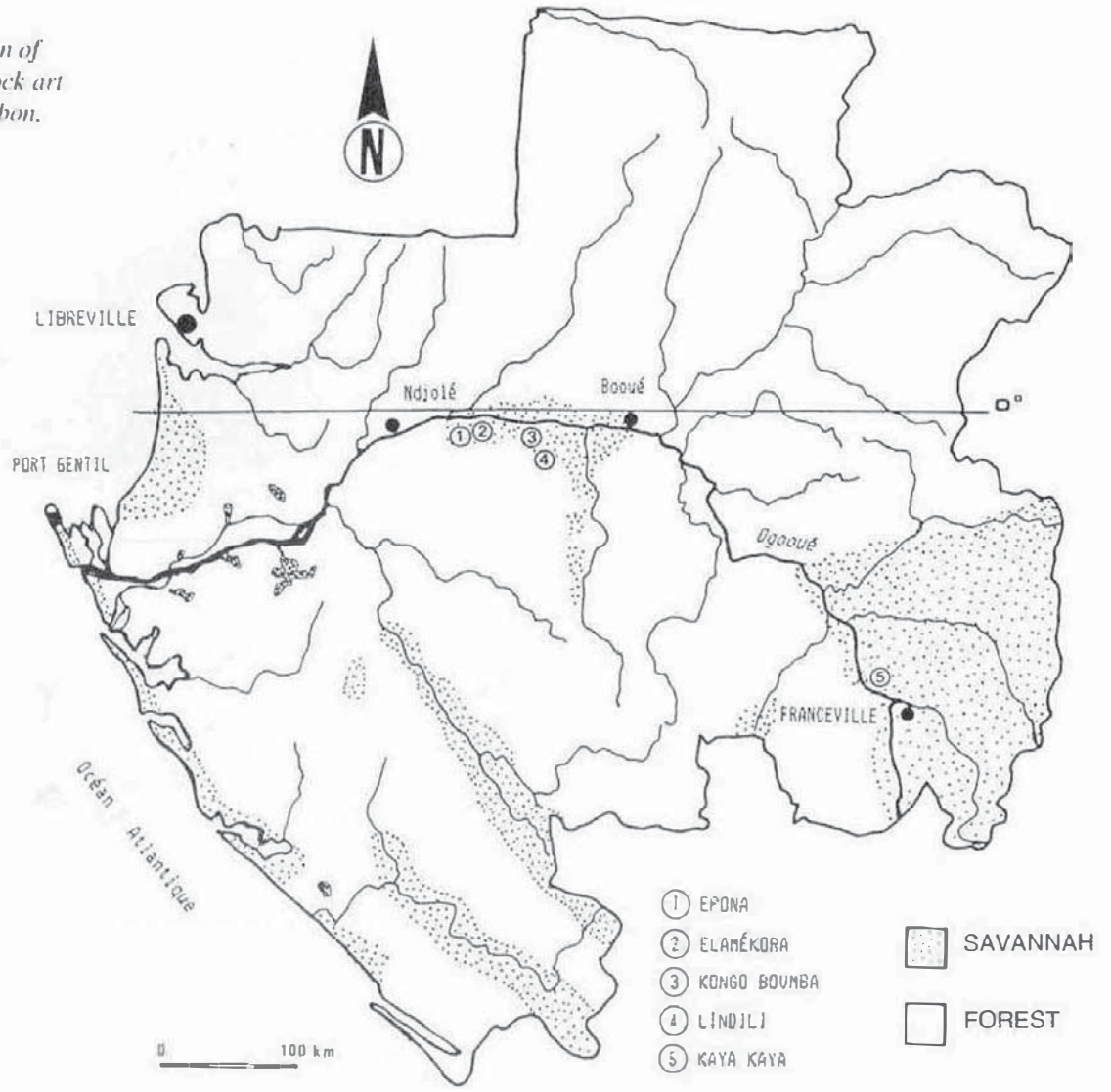

Figure 2.
Distribution of open air rock art sites in Gabon.

The Ogooué has been used as a route for trade and the movement of cultural products since the distant prehistoric past, by Stone Age hunter-gatherers, Neolithic peoples and Iron Age populations living on the river's banks (Oslisly and Peyrot 1987). Our research from 1982 to 1992 has shown that the middle stretches of the Ogooué valley were an important archaeological centre.

The Elarmékora site

The site's map coordinates are 0°5'15"S; 11°10'15"E. It is located on the pavements of outcrops of paragneiss above the river and consists of about 240 petroglyphs. Each figure has been first roughed out with barely visible, fine rectangular lines, followed by the probable use of metal chisels. This was subsequently pecked to produce thousands of small, homogeneous, cup-shaped depressions of great sharpness which exclude the use of stone tools. The apparent animal motifs convey an impression of an art of hunting symbolism. Most of them are associated with triangular motifs resembling projectile heads of assegai. Although no intentional layout is apparent in the location of the figures, they are grouped into five topographic zones (Oslisly 1988):

Zone A. This is the main concentration, in which more than 120 motifs have been found. Some of them occur in isolation but most belong to one of eight distinctive groups. The triangular form is the most frequent (60%), both with and without shaft (Fig. 3). Animal motifs (21%) depict small quadruped animals and probably lizards. They are sometimes closely associated with triangular motifs which is suggestive of a hunting symbolism (Fig. 4).

Zone B. This group is about 15 m to the west of zone A. It consists of about 30 figures of which 53% are triangles. A dozen small lines, probably sharpening grooves, seem to support the hypothesis of the use of iron chisels. About 6 m lower, five triangular forms are arranged around a small motif we interpret as a hoe, which would make it the only known depiction of a non-hunting implement at this site (Fig. 5).

Zone C. On a 250 m-high summit, there are 23 well-made concentric circles (85%) and a unique seven-petal rose motif, together with a figure evoking interpretation as an insect with a giant head (Fig. 6). About 10 m to the east, three figures stand out among others of a group. Two are of lizard form, the third is reminiscent of a tortoise carapace (Fig. 7).

Zone D. Located on a large pavement on the north-east slope of the spur occur 42 pecked motifs, almost all of which are circles.

Zone E. A group of seven figures, including two animal motifs.

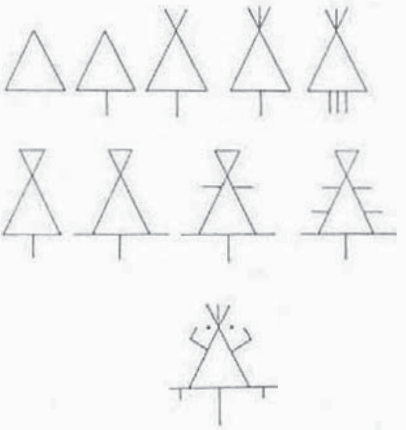

Figure 3. The evolution of triangular forms perceived at the Elarmékora site, Gabon.

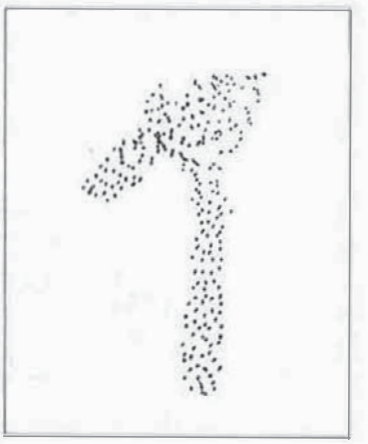

Figure 5. Small motif interpreted as a hoe, 32 cm high, Zone B, Elarmékora.

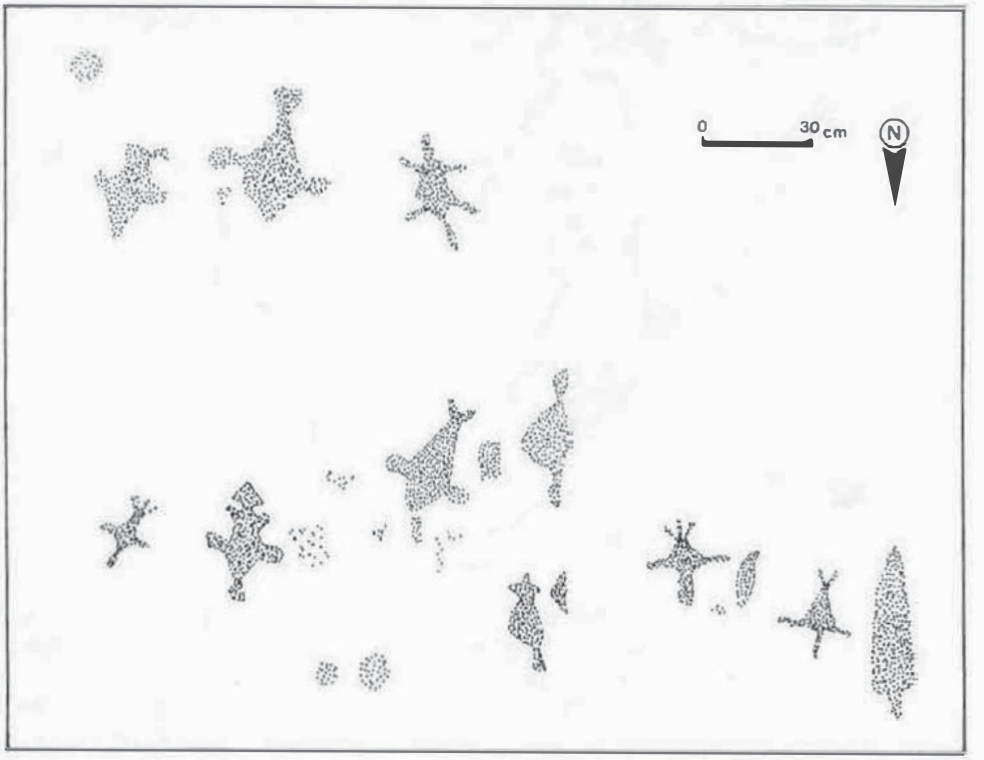

Figure 4. *Animal figures and triangular motifs with 'attachments', Zone A, Elarmékora.*

Figure 6. Motif resembling an insect with a large head, at Zone C, Elarmékora.

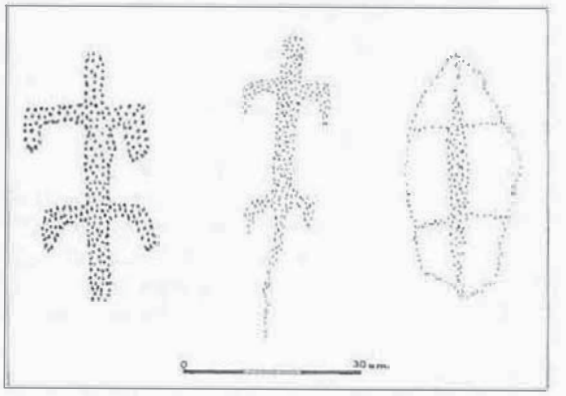

Figure 7. Lizard figures and motif resembling a tortoise carapace, at Zone C, Elarmékora.

Figure 8. Concentric circles, Epona.

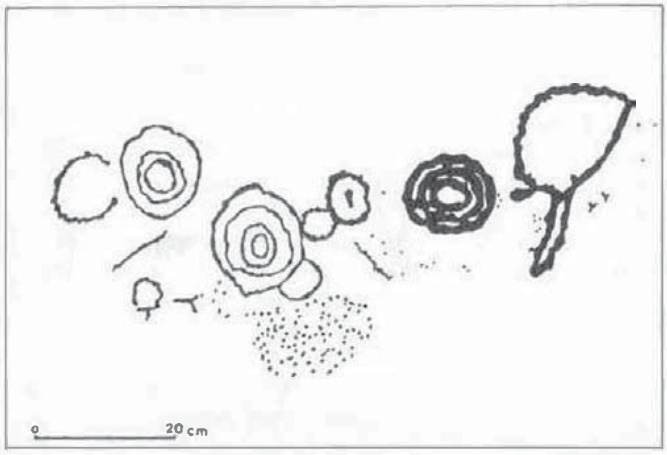

Figure 9. Circles with a figure resembling a throwing knife, Epona.

The Epona site

This site's map coordinates are 0°6'20"S; 11°8'50"E. Adjacent to a gallery forest, 3 km south of Elarmékora, are ovoid rocks bearing more than 410 petroglyphs on their surfaces. These blocks of paragneiss occur in three groups on the gentle slopes of a savannah hill. Once again, single or concentric circles are the most abundant motifs (98%). Small circles appear arranged around a large circle (Fig. 8), and sometimes concentric circles are arranged in the fashion of flower petals. Five lizard-like forms contrast with the predominant circle motifs and there is a figure resembling a throwing knife (Fig. 9). In central Africa, the throwing knife (single or double bladed) is the specific weapon of the Bantu populations.

The sites of the Kongo Boumba region

Five new sites with a total of 280 petroglyphs were discovered in the Lopé-Okanda Reserve, 40 km to the east of Elarmékora. The Kongo Boumba art occurs on numerous piled blocks of rock along the banks of the Ogooué river. Subspherical boulders of paragneiss very likely eroded by the combined processes of weathering and fluvial action of the river in the distant past. Groups of geometric figures are found on many of them. Nearly all motifs are circles, spirals, concentric circles, lines of circles arranged chain-like, and dissected circles (cf. Fig. 10). Chain arrangements predominate (35%), and they range in length from about 2 m, to 5 m when diverging like the branches of a candelabrum. We also noted the presence of various meandering lines similar to snakes near the chains of small circles. As in Elarmékora, the petroglyphs were made with metal tools, as demonstrated by the homogeneity and sharpness of individual peck marks on this very tough rock. Traces of surface flaking are evident, and exfoliation may lead to the loss of these petroglyphs which are an important testimony of the cultural past of the Ogooué valley.

Figure 10. Extensive petroglyph arrangement of spirals, concentric circles and chains of circles, at Kongo Boumba 1.

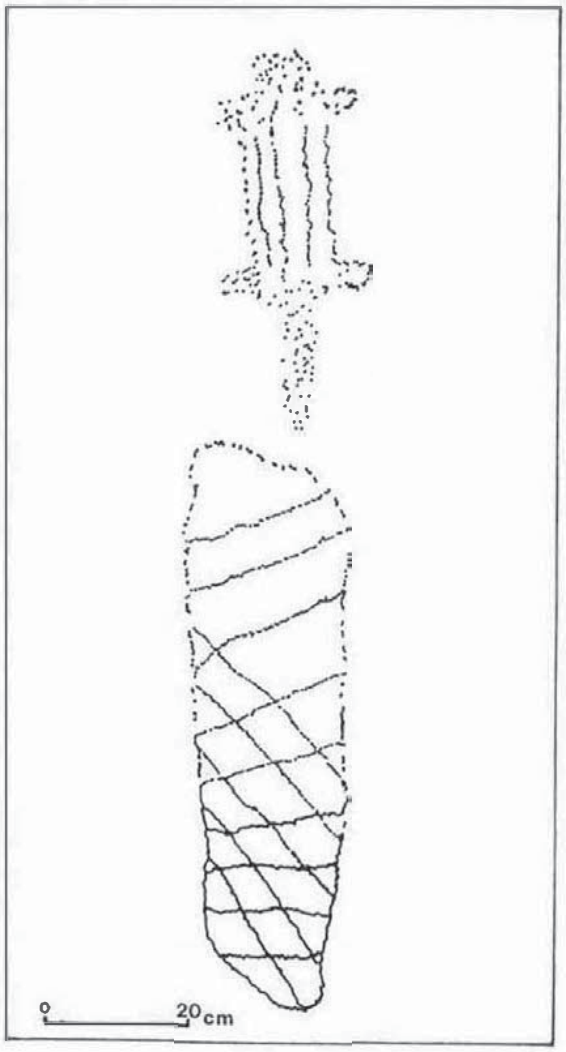

Figure 11. Animal figure and net-like motif, Kongo Boumba 5, Rock A.

Kongo Boumba 1 site (0°5'40"S; 11°28'10"E). On a savannah hill slope, three piles of ovoid boulders overlook a gallery forest, as in Epona. Sixteen of the blocks bear a total of about 130 petroglyphs. On one of them, an area of nearly 9 m² presents a large composition made of circles and serpentine lines, combined with spirals and concentric circles (Fig. 10).

Kongo Boumba 2 site (0°5'35"S; 11°28'25"E). On a flat paragneiss dome, this newly-found group of petroglyphs comprises about 30 figures among which concentric circles predominate. We also discovered the first cruciform representation here, next to two lizard forms.

Kongo Boumba 3 site (0°5'45"S; 11°28'5"E). Three small rocks reveal some petroglyphs: roughly pecked circles, concentric circles, a lizard-like shape and a probably double-bladed throwing knife.

Kongo Boumba 4 site (0°6'S; 11°28'15"E). Overlooking a forest is a group of boulders bearing more than 30 pecked circle petroglyphs, together with seven lizard-like figures.

Kongo Boumba 5 site (0°6'50"S; 11°28'40"E). Looking down upon a path, two enormous rocks present flat surfaces with petroglyphs. On Rock A, two zoomorphs are found, one above a net-like maze (Fig. 11), while Rock B bears two lizard-like figures and round pecked areas.

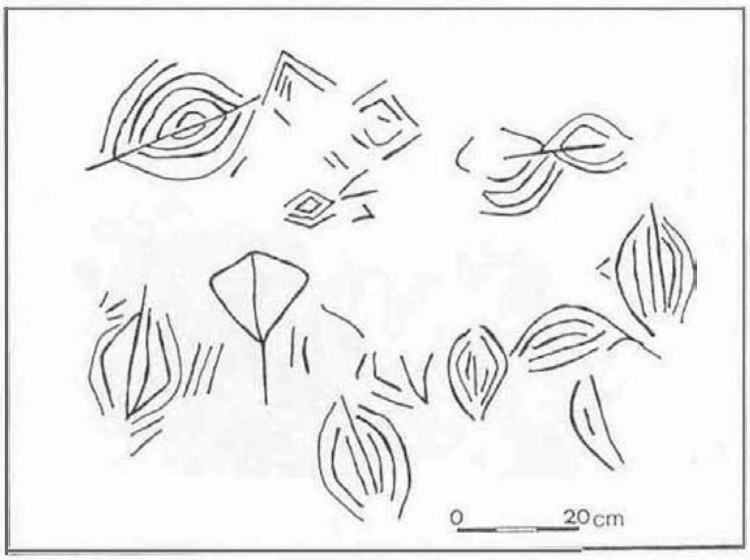

Figure 12. Vulva-like motifs at Kaya Kaya.

The Lindili site

Located at map coordinates 0°9'10"S; 11°30'50"E, 8 km south of the cultural area of Kongo Boumba, a rocky hillock rises above a marsh. More than 20 figures are engraved on its rock surfaces. They comprise, on the one hand, circles including a chain of 11 concentric circles, and on the other hand, pecked zones and meandering lines.

The Kaya Kaya site

This site was discovered in the course of uranium prospecting by the company Franceville (COMUF). Its existence was mentioned to us in order to determine its importance, and to record the petroglyphs. It is located 15 km downstream from Franceville in the upper Ogooué valley, at the map coordinates 1°35'10"S; 13°27'58"E. On a small tributary, the Missitigui river, oblong blocks of sandstone bear about 30 motifs. Located under the network of plants of a narrow gallery forest, the site consists of vulva-like motifs engraved on phallus-shaped rocks. This association leads us to suggest that it may have served in rituals of initiation or fertility (Fig. 12). Concentrated on three rocks, the figures were engraved with metal tools such as chisels, as shown by the presence of fine rectilinear grinding tracks on one of the blocks.

Discussion

At the present time, the Ogooué valley contains the major part of the sites, with the discovery of more than 1000 recorded petroglyphs, essentially on paragneiss rocks. This open air rock art seems closely related to its geological environment, being distributed in savannah enclave landscapes which occasionally abound with rock outcrops. As is the case for the majority of open air rock art sites, the age of the art is not obvious. Various factors are relevant in considering the age of the petroglyphs: the condition of the rock surface and the natural weathering of the figures; the techniques used by the engravers; and the archaeological environment. These approaches are limited, however, since oral tradition as well as history are silent about the petroglyphs, which are ignored by the contemporary local population. Thus it is difficult to determine the antiquity of the art. By considering the patina on the figures and the fact that they were certainly made with iron

chisels (Oslisly 1989), and according to the chronology of the Iron Age which is well known in the middle Ogooué valley, we would expect the age of the petroglyphs to lie somewhere between 2500 and 1800 years BP.

The archaeological site closest to the Elarmékora Hill petroglyphs is about 200 m from them. It consists of an occupation deposit of the Iron Age (Gif 8051: 1850 ± 60 BP), with slags and ceramic fragments bearing decorations made of concentric circles like those found on the nearby rock outcrop. In addition, an accumulating body of radiocarbon dates (2300 - 1800 BP) around the beginning of the Christian Era indicates a flourishing Iron Age occupation of this region (Oslisly and Peyrot 1988, 1992).

The same can be said of the Kongo Boumba sites with their numerous concentric circles, motifs that can also be found in the decorations of the ceramics (Fig. 13) of the Okanda tradition (Oslisly 1986, 1992) in the same area, from the second century B.C. (Gif 7776: 2110 ± 70 BP) to the second century A.D. (Gif 7524: 1840 ± 60 BP) on the sites Okanda 2 and 5, and Lindili 1.

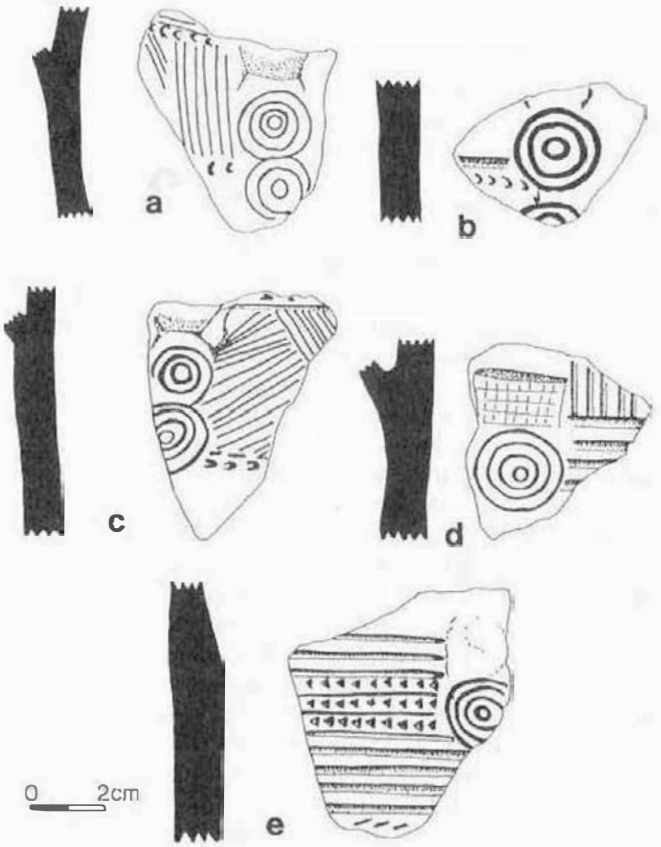

Figure 13. *Rim sherds with concentric circles decoration, Early Iron Age, Okanda tradition (2300-1800 BP).*

The age of the site of Kaya Kaya is more difficult to assess because the petroglyphs visible on the very hard sandstone blocks show evidence or erosion; they are blunt and polished by the waters of the small Missitigui river. They were made with the help of metal tools and they may date to about the beginning of the Christian Era, because the entire region at the confluence of the Mpassa, Ogooué and Lebombi rivers has a very rich archaeological context with an Iron Age presence since the fifth century B.C.

With 1000 known petroglyphs, the Ogooué valley axis has emerged as a very important region of open air rock art in western central Africa.

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Résumé. *L'art rupestre est connu au Gabon depuis 1987, année de la découverte du site d'Elarmékora. Depuis, une recherche systématique des pétroglyphes sur les nombreux affleurements rocheux le long de la vallée de l'Ogooué, a amené la découverte de nouveaux sites. Les premières études nous permettent d'estimer ces pétroglyphes, comme contemporaines de l'âge du fer, bien cerné aux prémices de l'ère chrétienne.*

Zusammenfassung. *Felskunst wurde in Gabon erstmals in 1987 entdeckt, als der Fundort von Elarmékora gefunden wurde. Seither hat eine systematische Suche für Petroglyphen auf den zahlreichen Felsen, entlang des Tales des Ogooué Flußes, zur Entdeckung mehrerer neuer Fundstellen geführt. Präliminäre Studien deuten an, daß diese Petroglyphen in die Eisenzeit zu stellen sind, und chronologisch nahe des Anfangs der christlichen Zeitrechnung fallen.*

Resumen. *Se descubrió arte rupestre por primera vez en Gabón en 1987 cuando el sitio de Elarmékora fue encontrado. Desde entonces, una sistemática búsqueda por petroglifos en las numerosas formaciones rocosas a lo largo del valle del río Ogooué ha dado como resultado el descubrimiento de numerosos nuevos sitios. Estudios preliminares sugieren que estos petroglifos son contemporáneos con la Edad del Hierro, estando cronológicamente cerca del comienzo de la Era Cristiana.*

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KEYWORDS: Bradshaw figures - Art traditions - Anthropomorphs - Kimberley

EARLY 'NATURALISTIC' HUMAN FIGURES IN THE KIMBERLEY, AUSTRALIA

David Welch

Abstract. This paper describes the earliest surviving paintings of anthropomorphs in the Kimberley region of Western Australia. These paintings appear as ochre stains bonded to quartz-sandstone rock, and most survive as monochrome 'naturalistic' forms. From these human figures, at least two tentative main groups emerge. These two groups, 'tasselled figures' and 'bent knee figures', are discussed here in detail.

Introduction

An overview of the Kimberley region, which comprises the northern part of Western Australia, and a discussion of the previous literature regarding the rock art has already been presented in this journal (Welch 1990). For several decades the rock art of the region has been broadly divided into two groups. 'Bradshaw figures' was the term used to describe the older human figures 1) now bonded to the rock. 'Wandjina' is the name given by Aborigines to paintings of certain mythological beings. These paintings are more recent, and survive with thickly applied pigments, often comprising red, white and black colours. The term 'Wandjina figures' came to be used to describe paintings from this period (Table 1).

One aim of the author's research has been to discover whether a chronological sequence of art styles exists in the Kimberley. In order to do this, aspects of the art such as rock type used, the physical appearance of weathering, rock spalling, and superimpositions have been studied. Initial research revealed that the older 'Bradshaw figures' could be divided into at least two chronologically different groups. The older group survived mainly in monochrome, naturalistic 2) human forms and was called the 'monochrome art period'. The latter group was found to comprise mainly human figures in a stylised form where often the body was depicted in sections with straight parts and in a frontal stance. Gaps often occurred where pigment was missing (Welch 1990). These paintings were said to belong to a possible 'bichrome art period' (Table 1). Further research conducted on now 700 Kimberley art sites has provided enough superimpositions to determine that, within the previously named 'monochrome art period', there exist at least two major, chronologically different groups of paintings, and they are the subject of this paper. The specific evidence supporting the notion that these two groups are chronologically different have been presented in a separate paper (Welch 1992a).

The purpose of this paper is to introduce the reader, by way of the accompanying illustrations, to these two major groups of painted human figures, which are here named 'tasselled figures' and 'bent knee figures'.

Early human figures

The oldest human figures of the Kimberley consistently appear to be painted in a broadly naturalistic form with tassels hanging from their bodies, tapering headdresses, elbow ornaments, bracelets, a simple belt or waistband such as could have been made from string or hair around their waists, and generally depicted with straight legs. Some have now been found to have boomerangs. These images are usually found to survive in light shades of red and I have termed these the 'tasselled figures' (Figs 1-17; Figs 1 and 8 are on the covers of this issue).

The second major group comprises human figures, often with an upper arm projection, headdresses with a large knobbed extremity, thick forearms, mostly depicted holding boomerangs, sometimes a possible fly-whisk, and skirts. Their legs are most commonly shown bent at the knees. These figures lack tassels and often survive with a dark pigment varying from a mulberry to blackish colour (Figs 18-34). In the following analysis of human figures the knees are said to be bent when their angle is at 5° or more from the straight.

I found it difficult to decide on a name for these paintings that would distinguish them from both the earlier tasselled figures and from other paintings not yet placed into a chronological group. For example, boomerangs are common in this group, but they occur also in association with many other paintings. A common distinguishing feature of this group is that figures are depicted wearing different types of waist appendages than the earlier group. Several forms, discussed below, could be interpreted as representing skirts, bags or tufts of decoration in a belt or waistband. While I called the most common form of waist appendage a 'skirt' or 'apron', I learned that my colleagues researching Kimberley rock art were calling this a 'bag' (J. Schmiechen, pers. comm.) or a 'sash' (Walsh 1992). Some sub-groups are simplified and lack a waist appendage, unless such features were in a now vanished paint (Fig.

1) Throughout this paper, motif definitions are only intended to convey the author's impression of iconic meaning. It is not being suggested that these impressions provide objective identifications of the motifs described. Ed.

2) 'Naturalistic' in terms of European perception and cognition. Ed.

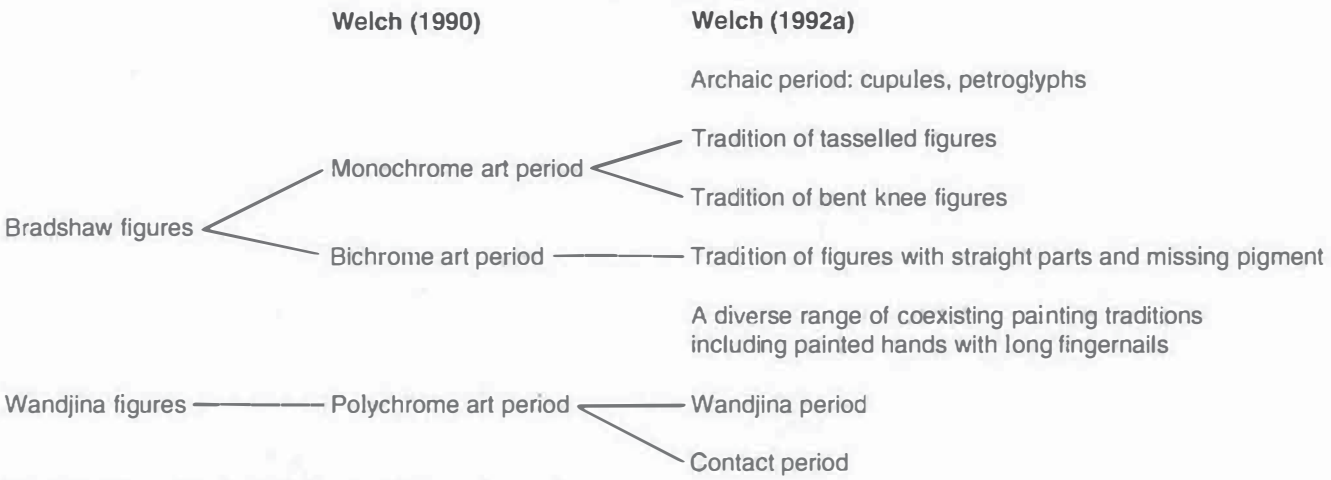

***Table 1.** Chronological divisions of Kimberley rock art.*

18). Other examples have all these regalia but are depicted with straight legs (Figs 20, 21), while others are fully embellished with all the regalia found associated with figures of that time, and bent knees are featured. The difficulties of finding descriptive terms for the various features found in such a large body of rock art are compounded by the idiosyncratic differences between individual artists. In view of the ambiguities of the waist appendages I opted to name these figures after another feature common to the majority of examples, calling them 'bent knee figures' for now. These include all the figures Walsh (1992) has referred to as 'sash Bradshaw figures'.

Although I have called these figures 'naturalistic' in order to distinguish them from stick figures and other forms, both tasselled figures and bent knee figures do display certain stylisation of their body portions. For example, the tasselled figures usually have a very thin trunk and some have long thin fingers or an exaggerated paunch (e.g. Figs 1-3). They may also have exaggerated pectoral muscles curving in to the axillae (Figs 3, 5). Both tasselled figures and bent knee figures often have small feet (Figs 2, 5, 21, 32). In two unusual cases, toes are obvious (Figs 20, 28). The feet in Figure 20 appear to have been retouched, but because the pigment used appears to be the same as the rest of the painting it is not clear whether this was done by the original artist or not.

As well as the naturalistic forms, there are stylised forms of tasselled figures (Fig. 9) and of figures derived from bent knee figures (Fig. 35). Other early naturalistic figures include full-bodied examples that do not fit into either of the two main groups described above, but which may be contemporaneous with some bent knee figures. Figure 38 shows three female figures without any body decoration, but with lines about them and 'in' them as if they have been speared. Figure 39 shows two other human forms without body decoration.

A summary of the major features found in the two main groups follows. All examples surveyed, including heavily weathered ones, were analysed. The percentage 'weathered' (in brackets) indicates the percentage of figures examined in which the feature in question could not be determined due to weathering. Further details of the study are described in Welch (1992a).

Tasselled figures

1. Tassels from the waist/hip 61% (31% weathered). Also tassels from the upper trunk or arms 34%, and head dress 17%.
2. Bracelets or bands at the elbow 44% (33% weathered).
3. Single wrist bracelet 32%.
4. Paunch shown 36% (31% weathered).
5. Fingers shown 32% (41% weathered).
6. Lack of spears 99%.
7. Lack of hooked sticks 100%. (By 'hooked stick', I refer to a short stick with a hooked end such as may represent a spearthrower or a fighting pick.)
8. Boomerangs present 9% (uncommon).
9. Baton or wand present 3% (not present in bent knee figures).
10. Red pigment 55%.

Bent knee figures

1. None have been seen with tassels from the waist.
2. None have been seen with fingers shown.
3. Boomerangs present 59%, absent 5% (36% weathered).
4. Mulberry or blackish pigment 84%.
5. Waist appendage present in 56%, absent 11% (33% weathered).
6. Legs bent at knee 56%, absent 23% (21% weathered).
7. Headdress with large knobbed end 51%.
8. Headdress with pendant from end 34%.
9. Holding triangular object 39%.
10. Thickened forearms (probable arm bands or bracelets) 37%.
11. Upper arm protuberances 36%.

Description of tasselled figures

Tassels from the waist or hip are the most common feature, but tassels may also be from the headdress or body (e.g. Figs 1-3). A common feature of the tassels themselves is the occurrence of sets of three as two long and one short tassel. The tassels may end in a tuft or pompom and some examples have inverted 'V' shapes on their ends, consistent with material such as feathers, grass or fur having been twined into the string of the tassel. This practice is seen today with feathered strings from Arnhem Land on objects such as arm bands, headbands, waist girdles, dilly bags, and some ceremonial poles (Isaacs 1984: 80-3, 95, 101, 105, 254-5). The tassels from the waist would most probably have been suspended from a hair or string belt, often not visible on the paintings. It is interesting to note that in historic times, the Wororra tribe of the western Kimberley wore their belt about the hips, not the waist (Love 1917: 27). On some of the tasselled

figures the tassels appear to be suspended from the hip rather than the waist (Figs 1, 2, 16; Fig. 1 is on the front cover).

No bent knee figures have been observed with true tassels. The closest resemblance to tassels is a branch-like object hanging from the waist (Fig. 20) or the probable fly whisk which hangs under the arm (Figs 20-22).

Skirts, which may have been made from grass, appear on both tasselled figures (Figs 2, 3, 8, 10) and bent knee figures (Figs 29, 30). Other figures with wide skirts cannot be placed easily in either group. Figure 36 shows details of the smaller figures seen in Figure 25. The two middle figures have possible elbow decoration (swellings) and the figure at right has wrist swellings. These are features of the tasselled figure tradition. Unfortunately it could not be determined which painting was the older of the two styles shown overlapping in Figure 25. Figure 10 shows human figures with the elbow decoration and sets of three tassels typical of tasselled figures. However, the figure at right also appears to have a similar waist appendage to that seen in Figure 20. The figure at the left appears to hold objects which may be branches with berries. Similar branch and berry motifs, appearing to be of similar age, occur in isolation in other rockshelters in the Kimberley.

Bracelets and arm bands. A swelling presumed to represent a single bracelet appears at the wrist of 32% of tasselled figures (with another 33% too weathered to tell). This feature is absent on all bent knee figures. Figures 2, 3 and 15 show examples of tasselled figures with several bracelets at the wrist. Ankle bracelets/bands appear on only 4% of tasselled figures (Fig. 5) and 1% of bent knee figures (Fig. 22). Ankle decorations made from grass are worn in Aboriginal ceremonies of the Kimberley tribes today (K. Akerman, pers. comm.). Tasselled figures have elbow decoration which sometimes appears to be only a band (e.g. Figs 2-4), while at other times there are projections which may represent feathers, leaves or fur. These often extend both upwards and downwards and may be simple in form (Fig. 1) or complex (Figs 5, 7, 8, 11). Figure 12 is the only example seen so far where a tasselled figure has arm projections appearing as tufts similar to those seen on bent knee figures. As will be discussed later, bent knee figures often have these tufts positioned higher up the arm.

A large *paunch* is featured on some tasselled figures in profile view, below which appears to be a belt from which tassels hang (Fig. 1, and Welch 1990: Fig. 26). Although a waist line is often shown on bent knee figures (Figs 30, 32), it never reaches the naturalistic flow of these paunches found on tasselled figures.

The presence of fingers. In one sub-group of tasselled figures, featuring the paunch and a curved body outline, the fingers are slender and usually correct in number (Fig. 1, and Welch 1990: Fig. 26). In other sub-groups, the number of fingers is often incorrect (Figs 8, 9, 15). Bent knee figures, on the other hand, never show individual fingers. The hand is shown attached to a boomerang or other object and the fingers are not shown, presumably because they are clasping it. The hands of bent knee figures are rarely empty, but in one example they are shown on the hips (Fig. 30).

The lack of weapons associated with most tasselled figures does not exclude the possibility that weapons were present in the original paintings, but were painted in a less durable pigment such as white. Where such objects exist, they are often shown beside the body and not actually held (Figs 8 top, 9, 15, 16). Because the hands are not depicted actually clasping these objects, on those paintings where the hands are empty it is not possible to tell if such objects were present on the original paintings. They may have disappeared due to weathering. On 21% of tasselled figures, no fingers are shown but the hands look as though fingers in another colour may have been present initially (Fig. 3). However, it may have been a convention of some artists to draw hands in this way as if the fingers were curled into a fist. Support for this latter possibility is found in Figure 8, where both the top and right hand figures hold dilly bags, yet fingers are only shown in the top figure.

Lack of spears and the hooked stick. Objects which may be spears are rarely associated with the tasselled figures. Examples in my series include the crook-like object which could be a single-barb spear and the other long sticks seen in Figure 7. It is interesting to note that the long 'sticks' are held by two smaller figures that appear to lack an elaborate headdress. From this example it is not possible to know whether such long sticks represented spears, digging sticks or ceremonial poles. However, a possible spear is seen in the back of a macropod (Fig. 9), which appears to be part of a single composition with stylised tasselled figures. Below the macropod is a human stick figure and the possible spear above is unusual in that the projections may represent barbs that are pointing the wrong way, and there is a thickening towards the upper end. An example of a single-pronged, single-barbed spear has been seen by J. Schmiechen (pers. comm.). No spears have yet been observed with bent knee figures, and no hooked stick (believed to represent a spearthrower or a fighting pick: Welch 1990) has been identified with either group. Figure 37 shows a weathered, mulberry-coloured figure holding a hooked stick. The pigment and weathering reveal that it may be contemporaneous with some of the bent knee figures, although it has none of their characteristics. One cannot be definite about this placement from just one example, but it is possible that bent knee figures may have been only one of several different art types occurring at the same time. On the other hand, this may be an example of a figure that has evolved just after the bent knee figures, when the hooked stick began to appear in the art.

It was noted that no figures from either of the two groups have yet been identified with shields or unequivocal clubs, nor have they been portrayed with a boomerang or other object tucked into their belts, as appears on human figures depicted in the period of figures with straight parts and missing pigment.

Boomerangs and short sticks. Where boomerangs appear with tasselled figures they are often shown rising vertically from, or just beside, the hand (Figs 13, 16). Similarly, short sticks are shown above and beside the hands (Figs 2, 9, 12). These short sticks could represent hunting or throwing sticks, or they could represent batons or wands. Wands are used today in ceremonial dances in the Kimberley and are held upward as shown in these figures (K. Akerman, pers. comm.). The depiction of these objects sometimes beside, rather than in, the hands may have been an artistic convention or it may indicate that the objects were being juggled, or that they were attached by fine string to the hands.

Painted dots or dashes around the bodies of the human figures are a feature seen on some tasselled figures (Figs 3, 15), but not on the bent knee figures. This is also seen on the dynamic figures of Kakadu art, western Arnhem Land. It is possible that these dots may have been meant to

represent movement, body heat or body odour, and in the Kakadu examples where the dots are in front of the mouth, breath or voice. Other dots and dashes in Figure 3 appear to be parts of dilly bags that must have been originally painted in an additional paint. It is thus possible that other lines of dots may have been originally tassels painted in bichrome (Walsh 1992).

Surrounding bands. Two examples are illustrated of tasselled figures surrounded by what resembles a string with interwoven decoration. At face value, the band on the left hand figures in Figure 3 appears to be almost held as if it were a skipping rope. However, on the right hand figure this is not the case, and in Figure 4 the band appears to surround each arm up to the arm pits and then surround the body.

The head shape of both tasselled and bent knee figures is usually portrayed as quite round, which could be a stylisation of the art traditions. However, it may indicate something of the skull shape of these early Australian artists. This requires further analysis. Another interesting point is that none of these figures are portrayed with beards, necklaces or earrings. It is again possible that some of these features were included in the original paintings in less durable pigments such as white. Long 'strings' ending in tufts, seen in Figure 7, may represent nose decorations.

Tasselled figures: regional variations and sub-groups

The tasselled figures do not form one homogeneous style. It is evident from the examples shown that many different artists have contributed to this group of paintings. In the future it may be possible to find some chronological order amongst the sub-groups, but at present no superimpositions have been found that allow a convincing chronological sequence to be deduced within this group. One major regional variation is that, on the King George River, some of the tasselled figures appear more rigid than elsewhere (Figs 5, 7, 8). One large panel (Fig. 5) has a superimposition which shows an orange pigment form with simple elbow bands, simple three-part tassels from the waist, and the figures holding 'strings'. These have infill orange but are shown here in thin outline. A red-brown form, indicated here in black infill, shows four tasselled figures, very similar in body outline to the orange form but with more elaborate waist tassels and elbow decoration and all holding dilly bags with one hand. Close examination reveals equal rock spalling and it has not been possible to determine with certainty which was painted first. However, the orange form is more faded in general and one wonders whether this was the older painting, and whether darker, red-brown pigment may have been used to better highlight the painted human figures on the white quartz-sandstone. Similarly, a panel on the Mitchell Plateau shows stylised tasselled figures (Fig. 9) which may have been superimposed on very similar figures. The faded figures, shown here in thin outline, consist of two animals and human forms, one with a wide skirt and one with simple, three-part tassels from the waist. The less faded figures, shown in black infill, have more elaborate tassels from the waist, except for the figure at the right which is similar to one of the faded forms. Both the faded and fresher forms are painted in the dark-brown/black colour and one wonders whether the same artist painted both forms in order to create a feeling of depth, or whether the earlier style was copied many years later.

The range of tasselled figures includes all of the northern Kimberley coast to at least 250 km inland and at least 300 km in an east-west direction. They may have extended as far east as Kununurra, where Figure 17 shows a faded painting that has some of the features of tasselled figures in that it is graceful, monochrome and has a tapering headdress, bracelets and prominent pectoral muscles.

Description of bent knee figures

Boomerangs. There is an opportunity to study boomerang types shown with early human figures. Generally, the boomerangs held by tasselled and bent knee figures are short, though larger ones are occasionally portrayed (Figs 18, 31, 32). One difficulty here is that these may be ceremonial boomerangs, and not the boomerangs that were used in hunting. The lack of spears, clubs, and fighting and hunting scenes with bent knee figures would support the view that these figures are in ceremonial attire. Hard evidence of early boomerang types can be found in examples of boomerang stencils which occur in the Kimberley.

Mulberry to blackish pigment. The use of darker pigments appearing as a mulberry colour is striking in the bent knee figures. Although weathering can sometimes change pigment colour, it appears that a specific method of pigment preparation or an additive such as blood or plant dye was used by the artists of the mulberry-coloured bent knee figures. Possible reasons for the choice of darker pigment include the fact that it stands out more on the quartz-sandstone rock, that there may have been a specific ritual associated with that pigment preparation, or that the people being portrayed were of darker skin. The importance of pigment in the Kimberley rock art has been discussed elsewhere (Welch 1990, 1992a, 1992b).

It is interesting to note that in many New Guinea Highland tribes a distinction can be made between 'festive' and 'martial' adornment. Brighter paints such as red, yellow and white are worn for festive adornment by both men and women, but for martial adornment the men may completely cover themselves with charcoal which is associated with warfare and aggression (O'Hanlon 1989: 89-93). This is remarkably similar to the findings of tasselled figures in reds which could represent a festive adornment, and bent knee figures with their boomerangs and in darker pigment representing the martial adornment. The drawings made to illustrate the two different adornments in O'Hanlon's book actually show the festive adornment figures with straight legs and hands by the side, while the martial adornment figure is shown with bent knees, arms raised, weaponry and in black pigment. This is not to say that both these styles in the Kimberley are two facets of the same art. As previously explained, the oldest human figures appear to be tasselled figures. Bent knee figures appear to have been painted later, although it is possible that later artists may still have painted some tasselled figures.

Waist appendage. A waist appendage is an almost universal feature in some sub-groups of bent knee figures. Other sub-groups appearing to be of the same age and having mulberry pigment and similar accoutrements lack such a waist appendage (Fig. 18). At least four types of waist appendage are seen. The most common is depicted as a triangle shape with three points (Figs 21, 25-27). It is possible that this three-point form is a stylised depiction of that which is seen in Figure 22. Here, the posterior waist projection shows more detail and several hanging 'strands'. In some examples (Fig. 27) this is depicted as leaving the body higher than the waist and a swelling is

shown which would represent the part tied around the trunk. Walsh's term 'sash' may best describe this object because a sash is defined as an ornamental band or scarf worn as a girdle.

The second waist appendage depicted on some bent knee figures is a bulbous form at the front (Figs 25-27). Again, Figure 22 appears to have an embellished form of this projection. This may represent some object that was crafted from fur, string, feathers or some other material. A similar object is seen on New Guinea indigenes, and consists of a large ball of hair string tied to the waist by string (Miller 1950: 160).

The third waist appendage seen is that which looks more like a grass skirt with fuller, wider body (Figs 22, 29, 30, 32). Note that in Figure 29 each of these three waist appendages are seen in the one composition. In this panel the figures in the left section are in profile with most headdresses pointing down and they lack upper arm projections. The figures at right are partly frontal, headdresses point upward, upper arm projections are present and additional objects are carried. A small simpler figure is at the left.

The fourth waist appendage seen on bent knee figures has been previously noted on Figure 20.

Legs bent at the knees. When paintings of humans which contained most of the elements of being monochrome red to black pigment bonded to the rock, having upper arm projections, boomerangs, waist appendages and lacking tassels were grouped and analysed, 56% were noted to have greater than 5° bend at the knees, while this condition could not be determined in 21% due to weathering. Some examples were found with straight legs (Figs 20, 21), as well as groups of fresher looking figures which also lacked waist appendages, but which had other features found in the group such as boomerangs, upper arm projections and knobbed headdresses with feather extensions (Welch 1990: Fig. 28). It is felt that this last example is a more recent development following many of the earlier bent knee figures.

The motif on the right in Figure 19, with legs apparently crossed, lacks any accoutrements, but is painted in dark-red/mulberry and is probably contemporaneous with the bent knee figure shown, located near it in the same shelter. Both these figures were noted by G. Hill in 1910 (Mountford 1937: Figs 28, 34).

Among tasselled figures, only 8% had knees bent greater than 5° (Fig. 16), with 30% being uncertain due to weathering. Of these, the average degree of bending was 26° compared to an average bend of 32° in the bent knee figures with bent knees. It is probable that the bent knees were illustrating a relatively important point in the minds of the artists, because of the prominence of this feature in so many paintings. One can only assume what the significance of the bent knees might be, but a likely explanation would be that the people portrayed are dancing or jumping. Less likely reasons would be that the figures are depicted in the acts of falling, floating, flying, sleeping or in death. The occurrence of elaborate body adornment and lack of spears, as already mentioned, renders it likely that these figures are painted in the act of performing a ceremonial dance or ritual.

Headdress types. While 14% (46% uncertain) of tasselled figures have a knobbed end to their headdresses (Figs 2, 3, 5), 51% (26% uncertain) of the bent knee figures have a knobbed end which is often much larger (Figs 18, 29, 30, 32). A pendant from this knobbed section was seen in 34% of bent knee figures, while tasselled figures have a smaller pendant in 4%. A hair bun tucked at the back of the head was seen in 6% of bent knee figures (Figs 24, 34). This hair bun is probably what appears in the frontal view as lateral swellings on both tasselled (Fig. 9) and bent knee figures.

Feathers. Projections which may represent feathers appear on 7% of tasselled figures and 24% of bent knee figures. In some cases an obvious feather is depicted (Fig. 33), which is a feature found on the Mitchell Plateau. Other paintings which may be contemporaneous with bent knee figures feature huge headdresses with a single feather projecting (Fig. 35).

Fly whisks. An object that appears to be made up of strands is seen hanging under the arm of Figures 20-22, and this is often carried in addition to a triangular-shaped object, possibly a dilly bag. The human figure in Figure 28 carries what appears to be a fly whisk, and it is possible that other, simpler objects also represent fly whisks.

Dilly bags/fans. Triangular objects are often hanging under the arm as well as being held (Figs 20, 21). One cannot be certain whether these all represent dilly bags or whether some may represent fans.

Thick forearms. In some sub-groups of bent knee figures the forearms are much wider than the upper arms (Figs 20-22, 24, 26). Sometimes a definite knobbed appearance can be seen, and this could represent multiple bracelets or bands. A clue to the exact meaning is found in Figure 23, where a row of individual dashes across the forearm of a bent knee figure appears to represent individual bracelets.

Upper arm protuberance. This object is often rounded and does not appear to be a feather, or of a naturally occurring shape. It may have been fashioned into this shape from fur or some other lightweight material because it almost always points upwards. A similar object worn by New Guinean natives consists of feathers wrapped up in long leaves and appears in early photographs (Miller 1950: 33). It was mentioned above that Figure 12 represents the only tasselled figure known with an object of this shape, located at the elbows. However, bent knee figures usually have this decoration positioned as if it were kept in place by an arm band or string tied to the upper arm between the elbow and the axilla. In those examples where it is high in the axilla, the protuberance is attached at the shoulder (Figs 21, 30) and I have described this using the term 'epaulet' in the past. There can be little doubt that the object depicted is tied at the upper arm, and a term such as 'upper arm protuberance' or 'upper arm decoration' is to be preferred.

Other armlets which project out in a similar fashion are still worn by Aboriginal women on Melville and Bathurst Islands during mourning ceremonies (Spencer 1912). These armlets are made from bark, woven with bush string, decorated with small feathers and painted.

Bent knee figures: regional variations and sub-groups

Different types of bent knee figures occur within each area of study. For example, Figure 26 with thick forearms and Figure 27 with thin forearms occur within 400 m of each other. Figure 22 in the embellished form is located next to another rockshelter that contains a simple form similar to that shown in Figure 18 and illustrated in Crawford (1977: 358). Different examples near Kalumburu are illustrated.

One form of bent knee figure has two large wings projecting from the front of the head. These were first described by Schmiechen as 'winged Bradshaws' at the First AURA Congress, in 1988, and he has found them concentrated in a northern section of the Drysdale River (Schmiechen 1992). Further examples of this head projection have now been found 160 km to the south (Fig. 27) and 80 km to the north-east (Fig. 28). Bradshaw (1892: 99), one of the first Europeans in the area, saw an Aboriginal in the distance with 'two huge appendages extending upwards and obliquely outwards from the top of his head, about 3 ft long; but whether they were made from the wings of a large bird, or were pieces of bark we could not ascertain'. An identical paired wing arrangement is occasionally used today by New Guinea Highlanders. There, it is the large white wings of the heron or egret that are worn (O'Hanlon 1989: 142, and Pl. 14). The projections seen in Figures 18, 21, 24 and 30 may be stylised versions of this wing arrangement, or could represent some other decoration such as a twig or small feather.

One major regional variation identified in the bent knee figures occurs on the Mitchell Plateau. Here, two features not yet seen elsewhere occur: the existence of a single large feather from the front of the headdress (Figs 32, 33), and the existence of bichrome forms. Figure 34 is from a panel on the Mitchell River. A gap is seen at the waist, and faded brownish pigment, shown speckled, reveals the body adornments usually seen with bent knee figures. Although it is possible that some of these 'extras' may have been added later, another example, shown in Figure 32, is also consistent with the paintings having been originally bichrome.

Bent knee figures have approximately the same distribution as the tasselled figures, but have not yet been identified as far south as the Isdell River, nor further east than Jack's Waterhole.

Further discussion

Tasselled and bent knee figures of early Kimberley rock art give us an enormous insight into the material culture of the early Australians. In Figure 8, two people hold containers of some kind. The detail on the lower right figure includes a splayed neck on that container, which raises the possibility that this represents a water container. There is no evidence that pottery was used in prehistoric times in Australia, but bark containers lined with beeswax, or tree or spinifex resin, were used in historic times to carry water. A dilly bag with a splayed neck similar to the example seen here was collected in 1912 from western Arnhem Land (Isaacs 1984: 123), but it was not lined with waterproofing. Thus the painting probably depicts the earliest known example of one of these unusual splayed neck bags.

Dilly bags were not made in the northern Kimberley region in historic times. Instead, bark was used to make various containers, including a small paperbark wallet used to carry stone knives, spearheads and ochre, and which was tied up with boab string and carried in a man's hair (Blundell 1976: 434). Yet many of the early human figures carry what appear to be dilly bags. This indicates one aspect of a cultural change over time for this area of Australia.

Much of the ornamentation featured in these early paintings is found not just on Australian Aborigines, but also on the people of New Guinea this century. As well as the examples already cited, this includes leaf tassels attached to the armlets seen on tasselled figures, and the various forms of plumed headdresses seen on both groups of paintings. There were no doubt close cultural links between the two areas in the past. Once dates are established for this art there will be implications about what people wore and did, thousands or tens of thousands of years ago, not just in Australia, but further north with links into Asia.

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Résumé. *Cet article décrit les peintures d'anthropomorphes les plus anciennes survivant dans la région du Kimberley en Australie occidentale. Ces peintures se manifestent sous forme de taches d'ocre liées à la roche de grès siliceux, et la plupart survivent en formes 'naturalistiques' monochromes. On peut distinguer au moins deux groupes essentiels provisoires de ces motifs humains. Ces deux groupes, 'figures avec pompons' et 'figures aux genoux fléchis', sont discutés en détail.*

Zusammenfassung. *Dieser Bericht beschreibt die ältesten überlebenden Malereien von Anthropomorphen im Kimberley Gebiet von Westaustralien. Die Malereien erscheinen als in den Quarzsandstein gebundene Ockerflecken, und die meisten sind als monochrome 'naturalistische' Formen erhalten. Aus diesen menschlichen Figuren treten zumindest zwei provisorische Hauptgruppen hervor. Diese zwei Gruppen, 'Figuren mit Quasten' und 'Figuren mit abgewinkeltem Knie', werden hier in Einzelheiten beschrieben.*

Resumen. *Este artículo describe las más antiguas pinturas sobrevivientes de figuras antropomorfas en la región Kimberley de Australia Occidental. Estas pinturas se manifiestan como manchas de ocre unidas a roca arenisca de cuarzo, y la mayoría de ellos sobrevive como formas monocromas 'naturalistas'. De estas figuras humanas, por lo menos dos principales grupos tentativos emergen. Estos dos grupos, 'figuras adornadas con borlas' y 'figuras con las rodillas dobladas', son examinadas en detalle.*

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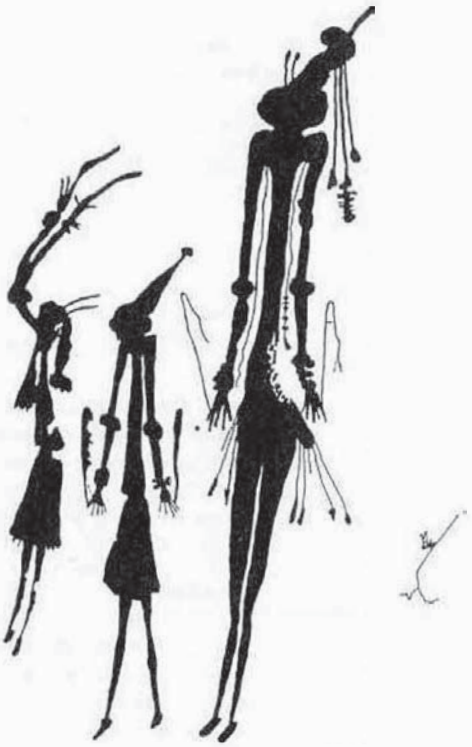


Figure 2. Red tasselled figures with wands, skirts and bracelets. Large figure 79 cm (note: Fig. 1 is on front cover).

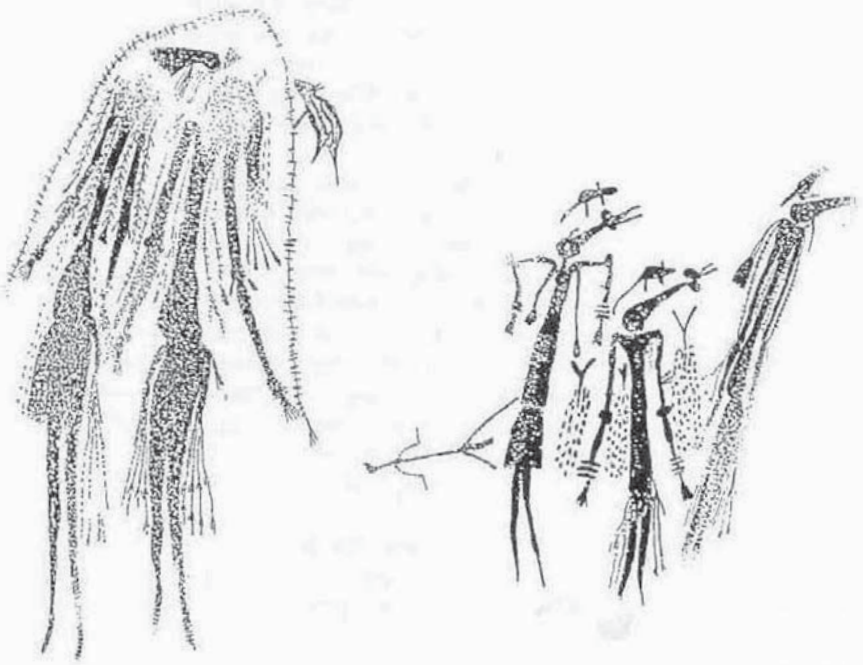


Figure 3. Tasselled figures with associated animals, dark red. Left figure 90 cm.

Figure 4. Tasselled figures, red, repainted head and arms on left figure and repainted legs on both figures. Right figure 41 cm tall. Manning Creek.

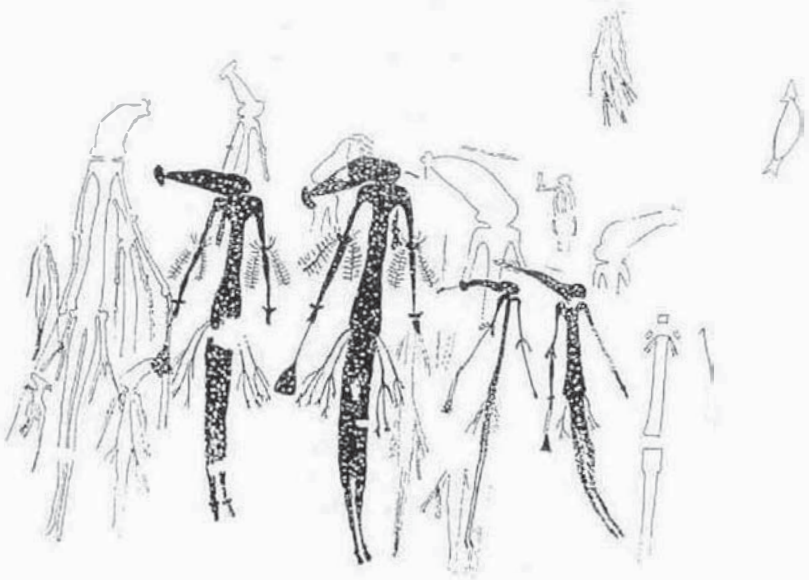


Figure 5. Orange figures (shown in thin outline) holding strings, brownish figures (shown infilled) holding dilly bags. The figure at right was added later, with straight parts and missing pigment. Central infill figure 120 cm. King George River.

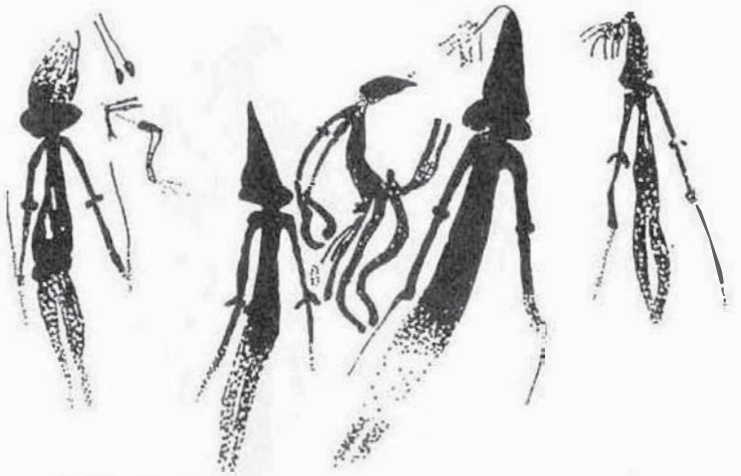


Figure 6. Orange tasselled figures with strings and a variant form in the centre. Tallest figure approximately 50 cm. An object at the left may be an axe. King George River.

Figure 10. A tasselled figure, 52 cm tall, holding objects resembling branches with berries. Kalumburu.

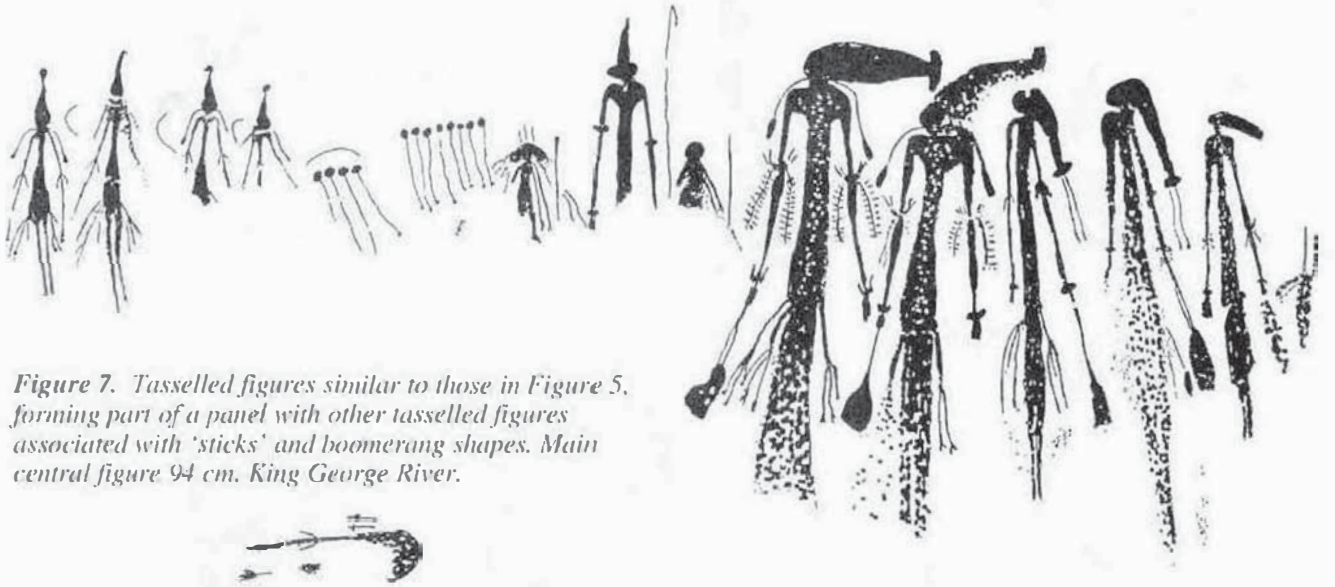


Figure 7. Tasselled figures similar to those in Figure 5, forming part of a panel with other tasselled figures associated with 'sticks' and boomerang shapes. Main central figure 94 cm. King George River.

Figure 9. Stylised tasselled figures with boomerangs, sticks and a speared macropod. Centre figure 54 cm, brown-black. Mitchell Plateau (note: Fig. 8 is on back cover).

Figure 11. Tasselled figures, 45 cm tall, red.

Figure 12. Tasselled figure, 61 cm, with elbow projection, small boomerangs and a stick, red. Pago.

Figure 13. Tasselled figure, 33 cm, with graceful shoulder line, holding a boomerang, reddish. Kalumburu.

Figure 14. Red tasselled figure, 52 cm, featuring headdress, pectoral muscles, hip line, and holding a weathered object.

Figure 15. Tasselled figure with wand and string, plant decoration and wrist bracelets, 60 cm tall. Weathered half red, half blackish.

Figure 16. Red tasselled figures with bent knees and holding boomerangs. Central figure 40 cm tall.

Figure 17. Left figure is mulberry-black, 36 cm tall, faded figures at right are red-brown. Kununurra.

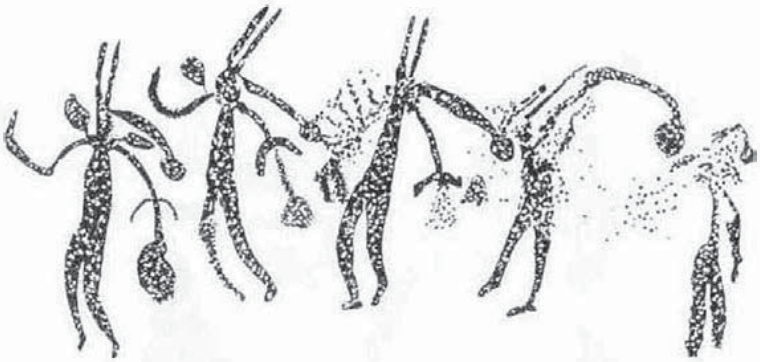


Figure 18. Bent knee figures without waist appendages, light mulberry colour. Left figure 36 cm tall. King Edward River Crossing.

Figure 19.
Bent knee figures, mulberry, left 18 cm tall. Right figure with crossed legs, 20 cm. Pago.

Figure 20. Figure with boomerangs, fly whisk, bags/fan, and waist appendage, mulberry. Feet are prominent, possibly retouched. Approximately 40 cm tall.

Figure 21. Bent knee figure, 54 cm, with three-point skirt, mulberry.

Figure 22. Elaborate bent knee figures, right figure 125 cm tall, with embellished skirts and arm projections, thick forearms, boomerangs, in mulberry colour.

Figure 23. Bent knee figure showing 'bracelets' on forearm, blackish, Mount Elizabeth Station.

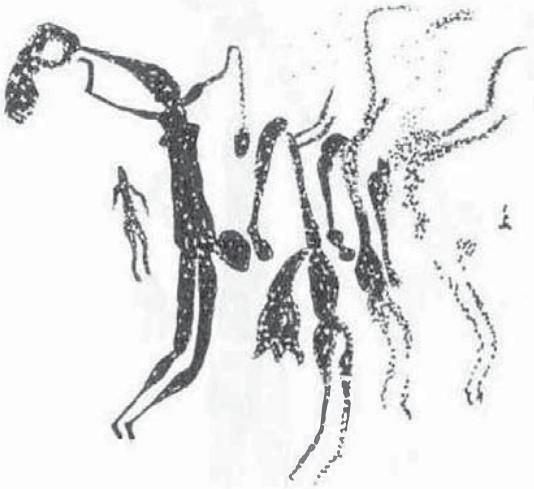
Figure 24. Profile of face, hair bun and head projections, 31 cm, brown. Note thick forearms, fly whisk and headdress pendant.

Figure 25. The lower parts of two bent knee figures, blackish, and red figures with wide skirts superimposed. The headdress of the larger figure, 84 cm tall, is at top right. For details of the smaller figures, see Figure 36.

Figure 26. Bent knee figure, 40 cm, at left with thick forearms. The figure at the right appears to have a slight gap at the waist. Mulberry colour.

Figure 27. Bent knee figure with fly whisk and winged head projections, 58 cm tall, dark brown.

Figure 28. Winged head projections and detailed feet, 50 cm tall, mulberry to brown. King George River.



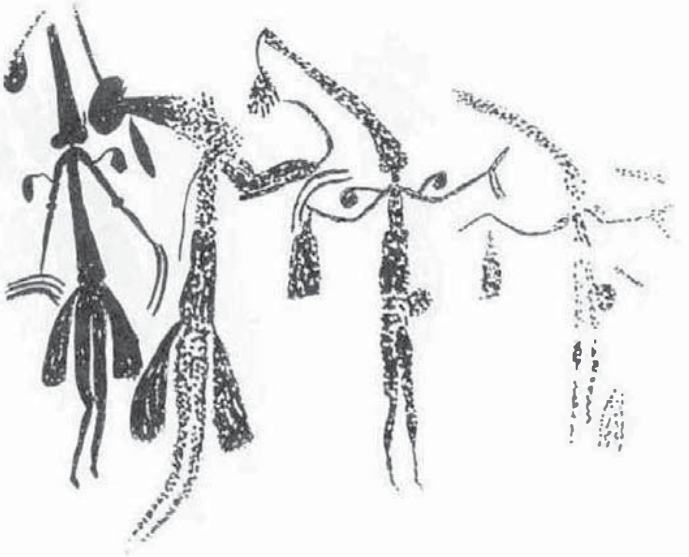


Figure 29. Dark brown composition, main figure on left 43 cm tall. King George River.

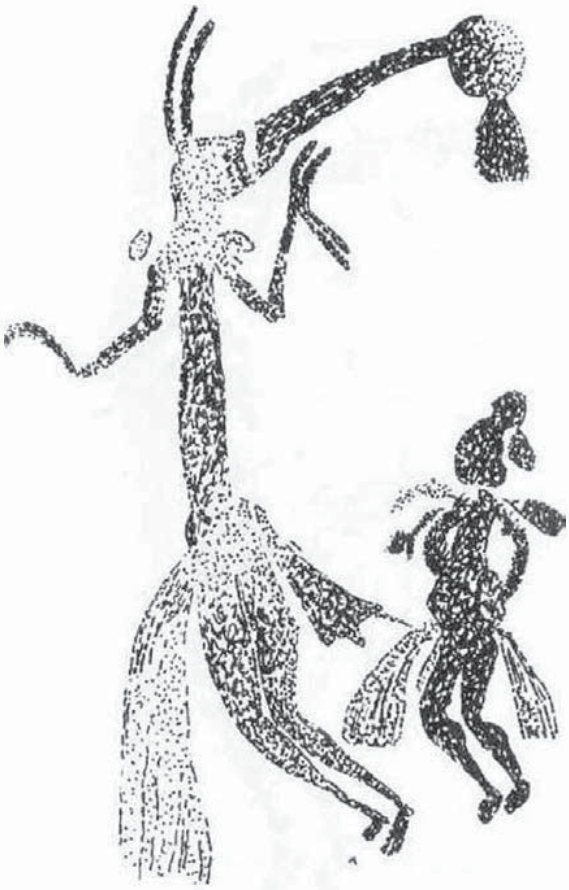


Figure 30. Part of a panel of bent knee figures, mulberry. The figure at right appears to have hands on hips. The figure at left, 60 cm tall, has an unusually long skirt. Pago.

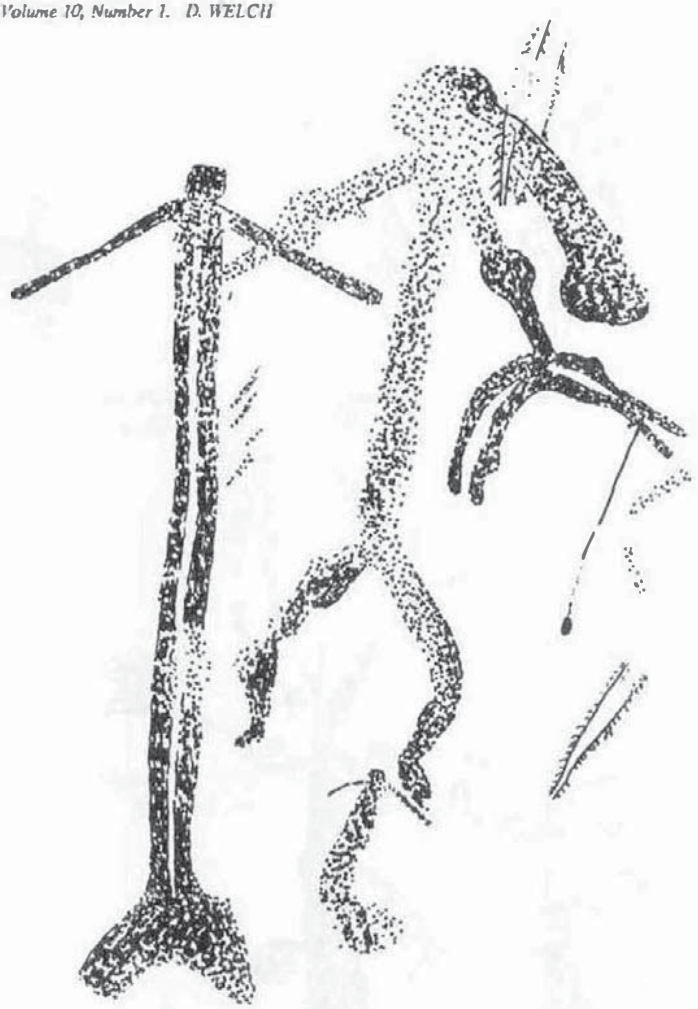


Figure 31. Figure with boomerangs on the right, 37 cm tall and in mulberry pigment, is painted over by brown figures with straight parts and missing pigment. A hooked stick and spear ends are in the latter colour. Pago.

Figure 32. Bent knee figure, red-brown, 56 cm tall, with large feather in headdress. The gap in the headdress is due to a crack in the rock. Smaller figure in bichrome. Mitchell River.

Figure 33. Bent knee figure with large feather. Length of larger boomerang 15 cm. Mitchell River.

Figure 34. Dark red-brown figure with gap in waist and stippled areas in pale brown, 42 cm tall. Mitchell River.

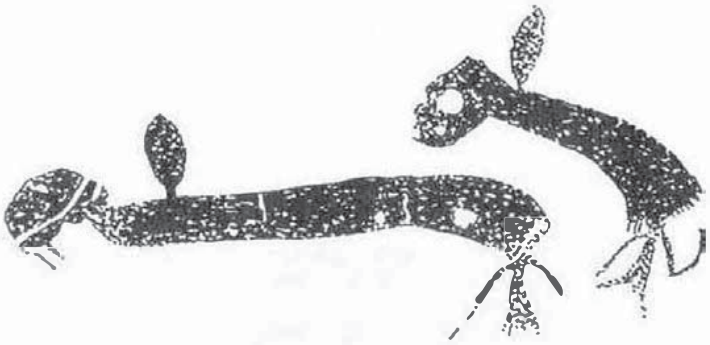


Figure 35. Stylised figures with large headdresses and feather projections, red-brown. Headdress of left figure is 56 cm long. Little Mertons Falls.

Figure 37. Mulberry-coloured figure, 52 cm tall, with hooked stick and skirts. Pago.

Figure 36. Detail of the red figures in full skirts seen in Figure 25.

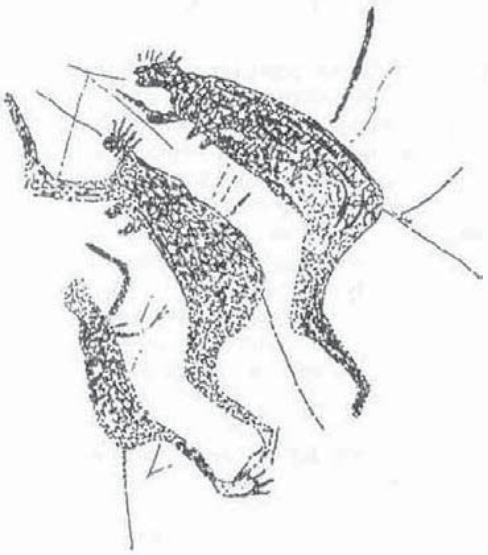


Figure 38. Female figures with lines about and at posterior ends, approximately 50 cm tall, in mulberry. Mitchell River.

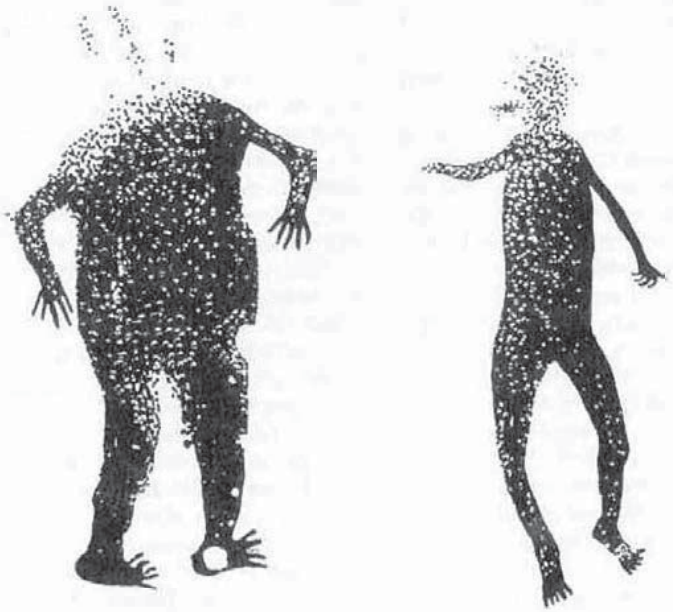


Figure 39. The left figure is blackish, 150 cm tall, from King Edward River. The right figure is dark red, 280 cm tall, from Mitchell River.

RAR DEBATES

Comment on
A SURVEY OF ROCK ART IN THE VICTORIA RIVER DISTRICT, NORTHERN TERRITORY

By HOWARD P. McNICKLE

In *Rock Art Research* 1991, Vol. 8, No. 1, pp. 36-46.

Reply to Comments and an update on the Victoria River District

HOWARD P. McNICKLE

In replying to Comments on my above paper, by David and Flood (*RAR* 8: 130-1) and by Walsh (*RAR* 8: 131-2), I would like to emphasise that my report was simply an overall summary of this large and diverse rock art corpus. Despite its length, the paper was no more than a brief overview of results obtained by myself and a number of other researchers, including D. Lewis, K. Mulvaney (both of whom reviewed the paper's original draft), and the above commentators. One of the latters' principal criticisms is the paucity of information given on many important rock art styles and other aspects. I entirely agree that *all* the styles, subjects and varieties of technique considered found only cursory mention, which was because of lack of space. Many important styles or techniques (e.g. distribution of stencils) were not mentioned at all.

David and Flood elaborate on the appropriateness of the term Lightning Brothers to describe pairs of large anthropomorphous figures found in various parts of the Victoria River District (VRD). Their Earthwatch project has undertaken the most detailed rock art recording of any region of the VRD and included detailed consultation with Aboriginal custodians. Thus David and Flood are well qualified to comment on this aspect, and considering that sites featuring the Lightning Brothers are the best known and most widely published of all VRD art sites, and were to most researchers the only well-known sites prior to my 1991 paper, I believe that it is most appropriate to elaborate upon this particular feature.

At the time I wrote the paper I did not have the full results of the Earthwatch project at hand, and I admit to using the name in a fairly loose and general manner. I did in fact suspect that the name Lightning Brothers and the associated story of Jabirringgi and Yagjagbula could strictly only be applied to the Yiwarlarlay site at Delamere, where they were first recorded by Davidson in 1930. However, a number of more recent researchers have used the name to describe pairs of anthropomorphs at other sites in this part of the VRD (e.g. Walsh 1988), and in my discussions with other researchers (including David and Flood) I have usually referred to pairs of anthropomorphs at other sites as possibly being versions of the Lightning Brothers. My implication here is that there is likely to have been a common cultural motive behind the practice of painting pairs of anthropomorphs at different sites and that, over a period of time, the meaning and interpretation of this has changed for each of the sites. At Delamere, the pair of male figures has been described as 'Lightning Brothers', but at other sites, different names and stories have evolved. Conversely, the practice of painting subjects in pairs is not restricted to large or small male anthropomorphs, pairs of females have been recorded both by the Earthwatch project and myself, and I have recorded pairs of dingo-like animals and mammal-headed rainbow serpents.

Walsh's Comments could convey the impression that my measurements of large paintings are inaccurate. He infers that the largest crocodile figure in the VRD was measured by myself at 7 m, but later, on accompanying me to the site, was found to be 6.23 m. This is not correct. The largest crocodile I had recorded prior to 1990 was at a site along the Pinkerton Range which was measured 6.0 m in 1985. Immediately below the crocodile is a Rainbow Serpent which reaches 7 m. In my 1991 paper, under the heading of *Fauna*, the maximum sizes of different species were quoted from memory and usually rounded to the nearest metre, simply to give readers an overall indication of the size reached by VRD paintings. The quotation of 'salt-water crocodiles of 7 m' was in fact a mistake on my part and I realised after publication that it is the serpent that reached 7 m, while the crocodile above it is 6 m. However, the site to which I accompanied Walsh in 1991 was not located and recorded until the 1990 season, i.e. after the paper had been written! The crocodile at that site was measured by me at 6.3 m, which was the figure given to Walsh before he re-measured the figure at 6.23 m in the following year.

In the case of very large figures, my own measurements have been quoted to the nearest 0.1 m, which I regard as being sufficiently accurate, considering the normally irregular or undulating support surfaces. In general, the measurement of a figure is taken to be the shortest distance which can be practically measured from one extremity of a figure to the opposite, following the shape of the rock. In some instances this may not be the shortest geometrical distance (e.g. a long snake painted around a convex surface). The method of measuring large figures is a point which needs to be clarified by agreement among researchers. A number of practical difficulties may arise in the field. Whereas Walsh is always accompanied by an assistant, I almost invariably work alone. Upon measuring the large snake at Keep River in 1985 (the longest measured painting in the world until Walsh's 43.7 m painting was found in 1991), the only practical way was by placing the tape measure on the ground below the painting. The measurement so recorded was rounded off to 24 m, but considering that the head of the snake is painted on an upper, exposed wall, the body recedes onto the flat ceiling of a shelter, while the tail emerges to terminate on a further exposed wall, it is not difficult to understand how a different technique may result in a measurement of 25.26 m. My own measuring techniques have been refined over the seasons and nowadays, all important measurements are carried out at least twice.

Since publication of the 1991 paper I have completed a further two seasons of survey in the region, while during that period Walsh has undertaken more detailed recording of selected VRD sites, in addition to recording in other regions of far-northern Australia, and in particular, in the west Kimberley. It is not at all surprising that styles and techniques characteristic of the VRD should also be present in the Kimberley, because the two areas form in fact a continuous rock art region, divided only by the state border. Styles and techniques in the far north-eastern VRD are more closely akin to those in the west Kimberley (800 km distant) than to those of Arnhem Land (300 km or less) to the north-east. The 25 m-long snake is within 5 km of the western Australian border {which end of the snake? Ed.} and my own 1991 survey found the style of this figure to extend into the Kimberley.

A principal objective of surveys such as those carried out by Walsh, myself or the Earthwatch project has been to record the progressive stylistic variations of rock art across this large region, and whenever possible to obtain ethnographic information in relation to the art from custodians. Some results of my two seasons of survey work since the publication of my paper are reported in the following.

Recent work in the VRD

In my two full seasons of survey in the VRD since May 1991 I have completed initial surveys of several significant areas. The following update is only a very brief overview, as had been my paper itself. More comprehensive information can be obtained from the detailed reports (totalling some 100 000 words) of seven field seasons, which are held at the Australian Institute of Aboriginal and Torres Strait Islander Studies in Canberra.

Upper Wickham River (see map, *RAR* 8: 37)

The geology along the Humbert and Wickham Rivers is considerably more varied than on the West and East Baines Rivers, and sites are fewer. Few of the distinctive West Baines style characteristics, such as large squat females, stone axe figures or 'Y' eye-headed figures appear to extend for any distance into the Wickham River region. One exception, however, is the 'Diwalliba' figure (contorted anthropomorph with lumps or enlargements along body or limbs). It was recorded at a considerable number of sites and is as much a characteristic of the Wickham River art as it is of the West Baines. Rainbow Serpent paintings appear to be less common than in either the West Baines or Gordon Creek regions and do not reach great sizes. Scratched line figures are present, including examples partly decorated with pigment, and these include contact art. The Humbert and Wickham River networks appear to be almost devoid of the stone structures that are common along several West Baines tributaries.

Wave Hill region

Much of this area, first surveyed in 1984 and 1985, is flat plateau, but where it is dissected by the steep-sided valleys or shallow gorges formed by water courses, scattered groups of sites are located. Mammal-headed Rainbow Serpents of moderate size are present. The 'Diwalliba' figures are represented by a fairly small figure with a black interior and white outline. A motif apparently confined to Wave Hill and the south of Gordon Creek is that of an upright anthropomorph without arms and indication of gender. During earlier surveys it had been observed that the great majority of anthropomorphs at Gordon Creek sites lack obvious signs of gender. A few sites of pecked petroglyphs were located, but no clusters of circular pits were recorded.

Coolibah region

As a result of the 1990 and 1991 surveys, the majority of sites between Timber Creek and the Innesvale-Willeroo area have now been recorded. Large painted anthropomorphs and zoomorphs are common, but large snake paintings are rare. The style of parallel stripes for internal design, typical of the Wardaman country, is common in the east of the Coolibah region but disappears to the west. Among the zoomorphs is a distinctive macropod with limbs swept forward, and often 'speared'. Among the numerous smaller paintings, 'echidnas' are extremely common, as are lizard figures with simple X-ray designs, and small pairs of copulating figures, sometimes several pairs at a single site. Petroglyphs were found to be confined almost exclusively to one technique, namely clusters of pits. They were recorded at ten sites, including one panel measuring 5 m by 1 m, densely covered with pits of uniform size. The sandstone of the Coolibah region is of a relatively hard type.

Jasper Gorge area

During 1991, a survey was carried out of an area to the south of Jasper Gorge, extending to some headwaters of tributaries of the Humbert River. However, much of this area possesses few outcrops suitable for rock art. Some ten small sites were recorded.

North-west VRD

A large-scale survey in 1991 focused on Spirit Hills pastoral station, and included a region near the state border, north of Keep River National Park, and an area extending up to 50 km to the east. Much of the eastern area is almost devoid of suitable shelters and of art sites, but further important sites were recorded in the western area. The rock art in the Keep River region differs stylistically from that of other VRD regions. White outline figures dominate at many sites and often reach considerable size. The largest paintings usually lack overall internal colour. Smaller outline figures are more likely to be bichrome, but the pigment is often applied dry and sparingly. Internal decoration, if present, is also applied sparingly. The area's large outline anthropomorphs appear to be the largest in the VRD, but are dwarfed by the largest paintings of snakes. Besides the 25.2 m giant, several examples of the same style were recorded, all within 10 km of the state border. Whereas the 25.2 m specimen is badly weathered in parts, three further examples (measuring 12.4, 11.8 and 9.2 m respectively) are all well preserved, being on shelter ceilings. One further example occurs on an exposed face, with only the tail section of 7.6 m preserved, and may have been larger than these originally. Smaller examples were also recorded. Typically, these snakes have a straight body in white outline without internal decoration, apart from eyes which are usually circles filled in with red. The tail may rear up and finish in a curl or 'hook'. Part of the lower outline comprises a 'serrated' pattern (described as dorsal fins by Walsh 1988). This is absent on some small examples but is present on all large figures recorded, and its extent varies from as few as five to as many as fifty or more of the 'fins'. The head, sometimes raised, is usually rounded, lacking decoration or 'ears', although the 11.8 m specimen does possess small 'ears'.

Petroglyphs

Petroglyphs occur in the Keep River region as abraded grooves on soft sandstone within shelters, sometimes in dense concentrations. Pecked figures, however, were rarely found in shelters. Instead, pecked outlines, mainly of zoomorphs, are often located on exposed rock faces, often not associated with rock-shelters. Such figures are usually fully patinated and difficult to see from a distance, hence many such sites are no doubt overlooked during initial surveys.

Sites with clusters of deep pits are also fairly common in this region, but they differ from those to the east, such as at Coolibah. There, the pits are usually of a uniform size, and frequently located on vertical rear walls of shelters, whereas the pit clusters in the Keep River region are almost always found on the upper surfaces of boulders, or on rock floors in shelters. There is also a greater variety in the size of the pits and in their distribution, they often exceed a diameter of 10 cm. The configuration of the pits renders it unlikely that they are a by-product of grinding of seeds or other foods. At some sites, large oval but shallow depressions or polished patches are located alongside the circular pits. These would appear to be grinding hollows, suggesting that the pits were created for another purpose.

Stencil art

The distribution of stencil art in the VRD was not discussed in the 1991 paper. Stencils are present in nearly all VRD regions, but rarely comprise a dominant feature of art sites. In the north of the VRD, stencil sites increase in frequency progressively from east to west. Thus they are rare at the important sites of the Willeroo and Delamere regions, but become more common at Timber Creek, and prolific in the Keep River and Spirit Hills regions. As in most Australian painting regions, hand stencils are the most common form of stencil. Foot stencils occur, and boomerangs are also stencilled, often in pairs. At least two Keep River sites feature stencils of rectangular or irregular objects of which some may be of the contact period.

In the West Baines region, artefact stencils occur, including those of boomerangs, spearthrowers, and at least one stone axe and one spear. Hand stencils and hand prints occur together at one site. Recent hand prints may be more common in this region than hand stencils: at one site, well over one hundred hand prints have been placed on the wall, many of them well above unaided human reach.

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REFERENCE

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RAR 10-265

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Comment on
INVESTIGATING THE CATION-RATIO CALIBRATION CURVE: EVIDENCE FROM SOUTH AUSTRALIA

By ALANWATCHMAN

In *Rock Art Research* 1992, Vol. 9, No. 2, pp. 106-110.

More information about South Australian cation-ratio dates

ALAN WATCHMAN

In addition to extracting fibrous material from basal portions of Pepuarta Bluff rock varnishes, I have also selected natural fibres from near-surface varnish above the two basal ones used in my article in the last issue of *RAR*. The new dates indicate that organic matter in the upper part of one varnish is younger than the base, but that the opposite case exists in the second varnish (Table 1). These results are interpreted as reflecting reworking of components in one varnish, but not in the other.

Sample 3 demonstrates accumulation of varnish components according to the Law of Superposition (Harris 1979), whereas Sample 4 clearly indicates superimpositioning of relatively recent material by older varnish organic matter. These dates confirm the suspicions of Reneau and Harrington (1988), Watchman (1989) and Reneau et al. (1991), who have suggested that organic substances are probably reworked from older rock coatings, soil and claypans, and incorporated in non-contemporaneous varnishes. The new data give ambiguous support to continual processes of varnish formation as required by the cation-ratio dating theory (Nobbs and Dorn 1988). The vertically inconsistent dates in one of the Pepuarta Bluff varnishes substantiate my personal and other observations of remobilisation of Yunta varnish components (Bednarik 1985: 81).

These latest results, together with other published information from Karolta (Watchman 1992), clearly signify that sub-varnish organic matter and cation-ratio dating methods potentially yield misleading, unreliable minimum ages for petroglyphs, unless research is undertaken to establish the nature, probable source(s) and stratigraphic integrity of the substances being dated.

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RAR 10-266

Sample identity	Lab No.	Radiocarbon age years BP (1σ)	Cation-ratio
Pepuarta Top 3	NZA 2573	Modern	Not determined
Pepuarta Base 3	AA 7721	3415 ± 70	4.95 ± 0.63
Pepuarta Top 4	NZA 2570	6970 ± 100	Not determined
Pepuarta Base 4	AA 7722	1375 ± 60	5.05 ± 0.47

Table 1. Comparison between radiocarbon ages (uncalibrated) of plant organic matter in near-surface and basal portions of rock varnishes from the Pepuarta Bluff calibration site, South Australia.

BRIEF REPORTS

The 1991 AURA China Tour

Australian papers presented at Yinchuan

EDITED BY GRAEME K. WARD

Australian rock pictures in China and the Helan Shan petroglyphs: an introduction to the papers presented by Australian AURA delegates to the Yinchuan conference

GRAEME K. WARD

Introduction

The first international conference of the Rock Art Research Association of China (RARAC), held at Yinchuan, Ningxia Huizu Zizhiqu (Ningxia Hui Autonomous Region) of the People's Republic of China, during October 1991, was attended by a delegation of ten Australian AURA members (Bednarik 1992: 2), six of whom offered eight of the 116 presentations listed among the conference agenda (anonymous 1991a, 1991b). Nine members of the delegation travelled together from Melbourne and Sydney aboard an Air China 747 to Guangzhou and Beijing. While based at the Minzu Hotel (adjacent to the Nationalities Cultural Palace) in the national capital, we had the opportunity to visit a wealth of historic and prehistoric places in and around Beijing, including the Qing Dynasty Summer Palace and the Imperial Palace Museum (the 'Forbidden City'), the early hominid site of Zhoukoudian and the Marco Polo Bridge to the south-west of the city, as well as Dingling, one of the many Ming Dynasty tombs (fifteenth to seventeen century), the spectacularly reconstructed Great Wall at Badaling in the north-west, and the immaculately kept 'incident' site of Tian'anmen in the centre of Beijing (Tian'anmen: the 'Gate of Heavenly Peace'), before boarding a steam train for a twenty-six-hour journey across the northern plains, through Hohhot, the fabled city of Inner Mongolia located at the southern edge of the Gobi Desert, across the Mongolian grasslands to the now industrial Baotou ('the steel city of the grasslands'), west then south along the Huang He (Yellow River) valley to Yinchuan. The return journey was accomplished by an internal Air China flight affording excellent views of changing countryside for those fortunate enough to have been allocated a window seat. One Australian took the opportunity of a post-conference tour to sites further west.

The formal and informal sessions of the conference were supplemented by field trips and visits to museums and other displays. The meetings appear to have been successful and the AURA delegation appreciated the generous hospitality of its Chinese hosts, both academic and local. One of the AURA delegates, Noelene Cole, justifiably called it 'A decidedly unstuffy conference' (Cole 1992: 2). Papers prepared for the Yinchuan conference by the Australian delegates are presented below.

The venue

Yinchuan is the capital city of the Ningxia Huizu Zizhiqu (Moslem Autonomous Region) located in the north-west of China. It is plateau country, divided by the mighty Huang He that runs from south to north along the north-western border of the province, and contains mountains, plains, forests, grasslands and deserts. The Ningxia plain is fertile and productive, having been irrigated from the river for more than two thousand years since the Qin and Han eras; it is renowned for its high quality hard rice and wheat. In the arid margins, livestock is raised. The Great Wall borders the province in both the west and east, and in the south there are walled cities and an outpost of the Old Silk Road. In the last forty years the Hui people have become a minority in their province, now comprising only one third of the population of 4.5 million. Yinchuan and other Ningxia cities are now largely industrialised, mainly processing animal and agricultural products, textiles, leathers and foodstuffs, but also producing agricultural machinery, tools and car parts. According to our tour guide, 'The native products, Medlar, Licorice Root, Helan Stone, Tanyang Lambskin, and Star Jelly are famous as the red, yellow, blue, white and black Five Treasures' of the Region (also: anonymous 1990a). Coal is mined, and burnt for heating and power generation; the northern plain, viewed from the Helan Shan foothills, is swathed in brown haze. That the regional government is seeking to publicise its tourist attractions was to the benefit of conference delegates.

Yinchuan, the largest of several substantial cities in the Region, is in the northern part adjacent to the Huang He. The city has ancient roots; it developed during the eleventh to thirteenth century A.D. as Ningxia ('Ning-Hsia'), the capital of the Tanguts, 'a Tibetan tribe that set itself up athwart the Old Silk Road' (Needham 1954: 133). The Tanguts were 'cattle breeders and caravaneers ... herdsmen of the Ordos area' who ruled the Chinese farmers and townspeople (Gernet 1982: 354-5). They named their kingdom Xia Xixia ('Hsi-Hsia' or 'Daxia' in older transliterations), the Western Xia, after the protohistoric 'Bronze Age' Xia Dynasty; it was a period known for its literature until the Xia Xixia Kingdom was conquered by the northern nomadic Mongol forces of Genghis Khan about A.D. 1227.

Effectively, the city is divided into an older (eastern) and newer section, and industrialisation and new settlement have had less impact upon the old city than they might have otherwise. The old city has an elaborate city gate, high pagodas, mosques, museums and theatres as well as extensive markets; white-capped Hui predominated here. During October, the weather was dry and warm with cool evenings; here there appears to be no concession to the speed of the sun across the earth — despite the possibility of there being three or four time zones across China, none are invoked in the north so that Yinchuan mornings are extra brisk and the evenings long. At the edge of the city, crops were being harvested.

The Conference venue was the Helan Mountain Hotel in the western seetor of Yinchuan; the hotel comprised a central meeting/banqueting building suitable for the plenary sessions, an older Soviet-style six-storey building in which some seminar meetings were held, and the newer 'Green Building' ('a two floor scaled American garden-style building') in which foreign participants were placed. The hotel provided comfortable accommodation and a wide variety of tempting northern-Chinese style dishes were served, as were Chinese beers and wines.

The conference

The International Conference on Rock Art Study, Recording and Conservation was held in Yinchuan during the period Friday 4 to Friday 11 October. It was convened by Professor Chen Zhao Fu, President of RARAC, and the Vice-Chairman of the People's Government of Ningxia, Mr Cheng Fa Guang. There were three sessions of academic presentations of varying degrees of formality interspersed with field trips into the Helan Shan — the mountain range bordering Inner Mongolia — and to museum exhibitions, as well as several opportunities to participate in diverse cultural activities.

The conference began on 5 October with an opening ceremony and formal presentations in Chinese and English (lubricated by many litres of tea), followed by a group photograph (reproduced in the *AURA Newsletter*: Bednarik 1992: 4-5). That afternoon saw the beginning of the various symposia, which were concluded on 9 and 10 October. These were interrupted by visits to exhibitions and museums, and an extended field trip. A formal reception, hosted by the regional government, was held on the evening of the first day, replete with toasts, and speeches about international friendship. On other evenings during the conference, films about petroglyphs were shown; there was a meeting of CAR and two 'theatrical festivals', as well as the opportunities for wide-ranging discussions with colleagues.

At the opening and other plenary sessions, held in the main hall, translations from English to Chinese and vice versa were made by interpreters (staff of tertiary institutions in Yinchuan). During the various symposia, interpreters were present, sitting with non-Chinese speakers to translate the speaker's remarks (and occasionally to debate with the speaker before passing on the message — with or without comment). For a non-Chinese speaker making a presentation to the predominantly Chinese audience, it was necessary to pause frequently for the interpreter (likely to be a medical or economics specialist), to simplify technical terms (Chinese equivalents were often supplied by the audience after a short discussion), and essential to remember that a paper was going to take more than twice its original time to present. Interpreters appeared to be available late into the evening, and non-Chinese-speaking AURA delegates had the opportunity to talk at length with many of their Chinese colleagues who had no English. (Our Chinese interpreters had full-time employment at various institutions in Yinchuan and their conference participation was extra to their usual duties.)

The opening session saw presentations by Chinese officials, welcoming the delegates, by the Italian cultural attaché in China (who outlined the role of the Italian authorities in providing for Professor Chen to spend a study year in Italy), Professor Emmanuel Anati (on Italian comparative studies), and AURA Secretary, Robert Bednarik (see below). At a subsequent plenary session there was a paper by Professor B. N. Saraswati of India on the subject of the ideology reflected in Indian rock pictures, and Robert Bednarik presented a brief version of his dating paper that is included here.

Figure 1. Part of a display of rubbings at the Yinchuan Ethnographic Museum.

The various symposia listed in the invitation appeared to have been discarded; delegates were placed into one of four 'discussion groups' for the various presentations that took place in meeting rooms in either the main hotel block or the Green Building. The four groups were 'Historical Group 1 and 2', 'Art Group 1 and 2'; each was co-chaired by a senior Chinese scholar and a foreign participant, and each provided with an interpreter and recorder; group participants were listed (anonymous 1991c). There was no order of presentations within each seminar, visitors being invited to speak first; this made it a little difficult to select papers and move among groups but, as members of seminars got to know each other, exchanges of views were encouraged. Another, not entirely unwelcome, departure from familiar conference format was the lack of projection facilities at each location, and the seminar rooms were brightly sunlit with no shades. However, a projector was available in the Green Building venue each evening.

Field trips and other diversions

The Helan Shan rise to 2000 metres above sea level and extend north and south approximately 250 kilometres, protecting the western Huang He plains from cold winds from the north-western plateau and the Tengger Desert. The Helan Shan are a cultural as well as geographical boundary, being seen as forming the '... juncture of farming peoples and nomadic peoples in ancient China' (Xucheng and Weizhong 1991a: 2). Two excursions to petroglyph sites in the Helan Shan were arranged by the Organising Committee. AURA delegates benefited by being able to make an initial visit to one major site on the afternoon of the day before the conference opened when, in the company of a small group of others who had arrived early, we were taken by coach into foothills of the Helan Shan, a distance of about sixty kilometres to the north-west of Yinchuan in an area immediately to the north of the distinctive Baisi Kou Double Pagodas (see below). This site was revisited in company with several bus-loads of delegates on the third day of the conference. Returning to Yinchuan, we visited Qin fortresses (221-207 B.C.), today made famous as the sets of period movies, one of which was being made as we watched.

On the second day of the conference, delegates visited the 'Petroglyphs in the Helan Mountains Exhibition' at the Ningxia Regional Museum. On display were original petroglyphs on pieces of rock taken from sites in the Helan Shan; these were accompanied by many rubbings of the motifs (Figure 1). Also displayed in the museum were representations of the Hui peoples. That afternoon, there were visits to the Ningxia Exhibition Hall to learn the social and economic history of the Region, and to the Nan Guan Mosque and Hai Bao Temple.

The following morning, along with the other delegates in several buses, we returned to the foothills of the Helan Shan to revisit the petroglyph sites. This marked the beginning of an extended tour, including Ningxia's famous 'Sand-Lake' at Sha Hu (a touristic venue focused upon an extensive marsh and lake bordered by sand hills now used for sledging and camel rides (where members of our group obtained in a sort of hoopla game garish plaster figurines). After several hours on the road south, a journey interrupted by a visit to spectacular but crumbling twelfth century A.D. tombs, relieved by story-telling and singing encouraged by the tour guide (including an unexpected and competent but rather incongruous tenor rendition of 'Edelweiss' from Mr Teng, one of our interpreters), we arrived at the city of Zhongwie and accommodation in its 'Guest House'.

The morning of the following day was occupied by a visit — using smaller buses — to petroglyph sites outside the city and beyond the farming areas in the rich valley of the Huang He. The buses travelled through a semi-desert of stony and sandy plains with extensive grave complexes, negotiating narrow roads along the sides of precipitous gullies with gold mines and spectacular rock outcrops. The petroglyphs here were similar to those north of Yinchuan but appeared to comprise larger friezes representing more coherent scenes. I was impressed by the facility with which several of the Chinese scholars accurately sketched the images

into their notebooks. Some friezes contained characters that were described as early writing. These were of considerable interest to our many Chinese colleagues. Eventually our police escort used megaphones to herd the mobs onto the buses, back to Zhongwie and a banner welcome to the city's petroglyphs museum (see below). Outside the museum is a square with another form of 'rock art', a massive statue of the late Chairman Mao Zedong, said to be one of the few remaining after the end of the 'Great Proletarian Cultural Revolution'.

The second afternoon of this excursion began with a trip several kilometres further to the west of Zhongwie. We travelled along a sealed road parallel to the railway built high in the dunes above the Huang He to another remarkable tourist locus, the place of the 'ringing sands'. Here, at the edge of the Tengger Shamo, an intensive meshing and tree-planting program had stabilised the dunes (although an area had been left for slides and camel rides). A section of the rapidly falling river had been divided to form a calm reservoir several metres above the main stream thus providing water for irrigation (and rides for tourists in little rafts made from animal skins).

Zhongwie must have other attributes but the image that remains with me was at the entrance to the museum. As at the Yinchuan Museum, there were walls of rubbings and samples of petroglyphs on the original stone. Just inside the entrance was the most spectacular of these — not so much because of the size of the presentation, which was several metres in length containing many smaller engraved rocks, and the complex engraved imagery — but for the way in which it was highlighted. In a way reminiscent of Beijing buildings on 1 October, but on a smaller scale, it was draped in fashionable 'fairy lights' (Figure 2). This practice will be of interest to conservators and site managers elsewhere.

Figure 2. Illuminated petroglyphs at Zhongwie Museum.

Two evenings during the conference were enlivened by visits to the Hongqi Theatre located in the older part of Yinchuan and said to be newly re-established. Here we were exposed to the spectacular sets, dancing and singing of a large troupe. On one occasion the theme was the cultural evolution and the ethnic diversity of Ningxia. The role through history of the great river, variously represented by many lengths of silk differently illuminated, was the linking thread in this performance. It remains a vivid memory.

Most Australian delegates had to leave Yinchuan on the morning of the last day of the conference to make their international flight connections. That morning, we were invited to a meeting with Mr Cheng Fa Guang, Vice-Chairman of the People's Government of Ningxia Hui Autonomous Region and President of the Ningxia People's Association for Friendship with Foreign Countries. Mr Cheng thanked us for attending the conference, provided us all with copies of the conference photograph (Bednarik 1992: 4-5), and the group with a copy of a magnificent collection of rubbings of the Helan Shan petroglyphs. He then proceeded to regale us with an account of the socio-economic progress of Ningxia Huizu Zizhiqu. He emphasised the increase in population over the last few decades; the production of coal and petrochemicals, machinery and textiles; the development of trade with more than forty overseas countries; the control of mobile sand dunes ('sand-taming') with the assistance of United Nations agencies, the subject of study by scientists from several countries; the extension of the irrigation system (elements of which, dating from the Qin and Ming periods, were still in use) by pumping river water into new areas; the production of quality wheats and rices and their distribution throughout China; and the anticipated bridging of the Huang He. Closer to the topic of the conference, he spoke of the more than fifty thousand petroglyphs dating to over thirty thousand years in the Helan Shan, of the Western Xia mausoleums that we had visited a few days previously, and of the Great Wall that we were discouraged from visiting on the way back from Zhongwie. Mr Cheng then accepted questions concerning the possible adverse effect of the extensive coal- and petrochemical-derived pollution upon the Helan Shan petroglyphs (not noticed) and the necessity of developing methods to conserve the images (taken on board). He invited us to tell our compatriots about the delights of Ningxia and its hospitality.

After extensive goodbyes we left Yinchuan a short time later (after a short wait at a military airport) for the apparently very different world of Beijing, and culture shock in Australia.

Figure 3. Face-like motif at the Helankou site, Helan Shan, Ningxia. The white marks around it are the result of a casting attempt.

The Helan Shan petroglyphs

At a location providing extensive views of the plain of the Huang He, a slight stream had sliced a short, narrowing valley, now denuded — apparently by flocks of goats driven each day from a nearby village — of all but a few late summer mountain flowers and stunted trees. Petroglyphs had been carved high and low on the walls of the gully. They have been subject to systematic investigation only as recently as 1983 according to Xu Cheng and Wei Zhong (1991b), and examples are still being 'discovered' (Liu Yi-qing 1991). Chinese experts, many of whom have been studying the Helan Shan petroglyphs intensively since that time, interpreted for the AURA and other conference delegates much of the wide variety of motifs. In various concentrations within the valley were single and grouped petroglyphs, the motifs of which included geometric shapes and designs resembling various quadrupeds, some apparently harnessed to 'vehicles'. What appeared to be face-like motifs (Figure 3) were sometimes remarkably similar to those recorded in central

Australia by Edwards and others (Figure 4); it was pointed out that the 'faces' were probably most ancient (but cf. Bednarik and Li Fushun 1991), their grooves were often heavily patinated, and they appeared on much exfoliated surfaces.

Jiang Zhenming, in a book dealing with several regions with rock paintings and petroglyphs, has pictured various of the Helan Shan motifs (1991: 94-103). While there are known to be many areas of petroglyphs in the gullies of the foothills of the Helan Shan (Xucheng and Weizhong 1991a: 1), the site we visited is that described by Jiang (1991: 94) as Helankou ('an opening in the hill'). He wrote of the presence of many 'faces' at this site:

> their characteristic features reflected local views on beauty, customs and religious belief. Anthropoid faces are a frequent subject of rock pictures, favoured by ancient artists because faces are like a window on human feelings as well as a screen sensitive to the outside. Spirit and face cannot be separated. By drawing faces the ancient artists tried to depict the spirit of man and gods.

Jiang described a variety of 'anthropoid faces' at Helankou, including ones 'like sunflowers with surrounding petals', and pictured an 'anthropoid face' within a 'fruit' (1991: 97).

We noticed, and Jiang described finding, Xixia script forming Buddhist phrases beside Helankou 'anthropoid faces' (1991: 96-7); the 'faces', however, belong to a time 'earlier than the Xixia Kingdom' since the script 'is clearer and has suffered less from wind and rain erosion ... . They are also of different ... colour' (1991: 97).

Figure 4. Exfoliating face-like motif, Helankou.

Apparently more recent are those motifs arguably representing animals of types found in the region today or within the recent past: sheep/goats, deer, cattle, horses. Many appeared to be associated in scenes with, for example, a 'hunter' with 'bow and arrows' pointing at 'running' 'deer'. There appeared to be 'heads' adorned with elaborate 'headdresses'; a 'copulation' scene; a realistic 'tiger' was recognised, along with some deeply engraved 'hand prints', and full 'human' figures. Complex circles were described by our Chinese hosts as 'sun gods'.

Jiang (1991: 99) saw the methods of presentation of the various engraved 'animals' as being sympathetic to their 'characters':

> ... every image shows its essential disposition. A deer is timid and sharp-witted; a dog is devoted; a horse is brisk ... .

He interpreted the 'naked' 'humans' as being earlier than 'clothed' figures, and 'A pair of testicles between the thighs is evidence once again of the ancient sex cult' expressions of 'human beings seven or eight thousand years ago, as they came out of caves and mixed with nature' (1991: 101). We remarked a distinct proclivity of the Chinese scholars to interpret motifs in sexual terms (despite the reported prudishness of Chinese society), and this is reflected in many of the papers discussing the Helan Shan and other motifs that were offered to the conference (see Appendix).

A two-metre-long ox-like representation from the Helan Shan has been pictured in a recent issue of *INORA* (anonymous 1993: 4-5; cf. Jiang 1991: 102). A more comprehensive selection of the reported 'fifty thousands' of rock pictures in the area has been illustrated by Yuan Zongjie and Li Tieliang who have described the motifs — 'human, animal, celestial bodies, hands and feet of human beings, plants and trees' as representing 'the nomadic way of life in ancient HeLan culture' (1990: 105). Their book contains few photographs, but many 'rubbings' made directly from the rock face using charcoal and a translucent paper (cf. anonymous 1990b). Artists in the region build their reputation on the basis of the accuracy of such rubbings and the activity appears to be a popular one — we saw many examples at museum displays in both Yinchuan and Zhongwie; many motifs clearly are well-known and their significances the subject of much discussion. Among those examples included in a collection given to the Australian delegates on the eve of our departure is what appears to be a rare example of a representation showing perspective.

The Australian delegates' presentations

Several presentations were made at the Yinchuan conference by the Australian delegates. A keynote address was given at the opening session by Robert Bednarik, Secretary of AURA. Bednarik's second paper, on 'Rock art conservation and research ethics', was based on that published in *Australian Aboriginal Studies* (Bednarik 1991) and the third, on 'The direct dating of rock art', was one of eight papers included in a collection circulated at the conference (anonymous 1991d) but which remains relatively inaccessible there. AURA has provided the opportunity for this and the other contributions offered by the Australian contingent to be included in this issue of *Rock Art Research*.

Robert Bednarik's brief opening address was given on the first morning of the conference. He places the Yinchuan conference in the context of the recent establishment of RARAC and the developing internationalisation of the discipline, and admirably captures the spirit of the meeting. Bednarik's second contribution describes various techniques for quantitatively dating rock pictures, emphasising high-technology extraction of minute organic materials and the determination of their radiocarbon content using accelerator mass spectrometry; he concludes that the microerosion technique is the only non-destructive method showing promise. The need is great and clearly there have been significant methodological advances in recent years; there is much to be done, however, before direct dating of rock pictures can be routinely attempted and credible chronologies established. It will be fascinating to see tested the various temporal models of the Helan Shan petroglyphs.

Margaret Bullen's paper is about the relationship of images to trance states. Trance experiences, especially those induced by the ingestion of hallucinogenic substances, have universal physiological correlates recognised as a powerful source of visual imagery, which, in turn, can be used for picturing a wide range of materials. She explores the possibility that non-iconic images such as the circles, dots and lines of the Pleistocene may have their origins in trance, discussing their elicitation with the aid of hallucinogenic agents, and demonstrating the ease with which such images can be produced during trance states produced without the aid of drugs. Further, she argues from ethnographic evidence that hallucinogens were not used in Australia to produce such trance experiences and their reflection in rock pictures. Her presentation invites comparison with the speculation by Sylvia Fein (1993) about the relation of rock images with those drawn by children.

In his paper, John Clegg newly describes a site that he visited in western New South Wales in company with heritage managers familiar with stories from the Aboriginal people of the region. The site contains petroglyphs described as 'Panaramitee' and of the 'simple figurative style', similar but different to the petroglyphs at nearby Mootwingee. Besides providing an initial description of the site, his writing evokes well the fieldwork situ-

ation and skilfully relates the rock images to Aboriginal traditions of the area. His model, seeing the new style as an expression of its location, successfully explains several research problems but raises others.

Figure 5. John Clegg at Helan Shan petroglyphs.

Noelene Cole and Alan Watchman have collaborated upon another fascinating piece of research in the Laura area of north-eastern Australia. Their review of documentary evidence of use of pigments in prehistory revealed that blue colour is uncommon; investigating unusual blue/grey rock paintings in a site near Laura, Cape York Peninsula, they show that the use of blue/grey is a departure from the range of colours typical of that area. Direct evidence of the nature of the production and of the cultural significance of the Laura 'blue figures' being unavailable, they use physical and stylistic analyses to investigate these aspects. Their combination of diligent fieldwork with innovative application of materials analytical techniques reveals the character of the unusual blue colours used and will encourage further development and application of similar methods.

Caryll Sefton's paper is drawn from her Master's thesis and is a compressed account of research into an area of coastal south-eastern Australia, the rock imagery of which is rich but deteriorating rapidly. Within her study area, part of the Woronora Plateau of the South Sydney Basin, she defines a broad concurrence among the density of charcoal drawings, grinding grooves and petroglyphs. Her analyses show the correlation of shelters containing children's hand stencils with dispersed locational and environmental characteristics. Stencil colours and motifs show chronological differences, and she draws sociological conclusions from her investigations which are enhanced by reference to the available ethnographic data.

Graeme Ward provides a summary of a program of grants for the protection of rock pictures in Australia, where rock imagery is under threat from various sources. Research into and application of various protection measures is supported by a federal government funding program, the Rock Art Protection Program. Sources of threats are identified, and examples are given of protection projects funded by the Program, including site surveys and recording, site restoration and practical site protection measures. A major focus of site protection has become visitor management; research into dating of rock picture sites has also been supported.

Many of the AURA delegates' presentations at the Yinchuan conference prompted considerable interest, with questions and discussions exceeding the presentation time. This collection of papers has been edited by the present writer who acknowledges the co-operation of the authors, the support of AIATSIS and the contribution of Ms Eliza Hill, a research assistant in the Institute's Research Section.

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APPENDIX: Annotated listing of papers presented to the Yinchuan conference on the subject of the Helan Shan petroglyphs

Reference is made to the *Symposium compilation of articles* ... and to the *Symposium compilation of abstracts* (two volumes) of the First International Conference of the Rock Art Research Association of China held at Yinchuan in October 1991 (FICRARAC), copies of which were provided to conference delegates, and to other materials circulated at the meetings. (Chinese names in the text, bibliography and appendix are not standardised but reproduced as they appear in the various publications cited.) In Australia, copies are held in the archives of the Australian Rock Art Research Association, Melbourne and at the Library of the Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra. A more complete listing of papers offered to the meeting is provided in a conference agenda booklet (anonymous 1991b).

A monograph including many of the Chinese delegates' contributions to the Yinchuan conference has been edited by Professor Chen Zhao Fu of the Rock Art Research Association of China and is awaiting publication (Chen, pers. comm.).

AI TIANEN 1991. 'Brief commentary on the petroglyphs in Helanshan Mt', FICRARAC *Abstracts* (volume 1, 2 pp.). Petroglyphs date from

about fifteen thousand years ago, the 'time of the clan commune' and 'primitive religion and spiritual belief'.

CAIXIUHUA and LIHAIBO 1991. 'Art treasures in a legacy of Chinese rock art — tentative study of aesthetic features of Helanshan rock arts'. FICRARAC *Abstracts* (volume 1, 2 pp.). 'Helanshan Rock Art is a overlength picture scroll' vividly depicting the life ways of ancient northern nationalities and reflecting the aesthetic judgement of the 'childhood stage of mankind'. It is both art and non-art because of its functional purposes. Its style is 'natural, simple, vivid and unadorned'.

GAI SHAN-LIN 1991. 'The observation of rock arts in Mt. Helan of Ningxia'. FICRARAC *Articles* (19 pp.). Rock paintings are a 'Kaleidoscope ... to spy upon the ancient nomadic people's social life'. 'Female' figures predominate, with an emphasis upon 'female genitals exaggerately enlarged'. Many are 'wizard figures' or 'witches' representing women who were 'designated to adjust relations between God and people'. Relates motifs to texts and traditions.

GAO SUN 1991. 'Soaring of the bird Di'. FICRARAC *Abstracts* (volume 1, 2 pp.). A totem of the northern Di clan was a fish-eating bird; petroglyph motifs and subjects of myths overlap.

HAN XIAOMANG 1991. 'My opinion on the time judgement and national origin of the petroglyphs in Helanshan Mt'. FICRARAC *Abstracts* (volume 1, 1 p.). Reference to subject matter of petroglyphs suggests they were carved over the periods between Chunqiu Zhanguo to Xixia Dynasty (A.D. 1038-1227); but judgment of time and national origin is difficult.

HUAN LIJUN 1991. 'Ancient natural environment, prehistoric relics and early petroglyphs in Helanshan Mt'. FICRARAC *Abstracts* (volume 1, 1 p.). Suggests the possibility of relationship of the petroglyphs with adjacent source of fossil animals of the late Pleistocene.

JIANG ZHENMING 1991. 'Rock pictures in the Helan Mountains'. FICRARAC *Abstracts* (volume 2, 4 pp.; see also 13-page paper of same title in *Abstracts* volume 2). Petroglyphs were made by a variety of ancient ethnic groups who lived on the pasture land of northern China; in Neolithic period these people had contact with North America. Ningxia petroglyphs have similarities with those as far west as Outer Baikal. The 'human faces' show regional characteristics. Research upon the animal motifs could reveal much about life ways, and a study of styles, the ancient peoples' appreciation of beauty.

LEI RUNZE 1991. 'Opinion on the conservation of the Helan Mountain petroglyphs'. FICRARAC *Abstracts* (volume 1, 2 pp.). Author provides a schema for protecting petroglyphs, involving centralised management, establishment of conservation units, physical reinforcing of rock walls. Examples of petroglyphs would be collected and displayed in a museum where they could be the subject of academic study.

LI TIELIANG 1991. 'Shaking beauty in the high mountain ridges — appreciation and analysis of petroglyphs in Helan Mountains'. FICRARAC *Abstracts* (volume 1, 2 pp.). These petroglyphs with qualities of 'naturalness, simplicity, roughness and naiveness', are the oldest treasures of China's plastic arts, 'historical poetry carved into pictures'.

LI WENJIE 1991a. 'Measures and methods for the record and preservation of the petroglyphs'. FICRARAC *Abstracts* (volume 1, 2 pp.). Discusses, especially, production of 'traditional rubbings' using paper and ink placed over petroglyphs; these are claimed to be both the most accurate representations and a means of artistic expression.

LI WENJIE 1991b. 'The Helan Mountain petroglyphs'. FICRARAC *Abstracts* (volume 1, 3 pp.). The petroglyphs are many and interesting; scholars at home and abroad are welcome to study them.

LI XIANSHI and ZHU CUANSHI 1991a. 'Study of the anthropoid heads in the rock engravings at Helan Mountain pass. An explanation of the composition codes and the reproduction worship'. FICRARAC *Articles* (51 pp.). The petroglyphs enable understanding of the 'true, the good and the beautiful,' and 'sources of culture, art and esthetics ...'. 'Heads' classed by external ('facial contours and ornamenets') and internal ('five sense organs and the foreheads') features into eight classes and many subclasses. Unlike Indian engravings, the sexuality of the Helan Shan petroglyphs is implicit. There is a clear three-stage evolution of reproduction worship as revealed in the anthropoid heads.

LI XIANSHI and ZHU CUANSHI 1991b. 'A tentative analysis of anthropomorphous head in the petroglyphs at Helanshan entrance — one the compositional code of the anthropomorphous head and worship of reproduction'. FICRARAC *Abstracts* (volume 1, 2 pp.). The discovery of the Helan Shan petroglyphs was of international significance. The use of artistic symbols to express abstract thought was '... a great invention'.

LI XIANSHI and ZHU CUANSHI 1991c. 'Petroglyphs and myths'. FICRARAC *Abstracts* (volume 1, 2 pp.). 'The Helanshan ... is a poem, a song and a touching myth.' The mountain range looks like a 'splendid supernatural horse', hence the name, Helan Mountains. Petroglyphs are related to legend of the Goddess Fuyi Nuwa and to gods with human heads and animal bodies.

LI YANGSONE 1991. 'Analysis of reproductive witchcraft about petroglyphs in the Inner Mongolia and Ningxia'. FICRARAC *Abstracts* (volume 2, 4 pp.). Motifs were carved to show belief 'about reproductive witchcraft'. Comparison is made with Yangshao Culture of 4000 B.C., especially representations of 'female genitalia' on painted pottery with petroglyph motifs. Presence of pictures of 'sexual intercourse' show that people understood its role in reproduction, and believed in reproductive witchcraft.

LIU TIANMING 1991. 'An outlook on the aesthetic sense of the northern nomadic nationality at the ancient time from the Helan Mt Petroglyphs'. FICRARAC *Abstracts* (volume 1, 3 pp.). Petroglyphs reveal the aesthetic and artistic senses of beauty: of motion beauty (revealed in the galloping horses' for example); of force (expressed in the powerful chiselling of the images); of form (revealed by the naturalism and realism of the motifs); of harmony (expressed in sense of animals in their natural surroundings); and of mystic beauty (scenes of sacrifices and the anthropomorphous heads 'present a profound, majestic and mystic beauty').

LIU YI QING 1991. 'New discovery of Helan Mountains rock art and its division of history into periods'. FICRARAC *Abstracts* (volume 1, 1 p.). Five motifs interpreted as 'giraffes' present problem, as giraffes were extinct in China by about two or three million years ago.

LUO MAO-KUN 1991. 'The petroglyphs on Helan Mt, and the primitive religion'. FICRARAC *Abstracts* (volume 1, 3 pp.). Author's interpretation of the inscribed Xi-Xia characters is that there is close relationship between them and the 'primitive religion' of the Xi-Xia people; consequently, caution is needed in interpreting apparently obvious motifs. The impressive environs of the gorge sites suggest that the mountains were the subject of the worship.

NIU KECHENG 1991. 'The sexual symbol and its usage in petroglyphs in the Yinshan Mountain'. FICRARAC *Abstracts* (volume 2, 11 pp.). Production of images was part of the sorcery practice related to worship of reproduction. The 'human face' images represent the god 'Teng-Ge-Li'; it comprises a combination of male and female symbols. The author interprets the imagery to reveal a five stage, evolutionary, advance from 'reproduction sorcery' to 'the worship of god in heaven', and also the source of the Ying/Yang concept. Also: two page table (one leaf) circulated at meeting showing various motifs.

RAO HENG-JIU 1991. 'On the rock paintings in the Helan Mountains'. FICRARAC *Abstracts* (volume 1, 3 pp.). Study of petroglyphs throughout China shows that they inevitably face to the east or south and thus to the sun. Petroglyphs of 'tigers' are almost unique to the Helan Shan. The conspicuously exaggerated genitals of animals suggest the 'worship of reproduction'.

SUN XINZHOU 1991. 'Tentative analysis on worship of the God of Frog on the Helan Mountains petroglyph and its cultural and artistic value'. FICRARAC *Abstracts* (volume 2, 2 pp.). Worship of the frog god is an 'ancient mother theme' reflected in petroglyphs and painted pottery and an aspect of late Neolithic shamanistic 'multiplication witchcraft'. Support for this view is derived from American Indian ethnography.

TANG XIAO-FANG and CHENG YU-NING 1991b. 'On the relation between the Helan Mts pictographs and the Hun's culture'. FICRARAC *Articles* (13 pp. plus figure). Helan Shan and other region petroglyphs reflect way of life of ancient nomadic peoples of the northern prairie and show relationships with cultures as far west as the Black Sea. Huns unified nomadic tribes during third century B.C.; many of their historically recorded activities are pictured in the Helan Shan.

WANG XI SONG 1991. 'The character of Helanshan Mt. pictographs on history on artology'. FICRARAC *Articles* (8 pp. plus two figures). Author emphasises aesthetic qualities of the petroglyphs '... the primitive people had understood the law of making beautiful forms ...'. The Helan Shan petroglyphs have a 'place in the history of international arts'.

WANG YONG 1991. 'A tentative analysis of the clan category on the Helan Mt. petroglyphs'. FICRARAC *Abstracts* (volume 1, 2 pp.). Variation in 'face' motifs is used to argue relationships to historic clans of the Xi-Xia and other periods.

WU EN 1991. 'A tentative analysis of the dynastic history of the petroglyphs in the Helan Mt'. FICRARAC *Articles* (12 pp.). Helan petroglyphs mostly date to period 'between the Bronze Stage and the early Iron Stage ... between the Shang-Zhou and Qin-Han periods'. Analysis of the forms of 'carts' and 'deers' and backgrounds of petroglyphs provides indications of their dynastic relationships.

WU SHANGREN and LIU HONGZHANG 1991. 'A brief introduction to the petroglyphs in the northern section of the Helanshan Mt'. FICRARAC *Abstracts* (volume 1, 3 pp.). 'The petroglyphs in this area were first discovered in ... 1984' and the subject of detailed investigation in 1991. Content, style and carving methods are similar to those further south. Microliths suggest occupation from about fifteen thousand years ago. Petroglyphs of the region were mentioned in a book of the Northern Wei dynasty.

XUCHANG and WEIZHONG. 1991. 'The research on the dynastic history judgement of the petroglyphs in Helanshan Mountain'. FICRARAC *Abstracts* (volume 1, 2 pp.). Simulated carving tests are used to argue that Helan Shan petroglyphs were made during three periods in

Chinese history: I. Prior to Spring and Autumn Period (722-481 B.C.) and Warring States Period (403-221 B.C.) — perhaps as early as the Shang (16th to 12th centuries B.C.) and Zhou Dynasties (c. 1122-221 B.C.); II. From Spring and Autumn Period and Waring States Period to Northern and Southern Dynasties Period (A.D. 386-589); III. From Sui (A.D. 581-618) and Tang Dynasties (A.D. 618-907) to Xixia (Western Xia, Hsia) Dynasty (A.D. 1038-1227).

XU CHENG and WEI ZHONG 1991. 'The dating research on the rock arts of Helan Mountain'. FICRARAC *Articles* (16 pp.). Helan Shan rock pictures mentioned in early Chinese literature. Archaeological dating of petroglyphs depends upon comparative methods. Helan motifs divided into three phases (see *Abstract* above). Comparisons made with other regions.

YANG XINGLIN 1991. 'The petroglyphs in the Helanshan Mt. and the image hallucination'. FICRARAC *Abstracts* (volume 1, 2 pp.). Creation of Helan petroglyphs was the result of image hallucination produced by observation of the 'rough and uneven surface and cracked veins of rocks [which] looked like the contour of certain animals' and was done in the interest of controlling aspects of the environment. These petroglyphs '... have miraculous function of hallucination.'

ZHANG YINGSHENG 1991. 'Culture implied in the rock arts of Helan Mountain'. FICRARAC *Abstracts* (volume 1, 3 pp.). The naturalism of the petroglyphs make them valuables sources for the study of cultural material and worship of sexuality, for examples.

ZHANG ZHIYAO 1991. 'Rock art study on human-face likeness in the west China. Human face likenesses and the source in Helanshan, Yinshan and Altainshan'. FICRARAC *Abstracts* (volume 2, 1 pp.). A wide-ranging study of the history and purpose of 'human face' representations.

ZHAO GUOHUA 1991. 'Synopsis of genito-worship and its embodiment in rock art'. FICRARAC *Abstracts* (volume 2, 2 pp.). The 'genito-worship culture' is the earliest of three 'spiritual cultures of mankind'. It seems that nearly all motifs can be included in this category; red, black and white are fertility colours; hunting scenes represent a form of 'genito-worship ritual [for] increased population'. Footprints among the petroglyphs are actually phallic symbols; any animal-like motif may be the symbol of the vagina or phallus.

ZHONG ZHUHUI and LI SHUYAN 1991. 'The periodical history and the connotation of the early petroglyphs in Helan Mountains'. FICRARAC *Abstracts* (volume 1, 2 pp.). Early petroglyphs are thought 'to have been deeply influenced by the [matriarchal] Yangshao Pottery Culture'; and to be evidence of 'sexual reproduction worship', in 'accordance with the development of primitive society ... from matriarchal to patriarchal society, and the transformation from female ... to male reproduction worship'.

ZHOU XINGHUA 1991a. 'The discovery and the study of Zhongwei petroglyphs'. FICRARAC *Abstracts* (volume 1, 2 pp.). Petroglyphs in the south of Ningxia date from the 'Old Stone Age' through to the 'Iron Stage' and later; they are 'chiefly the reflection of a primitive religious outlook'. The range of motifs appears to be comparable with that at the Helan Shan.

ZHOU XINGHUA 1991b. 'Prehistorical petroglyphs and primitive religion — tentative analysis of the petroglyphs in Ningxia'. FICRARAC *Abstracts* (volume 1, 2 pp.). Based on a comparison of petroglyph motifs with folklore data, the author concludes that the petroglyphs reflect religious outlook.

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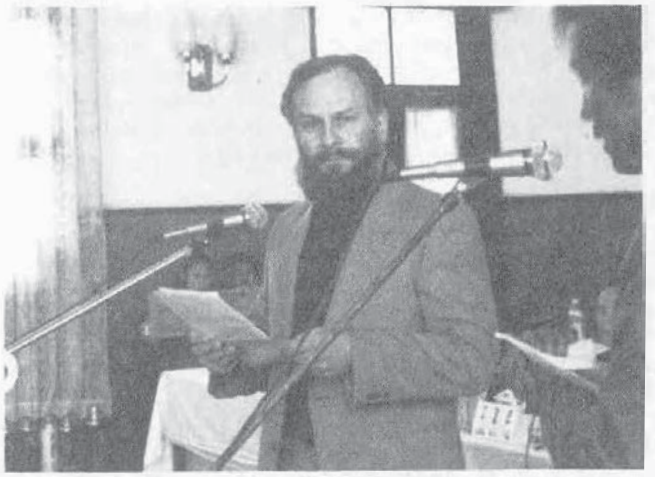

Robert Bednarik, Founder and Secretary of AURA, addressing the opening session of the Yinchuan Conference. Photograph by Li Fushun.

Address to opening session of First Conference of the Rock Art Research Association of China

ROBERT G. BEDNARIK
Secretary, AURA, and Convener, IFRAO

Mr Chairman, Conveners, Mr Cheng Fa Guang and Professor Chen Zhao Fu, members of the organising committee and colleagues.

I have great pleasure in participating in this significant conference, which I consider to be a turning point in the history of Chinese rock art studies. Only a few months ago, on 12 March 1991, a meeting held in Beijing decided to form the Rock Art Research Association of China. A committee of nine was elected, headed by Professor Chen Zhao Fu as President, Professor Li Fushun as Vice President, and Li You Chang as Secretary-General. This new association immediately sought affiliation with the International Federation of Rock Art Organizations, and it was admitted to the Federation as its seventeenth member, thus joining the world community of organisations dedicated to the study and preservation of prehistoric rock art. It was also immediately decided to hold an international meeting at Yinchuan, and this decision has led to our being here. It is therefore obvious that the new Rock Art Research Association of China has immediately taken decisive steps to achieve an effective integration into the international community of rock art researchers and that it is determined to be an active participant in this community, working closely with colleagues abroad.

Rock art studies were begun in China long before any other country, but much work was conducted in isolation. As recently as seven years ago, when the first scientific publication by a Chinese scholar appeared in a Western language [in *RAR*], nothing was known about Chinese rock art in the Western World, and a world map on the distribution of rock art showed a complete blank in China. The major contact in this discipline had previously been with Russian scholars, notably A. P. Okladnikov, some twenty or thirty years ago. This conference is therefore the first major influx of foreign specialists and offers the first opportunity of extensive contact and mutual consultation. I am certain we will all make the best of this rare opportunity, and I hope that this event will become the beginning of new international friendships, and of even closer working relationships between Chinese and foreign rock art scholars. I believe very strongly in the need for rock art studies to be conducted in a global perspective rather than a regional or national framework, especially in the areas of conservation, standardised recording and research methods, site management, uniform analytical techniques such as rock art dating methods, and in developing integrated models of universal cognitive developments. Moreover, our discipline is small, with only a few thousand practitioners world-wide, and in order to compete successfully with the more established and better serviced disciplines it is imperative that we develop international rather than national strategies. To forge strong ties between the official organisation of Chinese researchers, the Rock Art Research Association of China, and the rest of the world community is therefore imperative.

One of my principal concerns is always rock art conservation, and here, in particular, international co-operation is indispensable. High conservation standards are being developed and introduced around the world, and it is an area of highest priority to match these standards in all countries with rock art. This area requires urgent attention, and any constructive input from conference participants would be particularly valuable. Conferences such as this one often end with resolutions of some kind, but these are sometimes little more than expressions of goodwill which have very little impact in the long run. It could be regarded as a major achievement if this conference could conclude with a resolution that would involve some real change, some significant improvements, not only to improve the conditions under which

rock art studies are conducted, but also the conditions under which rock art is to survive into future centuries. At the rate at which the research potential of rock art is being destroyed around the world, future generations may soon find themselves without anything to study. Let us use this opportunity to give these matters some thought, because they are of the utmost importance to this discipline.

I take this opportunity to thank our hosts, the government of the Ningxia Hui Autonomous Region, and all those who have contributed to the preparations for this conference, for all their efforts, and for making our stay such a pleasant one. I particularly thank them on behalf of those of us who are visitors to this fascinating country, for this great opportunity to get to know your beautiful country, and for sharing with us your magnificent rock art and your knowledge about it. My most sincere thanks to all.

RAR 10-2ER

The direct dating of rock art

ROBERT G. BEDNARIK

Introduction

The scientific study of rock art is crucially dependent upon its reliable dating. Without this, different corpora of rock art cannot be convincingly related to one another, or be correlated with archaeological evidence, and reliable chronological models will remain elusive.

By 1980, practically no prehistoric rock art in the world had been firmly dated. Numerous dating attempts, listed elsewhere (Bednarik 1992a), related mostly to unfalsifiable claims of archaeological or indirect dating, and involved inductive reasoning in one form or another. They claimed stylistic correspondence, presumed association with a dated sediment deposit or sequence, spatial association and similar non-sequiturs. In recent years, several regional chronological sequences have been rejected or significantly revised (e.g. Spanish Levant, Sahara, Siberia, India, Australia), because they were based on such subjective notions as the identification of chronologically diagnostic objects thought to be depicted in the art, or a researcher's interpretation of the iconic intent of an artist based on his/her perception of an alien graphic production. Archaeological dates are available from all continents except Antarctica, but they refer in nearly all cases to minimum ages of rock art, and are generally contingent upon inferred relationships of different classes of data which are inaccessible to refutation or independent testing. In short, in 1980, 160 years after Belzoni's (1820) observations on the age of petroglyphs in Upper Egypt, there remained a distinct lack of scientific knowledge about the age of rock art, and a lack of an appropriate methodology promising an improvement.

Aware that rock art studies would continue to languish without at least crude regional chronologies, I pursued alternative approaches through studies of weathering phenomena and patinae from 1968 onwards (Bednarik 1979, 1981, 1984, 1985, 1988a, 1992b), developing a concept of 'Direct dating of rock art' (Bednarik 1981: 23):

> ... the most reliable means for determining the antiquity of rock art remains the investigation of features related to the art itself, which either date it (e.g. pigment), predate it (e.g. the rock art's medium, or the particular surface it was executed on), or postdate it (e.g. later cracks dissecting a motif, or precipitates deposited over the rock art).

After examining the potential for dating of patinae, rock varnish and weathering wanes ('wanes' are the result of slow, progressive rounding of rock edges), especially in the Australian Pilbara (1968-1970), I concentrated my efforts on the rock art stratigraphies of several caves near Mount Gambier, South Australia. The 'stratigraphical relationship' of the rock art phases (in the sense of Anati 1961) was here an indisputable physical stratigraphy of rock art and laminar layers of re-precipitated calcite. These calcite speleothems are datable by various quantitative methods.

At about the same time as I experimented with the dating of secondary carbonates in Australia, Dorn and colleagues developed the cation-ratio (CR) dating method in south-western U.S.A. (Dorn 1983, 1986; Dorn and Whitley 1984). The CR method utilises the selective leaching of cations from a ferromanganese accretion deposit of supposedly biological origin (Scheffer et al. 1963), called 'rock varnish' (Engel and Sharp 1958). The readily soluble cations K and Ca are compared with the comparatively stable Ti content. The local rate of leaching must be calibrated against a series of dates obtained with another method. Several large calibration samples, suitable for analysis of radiocarbon by AMS (accelerator mass spectrometry) have to be obtained before the petroglyphs of a site can themselves be minimum-dated via the cation-ratio of varnish formed in their grooves. The great antiquity of some Australian rock art was suggested with CR minimum ages exceeding 30 000 years (Nobbs and Dorn 1988). This led to a detailed debate of the method's inherent problems (Bednarik 1988b; Clarke 1989; Clegg 1988; Dragovich 1988a; Lanteigne 1989, 1990; Reneau and Harrington 1988; Watchman 1989) and, at a specialist seminar in Canberra in June 1990, the degree of reliability and accuracy of the method was questioned (Bednarik 1990a; cf. Dorn 1990, 1992; Dorn and Nobbs 1992; Watchman 1992a, 1992b, 1992c).

Watchman (1987) identified oxalate deposits at a series of Australian rock art sites in Kakadu National Park and recognised their potential to provide minimum or maximum dating where they are in physical contact with rock art. The oxalates whewellite and weddellite are salts of oxalic acid, contain organic carbon, and are susceptible to dating using radiocarbon determination (Watchman 1990). The oxalate dating method is thus similar to the carbonate dating method, but it has perhaps wider application and it may not share the serious limitation imposed on the carbonate method by the rejuvenation potential of more recent exchange or deposition (Bednarik 1981).

Several other 'direct' methods have been tried or suggested. Besides true rock varnish, various other ferruginous accretionary deposits are found on rock surfaces (Bednarik 1979). Their dating potential remains largely unexplored, perhaps their polymorphous origins and development are a deterrent for researchers. Lichenometry is among the earliest methods explo-red (Beschel 1961; Joubert et al. 1983); it is based on the presumed stable growth patterns of lichen thalli, but has been found to be of only limited utility. Several other methods (e.g. analysis of amino acid, cosmogenic radiation products) have been examined and found to hold little promise. Watchman identified organic matter enclosed in silica skins (precipitates of colloid silica commonly found at Australian rock art sites), from which it might be possible to extract organic material for analysis by AMS (Watchman 1985). Nevertheless, considerable uncertainties would apply to dates interpreted from such analyses. For instance, airborne organic matter may significantly predate a mineral skin in which it is deposited. I have described a process in which potash reacts with silica to produce glass during brush fires (Bednarik 1979: 31), which would probably be datable by various methods, but I have not yet observed such a deposit over rock art.

Dating rock paintings scientifically

By the late 1980s, 'direct dating' methods had thus been established as viable, if not preferred, alternatives to traditional approaches to rock art dating. The first radiocarbon determination obtained directly from a rock painting was announced in South Africa (Van der Merwe et al. 1987); it dated comparatively recent charcoal pigment. Actually, the first attempt to date a rock painting from the radiocarbon content of its paint was by Grant (1965); it was unsuccessful because he had only five per cent of the sample quantity then required. During 1990, innovative archaeologists began adopting the new AMS method. Multidisciplinary research teams in both Australia and France succeeded in obtaining absolute dating of painting pigments, publishing their

results within a few months of each other. In Australia, Pleistocene rock paintings were for the first time dated by AMS analysis of human blood protein identified in paint samples (Loy et al. 1990). Palaeolithic rock art was for the first time dated by absolute and 'direct' means when charcoal-based paint from the cave of Cougnac, Quercy, was subjected to AMS analysis (Lorblanchet et al. 1990). McDonald and Officer applied AMS analysis to charcoal drawings in the Sydney region, obtaining surprising results at the Gnatalia Creek site (McDonald et al. 1990). All rock art of the Sydney region had been assumed to be less than two to three millennia old, and the two 'dates' of about 6000 and 30 000 years BP have prompted further analyses at the site. More recently, the AMS method produced a date of about 3800 years BP from a naturally exfoliated painting fragment collected in a limestone shelter in Seminole Canyon, Texas (Russ et al. 1990).

The idea of extracting 'direct dates' from rock art or from contiguous datable mineral deposits, initially promoted by non-archaeologists and opposed by archaeologists (cf. Bednarik 1991a), has at last found support within the archaeological discipline. The most obvious application of the principle, the dating of paintings via some substance contained in the paint, will in due course revolutionise rock art studies. While few paints contain charcoal or organic binders, methods to date non-organic components of rock paints will no doubt be developed. For instance, Lorblanchet and colleagues (1990) reported that red pigments analysed by them were apparently not derived from ochre, but were prepared from locally occurring siderolithic clays which may have been mixed with water, decanted to separate the sand fraction, dried and then roasted on a fire to dehydrate the iron minerals to a red colour. Heat treatment of ochreous substances may have been practised by rock painters more frequently than had been thought (Bednarik 1987, 1991b), and the age of such paints ought to be able to be determined via the thermoluminescence method. The identification of distinctive paint recipes at Niaux and other French caves is also relevant to dating because they appear to have chronological connotations (Clottes et al. 1990).

The use of organic pigments or binders was perhaps more widespread than has been reported, despite Rosenfeld's (1987: 21) pessimism. For instance, animal proteins have been observed in red rock paint from southern China recently (Li Fushun 1991). Numerous other organic binders or pigments have been identified in rock paints (e.g. Gram 1965; Barnes 1982). Presumed manganese pigments have been found to be of charcoal, and I have identified several types of organic pigments, in North America, South America, Asia (three in India alone), Europe and Australia (Bednarik 1992a). All of these, and all paints containing organic binders or other organic carbon, as well as rock art made of bees wax, can presumably be dated accurately, within the limitations imposed by sample sizes and the inherent tolerances of techniques.

Recent work by Watchman (1991) and colleagues has opened several exciting avenues for analytical work on rock paints. They have detected datable plant fibres in paint from Laura, north Queensland, determined plant species from brush fibres (Cole and Watchman 1992), and found layers of paint stratified between accretionary layers even on apparently undecorated rock panels.

The dating of petroglyphs

While an absolute chronology of some rock painting traditions may no longer seem unattainable, the outlook for similar developments with petroglyphs remains bleak. Although there are likely to be improvements in methods of dating surface encrustations, accretions or patinae that cover and postdate petroglyphs, the present preoccupation with the ages of such deposits imposes a severe limitation: they can only provide minimum dates for the petroglyphs covered, and these may be highly conservative. The fundamental difference between paintings and petroglyphs is that the former are the result of an additive process, which is likely to have taken place when the paint was prepared, whereas the latter, being the result of a reductive process, cannot be readily related to a specific substance. Admittedly, the age of a component of a paint is not necessarily the same as the paint's own age: for instance, one must expect that occasionally the charcoal selected to provide black pigment was not fresh, but may have been already thousands of years old when it was added to a paint. Nevertheless, this is an inherent risk and one would hope to obtain valid dates in the great majority of cases.

With the exception of finger flutings in limestone caves (Bednarik 1986), which are made by reshaping a soft surface, all petroglyphs are attributable to a reductive process, such as abrasion, percussion, drilling or etching (with corrosive agents). The material removed is hardly recoverable, which is why all 'direct' dating methods so far applied to petroglyphs relate to features concealing them, such as carbonate precipitates, rock varnish and oxalate skins, the only exception being the microerosion dating method (Bednarik 1992b).

The declining interest in the CR method has rekindled interest in alternative dating techniques for petroglyphs. For instance, the carbonate dating method is being refined by A. Rosenfeld and myself. However, the possibilities of utilising calcium carbonates to date petroglyphs remain limited. Only a few of the currently known 310 sites of 'cave art' in western Europe and southern Australia (Bahn and Vertut 1988; Bednarik 1990b) feature speleothems that are physically related to art, and there are none in the many sites of cave art I have examined in the Caribbean. Nevertheless, the method has recently been used at two sites in China to date paintings sandwiched between calcite layers (Bednarik and Li Fushun). Calcite encrustations precipitated from soils, as they are found at petroglyph sites in various regions (e.g. Bednarik 1987; Dragovich 1988b), are more common than suitable speleothems, but they may have been subjected to a greater number of post-depositional variables.

It has become clear from recent research that the various approaches to dating petroglyphs using mineral deposits, irrespective of the accuracy of their results, can only produce associative data — usually minimum ages. To illustrate that we may have been biased in favour of complex, and perhaps over-sophisticated, methods I return to my original proposal for 'direct dating': phenomena that predate or postdate petroglyphs are certainly not restricted to mineral accretions. When considering various options (Bednarik 1979), I gave less space to rock varnish and other deposits than to integrated or cross-referential approaches. These include the assessment of various types of phenomena on a site-specific basis, particularly rock fracturing, weathering, patination of all forms, physical surface formation processes (fire spalling, glacial striae, insolation-induced fractures, erosion wanes, cryofracturing, Kernsprung); carved dates, inscriptions and historically datable symbols or surfaces; the spatial relationship of the art to specific topographic aspects of the site, such as subsided floors, roof falls (in caves and shelters), and changes in sediment levels or in accessibility. Soleilhavoup (1985) advocates a technique of recording which includes information relevant to geomorphological micro-topography, and he developed a standard system of depicting such details in the fashion of a geographic map. An extension of his method (e.g. radii of all rock edges physically related to art should be recorded) and its general adoption would do much more to enlarge the scientific base of this discipline than the practice of recording rock art purely in terms of iconographic content. I have previously referred to a method for determining the ages of blunted edges on sandstone (Černohouz and Solč 1966), in which the angle of the edge and the distance of retreat at the edge are assessed. Although theoretically valid, the method would lack significantly in accuracy, partly because the two surfaces forming an edge also retreat (Bednarik 1979: 28; cf. 1992c for solution to the problem). While it is true that such processes are often susceptible to intractable variables (for instance, climatic factors and environmental pH can accelerate, delay or completely inhibit the formation of patinae — Bednarik 1979: 30), it is also true that most petroglyph panels present a complex record of many time-related processes and events, and the relative position of the art

within these chronological sequences is often readily apparent. While very few petroglyph sites offer any means of relating archaeological 'data' to the art, at each and every site the art can be related to at least some of a multitude of geological, geochemical and geomorphological phenomena. All these phenomena refer to specific events or periods, many of which may be datable in some way.

Three new direct dating methods have been proposed recently. First is the FLECS (Focused Laser Extraction of Carbonaceous Substances) AMS method, in which localised combustion of in-situ trace organic matter is caused by a focused laser of about 0.01 mm diameter (Watchman and Lessard 1992). The carbon dioxide so formed is converted into a graphite target for determination of radiocarbon content by AMS. The method may be applicable to organic inclusions in rock varnish covering petroglyphs, as well as to organic substances in paints. However, it involves the removal of around one square centimetre of rock surface (Watchman 1992d). Second is the AMS dating of sub-varnish organic fragments; this also involves damage to the varnish veneer of the petroglyph being dated (Dorn et al. 1992), but it seems to offer considerably more secure minimum dating than the CR method. The third, microerosion dating, is the only currently proposed method of direct rock art dating that is entirely non-destructive (Bednarik 1992b, 1992e); it is in fact the purest form of 'direct dating' possible for petroglyphs. The method involves optical examination and calibrated quantitative assessment of microscopic modifications to crystal and fracture edges. It requires no expensive or sophisticated equipment, specialist knowledge or training, or handling of samples. Sample contamination, laboratory costs and waiting for results do not apply. Moreover, microerosion dating is the only currently available method of rock art dating that satisfies statistical sampling requirements (Lanteigne 1991), providing data from which statistically meaningful solutions can be generated.

NOTE: The most recent rock art dating results are not considered in this paper.

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RAR 10-269

Why people draw circles

MARGARET BULLEN

Introduction

The terms 'iconic', 'figurative' or 'depictive' when used of an item of rock art imply that the item so described calls to the mind of the observer a particular named entity, the converse being true of terms such as 'non-iconic' and 'non-figurative'. These terms do not separate two distinct classes of art but rather lie at opposite ends of a continuum; another dimension is the relationship of the observer to the item. What is recognisable and meaningful will vary within and between societies.

Some images are highly distinctive and can be reliably provenanced to a distinct spatial and, in some instances, temporal context. At the other end of the scale are items which, despite occurring in sites widely dispersed throughout the world, tend to be remarkably similar in form and content. These include circles and chevrons, dots and lines, and simple, track-like marks. This paper will consider possible origins of these apparently universal forms found in rock art, their elaboration as text, and the influence of hallucinogenic drugs on their production.

Australia seems to be one of the few countries in the world without a history of the purposeful and ritual use of plants with hallucinogenic properties (Schultes and Hoffman 1980: 62), but it too has the same form constants within its rock art. There are circles, tracks and nested curves, both as isolated items, and incorporated in and associated with iconic art. Deeply incised circles, some barred, others with deep central pits, cover the walls of Paroong Cave in South Australia (Bednarik 1986). Bahn (Bahn and Vertut 1988: 32) noted that these closely resemble petroglyphs from as far apart within Australia as the Early Man Shelter in Queensland and north-western Tasmania. Where did the people who made these circles get their imagery? It will be suggested that the apparent lack of use of hallucinogenic agents does not negate the theory that these universal forms owe their origins to trance experience, since trance experiences which elicit these forms occur without the use of hallucinatory drugs.

Australian Aborigines did use certain psycho-active drugs of which the most important probably was *pituri*. This was obtained from the dried leaves and stems of the shrub *Duboisia hopwoodii* and was highly prized and traded throughout much of Australia. It is related to the common thornapple (*Datura stramonium*), an introduced shrub which contains the powerful hallucinogenic alkaloids scopolamine and hyoscyamine, and which was widely used in Mexico and the American Southwest for its hallucinogenic properties (Schultes and Hoffman 1980: 106; Low 1990: 196). The only alkaloid in *pituri* is nicotine which is not hallucinogenic but does have a stimulant effect on the cerebral cortex, particularly in high concentrations. Experimentally it has been shown that the actions of nicotine on the cerebral cortex are complex and depend on the concentrations of other amines present at the time (Larson and Silvette 1971: 27). *Pituri* was chewed as a quid, the effects of its naturally high nicotine content being enhanced by the use of fine alkaline leaf ash as a mixer (Low 1990: 196).

Tobacco, obtained from *Nicotiana* sp. was also the only drug used by the Warao of Venezuela. It was taken in in extremely high concentrations, both by smoking and as a liquid, and was an essential component of their shamanic rituals (Wilbert 1972: 78). The novice shaman formed an association between the use of this very strong tobacco and trance, as his first experience of taking it followed many days of total fasting, and its use resulted in a form of trance (Wilbert 1972: 70). There is no ethnographic evidence to suggest that *pituri* was used in this manner but its properties were said to include increasing stamina, inducing courage in warfare and enabling men to 'fire-walk' across hot stones (Low ibid.). While the psilocyhin-containing 'magic mushrooms' (which now grow on cow pats) are an introduced species in Australia, there are indigenous mushrooms containing this powerful hallucinogen. There is no evidence, however, that the latter were used by Australian Aboriginal people (Low 1990: 206).

Phosphenes and cortical activity

What we see in our field of vision are external projections of mental images. These usually correspond to external objects but flashes of light and coloured spots known as phosphenes may result from retinal stimulation by mechanical pressure on the eyeballs and with certain disease processes (Emsley 1952: 15).

Neurological evidence

Certain visual phenomena have been described in neurological texts as elementary or unformed, and said to include flashes of light, colours, luminous points, stars and multiple lights like candles, as well as geometric forms such as circles, squares and hexagons (Adams and Victor 1989: 369). Vitreous tags can cause flashes of lights in the periphery of the field of vision and moving

images can result from perception of blood cells in retinal vessels (Adams and Victor 1989: 204).

Penfield studied the cerebral origin of these unformed images by direct stimulation of the cerebral cortex in un-anaesthetised patients. He found that stimulation of the occipital (or visual) cortex produced only sensations of colour and light (Penfield and Rasmussen 1950: 158), while stimulation of the temporal cortex could, under certain circumstances, 'activate elaborate psychical processes' (1950: 160). Penfield summarised, for a series of patients, their descriptions in response to stimulation of various points on the visual cortex. The colour images were: red, green, yellow, pink, blue, fiery, grey and fawn. The visual contours he described as 'simple and unreal in the sense that they bore little resemblance to things a man sees in his environment: a brilliant ball, a star, a streak, a wheel, a spot or a flash, a shadow, a light' (1950: 144). He noted that the images were frequently described as moving, dancing, flickering or whirling.

Penfield was able to produce complex visual hallucinations by stimulation of the temporal cortex. He suggested that the stimulation may present visual, auditory or combined memories to consciousness; memories which have come from the individual's personal experience, reading or dreaming.

Hallucinations, drugs and rock art

To the Tukarno Indians everything that is art is derived from their hallucinatory experiences; the geometrical and representational paintings with which they decorate their houses, their possessions and themselves are 'the things we see when we take *yage* ... they are the *yage* images' (Reichel-Dolmatoff 1972: 104). Reichel-Dolmatoff extracted an underlying set of images from a large body of paintings of the men's *yage* imagery. These were interpreted by other men of the same group, who had not participated in production of the pictures, as referring to important aspects of the group's incest and exogamy rules. The interpretations were consistent, 'the motifs having the fixed values of an ideographic sign' (1972: 106). The same motifs also appeared in the rock art of the region (1972: 111), and Reichel-Dolmatoff noted that Max Knoll, in a study of one thousand individuals, established a series of fifteen images which largely conformed to the motifs of the Tukarno.

The nature of hallucinogenic drugs

'One of the most important aspects of psychedelic drugs is that they open a person up to subtle influences' (Naranjo 1975: xix). Mescaline and harmaline, the active components respectively of *peyote* and *yage*, are both, like many other hallucinogenic agents, alkaloids containing an indole nucleus. They have a chemical structure similar to that of the centrally acting neurotransmitter, 5-hydroxy tryptamine (5HT). Their hallucinogenic action may be in part mediated through competitive inhibition of the autoregulation of 5HT activity. Experimentally, mescaline and related substances have been shown to increase the number and vividness of phosphenes (Barber 1970: 27). These agents have effects related to sympathetic nerve activity, including a rise in blood levels of glucose and free fatty acids, and dilatation of the pupil. The latter may be partly responsible for the reported blurring of vision and appearance of rainbows and halos around objects. These effects may also be the result of increased pressure in the anterior chamber of the eye. As is the case with many psycho-active drugs, tolerance may develop to the effects of hallucinogens so that increasing amounts need to be ingested to achieve the same effect.

A sense of spinning and flying is common to the ingestion of many hallucinogenic agents and may be associated with the frequently seen spiral motifs. The broomstick-riding witches of Europe used extracts of the plant henbane, which contains the hallucinogenic alkaloid hyoscyamine, in order to travel through the night skies, while the brew around which Macbeth's witches cast their spells before flying off into the mists of Scotland contained a potentially hallucinogenic ingredient, bufotenine, which is found in the skin of toads and is closely related to 5HT (Schultes 1972: 28).

Shamans and hallucinogens

According to Eliade (1964: 84), 'seeing spirits' is the determining sign of a shamanic vocation, and visionary journeys are frequently an important component of their healing or diagnostic practices. The description by a Mazatec shaman, Maria Sabina, of her experiences with psilocybin-containing mushrooms includes the following: '... the sacred mushrooms take me by the hand and bring me to the world where everything is known. ... when I return from the trip that I have taken with them I tell what they have told me and what they have shown me' (Schultes and Hoffman 1980: 144). However, not all would-be shamans achieve their goal. Among the Siona, for example, many individuals were unable to follow the *yage* as far as they needed to become shamans. The study of *yage* was expected of a man as part of his role as the protector, provider and master of the family. If he became a shaman he would perform a similar role for the community. Few achieved the status of shaman and many who did lost their power because of bad visions. Bad visions were full of frightening symbols of death and destruction and occurred when an individual lost the directions he had learnt and was unable to experience those visions that were both culturally expected and necessary. It was not considered shameful to lose control of the *yage* visions, rather the loss was put down to the effects of sorcery by a more powerful shaman (Langdon 1979: 78).

Shamans, hallucinogens and rock pictures

Lewis-Williams and Dowson (1988: 205) expressed confidence in the shamanistic nature of San rock art, and also suggested a similar influence for the art of the Shoshonean Coso of California. In Whitney Davis' terms it is the 'artifact-sign', expressing that which the shaman experienced during the trance state (Davis 1988: 184).

Lewis-Williams and Dowson (1988: 212) proposed a model for the production of Upper Palaeolithic art in which 'entoptic' form constants are elaborated into iconic imagery during trance. They derived from their reading a paradigm setting out three stages in the progression of mental imagery during altered states of consciousness: Stage 1 - 'entoptic' phenomena alone; Stage 2 - elaboration into iconic forms; Stage 3 - attempts by the brain to make sense of them (1988: 204). They proposed seven principles in the way 'entoptic' forms (grids and lattices, parallel lines, dots, zigzags, nested catenary curves and meandering lines) were perceived: replication, fragmentation, integration, superpositioning, juxtapositioning, reduplication and rotation (1988: 203).

Much of the research cited above was carried out using hallucinogenic drugs and much shamanistic practice seems to have involved the use of mind-altering drugs such as *peyote*, *yage* and mescaline; but are such drugs necessary for the production of 'entoptics', their elaboration and incorporation into iconic imagery?

Hypnotic trance and picturing

Trance is a ubiquitous state which many people experience frequently and of which they may be unaware. The ability to experience trance is not uniform in all people. It is largely genetically determined but the extent to which an individual applies this inherent ability can be enhanced by training.

What kind of images do untrained people see in a light state of trance when they are not given any suggestions as to content, and how would they reproduce them? Seventeen students were individually asked to participate in a short exercise. It was explained that they would be asked to focus with closed eyes while the operator counted from ten to one, to do whatever they chose in their mind while the operator remained silent for two minutes; then, after the operator counted from one to ten, they would be asked to open their eyes and draw whatever they had seen. Paper and crayons were provided and the whole procedure took about five minutes. It should be pointed out that the operator is highly experienced in the use of hypnosis.

Of the seventeen participants, eight produced circles of some kind. Three (Figure 1.1, 1.2 and 1.3) were whirling circles of colour, while two (Figure 1.4 and 1.5) were radiating semicircles of colours, described in one instance as a sunrise. In one picture (Figure 1.6) the circles were described as turning into flowers. A diminishing spiral, drawn with a fine red line through its centre, was described as a spinning movement away from the subject (Figure 1.9). Lines were incorporated into pictures; wavy lines close together above an eye-like oval (Figure 1.7), parallel meandering lines formed a path and a beach, and straight lines formed two staircases. One physiology student spontaneously described his bird-like figure with a man's head (Figure 1.8, a therianthrope?) as being 'formed out of the random shapes of the phosphenes; their content is related to my thought.' Only two pictures did not contain obvious 'entoptic' elements.

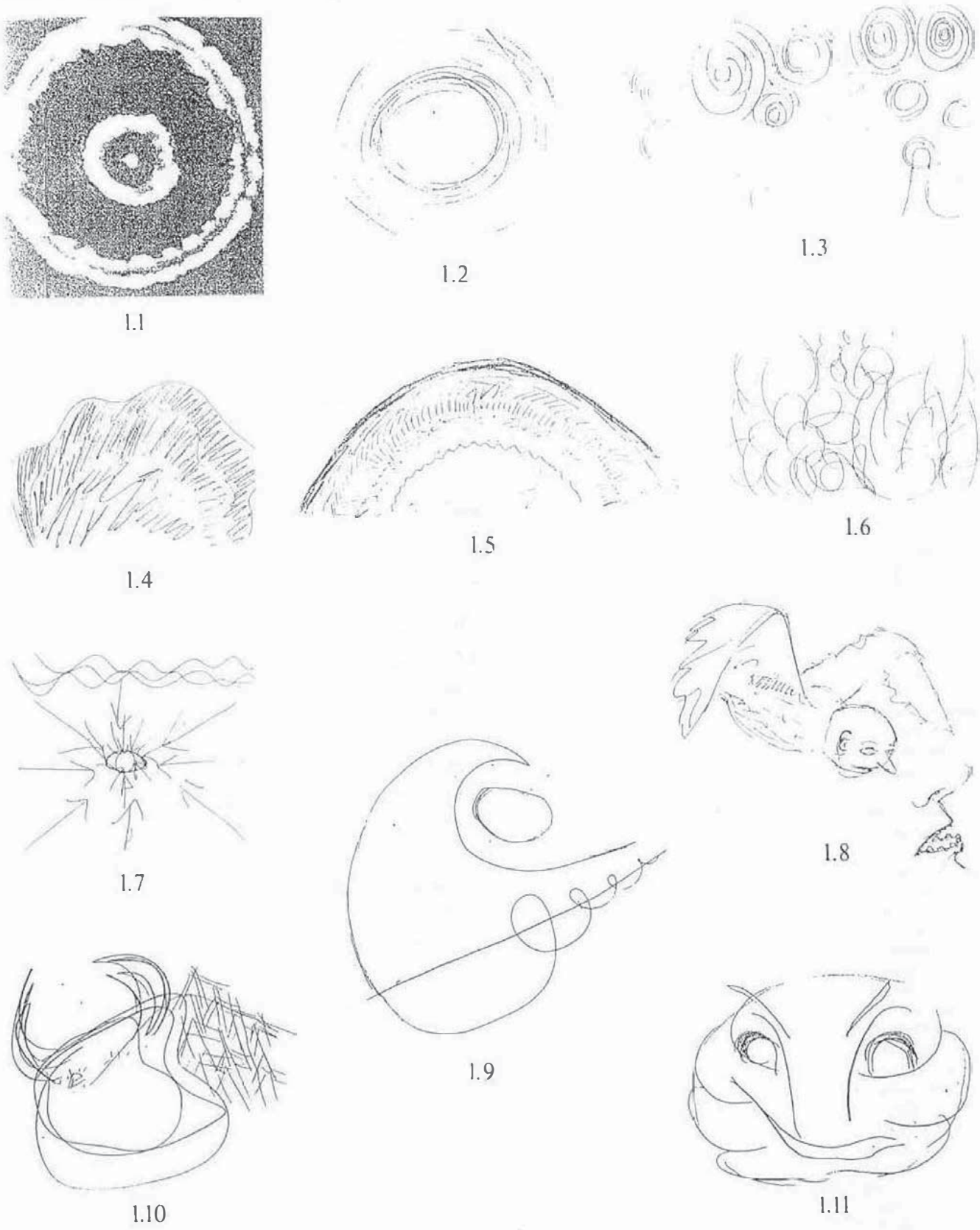
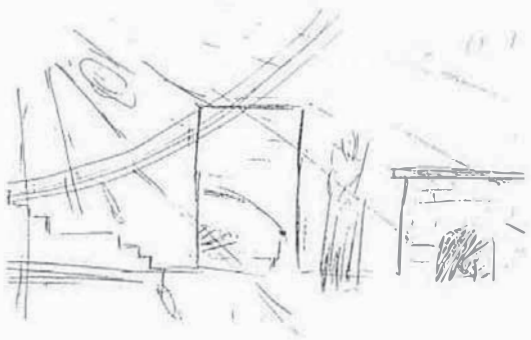
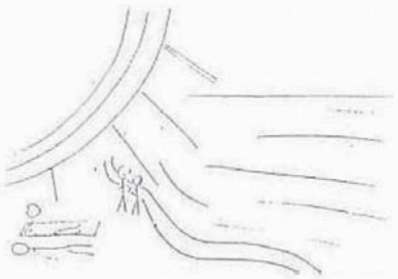


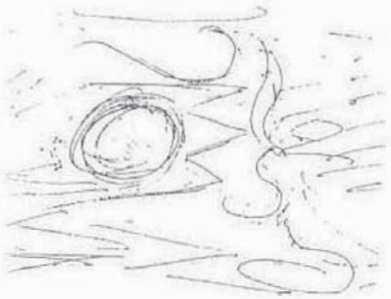
Figure 1a. Examples of the experimentally produced trance images.



1.12



1.14



1.15

Figure 1b. Examples of the experimentally produced trance images.

Discussion

Lewis-Williams suggested that 'australopithecines probably hallucinated' (1988: 202), repeating Bednarik's (1984: 28) proposal of 'phylogenetic longevity of phosphene types'. There is no reason to doubt that they had the anatomical ability to see 'entoptic' images but to reproduce them on another medium probably required skills of a higher order than was available to Australopithecines.

It is not known when the evolution of the hominid nervous and musculo-skeletal systems reached the point where the deliberate creation of specific marks was possible. Nor is it known whether the first deliberate marks were inspired by a wish to copy gestures or to reproduce external images or those perceived internally. When the anatomical requirements for intentional marking had been met, the internal images were available and could be called on with ease. While all people have access to an inner eye, some see better than others. Shamans were, and still are, special people. Those who used hallucinogenic agents achieved their status largely because of their ability to maintain their own psychic integrity despite the power of the visions they created. Some people do create more powerful visions. Barber (1970: 261) showed experimentally that the colour and intensity of images produced under the influence of psilocybin by people who described themselves as good visualisers was much greater than that of the images produced by self-described poor visualisers.

The small sample presented in this paper also demonstrates that trance ability and the intensity and complexity of visual imagery created within the trance is not uniform. Among this group of individuals, circles predominated in the images which they reproduced on paper. The brilliance and colour range of the images varied, some consisting only of simple lines while others were glowing with many colours. These circles were not images created under the influence of hallucinogenic drugs but within a brief episode of trace following a simple hypnotic induction.

It seems not unreasonable to suggest that men and women saw circles and lines when they sat in places such as Paroong Cave and that some of them saw those images more intensely than others. They were perhaps the spiritual ancestors of the 'Aboriginal Men of High Degree' (Elkin 1977). While psychic powers were said to be possessed by all Australian Aboriginal people, these were especially well developed in some individuals (1977: 57). Lack of evidence within a society for the use of substances known to be hallucinogenic does not therefore exclude the possibility of that society's art, including that preserved on rocks, being related to trance experience.

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RAR 10-270

Gap Hills

A new Simple Figurative Style engraving site in western New South Wales

JOHN CLEGG

The sites and problem

> Sturts Meadows, Mootwingee, and Euriowie ... are three engraving sites in western New South Wales located within 40 miles [63 km] of each other. The pattern of occurrence of Simple Figurative and Panaramitee motifs at these sites suggests that the former style gradually replaced the latter in this area. (Maynard 1979: 103)

The three large, well-known and important engraving sites described above exist within a relatively small area to the north and east of Broken Hill, and are thought likely to lie within the territory of a single social group because they are close to one another in an arid area. Accordingly, gross differences between the engravings at the sites were interpreted by Maynard to result from chronological changes. These sites were fundamental to the development of Maynard's three-stage synthesis of the Australian rock art sequences. The early (10 000 plus years old: Dragovich 1986) Sturts Meadows engraving site is fully patinated, and contains a high proportion of figures which resemble animal tracks and non-figurative elements such as circles, dots and arcs, with five per cent or fewer motifs which resemble humans, kangaroos, emus, and other animals. These are referred to (controversially: McCarthy and commentators 1988; Rosenfeld 1991) as the 'Panaramitee Style'. By contrast, the later engraving site of Euriowie, which is unpatinated, has sixty per cent figurative elements and only five per cent 'tracks' (Maynard 1979: 103-5). The associated gross differences of patination and motif type were interpreted by Maynard (1979) as evidence of chronological change, an interpretation which continues to appear appropriate for the immediate area of western New South Wales.

There are subtle differences as well as gross ones among sites in the area. The third large and well-known site is the Mootwingee rock slope, which Maynard also examined in 1971 and discussed in her 1976 and 1979 papers. Like Sturts Meadows, the Mootwingee rock slope pictures are fully patinated, but the site has twenty per cent human- and animal-like figures (a considerable increase from Sturts Meadows' five per cent), with a corresponding decrease in the proportion of 'tracks'. Maynard (1979: 104) proposed that there was a gradual replacement of 'track' motifs by 'animal' motifs, and so the Mootwingee rock slope (20% 'animals') was engraved at some time after Sturts Meadows (5%) but before Euriowie (60%).

Sturts Meadows, where I have been working since 1981, was arguably (Clegg 1984, 1987) engraved over a long period. There is increasing but still inconclusive evidence that Panaramitee engravings had varying emphases at different times, with more circles early on, more tracks later (Clegg 1988: 140; Nobbs and Dorn 1988; Lanteigne 1991). The apparently long-term Sturts Meadows site (Clegg 1992) is a palimpsest from different periods. In seeking further clarity, I hoped to find a Panaramitee site that was made during a short time, whose characteristics could present evidence unencumbered by superimposition. Accordingly, I was pleased to hear of what was described as a small Panaramitee site in the same general area, at Gap Hills, approximately ninety kilometres (measured directly from 1 : 100 000 maps); about six hours' four-wheel drive or two to three days' walk from the Sturts Meadows site, about the same distance from Euriowie, but much closer to the Mootwingee rock slope. The four sites are close enough to have been visited (and engraved) by the same individuals.

Developing models

For a long time (Clegg 1977), I have been working with a model, a major element of which assumes that gross variation within rock imagery is caused by three factors: *medium*: the materials and techniques from which the art is made; *function*: the purpose for which the art was made or used, including its 'meaning'; and *culture* which produces *style*, a result of different peoples' different ways of doing things. Such differences would be expressed in time and space, and modified by social and ethnic factors including information exchange (David and Cole 1990). The engravings mentioned in this paper are all of the same medium, being *pecked* (Euriowie is 'pounded', according to Maynard 1979: 103) into *rock*, and from a small area, so observed variation is ascribed to the aspect of culture, which changes through time, and to function.

In 1990 my general understanding of the art history of the rock art in central western New South Wales was an expanded version of that of Maynard (1979: 91-2, 103) quoted above:

> For some time, beginning during the Pleistocene (Dragovich 1986; Nobbs and Dorn 1988), Panaramitee engravings were made over wide areas of Australia. They varied through time (Lanteigne 1991) and in space (Maynard 1979: 95), but change was slow. At some time (perhaps associated with climatic variation) the rate of change increased, and the focus of activity shifted in style and location, to the Simple Figurative Style at the Mootwingee rock slope, and more recent Figurative sites at Mootwingee and Euriowie. There was some continuation and link over the long periods involved (Clegg 1986: 49-51). All the sites were known and visited during the recent past (as evinced for Mootwingee and Euriowie by ethnographic information reported by McCarthy and Macintosh in 1962, by a coolamon-scar on a river gum in the middle of Sturts Meadows, and a nineteenth century occupation near Gap Hills). Panaramitee sites continued to accumulate motifs, as they still do in the form of casual visitors' admiring imitations and other graffiti.

Simple Figurative Style engravings at Gap Hills

In 1990 I was invited to the Gap Hills site by Dan Witter and Badger Bates of the New South Wales National Parks and Wildlife Service's Western Region, to whom I am very grateful. Dan knew the site was worthy of investigation and wanted it recorded; Badger wanted the site recorded because his uncle had told him of a site somewhere in the hills which was important ritually and mythically. The uncle died before a trip to the site could be organised; Badger thought Gap Hills might be it, and wanted it investigated. I wanted a small Panaramitee site to compare with Sturts Meadows. (Another story, told elsewhere — Clegg 1992.)

The site is all about and around a valley less than a kilometre long where an intermittent tributary to the headwaters of Gnalta Creek flows down from the Gap Ranges, a drop of one hundred metres (Figure 1). The creek makes the drop in three large steps.

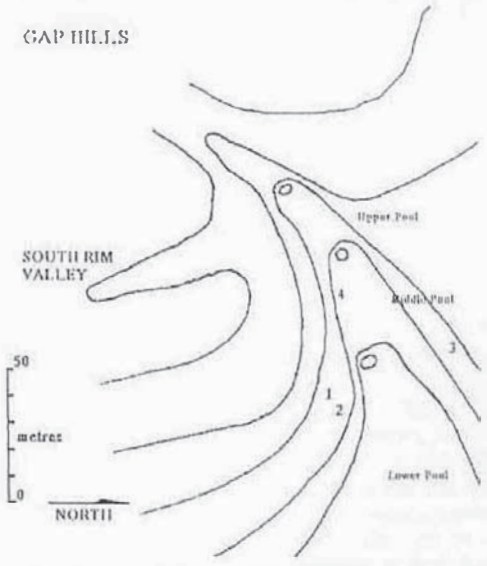

Figure 1. Sketch map of the Gap Hills site, showing locations of various features: 1 - Mr Two-stick panel; 2 - Yams and football; 3 - Floor of Middle Pool; 4 - Roo, euro and yams.

Figure 2. 'Mr Two-stick panel'. Engravings on a rock high on the southern side of the valley at Gap Hills. Scale: one metre.

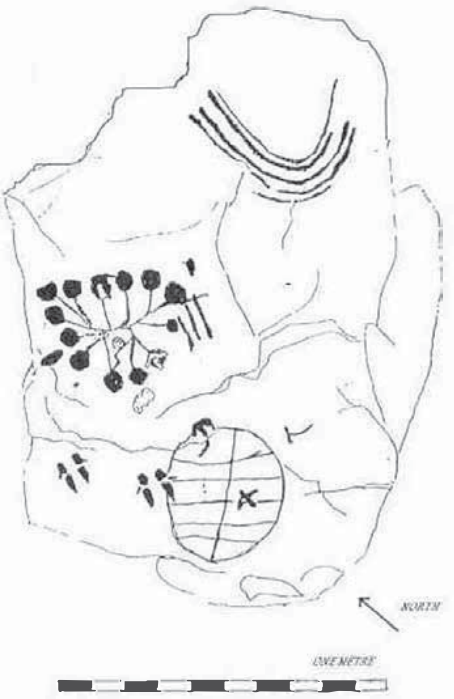

Figure 3. 'Yams and football'. Engravings on a rock on the southern side of the valley at Gap Hills. Scale: one metre.

Each step has a near-vertical cliff (which in wet weather must form a waterfall), a rock hole (large enough to contain a substantial supply of water after rain, but sand-dry when we were there), and a near-horizontal platform leading to the next lip.

There is not yet any clear pattern of dating evidence at Gap Hills. Many of the engravings, including all the figures illustrated in this paper, are completely patinated; there are a few incompletely patinated engravings at the site, which can be brushed aside like the copyists' graffiti of Sturts Meadows (cf. Rosenfeld 1991: 140 for a convincing argument against such dismissal).

The majority of engravings at Gap Hills are in the Panaramitee, but some Simple Figurative engravings occur on large boulders in the sides of the valley. Only some of these engraved boulders were recorded (because the aim of the expedition was to obtain data about the Panaramitee pictures). Our tracings are shown in the accompanying plates (Figures 2 to 5). Figure 4 shows a panel which became a favourite of us all. It was found by Dan Witter on the next-to-last day of our expedition, on the northern rim of the main valley. Dan recognised that it showed two 'macropods', several 'yam plants' and one 'human being'; these motifs could relate to one of a set of stories which belong to this area, about Red Kangaroo and Euro, when they travelled around together:

> At first they are friends. Euro belongs to the hill country, Red to the plains. Euro is showing Red around, and providing yams (which he owns) as food. After a long time, Red becomes jealous of Euro's knowledge, and spies on him to find out where the yams come from; later, while Euro is distracted, Red steals some yams. Euro finds out, and they have a big fight.

A set of very similar stories belongs to the Flinders Ranges in South Australia (Tunbridge 1988: 35-9). The Euro and the Kangaroo here dig up the root of the wild pear, rather than yams. During the fight, Euro beats up Red in certain ways which produce their present physical differences, and Euro goes off and creates the hills which threaten Red's plain; the kangaroo uses his tail to sweep the plains flat, and pushes an edge to the hills (where there is now a geological fault), with plains on one side and hills on the other. There is a similar situation at Gap Hills; a geological fault is marked on the geological map at the edge of Gap Range. It is only two hundred metres east of the engravings and runs for about ten kilometres roughly northeast-southwest.

Discussion

The Simple Figurative Style engravings of Gap Hills at first reminded me of those at the Mootwingee rock slope, thirty-four kilometres or four hours' four-wheel drive away. I did not realise that the styles are so different until George Chaloupka congratulated me on finding a new style after I had given a version of this paper in Ningxia. I had assumed that the styles were similar partly because the motifs are figurative, and near Mootwingee, and partly because the small male 'Mootwingee man' figure, with two or sometimes four 'boomerangs' held in outstretched 'arms', is so predominant. But he exists at plenty of other sites, including Sturts Meadows. I have not studied the Mootwingee pictures in detail, but now have the impression that the Gap Hills Simple Figurative panels are quite distinct from the Mootwingee rock pictures — for one thing, I cannot think of any of the motifs I confidently call 'yams' (several pecked discs or large dots joined by lines) at Mootwingee, and, for another, the composition (the way the figures are crammed so neatly onto their rocks), are completely different from what I recall of Mootwingee.

If this impression is correct, that the Gap Hills Simple Figurative engravings are distinct from those on the Mootwingee rock slope, there is some explaining to be done. How to get different styles in such close proximity? Too close for separate ethnic groups, the Simple Figurative facies at Gap Hills, which has noticeably few 'tracks', could represent a time later than the Mootwingee rock slope in a Maynardian evolution, in which case we might expect to find similar pictures at Mootwingee itself, or elsewhere.

But I would like to incorporate the evidence of the myths (as allied to the engraved rock in Figure 4), and promote the hypothesis which fits well to widespread information about Australian beliefs: that locations are significant, and significant enough to cause variation in rock imagery. Gap Hills could be a place which features in the Red Kangaroo-Euro myth cycle, while the significances of Sturts Meadows, Mootwingee and Euriowie relate to other Dreamings.

There are aspects of the Panaramitee facies at Gap Hills which seem to relate to the engravings' location. The engravings on the floor and the waterfalls of the main valley consist of motifs (mainly asterisks, nested ares, and spirals), which are normal constituents of the Panaramitee, but are here present in larger size (c. 40 cm) and greater incidence. Figure 5 shows an area from the

Figure 4. 'Floor of the Middle Pool'. Engravings on the floor of the Middle Pool Area at Gap Hills. Motifs are larger versions of Panaramitee motifs. Scale: one metre.

Figure 5. 'Roo, Euro and Yams'. Engravings on a rock high on the northern side of the valley at Gap Hills. The engravings seem to fit with a story about macropods and yams. Scale: one metre.

floor of the middle step, with a high proportion of nested arcs. In these areas, variation due to location appears to be clearly marked during Panaramitee times, and even more obvious when Simple Figurative Style motifs were being engraved.

Variation in rock art thus has an element of location, quite distinct from the elements of style. This location relates to the meaning, significance, or use of a site, and thus belongs within the dimension function.

Implications of the 'new' model

The 'new' model is that a significant element in the variation of rock art is an expression of the significance of its location. This model explains the fact that the pictures in each Australian site have many aspects unique to the site (see almost any of the literature, summarised and illustrated by Walsh 1988). I do not find it easy to suggest how the model might be tested. One might explore the uniqueness of sites, and hope for some signs of continuity through time at suitable sites. But the three examples of the Gap Hills Simple Figurative facies are themselves so different that such an exploration would be a challenge.

There is any amount of evidence to support the model, for the significance of location in Aboriginal religion pervades Australian ethnography (Capell 1972; Chatwin 1988). One far-fetched example from Cape York comes to mind: Deighton Lady (illustrated by Haginikitas 1991). This particular site is a large rockshelter which contains a large vulva-shaped back wall. It has paintings of women in it, which seem closely related to the shelter shape. It also has engravings in the rock of the shelter floor, now under a thick mineral deposit. These engravings are not of women, but lines, in the Cape York equivalent of the Panaramitee (pers. obs.: David and Cole 1990). The Deighton Lady shelter clearly was significant in Panaramitee times as well as later.

How does the Gap Hills evidence modify the model of local art history? Only by adding the complication that each of the sites had its own significance:

The landscape is occupied by significant places. For some long time during the Pleistocene, people used to visit Sturts Meadows and made there engravings appropriate to the place and the time. They probably also visited the other sites, but did not do much engraving, apart from a little at Gap Hills, during the same period as the Nebula site at Sturts Meadows was being engraved. The emphasis on particular motif types changed slowly through time. Later, style change accelerated, and the Panaramitee gave way to the Simple Figurative Style. Mootwingee rock slope and Gap Hills were engraved appropriately for those places. Any engraving at Sturts Meadows was in the same style as the earlier figures. The Simple Figurative styles continued to change, and focus shifted to other areas at Mootwingee, and to Euriowie.

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RAR 10-271

Blue paints in prehistory

Preliminary investigations into the use of the colour blue in Aboriginal rock paintings at Laura, Cape York Peninsula

NOELENE COLE and ALAN WATCHMAN

Introduction

In the Laura region the colour range of paintings in the hundreds of documented rock picture sites is dominated by the natural earth colours of red, white and yellow, so that the rediscovery in 1986 of an Aboriginal art site containing blue paintings is of great interest. More than a century ago, Aboriginal civilisation in this region was devastated by European invasion and settlement; consequently, we have no direct information on the creation of the paintings in the Blue Figures rockshelter or on the specific nature of human occupation there. The uniqueness of the blue paintings and the conservation problems evident in the state of the surviving blue-coloured paint therefore merits a special study in terms of stylistic and physical analysis, both in regional and in wider contexts.

There are few records of blue colour being used in prehistoric rock painting (Table 1). However, in protohistoric times, blue pigments were used widely, for example in the mural and tomb art of Egypt, North and Central America, and in Asia and Europe, reflecting more recent changes in the technology of paints.

Most studies of rock paintings in Australia and recent pigment investigations have recorded the predominance of red, yellow and white (and, less commonly, charcoal or mineral-based black). These colours appear also to have been those mainly used in the decoration of artefacts. Elkin (1948) reported the use of the mineral glauconite in 'blue' rock paintings of the Kimberley region of Western Australia. We have not examined samples of pigment from the latter region, but if the blue paint is composed of glauconite it should be green rather than blue as its composition is similar to that of biotite ($K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$). At a site at Mootwingee in western New South Wales, Walston and Dolanski (1976: 6) identified blue pigment as azurite ($Cu_3(CO_3)_2(OH)_2$) but, they concluded, 'It is doubtful whether the blue markings are of Aboriginal origin'. McCarthy's review of Aboriginal rock art pigments (1979: 46) also refers to the use of blue from 'an ochre on the Johnstone River in Queensland', but gives no specific details of its nature or use.

Red, white, yellow and black also appear to be the pigments most commonly used world-wide in prehistoric rock paintings (e.g. Rudner 1982). References to blue paint are rare and usually lacking in detail. Rudner's account (1982: 17, 19) refers only to a 'bluish to violet manganese' colour recorded by Pericot Garcia and Ripoll Perello (1964) in the Spanish Levant, and a report of a 'light bluish grey' recorded by Gardner in the Argentine.

For more recent Australian rock paintings, the use of synthetic blue pigment derived from 'laundry blue' has been documented. 'Reckitts Blue', a common commercial brand of laundry blue, first became available in the 1830s in North America where it is composed of ultramarine blue (derived from lapis lazuli $(Na,Ca)_4(AlSiO_4)_3(SO_4,S,Cl)$ and sodium bicarbonate). In North America and Australia, alternative blue bags to Reckitts Blue were made using Prussian blue (Gettens and Stout 1966). Prussian blue, sometimes called iron or Paris blue, consists of ferric-ferrocyanate, a synthetic pigment which was first produced in 1704 (Gettens and Stout 1966) and which has the chemical formula $Fe_4[Fe(CN)_6]_3$. It has been described as 'a transparent colour with very high tinting strength allowing a very small amount of pigment to impart a very dark blue colour' (Miller et al. 1990). In Canada, ultramarine (Reckitts Blue) and Prussian blue, identified in paints on artefacts of the Plains and Northwest Coast tribes (Miller et al. 1990), are the most commonly recorded blue pigments. Here, the pigments, perhaps from different laundry blue bags, were either mixed with a filler, (usually gypsum), without a medium, or with an unidentified proteinaceous medium.

REGION	USE	COMPOSITION	DOCUMENTATION	NOTES
Australia (Kimberley)	rock paintings	glauconite	Grey 1841; Elkin 1948; McCarthy 1979; Brandl 1982	pale bluish-green
Australia (Pimba)	rock paintings	unknown	Mawson and Hossfeld 1926	bluish grey
Canada	kiva rock murals	azurite	Watson 1967	blue
Spain (Levant)	rock paintings	unknown	Pericot and Ripoll in Rudner 1982	bluish to violet manganese
South Africa	rock paintings	phosphatic nodule	Rudner 1982	blue
Australia (Kakadu)	rock paintings	Prussian blue	Clarke and North 1991	
Australia (Harvey Range)	rock painting	washing blue	Roth 1904: 15; Brayshaw 1977	
Canada	Native American arts	Prussian blue, ultramarine	Miller et al. 1990	

Table 1. Documented use of blue pigments in rock painting.

In Australia, the blue paint used by Najombolmi in 1964 in a panel of motifs (human, turtle, fish), which he painted in the 'traditional X-ray style' at the Blue Paintings site at Nourlangie Rock in Kakadu National Park (anonymous n.d.), was found to be derived from a laundry blue (containing in this case Prussian Blue) when analysed by Clarke and North (1991). Roth, in his detailed ethnographies stated that 'Blue is not met with as a pigment, etc., anywhere in North Queensland, though "washing blue" has been introduced here and there by trade and barter from natives employed at the settlements' (1904: 15). Rock paintings made with washing blue exist at a site near Townsville (Brayshaw 1977; E. Hatte pers. comm.) and traces of pigment believed to be derived from a similar source are visible on the surface at a rock painting site at Chillagoe (pers. obs.).

The Laura blue figures

The site containing the Laura blue paintings is situated at the top of an eroded sandstone escarpment near the Deighton River. The rockshelter is about seven metres in length, has little overhang and, on parts of the rock surface, dust has collected and obscured some of the motifs. The paint in the blue and other motifs is exfoliating as a result of local environmental factors, such as direct exposure to sun, rain and wind. It is possible that use of the shelter is of some antiquity since the site contains not only a rich concentration of superimposed paintings, but also some heavily weathered engraved pits, typical of an 'old' style at Laura (Rosenfeld et al. 1981). Occupational deposits on the flat sandy floor include charcoal, flaked stone and glass artefacts, a woven net and European items, providing evidence of site use in relatively recent times.

An interesting and unusual feature of this and nearby sites is the existence on parts of the rock surface of a blue/black deposit, the composition of which is currently being investigated.

Detailed analysis of painted, engraved and stencilled subjects at the Blue Figures site revealed the usual range of motifs and techniques at Laura. Painting is the most favoured technique at this site. The most common Laura categories of painted motifs are present and in approximately similar proportions; for example, most motifs resemble human or anthropomorphous figures or different types of fauna (Cole 1988).

Except for the use of blue, the range of colours also follows the usual pattern at Laura (Cole in prep); that is, paintings are usually monochrome (red, white, yellow, brown) or in bichrome combinations of these colours. Many paintings appear to have been re-outlined in white, or to have been fully repainted. In terms of technique, motif and design elements, this site presents the usual Laura pattern. Only the blue colour is unusual and appears to represent a deliberate effort in this site to depart from normal conventions of colour use.

At this stage we can only speculate upon the reasons behind the selection of the blue colour. Perhaps the presence of the naturally occurring blue/black deposit may have been involved. Although some areas of underlying blue colour are visible through later, deteriorating, layers, only a few decipherable motifs in blue exist in the most recent layer of the art. The blue paint occurs both as solid colour infill and as outlines. The blue human figures are either inverted or placed horizontally. Paintings aligned in this way have been identified at Laura by Aboriginal people (Trezise 1971) as sorcery figures.

The blue paints are deteriorating and it is clear that there is little cohesion between the blue of the top layer and underlying layers. Fine striations, visible in the paint of some of the blue figures, appear to indicate brush marks. In the blue human figures (e.g. Figure 1) the blue paint is the latest repainting episode, since brown, red or white paint underlies and shows through the blue. Munsell colour readings of blue paints taken on two different occasions at the site were consistently bluish-grey to dark bluish-grey. On the Kodak scale the colour of these paints most resembles blue (Table 2).

SAMPLE	MOTIF	MUNSELL	SEM/EDXA	MINERALS
BF5	indeterminate	5B4/1 dark blue grey	Mn, Al, Si, (K)	Mn, kaolinite, quartz
BF8	'human'	5B6/1 bluish grey	Si, Al, K, Mn	muscovite, kaolinite, Mn, fibres

Table 2. *Preliminary mineralogical analysis of paint samples at Blue Figures, Laura.* Mn = manganese oxide hydrate; ( ) = minor amounts.

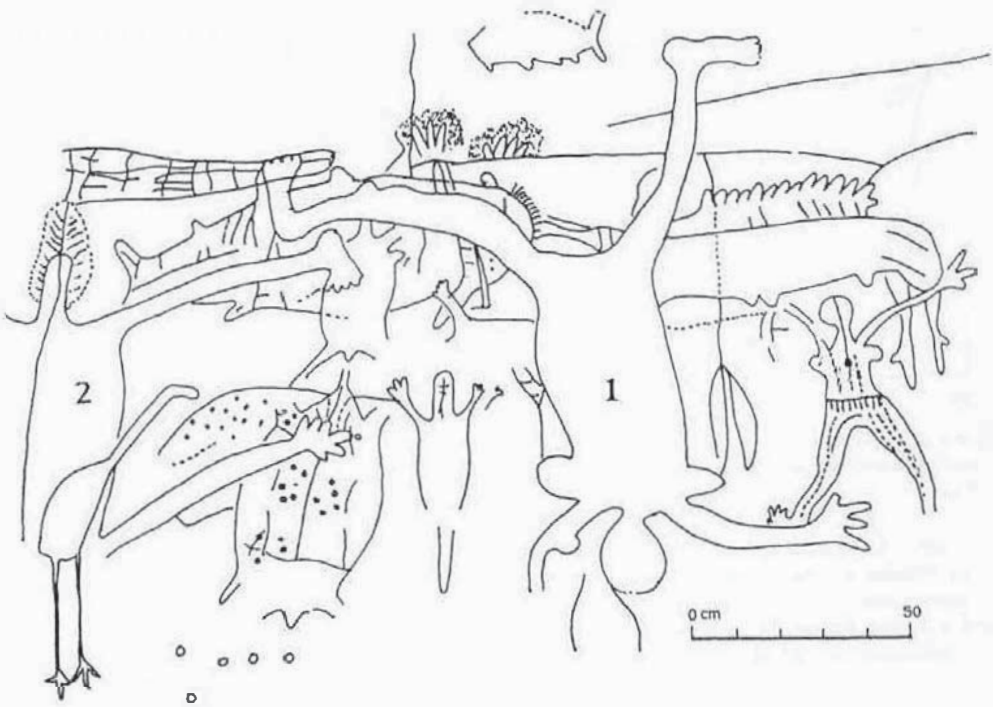

Figure 1. *Section of painted panel at the Blue Figures site, Laura, showing two of the blue paintings (marked '1' and '2').*

Mineralogical analyses

Some mineralogical analysis of blue paints was conducted in a wider study of Laura pigments. The blue paint is difficult to analyse because, in the samples collected, the paint layer is very thin and strongly bonded to the underlaying paint layers. Scanning Electron Microscopy and Energy Dispersive X-ray (SEM/EDX) analyses of samples from different areas of blue (in different superimposition layers) revealed that the blue paint contains Mn, Al, Si and K in various proportions (Table 2). Al, Si and K could be present either as contaminants from an underlying white ground layer or as constituent elements of the blue paint. Si and Al (clay) and Si, Al and K (feldspar or muscovite) are abundant in most of the Blue Figures paints.

X-ray diffraction (XRD) results indicate that the manganese is present either as an amorphous mineral or in the form of an hydrated oxide. Analysis of two cross-sections of exfoliating paint (c. 0.6 mm thick) showed that, in one case, the blue manganese-rich pigment lies over at least three separate layers of red (haematite) and, in the other, the blue pigment lies in lower levels of the superimposition sequence.

The discovery of manganese in the Laura blue was unexpected because in other pigment studies the samples containing manganese have been black in colour (for example Buisson et al. 1989; Clottes et al. 1990; Demailly 1990). However, a manganese mineral cannot be discounted as an ingredient of a blue/grey paint. When manganese dioxide is mixed with white a bluish tinge can be obtained. Blue, manganese-bearing clays are known to exist in tropical environments, for example as smectites; Guven and Deer have described a pale blue, manganese-bearing kaolinite.

At Laura, oxides of manganese would be available in the general area (M. Rubenach pers. comm.) and blue-grey clays, although considered rare, are not unknown in north Queensland (G. Musgrave, C. Robinson, pers. comms). Further analysis is required to determine the status of the Al, Si and K whether as integral components or as contaminants of the Blue Figures paint samples and to identify the precise mineral contents of the paints. It may then be possible to match these with local materials.

Sample BF5, from a lower level of superimposition, and sample BF8 (Cole and Watchman 1992: Fig. 1), from a surface layer, have similar compositions (Table 2), indicating that the recipe was retained in the most recent paintings. Analysis of cross-sections also indicated that the blue paint was used in earlier strata and its use has not been confined to the most recent painting episodes.

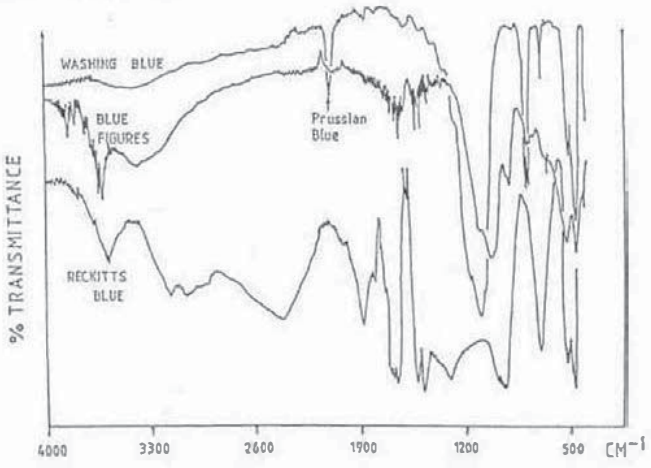

Figure 2. FTIS spectra for comparison of Blue Figures paint with colourants 'Reckitts Blue', Prussian blue and washing blue.

Fourier Transform Infrared Spectroscopy (FTIS) and XRD results indicate that the elemental compositions of the ingredients of Reckitts and other laundry blue distinguish them from the blue paint at Laura (Figure 2). Sodium, calcium and sulphur (present in ultramarine) are all absent from the Laura blue, as is iron (present in Prussian blue). In contrast, manganese, one of the major elements in the Laura blue paint, is not present in the commercial laundry bluing agents. Other types of synthetic blue pigments used by modern artists, which include smalt (K, Co oxide glass), Cobalt Blue (Co, Al oxide glass), Cerulean Blue (Co, Sn, oxide glass), blue verditer and azurite (complex Cu hydroxide, carbonates), verdigris (Cu acetate), are chemically and spectrographically different from the Laura blue paint.

To date, physical analysis has been confined to preliminary chemical and mineralogical investigations and the presence of organic components has not been investigated. We might also consider the possibility that the paint may have altered in appearance since its application. For example, its original colour may have been affected by compositional changes involved in the growth of organic deposits.

Conclusions

The Laura blue paint appears to be quite different in composition from any of the other blue paints whose components have been analysed. Even though there is evidence of fairly recent Aboriginal usage of this site, the painters do not appear to have used modern synthetic pigments, at least in those figures sampled. Although a manganese-bearing mineral appears to be the major ingredient, it is possible that the paint may consist of a mixture of inorganic and even organic ingredients, and that local micro-environmental factors may in some way have influenced its production. It is possible that at this site the occurrence of blue represents an enduring and unique cultural tradition.

The sparse documentation of blue in studies of surviving rock art seems to indicate that this was a colour seldom used by prehistoric painters, possibly due to the low availability of natural mineralogical sources of this colour. The paintings at the Laura Blue Figures site are unusual for Laura only in terms of the presence of the blue paint. It is clear that the analysis of the blue is difficult; additional tests must be conducted to determine the precise mineralogy of the paint and to investigate the presence or absence of organic materials. It is also necessary to investigate potential local sources of likely ingredients of the paint. Such information is needed to shed significant light on the techniques used by the artists and to assist in a more accurate assessment of the conservation status of this site.

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RAR 10-272

Stencil art on the Woronora Plateau

A description and analysis of sites and artefacts including stencils, charcoal drawings and petroglyphs

CARYLL SEFTON

Introduction

Since 1970, the voluntary Illawarra Prehistory Group has been surveying the Woronora Plateau for evidence of prehistoric occupation. The study area (Figure 1) consists of a deeply dissected area (c. 350 km^2) of raised sandstone plateau located west of the narrow coastal plain. It is divided into four ill-defined drainage basins. Many of the innumerable water courses begin in upland dells (swamps), basins filled with water-logged soils, and flow into narrow steep-sided gullies which deepen and widen to form major valleys. Horizontal sandstone outcrops and small vertical cliff lines are present throughout. Petroglyphs are located on open horizontal outcrops, mainly at or near plateau level; drawings, stencils and paintings are located in sandstone overhangs under cliff lines.

The study area is largely undeveloped and supports forests, woodlands, heaths and sedges. There is a complex mosaic of vegetation units. Woodlands have a shrubby understorey and where these and heaths are not frequently fired the vegetation can be impenetrable. The archaeological survey found direct evidence of Aboriginal occupation in sandstone overhangs, including imagery, shells, stone artefacts and grinding grooves, and on open sandstone outcrops as grinding grooves, petroglyphs and engraved groove channels. Surface scatters of stone artefacts identifiable on open areas of soil were not systematically identified.

Ethnohistorical background

Tindale (1974: 191, 195) divided the study area between the Tharawal (Georges River Basin) and the Wodi Wodi (Cataract River Basin). Eades (1976) reviewed the linguistic evidence and concluded that a common language, Dharawal, was spoken. Mathews (1896) was specific in identifying the drainage line between the two major drainage basins as the northern limit of the Bunan initiation ceremony. Organ (1990), who has compiled documents relating to early contact history of the Illawarra, noted that the earlier ethnographers did not refer to tribes; Aborigines identified themselves as belonging to a particular place (clan affiliation).

In both the coastal zone and the inland zone to the west of the study area were small mobile groups which, while associated with one tract of country by clan association, ranged over extensive neighbouring areas in all directions (Sefton 1988). Clan associations with country are reflected in social divisions in the population. There were frequent contacts between these groups as families moved along the coast and inland rivers and between coast and inland. Both coastal and inland groups would have had tracts within the study area which also was crossed by routes connecting the coast and inland. Family groups walked large distances to attend major ceremonies such as the Bunan.

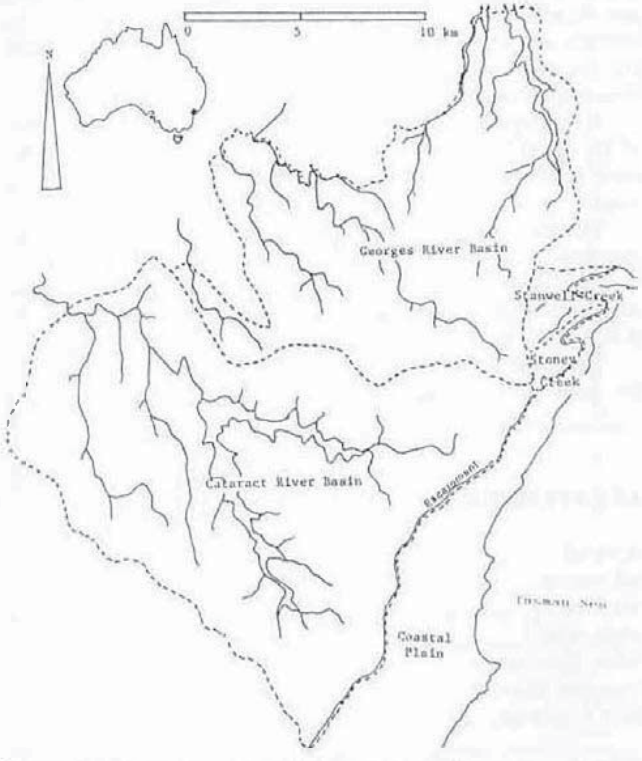

Figure 1. The study area on the Woronora Plateau, showing drainage basin subdivisions.

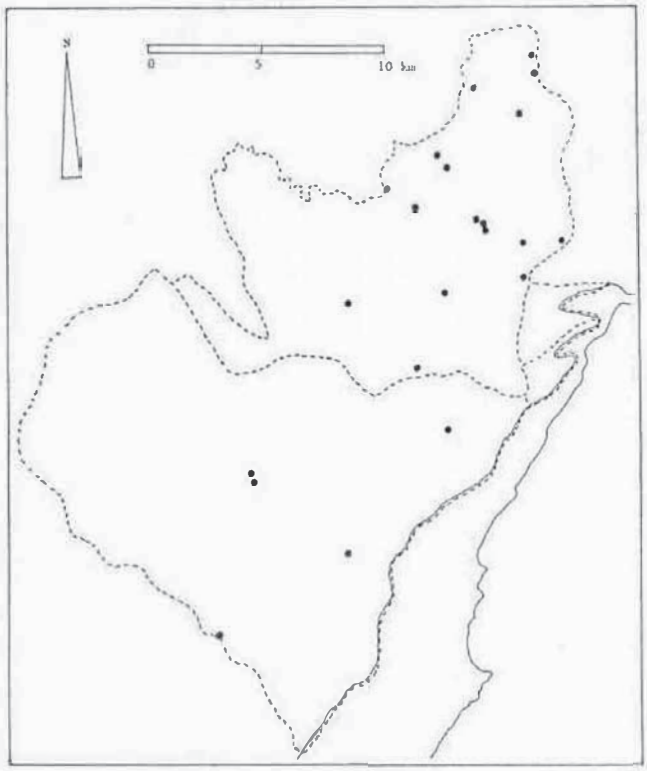

Figure 2. Distribution of petroglyph sites in the study area.

Archaeological evidence

A total of 316 open sites with 3912 grinding grooves were recorded. They are mostly located at or near plateau level, on sandstone outcrops in swamps or in creek beds near the head of a creek. Grinding grooves are distributed mainly in a band from the northern to south-western extent of the study area. This band has a wider east-west extent and much higher density in the Georges River Basin than in the Cataract River Basin. Grinding grooves sometimes are associated with other features including petroglyphs and engraved groove channels. The latter are punctured and abraded grooves cut into the soft sandstone to direct water seepage at a site; twenty-one examples were distributed throughout the entire study area, and there is a decrease in frequency from north to south.

Petroglyphs were found from the northern to southern extent of the study area but only in the eastern sector (Figure 2), the most westerly examples being only eleven kilometres from the coast.

Shelters were categorised on the basis of the artefacts they contained. Stone artefacts were found at the drip-line of 222 shelters; marine shells were present in fifty-six; twenty-five shelters contained grinding grooves. Paintings were found in 463 (83%) of the total 555 shelters recorded.

Recorded imagery has been subdivided into seven classes on the basis of technique of application and of colour: charcoal drawing; white stencil; white drawing; red stencil; red drawing; red/orange/yellow/painting; bichrome drawing. Yellow drawings, black stencils and scratched drawings (all very minor components of the art) have been subsumed into the major class 'total art'. The total number of motifs has been recorded for each class. A summary of the percentage frequency and distribution of the art techniques in shelters (counted by motifs) is presented in Table 1. The most common technique identified is charcoal drawing; the other techniques described are significant but minor components.

Univariate analysis of these art techniques indicated a high range of motif count per shelter but a high frequency of shelters with low motif counts. Twenty attributes were measured for each of the 555 shelters identified. These include: decorative techniques, shelter size, environmental variables (distance from water, plateau level and slope) and distance from other site types. After the resulting data had been transformed into a matrix of ranks in order to control the effect of outliers, it was analysed by Correspondence Analysis (CA). The major pattern identified on the first axis (14.5% of the variation) showed that shelter size contrasts with distance from other sites and less importantly is associated with high counts of charcoal drawings and stone artefacts. Large shelters tend to be close to another site. Also significant, large shelters have high counts of charcoal drawings and stone artefacts. The other variables are poorly sorted on the first axis.

The first axis also distinguished between shelters in the two major drainage basins and those in coastal and inland areas. The distribution of variables on the first axis shows that large shelters in the Georges River Basin or shelters less than ten kilometres from the coast ('coastal') are close to another archaeological site in contrast to shelters in the Cataract River Basin or more than ten kilometres from the coast ('inland'). Less importantly on the first CA axis, the large shelters in the Georges River Basin or coastal contain stone artefacts of foreign raw materials and high counts of charcoal drawings in contrast to the large shelters of the Cataract or inland which do not contain either of these.

The first CA axis identified the association of charcoal drawings with the archaeological structure of the study area. Charcoal drawings have a much higher density in the Georges River Basin than in the Cataract River Basin where density is much less. The highest densities are near the coast in the Georges River Basin, and in the area defined as inland in the Cataract River Basin. The density distribution for charcoal drawings is similar to that for grinding grooves despite the obvious difference in site requirements for the two artefact types. Where there was a high intensity of shelter use and grinding there was also a high intensity of decorative activity expressed as charcoal drawing in shelters and petroglyphs on open sites. There was also a difference of intensity of use of the two major river basins.

On the first three CA axes, the stencil variables were unsorted and failed to sort shelters. The distribution of stencils in the area when motif, colour and superimposition are analysed could indicate Aboriginal behavioural patterns and chronology in the study area. In the study area, eighty-six shelters contained 460 red stencils, and thirty-seven contained 201 white stencils; fourteen shelters (13%) contained both red and white stencils. Red stencilling is the second most common decorative technique recorded

ART TECHNIQUE	TOTAL COUNT	% TOTAL MOTIFS	SHELTERS: NUMBER	% WITH TECHNIQUE	COUNT/SHELTER: RANGE	MODE CLASS
charcoal	3906	78	427	92	1 -140	1 - 10
red stencils	460	9	86	18	1 - 34	1 - 5
red drawing	183	4	86	18	1 - 10	1
white stencil	201	4	37	7	1 - 28	1 - 5
white drawing	119	2	38	8	1 - 17	1 - 5
bichrome drawing	46	1	28	6	1 - 6	1
R/O/Y painting	172	3	19	4	1 - 62	1 - 10

***Table 1.** Summary of the frequency and distribution of the art techniques in shelters counted as motifs.*
NB multiple counting of some motifs

SHELTERS WITH COLOUR:	ENVIRONMENTAL LOCATION: Ridge top	Upper valley slopes	Lower valley slopes	Valley bottom	SLOPE: Gradual	Moderate	Steep
Red	5	10	4	1	1	13	6
White	2	8	2	1	3	8	2
Black	0	2	0	0	0	2	0
Total shelters with children's hand stencils:	7	20	6	2	4	23	8
Total shelters	46	332	134	43	53	323	179

Table 2. Environmental details of shelters with children's hand stencils

in the study area and represents nine per cent (count by motif) of the total number of recorded motifs, while white stencils represent four per cent only. There were also recorded one pair of black charcoal juvenile hand stencils in each of two shelters and a single yellow hand stencil in one shelter.

Flood (1987: 104) analysed hand stencil size in the sandstone rockshelter art of the Koolburra Plateau, north Queensland. She measured the length of the middle index finger of stencils and compared them to measurements recorded for Aboriginal finger size by Abbie (1975: 5, cited by Flood) who found that a sample of Aboriginal hands reached maximum size by thirteen years in males and twelve years in females. By comparing her hand stencil measurements with Abbie's measurements, Flood estimated that fifty-eight per cent of stencilled hands were those of children less than ten years old. Some sites had a large range of hand stencil sizes while others contained only large hands; there was a predominance of hand stencils of children in small rockshelters far from water in remote upper reaches of valleys. This she assessed as the result of hunting and gathering expeditions or as use of these shelters for initiation sites for boys at early puberty, or secular sites for women and children. If these represent initiation sites then the boys would have been very young, under ten years old.

Officer (1984: 15, Figure 5.11) measured hand stencils recorded immediately north of the study area in the Georges River Basin on the Woronora Plateau near Campbelltown. Measurements across the knuckles of the four fingers varied from 50 to 150 mm. In the sample measured by Officer (1984: 35) forty-seven stencilled hands ('children') were less than 80 mm across, and seventy-eight ('adult') were larger.

In the study area, I compared hand stencil size with mine (80 mm across the knuckles; middle finger length 72 mm; these data are within Flood's pre-puberty range for males 7-10 years, females 8-10 years), and any hand stencil smaller than mine I classified as 'juvenile'. I recorded seventy-seven red hand stencils as juvenile and 103 as adult; twenty-four white hand stencils as juvenile and 121 as adult. In both the study area and the nearby area studied by Officer, children's hand stencils are common among stencilled images.

The location of shelters with children's hand stencils has a direct link to settlement patterns within the study area. If the family group was transient within the study area and travelled quickly through the rugged landscape, then children's hand stencils could be expected to be located in shelters near plateau level and along major east-west ridge lines.

Table 2 illustrates the environmental location and slope associated with shelters containing children's hand stencils. Chi-squared analysis of the frequency of shelters with juvenile hands from several environmental locations confirms that the sample came from the same population as the total shelters. Similar analysis comparing the frequency of shelters with juvenile hand stencils, with the three grades of slope confirms that the sample came from the same population as the total shelters. Comparison of site location with topography indicates that shelters with juvenile hand stencils exist on major and minor ridge lines, in the major river valleys, in tributary valleys and at the heads of creeks. These analyses support the picture of a settlement pattern in which the family group was not restricted to transient activities on major readiness at plateau level but used widely dispersed shelters and a variety of environment.

Chronology

McCarthy (1988: 16-19) has suggested a chronological sequence for rockshelter painting styles in the Sydney-Hawkesbury region of the Sydney Basin in which stencils are present in the first and fifth phases. Stencils in red and white of human hands and feet are a feature of the first phase, while the fifth phase stencils are white and feature human hands and feet, animals' paws and a wide variety of artefacts, parts of plants and other subjects. This sequence for Sydney-Hawkesbury stencilling has been critically reviewed by McDonald (1988: 29) and Moore (1988: 31) who have been unable in the field to detect McCarthy's sequence.

Superimpositioning of stencil motifs has been recorded within the study area and this will be analysed to establish whether or not a chronological sequence is represented. Counts of stencil motifs represented within the study area are shown in Table 3. The common stencil colours recorded in the study area, red and white, have different characteristics which affect their states of preservation within individual shelters, and this reduces their usefulness as possible chronological markers. Red ochre pigments penetrate the sandstone surface and bond with silicates located on and near the surface. They appear as stains in or on the sandstone. Consequently, red stencils are characteristically blurry and often it can be difficult to distinguish complete stencils.

They do, however, appear to be long-lasting when compared to the white clay stencils, or the white or charcoal drawings where the medium simply adheres to the sandstone surface. Often distinct areas of sprayed red pigment have only remnants of charcoal art adhering. Flood (1987: 114) also has noted the instability of white pigment in the art of the Koolburra Plateau.

STENCIL MOTIFS		RED	WHITE	BLACK	YELLOW
Overall `hand'		379	153	4	1
`Hand'	- adult	103	121	0	1
	- child	77	24	4	0
`Foot'	- adult	0	3	0	0
	- child	0	1	0	0
`Fist'	- adult	0	1	0	0
`Fingers'?	- adult	0	5	0	0
`Animal'	- `mouse'	0	2	0	0
	- ?`wallaby front feet'	0	5	0	0
	- ?`wallaby back feet'	0	2	0	0
Overall Material Object		3	15	0	0
	- `hafted axe'	2	4	0	0
	- `non-hafted axe'	1	0	0	0
	- `woman's bowl'	0	1	0	0
	- `headband'	0	2	0	0
	- `boomerang'	0	4	0	0
	- `woomera'	0	1	0	0
	- `small bag'	0	1	0	0
	- other object	0	2	0	0
Indeterminate stencils		78	15	0	0
Overall motifs		460	201	4	1

Table 3. Stencil motifs and the colours in which they are represented within the study area. Indeterminate stencils are areas in which sprayed pigment is present but a definite stencil cannot be determined; these areas have been counted as if they represented an adult hand stencil but not included in the hand stencil count. Other material objects are definite stencils of material objects but the shape is outside my experience. ? = probable. Totals not additive.

Whereas sprayed red pigment has a distinctive appearance on sandstone surfaces, white sprayed pigment often resembles white secondary mineralisation (silicates) on sandstone surfaces; it was often difficult to recognise white pigment where the motif was not obvious. Excellent preservation conditions were usually required for white stencils to be preserved. The bias in recording indeterminate red and white stencils can be seen in Table 3 where seventeen per cent of red stencils were recorded as indeterminate but only seven per cent of white stencils were indeterminate.

Comparison of red and white stencil categories revealed major differences in the motifs depicted. Although red stencils are more common than white there is much greater diversity of motif stencilled in white. Red had been used for hand stencils and three axe stencils; white was used to represent hands, animals or animal features, various material objects, human feet, fingers and a fist (Table 3). This was also a feature of the stencil art recorded by the Sydney Prehistory Group (Officer 1984: 33) in the Campbelltown area, where in eight shelters, fifty-three red stencilled hands and one red stencilled foot were recorded, while in five shelters ninety-eight white stencilled hands, five human feet, two macropod feet, two emu feet, one boomerang and two other implements were recorded.

UNDER / OVER	white drawing	white stencil	charcoal drawing	red drawing	red stencil	wet red ochre (paint)*
white drawing	n.d.	0	0	0	0	0
white stencil	0	n.d.	0	0	0	0
charcoal drawing	8	11	n.d.	0	1	2
red drawing	2	3	10	n.d.	0	0
red stencil	0	5	11	1	n.d.	0
wet red ochre (paint)*	0	2	4	0	0	1

*Table 4. Art superimpositioning within the study area in terms of number of shelters with art classes superimposed of different techniques. * includes hand imprints. n.d.: not detected.*

Table 4 presents superimpositioning of art within the study area. There are major differences between the superimposition of white stencils and red stencils. In the twenty-one shelters in which white stencils are superimposed, they were located over the other classes of art. By contrast red stencils were located under other art classes including white stencils, except for one example where a charcoal drawing lay under red stencils.

Differential rates of preservation of the two colours may be responsible for the trends in Table 4: poor preservation of old white stencils may have led to their under-representation. Even so, a chronological difference is demonstrable in that red never overlies white and therefore the red stencils are earlier than the surviving white stencils.

If this chronological conclusion can be generalised to the study area as a whole (i.e. to those motifs not in superimposition), then the various motifs typically depicted in red or white represent a chronological difference. The more recent (white) stencils have a greater diversity of motif than the older (red) stencils.

Conclusions

The Correspondence Analysis of the shelters and shelter attributes was a valuable means of objectively identifying the major site patterns in the study area on the Woronora Plateau. A clear relationship was demonstrated among shelters, shelter attributes, the drainage basin on the Woronora Plateau and the inland/coastal association of the shelters.

Within the study area there is a broad concurrence between the density of grinding grooves, charcoal drawings and petroglyphs. Where there was a high intensity of industrial activity (grinding) there was also a high intensity of decorative activity. Although the former represents a particular economic activity, the imagery could represent social and/or religious activity. Further studies of attributes of the imagery such as motif may identify social or religious affiliations of the Aboriginal population.

The presence of children's hand stencils in shelters with dispersed locational and environmental characteristics was statistically tested and indicated that the family group was not restricted to transient activities on major readiness at plateau level.

The presence and significance of chronological patterns within the study area has not been generally explored. There is, however, an apparent chronological difference in the stencils which remain in the study area. The more recent white stencils have a greater diversity of motif than the older red stencils.

The analysis of patterns within the study area has identified important behavioural characteristics of the Aboriginal people who exploited the Woronora Plateau.

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RAR 10-273

Helan Shan petroglyphs

Conservation of rock imagery in Australia: funding support, protection projects and related research

GRAEME K. WARD

Introduction

Paintings and engravings have been made by the Aboriginal people of Australia during the more than 50 000 years that they have inhabited the island continent. Despite 200 years of settlement from Europe and Asia, which has severely disrupted traditional life ways, rock pictures continue to be of cultural and spiritual significance to Australian Aboriginal people. In recent years, Australian Aboriginal rock imagery has become popular with non-Aboriginal Australians and overseas visitors.

Major concentrations of rock pictures are found in the far north of Australia, in the Pilbara, Kimberley, Arnhem Land and Cape York Peninsula, south to the Flinders Ranges, Southern Highlands of Queensland, the Sydney sandstone, western Victoria, and the Ice Age caves of south-western Tasmania. Engravings from the caves in the Nullarbor Plain are simple with single or multiple lines, most of which probably were made by running fingers across the soft damp limestone. Petroglyphs, made by removing part of the rock surface by pecking, hammering or abrading, show a range of motifs; in the Pilbara and in the centre of the continent, there are geometric figures, and representations of birds and animals, their tracks, of tools, weapons and ritual objects, mythical figures and human faces, appearing either singularly or grouped into scenes. Rock paintings and drawings, made in a variety of dry and wet pigments applied with fingers, brushes or by stencilling, tend to be more representational. In many parts of Australia, there are extensive friezes of elaborate figurative paintings with considerable superimpositioning of motifs. Some paintings also evidence contact with other cultures — Macassan sailing ships, Japanese pearlers, and men on horseback with guns and cattle. Researchers have defined several styles of rock painting and engraving, and argued about the sequencing of motifs on the basis of these styles.

In Australia, rock imagery retains a contemporary significance to many Aborigines (e.g. Crawford 1968; Mowaljarlai et al. 1988; Lewis and Rose 1989). In a RAPP-funded study (Note 1) focusing on the Victoria River region, members of the Aboriginal community described to researchers the significance of the rock picture sites there. There were two main categories of pictures: the first were identified by Aboriginal people as being painted by them; these were concerned predominantly with sorcery. The second category included images made not by humans to represent Dreaming Beings but, rather, by Dreaming Beings, and which were themselves Dreaming Beings. The cultural meanings of the paintings depended upon a knowledge which goes beyond the depictions themselves.

In the western Kimberley, superficial meanings of some motifs were more accessible. Wandjina paintings related to the spirit beings associated with the coming of the monsoonal wet season. If the representations of the Wandjina were colourful and bright — newly painted — the Wandjina was satisfied and looked after the country and the community, especially by bringing desired rain after a long dry season. This relationship was manifest in frequent repainting of the Wandjina figures in many of the rock picture sites in the Kimberley.

While repainting of rock picture sites was widespread in prehistoric Australia and still continues in some regions, most rock imagery no longer has Aboriginal custodians who actively maintain their sites by traditional repainting. The business of maintaining rock pictures in Australia is now predominantly an activity of professional managers and conservators.

Threats to rock imagery in Australia

Australian rock pictures have been of interest to non-Aboriginal newcomers to Australia since the early years of British settlement. In the late 1700s there were reports of extensive rock engravings in the sandstone around the new settlement at Port Jackson in New South Wales. Early next century, the circumnavigator of Australia, Matthew Flinders, reported finding rock paintings on islands off the coast of northern Queensland. Since then, Aboriginal rock pictures have been subject to a variety of studies, and tens of thousands of sites have been recorded. Some authors have commented upon deterioration observed between their visits to sites.

Obvious and continuing threats to rock imagery are those which affect the physical fabric of engravings and paintings and that of the underlying rock. Destructive agents include surface and sub-surface water and frost, water-borne mineral salts, soil cover and vegetation, microflora, airborne dust, native and exotic animals. Concerted studies of the deterioration of rock imagery in Australia, the effects of the spalling of rock walls, the wash of rain and ground-water across painted sites, the impacts of native and imported animals, have been reviewed by Rosenfeld (1985) and Lambert (1989). Increasingly, threats from vandals and other visitors to sites, especially graffiti, have been noticeable at many sites; aspects of visitor management have been researched by Gale and Jacobs (1987).

Recently there has been increased interest in Australian Aboriginal art, with paintings on bark (which have their origin in the paintings in rockshelters) from the Top End of the Northern Territory becoming sought after by curators of galleries and private purchasers; representations on board and canvas of the sand paintings of central Australia (the so called 'dot paintings') command prices reaching hundreds of thousands of dollars. This interest in contemporary imagery is paralleled by an increase in Australian and overseas tourism to Aboriginal Australia; many tourists, as shown by an Australian Bureau of Statistics exit survey, stated that they were interested in seeing Aboriginal art, and a significant proportion purchased an art or craft item, or especially visited a museum or gallery. Travel brochures, especially those deriving from northern Australia, encourage such tourism. Kakadu National Park records show that in 1987, nearly 150 000 people visited one or more of the major rock painting complexes there. This increase in tourism is placing great pressure upon rock picture sites. There is a commensurate need for the development and application of visitor management techniques.

The federally-funded Rock Art Protection Program

In 1986, the Australian Minister for Aboriginal Affairs provided $A150 000 annually for the protection of rock pictures (Ward and Sullivan 1989). The Australian Institute of Aboriginal and Torres Strait Islander Studies (Note 2) established and administers the Rock Art Protection Program (RAPP). As with other Institute research programs, RAPP funds are disbursed as grants for particular projects following critical review of applications. The RAPP has three main aims: (1) Physical preservation of endangered sites, including those threatened by natural elements, by domestic animals and by human visitation. (2) Detailed recording of sites, especially those which could not be preserved. (3) Research into Aboriginal cultural significance of sites.

The Program is in its sixth year. Each year, notices are sent to more than 200 community representatives and individuals and organisations involved in research into, and conservation of, Aboriginal rock pictures calling for applications for Program funding. The Institute's Research Advisory Committee considers proposals and makes recommendations to the Council. Individuals and organisations receiving RAPP grants, as with other Institute grants, must meet certain criteria in the application and in the conduct of the research, must report fully on the substance of the work, and must properly acquit funds received. Applications have been received from individual conservators, Aboriginal organisations and communities, and State and Territory agencies with statutory authority for the protection of Aboriginal sites.

The Institute's committees have taken a broad view of the term 'protection' and recommended funding for a wide variety of

projects. The main categories of project funded under the RAPP have been: (a) Surveys for rock picture sites, and detailed recording of rock imagery. (b) Site restoration and protection projects; in these types of projects, damage is repaired and attempts are made to obviate any further threat; conservators may establish a monitoring program and advise upon further work. There is a major subset of this type of project, that directed towards visitor management — to lessen the impact of visitation at a site. (c) Research into conservation methods, either directed at a particular site or generalisable to many sites, and leading to longer-term protection. (d) Research to elucidate the Aboriginal significance of rock imagery; education about the cultural significance of places will lead to the enhancement of the protection of rock picture sites in general. Elements of each category might be found in a project. Some examples of each are given below.

Surveys and detailed mapping

Site surveys provide new knowledge of the existence of sites, including detail of their condition and sources of actual or potential threat to the sites. They can be the first stage of more focussed protection measures, and may result in detailed management plans for a site complex. In some cases, detailed recording may also be the only way to conserve imagery, especially where it is already degraded, or where sites are threatened.

In the Northern Territory a project was conducted for Aboriginal custodians by a consultant with particular skills in recording rock pictures and in interacting with Aboriginal people upon land which was the focus of a development [illegible] al. It emphasised detailed recording of imagery and the recording of traditional stories about the places. Such work had high priority because of the fear that sites would be destroyed or disturbed. In another example, for an area proposed as a new national park in the Northern Territory, the consultant was required to record rock picture sites in detail and to assess any threats to the sites, working closely with the Aboriginal custodians, seeking their advice as to which sites might be opened to tourism. After extensive consultation he recommended that no sites be open to the public due to their continued importance to the Aboriginal community.

Site restoration

Mud-nests, salt deposits and graffiti are typical problems affecting Australian sites. At Chillagoe in northern Queensland, defaced paintings and engravings were repaired by a rock art conservator skilled in graffiti removal. Detailed records were made of all motifs and graffiti, then the graffiti removed by dry- and wet-brushing and washing with non-ionic detergent (Lambert 1989 has discussed techniques). The appearance of the site was markedly improved; original motifs were much better able to be discerned and appreciated. A similar RAPP-funded graffiti-removal project was completed recently in western Victoria at Bunjils Shelter, and another has been funded near Townsville, as has the production of an air-abrasive device to remove graffiti.

Mud-nests made by mud-wasps and certain birds are found on painting sites in some areas; if they are treated soon enough they might be removed without damage to pigments. Salt deposits are more difficult and original research into the problem has been conducted under the Program (see below).

Site protection

In northern Australia, much of which comprises pastoral leases, cattle have damaged paintings by rubbing against painted images or licking them with salts from the walls. The RAPP has provided substantial sums to fence major rock picture complexes on behalf of traditional custodians in the Northern Territory. Fencing can be effective in keeping animals away from imagery in rockshelters but may produce further problems. For example, within a fenced area, where cattle can no longer crop them, grasses, shrubs and trees can grow up and brush against painted surfaces. Furthermore, build-up of vegetation within fenced areas can provide fuel for fires which might have a disastrous impact upon rock pictures. To avoid adverse impacts, it is necessary to control vegetation growth and to prevent fuel build-up within fenced areas.

Visitor management

With visitation increasing, it is probable that the greatest threat to rock imagery is from tourists. Fences and, in some areas, strong metal cages have been used to prevent access to otherwise uncontrolled sites. Today these measures are less acceptable to visitors, both aesthetically and in terms of gaining good visual access, and because the means of attachment and location can adversely impact the sites themselves. Moreover, observation of behaviour at rock picture sites has shown that visitors can be controlled less intrusively by the use of, firstly, structures which physically guide visitors past rock pictures and, secondly, well-researched and carefully presented information. Clear walkways made from gravel or wood, or elevated metal or timber board-walks, encourage visitors to keep to paths. Low barriers constrain visitors psychologically rather than physically. While elevated board-walks can be used both to provide a clear path and a better viewing perspective, they are also important to prevent dust, which may bond chemically to painted imagery and the rock face, being disturbed by the viewers' feet. The RAPP has assisted in the construction of board-walks at several frequently visited sites in northern Australia.

Research into visitor behaviour also suggests that sites giving the appearance of being actively managed are less likely to be vandalised. A simple sign providing the site name, proscribing certain behaviour and listing penalties for offences against the law, can be sufficient. More informative signs, especially those interpreting imagery, are appreciated by visitors and thus promote site protection. Similarly, leaflets, placed at the sites or at nearby visitor centres, can provide information and enhance protection. Visitor books have also been found to be important in suggesting active management and in deflecting any graffiti or unwanted attention from sites— comments tend to be made in the book and not on shelter walls.

State and Territory agencies have used RAPP funds to research cultural significance of sites and to prepare signs and brochures; their substantive contents must be produced with the co-operation or approval of the relevant Aboriginal community, particularly the formal organisation, such as a land council, where one exists.

Conservation research

The Program has supported original research into the development of methods to deal with some of the intractable problems faced by site managers. Two examples will suffice.

Conservators are investigating painted shelter walls in the Gariwerd National Park in western Victoria to understand causes of natural erosion through salt extraction; they have developed techniques using cellulose-based poultices to extract soluble salts before these force spalling of the walls. A second project involved research into silica skins, the clear or slightly milky films deposited from water flowing over siliceous rocks especially in the monsoonal north of Australia. The film may become sufficiently thick and discoloured to obscure the imagery it covers; rainwater can be kept from painted walls by various means including silicone drip-lines. The research found that silica skins were formed by complex interactions among not only water and rock substrata but also micro-organisms, with climate a major factor. Skins were physically complex, tending to contain several minerals and organic materials in a dynamic relationship. Over time they could seal pigments used in a painting, thus preserving it, and assist in maintaining the rock surface. Conversely, diversion of water from painted surfaces could adversely affect this natural preservation. Conservators will have to assess carefully whether the use of drip-lines to divert water from a painted surface would necessarily serve to protect the imagery.

Related research

As a by-product of the silica skin research, it was found that the micro-organisms caught within their layers could provide

sufficient organic matter for analysis of radiocarbon using the Accelerator Mass Spectrometry (AMS) method. It also suggested the possibility of other dating methods and the use of various stable isotopes for investigating the environment and climate when the paintings were made, and thus the potential for gaining a greater understanding of the context of the painters and their paintings.

The RAPP has supported other research devised to date rock pictures. Organic materials used to bind ancient pigments has been found to contain blood proteins which have been used for AMS analyses to date sites in Tasmania and the Northern Territory. Other research evaluated the cation-ratio method of dating the rock varnish which develops upon newly exposed rock surfaces in some arid parts of Australia; the evaluation pointed to the complexity and uncertainties inherent in the technique and suggested caution in its application. There appear to be better prospects of obtaining chronometric dates by AMS analysis of the minute traces of organic materials trapped within the rock varnish.

Apart from their own intrinsic interest, dating petroglyphs and rock paintings is of particular value to their conservation. Whether rock pictures are a few years or tens of thousands of years old, may be important for understanding the interaction of forces which led to their preservation or weathering, and thus to the development of well-based strategies for conservation of rock imagery. Also, the considerable antiquity of sites increases their importance to many people, and that appreciation will indirectly enhance their preservation.

Summary

In Australia the Rock Art Protection Program funded by the Federal Government has provided resources for a wide range of projects designed to protect Aboriginal petroglyphs and rock paintings. These have ranged from projects to provide detailed recordings and recommendations for protection of rock picture complexes, through direct protection and restoration measures, to development of conservation measures and innovative dating techniques which have resulted from fundamental scientific research. The investigation of the significance to Aboriginal people of rock imagery is an important aspect of the RAPP. An appreciation in the wider population of various aspects of rock imagery has the potential to enhance directly its protection.

The Program, now in its sixth year, has disbursed $A150 000 annually, the average funding for each project being approximately $10 000. Last year, applications worth more than $600 000 were received, suggesting that the funding level needs to be reviewed. Moreover, increasing pressure from tourism, as well as fundamental problems of weathering and of the impact of vegetation and stock, indicates that there is a continuing need for a program to provide for the conservation of Australian Aboriginal rock pictures.

NOTES

1. This paper was written as a review for conference presentation and referencing has been kept to a minimum. Further discussion of some results of the initial four years of the program has been made elsewhere (Ward 1989, 1992) and detailed references provided. An updated list of projects supported by the Institute's Rock Art Protection Program and the resulting reports held in the Institute's Library is available from the Research Officer Sites, AIATSIS, GPO Box 553, Canberra. A recently updated HERA bibliography has provided a comprehensive listing of publications relating to research and conservation; this is available from the Australian Heritage Commission, GPO Box 1657, Canberra 2601.

2. The Australian Institute of Aboriginal and Torres Strait Islander Studies is a statutory authority of the Australian government dating from 1963. The Institute is governed by a predominantly Aboriginal Council of nine persons. The Council is advised by a Research Advisory Committee comprising mainly subject specialists elected from its membership. The major activities of the Institute are to provide grants and fellowships for research, to maintain a library, and to publish the results of research. There is a staff of approximately sixty located in Canberra, including a small Research Section. The Rock Art Protection Program (RAPP) is administered from this section, as are the other grants allocated by the Institute for research.

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REVIEWS & ABSTRACTS

Rock art — the way ahead. Conference proceedings of the First International Conference of the Southern African Rock Art Research Association. Occasional SARARA Publication 1. Edited by S.-A. PAGER, B. K. SWARTZ, Jr and A. R. WILLCOX. 1991. 239 pages, line drawings and diagrams, soft cover desk-top publication.

The First International Conference of the Southern African Rock Art Research Association (SARARA) was held in Augnst 1991 in the magnificent setting of the Natal Drakensberg at Cathedral Peak, an area rich in rock art sites. Despite differences of opinion during the organisational process, which led to some rock art exponents withdrawing from the proceedings, delegates from fourteen countries participated.

Although the initial conference pamphlets emphasised rock art conservation and management as the theme, the proceedings include thirty-two papers covering a wide range of topics under the headings Conservation, Interpretation, Education, Recent rock art research, The law and rock art, Recording methods, and Methodological approaches. The papers vary as much in calibre as they do in subject matter, and some are marred by typographical errors. However, the effort that went into producing the volume from a limited pool of both human and financial resources is commendable.

This reviewer finds it difficult to write about such a broad spectrum of papers in a cohesive form, and difficult also to do each paper justice. In my view, one of the drawbacks of conference proceedings is that, unless one was present at the meeting, it is impossible to know the content of the volume without first seeing the publication. Indeed, especially if the proceedings are occasional publications from a little-known association, the papers are apt to become lost in obscurity. In order, therefore, to promote the papers to a wider audience, and to inform those reading this review, I am taking the somewhat tedious approach of briefly commenting on each paper, though not necessarily in the order in which they are sequenced in the publication. I shall follow, in general, a thematic progression from technical recording of the art through to studies of particular localities and management studies (including legal protection and public education), followed by more general papers on interpretation of the data.

For those wishing either to set out on or to improve their skills in rock art recording, Gerald Newlands of the Transvaal Museum presents a useful technical paper, *Recording rock art photographically*. He discusses the appropriate photographic equipment and materials to use, together with tips on methodology. If you can see it, he claims, you can photograph it. Tracing rock art, although an invaluable method in the study of rock art as opposed to the recording of rock art, is coming increasingly under fire because of the subjectivity of interpretation involved, and because friable rock surfaces may be damaged by the application of materials and methods that cause physical pressure or friction. As a compromise, Newlands describes the construction of a camera lucida, an optical instrument which reflects an image of the original object on to a screen from which a tracing can then he made.

In a paper titled *Photography versus tracing?*, Lucas Smits, who coordinated an ambitious recording project at the National University of Lesotho, makes the point that as photography and tracing serve the fundamentally different purposes of recording and observation, the two methods are neither competing nor incompatible. However, they are not interchangeable; photography and drawing are complementary, not substitutes for one another, and ideally should go together.

As a comment from this reviewer, irrespective of the recording process, when it comes to interpreting the rock art we are viewing, whether directly from the rock face, through a camera lucida or by looking at the best of photographs, it is still impossible to avoid subjective interpretation of the details that the human eye conveys to the brain. As long as humans are involved in the study of rock art (or any other study for that matter), there will be unavoidable subjectivity when it comes to marshalling and interpreting the evidence.

Bert Woodhouse sets the scene for the conservation section with a paper titled *Deterioration, damage, desecration, disappearance and dynamite: the depressing drama of dozens of South Africa's rock art sites*. This was illustrated with eighty colour slides selected from his mammoth collection spanning thirty years or more. Among the long list of afflictions, Woodhouse cites the removal of selected painted panels by museums. Some of these painted rocks are inadequately documented, and Woodhouse has, through a combination of observation and detection, been able to establish the provenance of some of these quarried specimens. Although Woodhouse is critical of some of the present conservation practices within the so-called safety of a museum, he suggests that every museum should have a rock art advisory capacity, and that the local community should become involved in rock art recording and conservation projects.

R. H. Steel (*Problems in the conservation of rock engravings in natural environments*) outlines the damage observed during a seven-year survey of engraved sites in the Magaliesberg near Johannesburg where he has noted the detrimental effects of pollution derived from heavy industries. In addition to pollution and erosion, Steel includes human damage and stresses that if the effect of human impact on the art is to be reduced, a concerted program of public education is essential. Rob Steel has himself made a valiant attempt in this direction, with ongoing visits to farmers on whose properties the engravings occur. He has also visited farm schools where, with the co-operation of the teachers, he has been able to introduce an awareness of the value of cultural heritage to approximately a thousand children — a good example of what can be achieved by a concerned individual.

Mary Gorden (*Outdoor education: an effective vehicle for building a conservation ethic*), has produced a useful paper outlining some effective means of public education which draws on the international experience of environmental educationalists. She emphasises that the long-term success of any site protection depends largely on the support and co-operation of the community.

> The ultimate goal of environmental education is the formation of a life philosophy wherein the individual is aware of his impact on the environment and chooses to minimise that impact. The achievement of this goal will require the definition of values: the realisation of the niche rock art conservation occupies in the overall ethic: and the processes necessary to effect the desired attitudinal and behavioural changes. ... The creation of an effective environmental ethic requires that all disciplines work together. Otherwise, the focus will be too narrow and, as a consequence, will fail.

The paper contains many such words of wisdom, much of which is destilled from the experience of others to which full reference is given.

A paper by Stephen Bassett from the University of Stellenbosch in South Africa, *The Cederberg rock art management project*, outlines progress achieved through funding from the Department of Environment. The project, which has selected particular sites for public visitation, straddles Forestry Reserves, private nature reserves and wilderness areas where all members of the public, including researchers, have to be accompanied by a forest guard. To date, twenty-four additional sites have been located and recorded, in addition to the sixteen sites previously known.

A paper titled *South African rock art and the National Monuments Council* by Janette Deacon outlines the role of the National Monuments Council in protecting rock art through legislation, education of the general public and through effective management of sites. The infrastructure to enforce the law has, however, been sadly lacking. Involvement of the public in management strategies is seen as the only effective solution.

Professor Osaga Odak, in *Status of rock art legislation in Kenya*, outlines the history of Kenyan legislation on sites and monuments. He makes the valid point that the laws are supposed to protect and safeguard cultural heritage, but that they also reflect the social, political and cultural life at particular periods in a country's history. On the eve of Kenyan independence in 1963, for instance, most of the revisions were concerned with the removal of terms relating to colonialism, and in 1983, rock art protection came under the definition of a 'monument' which was conceived as any immovable structure built before the year 1895. Presumably, therefore, if any Kenyan rock paintings prove to be contemporary, they will not be protected by law. There are now about 100 known rock art sites in Kenya, but as yet, they are neither legally protected nor subject to conservation or management plans due principally to the technical, professional and financial weakness of the administrative structure of sites and monuments activities.

David Lambert of the New South Wales National Parks and Wildlife Services in Australia presents the only technical paper on rock art conservation: *Monitoring cave paintings for pigment loss and deterioration*. Lambert stresses that monitoring is necessary not only to assess the effectiveness of past conservation work but also to justify the use of surface consolidants to conserve rock faces, and to correlate deterioration with other events such as bushfires, climate and salt accumulation. His paper outlines methods of monitoring colour change over time by the use of a chroma meter in conjunction with close-up photography. He backs up his recommendations with observations made in his own study area in Australia.

Another technical paper, by Margaret Nobbs, not on conservation but on establishing the age of rock art, presents a comprehensive assessment of *Dating Aboriginal rock art in the Olary district of South Australia*, with an evaluation of cation-ratio analysis. Based on samples analysed by Dr R. I. Dorn of Arizona State University, it has been established that some of the petroglyphs covered with desert varnish are in excess of 30 000 years old.

In some papers of a series detailing the art from specific clusters of sites or from wider regions, details of the ethnography of the art are given, and some discuss motivation. In a regional study from Africa, *Rock art of the Mphunzi-Nthala Hills, Dedza district, Malawi*, Yusuf M. Juwayeyi describes the rock art associated with granite boulders in this area, some not discovered until recently. Some of the paintings are executed in cavities requiring considerable effort to climb into, and Juwayeyi notes that the distribution of the painted sites in relation to the large number of unpainted boulders in the region suggests that the boulders were not painted randomly. However, the criteria for those that were selected is not clear. According to local oral tradition, the earlier red paintings in the stylistic sequence were made by Stone Age hunters who were displaced by Iron Age Bantu farmers, while some of the later white paintings were indisputably associated with the Nyau secret society of the Chewa people.

Dr Osaga Odak reports on a detailed area analysis in a paper titled *Distribution of cupmarks at Kebaroti Hill sites of South Nyanza district of Kenya*. Cupmarks from four sites are analysed according to size, comparative pattern distribution, density and compass distribution. As an outcome, Odak tenders the hypotheses that there is a relationship between the topographic location of the sites and the heavenly bodies due to visibility of the sky from specific areas of the sites.

A well-marshalled paper, *The rock art of Lukuba Island in the wider context of rock art of the Lake Victoria basin*, by F. T. Masao, highlights the question as to whether the highly stylised art forms from this lacustrine area should be considered as belonging to a single cultural province, unified by the lake they surround, or be seen as different cultural traditions reflecting progressive migrations. Although Masao considers it likely that the sites are shrines of ritual places as confirmed by local folklore, he is careful to stress that the proper historical and cultural significance of the rock paintings of the Lake Victoria basin cannot be adequately assessed given the present status of knowledge.

Speculation on the motivation and meaning of central Tanzania rock paintings, also by F. T. Masao, is an excellent overview of the subject in that region. Masao draws widely both from published literature and his own field experience, and although very cautious in his conclusions, his ultimate contention, based on strong ethnographic evidence, is that the majority of the art is involved with the fabric of ritual life. He believes that the paintings were indeed a record of the myths and beliefs of people who were most likely the ancestors of the present inhabitants.

B. K. Swartz, in *Levels of interpretation in rock art study and their application to investigations in east-central Nevada, U.S.A.*, quite correctly observes that the topic of rock art interpretation often evokes passion. He enumerates all the various approaches, and then concludes with the hope that, after his own intensive descriptive recording of a large number of engraved panels in a limited area, the 'design elements can be explained and integrated, and the ideational and information prehistory of the area will be revealed'. My personal observation is reflected in a comment made above: however particular Swartz hopes to be in interpreting the data, a degree of subjective emotion will undoubtedly creep into the findings. It is well nigh impossible to avoid it.

Ethnographic approaches to rock art research in Bolivia by Roy Querejazu Lewis records some fascinating data on contemporary usage of rock art sites in his study area. This includes offerings of goods and sacrificial blood, and the burning of candles at a natural rock image resembling the Virgin Mary. Querejazu draws attention to the dearth of protective measures for rock art sites in Bolivia, and makes a plea that its 'rich resources in native population and rock art sites should be incorporated in the global perspectives of rock art research'.

Mario Consens, in *Change and variation in rock art*, describes the San Juan rock art project in Uruguay, an area dependent on archaeology and ethno-historical documents as interpretative aids. There has been no associated indigenous culture during the last 100 years. This poses limitations because these approaches supply only a partial reconstruction of the culture of several indigenous groups that formerly inhabited the area. The methodology employed includes typological analysis based on style, taxonomy, morphology, seriation and distribution. In five years of work, nearly 700 engraved sites and one painting site have been located, but as yet, no units of synthesis have been formulated, largely due to the high degree of variation in the designs.

N. Walker, of the National Museums and Art Gallery in Gaberone, discusses *Rock paintings of sheep in Botswana*, where two new sites have recently been located near the Thune River. These finds are then set within a broader discussion surrounding the contentious issues of authorship of the paintings, the introduction of domestic animals into southern Africa and of possible sheep migration routes. Walker concludes that foragers were more likely to be responsible for the sheep pictures rather than herders.

A study of animals on a different continent is presented by G. L. Badam and V. G. Sathe, titled *Animal depictions in rock art and palaeoecology: a case study at Bhimbetka, Madhya Pradesh, India*. Here, an attempt is made to reconstruct the ecology of the animals depicted from Mesolithic to historic times, with the help of extant analogies. They conclude that floral heterogeneity, in terms of primary to secondary forests with intervals of open savannah grasslands and swamps, is inferred. These finds are linked to geological and palaeontological studies of the central Narmada valley and to the climatic and ground water changes over time. In conclusion, a plea is made for careful and proper identification of the animals in the paintings in order to facilitate such studies: past identifications have included erroneous judgments, thereby rendering the data invalid.

Carol Patterson-Rudolph takes a different approach to animals in rock art, where they are seen as metaphors rather than as environmental indicators. Her paper, *Animals as metaphors in Pueblo Indian petroglyphs*, discusses animal forms which incorporate human parts, images used as sign vehicles, and metonymy (abbreviated metaphors). An explication is also given, from ethnographic sources, of petroglyphs depicting the Hopi life plan and a complex myth which, without an intimate knowledge of the culture, would be impossible to interpret.

In addition to analysing rock art from specific regions or localities, other studies are a synthesis of data collated from multiple sources, or a reappraisal of the hypotheses and viewpoints of other workers in the field. A number of papers question aspects of the 'shamanistic' theory on rock art production.

Specific configurations of dots and tallies in rock art, as suggested by Annemarie Martinson in a paper on rock art in mathematics education, may be related to a universal counting tradition, some tentative examples of which are cited from southern African petroglyphs. As a mathematics teacher, Martinson's investigations are stimulated by a desire to find evidence for numeracy among pre-literate societies in Africa in order to counter the perception among educationally disadvantaged students that mathematics is a major obstacle to learning. This is a commendable objective, but as yet the data appear elusive.

Alex Willcox, in his article on *Prehistoric handedness*, draws together the experiments of others, together with additional data initiated by himself, on preferences shown by left- and right-handed people for the direction in which profiles of animals or humans are portrayed. He also analyses the incidence of left or right hands in stencils and hand prints. His findings suggest that proportionately more left-handers are found among artists than in other walks of life. He concludes that, since the right side of the brain controls left-handedness, and that it is also in the right hemisphere of the brain that faculties such as visualisation and the recognition of patterns and of colour differences are located, there may be neurological reasons for the predominance of left-handed artists.

Willcox also looks at *Entoptics: their incidence in southern African rock art*. He disputes the view that the majority of southern African rock art is of shamanistic origin and that 'entoptic' forms such as grids, lines, curves, zigzags and circular designs result from altered states of consciousness. He quotes the quantitative data collected by other researchers, and concludes that 'entoptic' designs are but a small percentage of the paintings; if indeed the majority of the art was executed by shamans who saw these designs when entering trance, he argues that the incidence of the designs should be far higher.

Neil Lee similarly takes issue with 'the highly persuasive but rigid neuropsychological/trance theory'. In his paper *Correlations between the 'real' and the 'unreal' in San rock art*, Lee gives examples of what he considers to be realistic paintings accurately illustrating contemporary scenes not influenced by trance experience. In summary, Lee makes a call that the 'real' and the 'non-real' should belong together as integral parts of the whole corpus of art.

In *The intensification of ritual and the disappearance of trance related rock art*, F. E. Prins suggests that the majority of paintings that appear to depict highly developed trance themes are a response to stress. He argues that when more dominant social and political forces were intruding on the way of life of the indigenous hunter-gatherers, the reaction was a change from a loosely structured society with few boundaries to a more closed group where social boundaries are highly defined. Prins is of the opinion that not all the rock art produced by Bushmen is trance related because the degree of trance would have been affected by group structure which was not uniform throughout the sub-continent.

M. P. Lanteigne of the Rock Art Association of Canada presents a detailed paper on the physiology of the human eye, titled *Palaeoneurology: mapping the neural pathways of the human brain*. He argues that the recurrences of elemental forms such as grids, lines and dots in rock art are not necessarily indicative of 'entoptic phenomena' as advanced in the 'trance theory', but of chemico-physiological reflex responses. Much of the paper is couched in terminology difficult for many readers to comprehend, but interesting points emerge, pertinent to the subjective and objective perspectives previously touched on in other papers. Lanteigne makes the point that what we see is not a conditional function of objective reality, but of human neurophysiology. May it also be true, he asks, that what we potentially 'think' is similarly delimited?

Another paper on 'mapping' by Hugh Cairns from Sydney, Australia, titled *Is ancient sky-mapping expressed in prehistoric artistic cultural material?*, appears to demonstrate that human 'thinking' is difficult to delimit. While postulating that many groupings of cupmarks and grooves may demonstrate astronomical knowledge, examples (some with ethnographic parallels) are drawn from Australia, Siberia, Europe, America and Africa. There was a requirement, on the part of the reviewer at any rate, to indulge in a degree of neurological gymnastics in order to follow the global thought patterns espoused.

Moving to a critical overview of rock art research in South America, *Methodological approaches in the research processes of South American rock art*, Mario Consens gives a perspicacious account of research in the major art provinces of South America. These include Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay, Guyana, Surinam and French Guyana, Venezuela, Colombia and Ecuador. He takes the use of 'style' to task, and similarly targets synthesis, classification and terminology. According to Consens, the best conditions in which to learn about rock art are to escape from dogmatism, narrow paradigms and 'official schools' of scientific thought. These cultural and scientific systems, believes Consens, impose a restraint on talent: 'in the midst of the discussion of methodologies and theories, papers and ideas, it is the talented person who creates new methods, not the opposite'. In Brazil, where there are more than 100 syntheses on the more than 1000 published sites, there are 37 styles, 19 traditions, 3 great traditions, 6 sub-traditions, 8 varieties, 13 phases, 7 facies, 8 categories, some 'stylistic groups', some 'stylistic units' and also a 'stylistic complex'. 'The process', remarks Consens wryly, 'is so dynamic that the same researcher may even modify his way of naming the composition of units and the very concepts he has used in a single area'. Consens believes there is an anthropological game in research whereby, through giving names, researchers (in the same way as many aboriginals) persuade themselves that, through the name, they may acquire knowledge and therefore power over the object. Despite the procedural and terminological chaos, Consens sees a ray of hope. I concur with many of the views he espouses, and I believe they summarise the present and future of rock art studies in areas beyond the confines of South America:

> The new theoretical trend brought about by the readjustment in archaeology, in which systematic, post-processualist, neo-structuralist or historic and materialist positions are highly critical of previous views, is not negative. Rock art has benefited from this great theoretical opening. It is now part of many university courses. There are symposia for specialists and Ph.D. degrees — a situation that was hardly imaginable a few years ago. Consens states:
>
> But the great conceptual step has not yet been taken. Acknowledgment of the fact must be made that rock art is only a relic of the activities of the human matrix. That the object under study must be the ideological and symbolic system which produces the different expressions of culture. That cognitive processes are at the basis of the forms of representation of human groups.

And on this note, I wish the readers of this review freedom from the constraints of culture-bound vision. This, I believe, is one of the principal functions of international conferences and the papers produced as an outcome of those deliberations.

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Copies of the SARARA conference proceedings can be obtained from: SARARA, P.O. Box 81292, Parkhurst 2021, South Africa.

Felsbilder: Wiege der Kunst und des Geistes, by EMMANUEL ANATI. 1991. U. Bär Verlag, Zürich. 256 pages, 41 full-page colour plates, numerous monochrome plates and line drawings in the text, bibliography. Large format of 34 cm × 25 cm, art paper, cloth-bound. ISBN 3 905137 33 X.

This would be an outstanding rock art book even without its colour plates and expensive production, simply by virtue of it being the definitive work of its author. Anati has probably contributed more than anyone to the emergence of a discipline of rock art studies, and his first-hand knowledge of the rock art of the world cannot be equalled by many. Such qualifications place the author in a class of his own, having at his disposal a wealth of knowledge which not even those who disagree with him can afford to ignore. What Anati has to say about the subject of rock art studies is of historical significance, and when he speaks, we are obliged to listen with respect. This much we owe the author.

On the whole, there is not even very much to disagree with in this book. I happen to agree with some of the author's more controversial pronouncements, for instance on the role of universals. As the book has been translated from the Italian, one would have expected that more of the original flavour would have been lost, but in general the translation seems to have been handled with care, the characteristic style of Professor Anati comes through well in this German version. Some of the minor problems in the text are probably attributable to the translation: the cupules of La Ferrassie (p. 40) are obviously not *Bemalung* (paintings), the meetings of Australian Aborigines are not called '*corroboring*' (p. 79), and Mountford's first name is not Lewis (p. 10). A number of seemingly over-enthusiastic statements and phrases may also have been more muted in the original, such as "The creative act of the artist is the fulfilment of a psychic-corporeal need, through which he can discharge powers which would otherwise suffocate him" (p. 176), and a variety of pronouncements about the religious significance of the rock art and the 'creative urges' of humans.

But there are also claims that could not possibly have been garbled in translation, e.g. that the depiction of plants in a rock art "must indicate a strong use of narcotics" (p. 190). Anati recognises that varying intensities of research in different regions may distort the available record, and yet he emphasises that the oldest evidence of human consciousness is from Europe and the Near East. This is obviously wrong (currently the oldest dated rock art is in Australia, and the probably oldest known undated rock art is in India), and seems to contradict Anati's own views that art probably originated in Africa (e.g., p. 85). His discussion of the oldest known art finds is so much based on inaccuracies that it is best ignored; he cites dated 32 000 year-old art from Lake Baikal (no reference given), carbon dating for Bhimbetka art (there is none, nor is this a township as he says), attributes an age to the Koonalda Cave art (citing in fact me; I have stated several times that the Koonalda art is undated, although a minimum age could be argued for), and his description of the petroglyphs at Early Man Shelter in Queensland as vulva symbols is Eurocentric, and is in fact the first I have seen in which they are so identified. Those Australian specialists who have been unable to control their urges to interpret the marks have called them bird tracks, but Rosenfeld's neutral definition is to be preferred. Most of the details Anati provides in his discussion on dating are either wrong or debatable.

Apart from dividing rock art into that of archaic hunters, developed hunters, herders and nations, Anati wisely keeps clear of questions of

chronology in most of the book. He correctly perceives that stylistic and associative elements of many regions or periods re-occur elsewhere, but his view that there are two mainstreams of Upper Palaeolithic art (Aurignacoid and Magdalenoid) which are manifested world-wide is certainly not shared by many others. Nor is his description of Upper Palaeolithic religion as dualism, based essentially on Leroi-Gourhan's sexual duality. Anati perceives this 'universal religion' as disappearing at the end of the Pleistocene, when man experienced 'spiritual emptiness' (p. 217): 'It took about 3000 years before he reconstructed a new ideology. In the Mesolithic he experienced an era with very few and inferior religious expressions.' The decadent Palaeolithic tradition and 'its incoherent art manifestation lack the deep philosophical content of the cave art'. Having consulted the author, I am informed that this is not at all what the original Italian text said, which illustrates that great care is needed in checking translations of scholarly texts. Epistemologically incongruous and taphonomically naive statements of this type may be attributable to the translator's poetic licence, but they detract from the value of this book.

Another baseless claim is Anati's notion that patterns of dots, lines and geometric network lattices in various parts of the world are indicative of peoples who were primarily gatherers of molluscs. Their 'activities seem to have prompted a preference for arithmetic and a tendency to schematic depiction'. Examples given are the Mesolithic people in Scandinavia and the people living along the Murray in the south of Australia.

But apart from a number of fallacies which are so obvious that they will not trouble the specialist reader, much of what Anati says is eminently reasonable. His central thesis is that human conceptualisation and art are intimately connected (p. 228), that rock art is the largest data bank available to us for the study of early human cognition, and that it will be from this resource that we will one day learn how the knowledge of *Homo sapiens* was derived (p. 32).

In his concluding sentence, Anati compares the book with the act of throwing a stone into water, in the hope that the ripples will reach the shore. It is in the area of holistic contemplation that his ripples have the greatest effect. Anati exhorts us not to explain the art of hunters on the basis of rational views of indoctrinated Westerners, which have little in common with the basic logic and systems of primary associations of the hunters (p. 78-9). His eloquent discussion of naturalistic versus abstract art, his description of how some investigators look at all the details but without comprehending the whole picture, the integrity of his scholarly conviction all make inspiring reading, and he can be sure that these ripples will reach the shore. Concepts of archetypes continue to be unpopular among archaeologists, and Anati's courage in not submitting to the formidable powers opposing them needs to be appreciated. It is not a coincidence that those who have seen large quantities of rock art the world over, as Anati has, have no hesitation accepting the existence of universals in rock art, while those who oppose such concepts are notoriously unfamiliar with world rock art. It is here that Anati's work becomes most important; he has simply seen far too much palaeoart not to be struck by the universals evident in these hundreds of traditions. Humans all have a similarly organised brain, and at least in recent millennia, they have all related to a similar anthropocentric construct of reality. Whatever their means were of acquiring this construct, art externalised and probably communicated it, and it would be strange indeed if there were no underlying universals in these physical externalisations of human reality-building processes. Anati knows this, and while it is easy to fault his book on a number of details, he certainly paints a valid overall picture of the potential and significance of world rock art.

The book begins with a foreword by Yves Coppens, followed by chapters on the exploration, methods and relevant concepts. The author then addresses art as a visual language and looks at its origins. A chapter on order and logic expounds Anati's tripartite model of rock art, dividing it into psychograms, ideograms and pictograms. There are significant problems with this taxonomic system, but it does offer some heuristic compensations. Historically it has freed us from the old tyranny of the naturalistic/geometric dichotomy, and the implicit assumption that geometric arts are generally recent. It also leads Anati to constants and archetypes, and in turn to the origins of conceptualisation.

This summary of Anati's work is the result of a life-long dedication to the study of rock art. Its main strength is its ability to bring into focus some of the principal issues in the discipline, issues that will need to influence its direction in the next century. Anati's contribution to the discipline has been so outstanding that he could afford to rest on his laurels, and yet he continues to give his very best to it. I do not always agree with him, but when I think of where this discipline would be without him, my tribute comes from the heart. Emmanuel, you are up there with the finest of scholars!

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Essays in Palaeolithic art. Proceedings of the Prehistoric Society. Vol. 57, Part I, 1991. 174 pages. US$40.00 incl. packing and postage, from W. S. Maney and Son Ltd, Hudson Road, Leeds LS9 7DL, U.K.

While the proceedings of the first conference organised by the Prehistoric Society in 1967 on the topic 'Prehistoric art in the western Mediterranean to the second millennium B.C.' were never published, the Prehistoric Society has published in 1991 a set of topics presented at the second conference on Palaeolithic art, held in Oxford in 1989, as the 57th volume of its *Proceedings*.

The purpose of the conference was to present new results of the study of artistic traditions in Upper Palaeolithic western European hunter-gatherer societies, and to analyse what these traditions may evoke about technical achievements and skills, and perhaps also about the social organisation of these societies. The contributions stress the archaeological context and human behaviour within the framework of the chronological and geographical changes.

Clive Gamble sees the landscape and the territory as part of the social context. Efforts were made in recent decades to find 'centres' of the Palaeolithic world, but they neglected to some extent chronological and geographical changes in artistic production. Neither the timing of the occurrence in the course of the Upper Palaeolithic in the supposed western European Franco-Cantabrian centre, reaching its peak approximately 13 000 - 10 000 years ago, nor the geographic absence of preserved artistic creations in regions where vast numbers of stone tools document intense settlement (e.g. the Near East) have been evaluated properly. Gamble comes to the conclusion that the Upper Palaeolithic world did not have any centre which could be used as basis for the comparison of the level of relative complexity. In answer to the question whether the Upper Palaeolithic society was simple or complex, Gamble presents two models: a mobile, low population density and exogamous simple hunters' society; and a complex one, which has been the subject of most recent studies of hunter-gatherer-fishers. Mellars sees Upper Palaeolithic peoples of Franco-Cantabria as exemplifying complex hunters' society. Gamble notes, however, that neither complexity nor simplicity are conditioned by the ecological situation of the population, but they are the result of a historical process. It should not be considered as a contradiction, because the same population group often included both complex and simple forms in the course of a one-year cycle.

As to the long-term climatic changes, Gamble suggests three periods with corresponding social consequences: the down-turn phase leading to the glacial maximum around 18 000 BP, the refuge phase between 21 000 - 13 000 BP and the upturn phase corresponding to the postglacial. Various ecologies corresponding to the mentioned climatic changes are considered as being part of the historical trajectory. The Upper Palaeolithic social systems related to the changing climate had, however, further variations in different latitudes. Gamble distinguishes between three main systems: the open system between 27 000 - 21 000 BP, closed Palaeolithic refuges between 21 000 - 13 000 BP, and the colonisation after 13 000 BP. The existence of common features and similar finds in various populations in the period of the open system is explained by Gamble either by the spreading of information due to ever more intense inter-population contacts, or by the migration of populations, in which the populations retained their cultural identities. The territorial concentration of art in the refuges is considered to be a consequence of particularly intense contacts.

However, many questions remain unresolved. Some Magdalenian sites are particularly rich in evidence of artistic activity, while there exist other sites from the same period with very poor artistic production, or even almost without any trace of it. Why are there some regions rich in both cave art and portable art (Dordogne), and others from the same period and cultural context (Moravian Karst) do have outstanding portable art, but not a single cave painting or engraving? Why is there not any cave art for thousands of kilometres to the east, then we know of a single site with cave art in southern Ural, and still farther on there is nothing again, or almost nothing, up to the Siberian sites with portable art (e.g. Mal'ta, Buret')? Another certainly illustrative fact is that all hunters' populations, as they could have been observed until the end of the past century and into the beginning of this one, engaged in at least some artistic activities, without exception: there were various kinds of such activities, and they were exercised with different degrees of intensity. The mosaic model was applied, referring to probably innumerable biological, environmental and historical influences. This universal situation allows us to presume that it was more or less the same in the Palaeolithic period: paintings and sculptures, rock art and portable art were represented in different ways, and it must have been the same for story telling, dancing, singing, music, mime etc. Unfortunately, traces of the latter activities in the Palaeolithic are very scarce. The world-wide ethnographic knowledge evidently demonstrates the absence of any exact universal model with

general applicability. Artistic creation existed, and still exists, in different conditions and in different forms. Both the environment and the historical evolution have exerted their influence, in connection with the genetic setting.

Alexander Marshack has focused his attention on the female image as a time-factored symbol in the European Palaeolithic. The core of his study is the female image of the Gravettian. He starts with the idea that the image had a meaning only in a given cultural context. It is not completely clear why he makes a distinction in his contribution between 'the Willendorf image' and 'Moravian images', if both manifest temporal, geographic and cultural unity. Similarly, it may not be expedient to assign the Willendorf sculpture to the late development of Upper Palaeolithic female imagery. The statement that 'she is by this late date highly stylized, exquisitely carved and quite sophisticated' is misleading, because we know the same stylised, exquisitely carved and quite sophisticated portable art also from the Aurignacian Württemberg region (animal and human sculptures from Vogelherd, Geissenklösterle and Hohlenstein), as well as from the site Galgenberg in Lower Austria (a female figure depicted in movement and cut in serpentine; *RAR* 6: 118-25). This can signal that creative artistic activity does not develop merely according to the model 'from simple to more complex'. The fact that in the Gravettian tradition, there exist simultaneously realistic and highly simplified figurative representations seems to support this view.

When Marshack notes that the use of ochre predates the recorded beginnings of symbolic carving he is perfectly right. But this statement is part of a much broader fact: the ways and components of artistic activities can appear combined in diverse ways. Red ochre use and any other symbolic activity can appear early or need not appear at all. The components which we call today, according to our own cultural traditions, artistic activities are interconnected in very diverse ways. If in one region and in a given period there appears cave art, it does not mean that in another region in the same period and within the same material culture it will appear as well. The existence of any feature depends on many factors: traditions, historical events, environment etc. When the elaborate headdress of the Willendorf figurine is mentioned and the representations of human faces are quoted at Dolní Věstonice, Brassempouy, Monpazier, Kostenki and Grimaldi, we should be precise: only in one unique case in Dolní Věstonice is a realistic portrait of a real person represented. All the other quoted sites provided figures with fairly simplified facial features, but not true portraits. The reasons for this are not clear.

As for Marshack's Figure 3, representing a set of breasts from Dolní Věstonice, we see in one piece a combination of breasts with a clear vulva symbol, a truly sophisticated combination of two erotic or fertility elements. The use of clay sculptures from the same site for prognostic or sacrificial activities, their being thrown into the fire in order to explode and not to be baked, as it is mentioned by Vandiver and colleagues in 1989, is considered by the author of the present review to be a speculation contradictory to the find situation as well as to the technology of baking. This is yet another example of inexact statements and insufficient knowledge of the finds complicating the process of cognition and understanding of the Upper Palaeolithic hunters' behaviour. I mention here Vandiver's publication because it has already reached the attention of other specialists (as documented also by Marshack's study), and it will therefore deserve in the future a special critical analysis in the specialist literature.

Marshack rightly recognises the possibility that two female representations, the baked clay 'Venus' from Dolní Věstonice and engraved female figure from Předmostí, are probably 'spirits' or 'mythologised creatures'. However, the Upper Palaeolithic female imagery is not represented merely by mature, mostly obese women, there are also other types, as documented for example by the sculpture of a young girl from Petřkovice in Moravia, figures of slim women from Avdeevo or the so-called *'Vénus impudique'* from Dordogne. It is interesting that some of the crude, simple sculptures like the sparsely worked ivory tusk from Pavlov or others are not considered as possibly unfinished, discarded work. To follow such a possibility we would of course need a broad comparative and technological study.

Starting with the variability in the depiction of women or parts of the female body, Marshack shows that various interpretations based only on the form and not taking into account the context in which the finds were discovered, or possibly also the use of the objects, cannot explain their real function. They were multivalent, multipurpose symbols.

Ann Sieveking provides an analysis of portable art. She stresses how important it is to consider the traditions of the given civilisation or period in their complexity, because individual features or fragments extracted from their context either cannot be interpreted at all, or will be misinterpreted. When mentioning the earliest finds of Aurignacian art (33 000 BP), Sieveking says that Gravettian art follows almost 10 000 years later. However, the climax of the Gravettian in Moravia is date edbetween 27 000 - 23 000 BP. More exact statements would cause less misunderstanding. The same applies to quoting foreign names, e.g. Geissenklösterle, Předmostí and others, which is, by the way, a common problem in the English-language literature. The rule that local names should be quoted in their right spelling and in the local form, or at least in the closest possible transcription, is to be respected in order to achieve smooth communication.

Sieveking considers the 'Venus' figurines to be the subject of a cult and she says that they appear in central Europe and in southern Russia, and then they spread as a 'fashion' to western Europe and Siberia. This does not seem to be a right and well-founded formulation, considering the geographic distance (Siberia) and the dating of the Ligurian Gravettian and Siberian finds. Marshack's opinion on the multifunction of female sculptures seems to be closer to the truth.

The opinion that 'at all stages of the Upper Palaeolithic a purely naturalistic tradition exists alongside the schematic' is again rather inexact. In fact it is a purely naturalistic — figurative symbolism, standing alongside another symbolic system of simple geometric marks. What is surprising in Vogelherd is not only the perfection of the figurative image, but the use of simple geometric 'signs' at the same time. The point here is not schematic simplification of figurative motifs, but the use of another symbolic system. It is not evolution proceeding 'from the fish via the fish-tail to the chevron', as Sieveking claims, although some simplification of figurative imagery can of course be proven. It is a pity that the work limits itself to western European material which often provides a limited view with only regional validity. A broader study of material would allow better explanation of the origins, range of occurrence and spreading of symbolic systems. The necessity of a broader study of basic material is voiced in the author's own remark that the rich sites — super sites — as for instance the mentioned Parpalló, Isturitz, Gourdan, Brassempouy, Laugerie Basse or La Madeleine (as well as some sites not mentioned, such as Předmostí, Věstonice, Pavlov, Kostenki, Avdeevo, Mezin) offer the possibility of a deeper insight. As to the occurrence of strikingly similar artistic images, there is a sound theory that it might be due to migrations of whole populations, individuals, or merely exchange of objects. On the other hand, there might also have been widely spread ideas, facilitating the existence of very similar images, though not exact copies. However, these alternative possibilities have to be either proven or eliminated, and an appropriate method has to be chosen in order to do so. The same applies when considering the idea that the huge super sites might have been aggregation localities. In any case, one should keep in mind what was mentioned above: the richer the material, especially material from bigger and richer sites and from wider geographic areas, the more qualified comparative analyses and, in consequence, the better the insight into the Palaeolithic hunters' life and their artistic creation.

G. Bosinski focuses on the study of the representation of female figures in the culturally and regionally delimited area of the Magdalenian in the Rhine region. His study is mostly based on finds from two contemporary, rich sites, Andernach and Gönnersdorf. Of particular interest is the fact that on numerous slate plaquettes there are quite realistic representations of various animals, while female figures are extremely schematic. However, even in their very simplified form they document a great deal of variability: there are individual figures or groups of figures, two figures facing each other, figures with their interior filled in, figures with sketched, half-raised arms, with apparent breasts or without them, with either double or single upper part of the trunk, and others. There are also gradual transitions between different degrees of simplification and different compositions of figures. It is interesting and important to learn that the engravings on slate fragments were discovered in the area of the settlement together with other, similar slate fragments, creating together a kind of panel. The figures cut in antler or in mammoth ivory, i.e. sculptures, were often found in garbage pits together with other debris. Bosinski shows that they were not purposefully deposited, they were considered to be waste. He compares the finds from Andernach and Gönnersdorf with the wider European occurrence of similar simplified images. Seventeen figures of mammoth ivory, discovered at Mezin in Ukraine, were divided into two groups — 'phalluses' and 'birds'. Triangles are engraved in the lower part of the flat side of these figures, and sometimes also hanging breasts, clearly evidence that the representation of female elements was there of particular, if not decisive, importance. The fact that six 'phalluses' were found in dwelling No. 2, and six 'birds' in the vicinity of dwelling No. 3, is rightly interpreted by Bosinski as representing either the specific style of the individual artist, or the representative artistic features of the inhabitants of the two dwellings.

Bosinski's mention of half-finished figurines found in Petersfels (Baden) supports the need for an analysis of finds from other localities from this point of view. They might not always by 'time-factored' figurines of short-time use (compare with Marshack's contribution), but half-made and unfinished sculptures. Conversely, the situation is similar and quite common in many engravings and paintings of rock art.

Bosinski's study is a good example of an analysis of the female image in the wider context of cultural traditions and behaviour of the given population, as manifested in archaeological finds. Since Andernach and Gönnersdorf, similar to the huge sites used for comparison, are the so-

called super sites. Bosinski comes to the conclusion that the sites in the Rhine region must have been village-like settlements with the role of meeting points of several groups of people. The variability of artistic creation is thus interpreted here as various local variants of one tradition meeting at the aggregation site. As there is another possibility, that of mere variability in the production of one or several artists, it would be appropriate to try to exclude the theory of a vast living site of one population, and prove the existence of the aggregation of several smaller groups not only in artistic variability, but in other features as well.

R. Bégouën and J. Clottes have focused on the comparison of portable art and cave art in the Volp Caves in Ariège, a system of three caves: Le Tuc d'Audoubert, Les Trois Frères and Enlène. While Enlène is characterised by rich finds of Middle Magdalenian engraved plaquettes or their fragments, as well as many decorated figures made of bone and antler, Les Trois Frères is considered to be a cave sanctuary of the same age and style. The authors aim at contributing to the explanation of the topics, techniques, chronology and cultural values of the portable art and cave art in this system of caves.

The findings that in the Tuc d'Audoubert, claviform signs are found only on the walls of the cave while they are missing in portable art, and that the seemingly chaotic groups of lines ('scribbles') occur only on plaquettes and on the cave walls, and not on portable art, points to the existence of a certain concept in graphic art, contrasting it with applied art on various objects. If individual engravings of animals occur on plaquettes, made of many hatchings and fuzzy lines but never transgressed by the figure of another animal, superimposition is quite frequent on the walls of the cave, as well as incomplete parts of figures, or motifs impossible to define. On plaquettes, deeper engravings are completely missing.

Similar to Bosinski, Bégouën and Clottes also come to the conclusion that plaquettes had been considered as useless, broken and thrown away as simple flat stones. The authors conclude that cave art, plaquettes and bone or antler objects were probably produced by different individuals, even when respecting similar or common traditions. This interesting study provides the material for further considerations on the function of various manifestations of Palaeolithic art in the Magdalenian society.

Altamira and its paintings has provided material for new or innovative studies already several times in the past. In the light of the recent discoveries in the caves of the Cantabrian region, it has become the object of a new analysis by F. H. Bernardo de Quirós. The homogeneity of style and concept of the paintings supports the idea of their having been executed by a single author, de Quirós states with reference to the detailed study by M. Muzquiz, published as a Ph.D. thesis at the Complutense University in Madrid in 1988. De Quirós has analysed the use of the natural rock relief in combination with polychrome paintings. The engraved outlines of the paintings might have been preliminary sketches for the final works, in which the absence of any corrections documents the mastership of the author.

Special attention should be devoted to the farthermost part of the cave called 'horse's tail', and there, mainly the so-called 'mask', making use of the natural rock protuberance, to which eyes and a mouth had been added, as well as another similar formation in proximity, completely natural, evoking the idea of a human face. Other 'masks' executed in this part of the cave provide it with special meaning, mainly because of their location, presumably purposeful, that renders them visible to those who leave the cave. The fact that there are more such rock shapes in the cave than those used for the creation of the 'masks' supports the idea of their having been selected purposefully. The same design in the three main centres of the cave supports the idea that one and the same artist had worked in all three. The dating of Altamira as a homogeneous whole falls into the Lower Magdalenian (15 910 ± 230 BP to 15 500 ± 700 BP). The art of Altamira has to be considered in connection with other local caves: Castillo, Juyo, Rascaño and Cierro. B. de Quirós considers the triangle Altamira, Castillo and Juyo to be the area of one human group. [But cf. recent direct AMS dating which squarely contradicts this stylistic reasoning. Ed.]

The new analysis of the Altamira paintings shows that a new study of older, well-known and often described caves may lead to new findings. In his study, Paul Bahn presents evidence documenting that Palaeolithic art is not limited to Europe, and that it is a universal phenomenon, though not so frequent elsewhere in its plastic manifestations. He recalls that artistic activities in various parts of the world began some 40 000 years ago, and were particularly intensive towards the end of the Pleistocene, i.e. 12 000 BP. Although a lot of datings of the recent finds are not clear and need to be verified, it is obvious that, on the one hand, Europe was neither the first nor the sole area with artistic creation; and on the other, the European model characterised by the Upper Palaeolithic and especially its latter part has no general validity. Other populations fulfilled their needs by various other forms of artistic creation and in different quantity.

S. J. Mithen's attempt at an ecological interpretation of Palaeolithic art is introduced by a basic idea: 'It is the supposed contradiction between human creativity and human adaptation that is an error, not the idea that Palaeolithic art and ecology are fundamemally related.' Mithen's idea is absolutely right if we consider that art, society and economy are our artificial categories, which in life (in our present-day life as well as in the life of Palaeolithic hunters) were interconnected by a complex network of mutual relations.

The four parts of Mithen's study are: adaptation and Palaeolithic art, hunting magic as an ecological interpretation, criticism of Jochim's ecological interpretation, and the theory of 'thoughtful foragers'. Mithen defines adaptation as decisions of individuals 'about how to increase their chances of survival and reproduction and the attainments of intermediate goals towards that end'. He understands adaptation not as a state, but as a process. Individuals actively making decisions engage in the process of adaptation to a constantly changing world. Therefore 'Palaeolithic art is an emergent property of the interactions between individuals as they pursue their own social and economic strategies'.

Jochim explains in his 1983 and 1987 ecological interpretations the increase in the appearance of portable art by a higher degree of communication among ever more numerous populations, as a reaction to the increasing ecological stress. According to him, the second reaction consisted in a diversification of the economic basis, i.e. in widening the range of hunted and gathered kinds of food. This was related to Jochim's third argument, about the exploitation of salmon which was supposed to involve a sedentary way of life and property of the fishing grounds. The population stress arising from the increase in population was, in Jochim's opinion, reflected in an increase of ritual activities facilitating social interaction.

In opposition to Jochim's view, Mithen says that nowhere in the finds from archaeological layers, in the figurative cave art or in portable art is there proof about economic orientation to salmon, or to fishing in general. He does not consider Jochim's interpretation of Palaeolithic art as being a special concept of adaptation, but as an interpretation with the help of a new, not proven orientation to salmon fishing. Generally speaking, and similarly to Mellars' theory, we would have to deal with economic security or near-surplus economy, and south-eastern France would represent a kind of hunting Garden of Eden, which would lead to the development of cultural complexity including proliferation of art. To that, Mithen opposed his theory of 'thoughtful foragers', based on the difference of food remains found in the Palaeolithic layers, and the animal kinds represented in Palaeolithic art. At a time when the main game animals in the Magdalenian of the Franco-Cantabrian area are the elk and deer, the main themes of the Palaeolithic art are the horse and bison. Mithen believes that the increase in exploitation of food sources (the elk and deer) led to economic stresses which gradually resulted in the use of a new hunting method of smaller groups or individuals, the stalking of individual animals. This individualised hunting focused on animals with a greater biomass, the horse and bison. The depiction of these principal representatives is explained by Mithen as a retrieval cue for information on the animal, on its behaviour, occurrence, diet, in brief as retrieval of information stored within encyclopaedic memory. Thus he sees art as a means of information.

The change in hunting strategies was not sudden, but gradual. That is how Mithen explains the presence of the elk and deer as the economic basis, even when the remains of the bison or horse among food remains are much less frequent. Mithen's inventory of possible information incorporated in Palaeolithic art — information on the occurrence, condition and behaviour of animals, which was important for the individual hunters in stalking individual animals, is not convincing. The individual hunter needs different kinds of information than that mentioned by Mithen. The primary information from faeces does not consist in the state of health of the animal, but in the dating of the faeces to determine whether it is worth pursuing the animal in question. Other information that may be derived, in Mithen's view, from the Upper Palaeolithic imagery was not of practical or decisive importance of the hunter.

It may be concluded that Mithen's premises are stimulating and touch on many basic questions connected with the prehistory of Upper Palaeolithic society. However, his ecological interpretation using the theory of thoughtful foragers is not convincing. His view that when discussing art it is not possible to separate human adaptation from artistic creation is certainly of prime importance, nevertheless, it needs another analysis to be definitely justified.

M. Coles, in his paper 'Elk and Ogopogo', deals with rock art in northern regions, mainly in Scandinavia, Canada and northern Asia, and attempts to compare these postglacial and sometimes even recent rock paintings and petroglyphs with historically known traditions of local aborigines. He tries to give some examples 'reflecting the appearance of systems of beliefs concerned not only with the practicalities of survival but also with the acceptance of forces from outside this world'. He therefore identifies two general types, the ministreal/instrumental (secular) and deific/transcendental (sacral).

The disproportionate space allowed to Scandinavian, Canadian and north Asian rock art is immediately striking. Hundreds of rock art sites from the Kola Peninsula to Chukotka in the Far East are touched on in

one short paragraph only. The ignorance of Russian literature is evident, as only few papers and monographs are mentioned. As often in French and English publications, the linguistic barrier takes its toll. In a paper which is a generalised survey aimed at drawing some general explanations one would presume detailed knowledge of material on which the generalisations are based. In Scandinavia one would expect a detailed knowledge of local literature in Swedish, Norwegian and Finnish languages and not only of a few papers or books written in English. The knowledge of hundreds of Russian publications is indispensable, and probably even some knowledge of the terrain should be useful and expected.

M. Coles rightly recognises that the systems of beliefs seen in the rock art are complex, with both secular and sacral aspects. The length of time and vast spaces with diversified tundra, taiga, riverine, sea shore, inland, lowland and highland populations bring no doubt numerous variations in human adaptive strategies, culture traditions, and therefore also in one aspect of their artistic expression, rock art.

Ogopogo is part of a certain mythology. Since mythological ideas are an important part of rock art it is not surprising that they appear in different variants on various continents, conforming to their respective mythological traditions. It is the same with unnatural beings, combining human and animal features, as well as with realistic figurative representations (e.g. the elk) which may have various symbolic meanings. By quoting these examples the author of the present review wants to show that human psychology, the variations of the human mind, are co-responsible for the principal categories of human adaptations, partly reflected in artistic activities. The rock art imageries with X-ray style characters, known not only from northern regions but also from Australia, California etc., are illustrative of another example — in different regions and different times.

Coles merit is in focusing on the vast northern region which is somehow marginal in our study of humers' rock art. It seems that this is not only due to the postglacial age of the colonisation of these vast regions, but also due to the linguistic barrier and limited communication between specialists.

Simple comparative analogy, characteristic of the archaeology of the beginning of this century, was based on using well-known ethnographic phenomena for explaining the behaviour of pre-Historic humans, often with no regard to the distances in time and space. In his contribution called 'Wrestling with analogy', J. D. Lewis-Williams aims at showing that no matter how superficial and uncritical use of analogy may be misleading, it would not be reasonable to reject the method of analogical comparison in cases with a great number of definitely documented analogies between the source of knowledge and the archaeological context. Thus, Lewis-Williams does not consider the method of analogical comparison itself to be mistaken, but only its uncritical use. He documents it with the example of the neuro-psychological model of the altered state of mind, as manifested in the comparison of rock art expression of San and Upper Palaeolithic hunters. In the European Palaeolithic this comparison is explained by a certain form of shamanism, because in terms of ethnography, shamanism is connected with altered states of mind. Lewis-Williams demonstrates his theory on the example of San rock paintings and the painting of two horses from Pech-Merle. According to this theory, the altered state of mind would explain the simultaneous use of geometric signs together with realistic figurative representations, entoptic compositions, representations of therianthropes, various 'monsters', etc.

Although shamanism as a working hypothesis cannot a priori be excluded from the European Palaeolithic, the mentioned manifestations of the altered state of mind can be explained just as well by normal human psychology, normal mental processes and imagination. Therianthropes exist even in modern Christianity (the devil, the angel), without shamanism and altered states of mind, and unnatural animal monsters are commonly part of mythologies. We know that hallucinogenic substances were used in pre-History; consider, for example, the representations of people-mushrooms in the petroglyphs of the Chukotski Peninsula. But to confirm the influence of the altered state of mind in rock art would probably need other, more pertinent proof. The impact of Lewis-Williams's study consists in the use of the neuro-psychological model in looking for analogies in human behaviour in the research of rock art.

The last contribution, by Robert Layton, deals with the comparison of hunter-gatherer rock art of Palaeolithic western Europe and of Australia. Layton starts with mentioning certain characteristic features of the western European Upper Palaeolithic. For the readers' sake it is necessary to qualify some of his statements. For instance, the anatomically modern Aurignacians did not 'coexist with Neanderthal populations associated with Châtelperronian stone tool assemblages for up to 1000 years ...'. The coexistence was certainly longer, as demonstrated by the earliest Aurignacian and the latest Châtelperronian dates. It is also a simplification to say that 'abundant personal ornaments appear with the early Aurignacian', since the first, although rare personal ornaments are known already from the Mousterian (e.g. La Quina) and of course in the Châtelperronian, and later in the early Aurignacian these ornaments cannot be considered as abundant. They only became abundant in the Moravian Pavlovian, beginning about 27 000 BP (the Brno II grave, Dolní Věstonice, Pavlov-Předmostí). Thus, the appearance of these ornaments is not sudden. It is also necessary to rectify the opinion that the X-ray style in Australia (Arnhem Land, Northern Territory) is a modern phenomenon. This applies for its climax, and especially for its decorative phase in the East Alligator River region, but its roots, mainly in the inland regions of Arnhem Land, are much older. Neither is there evidence here for the sudden appearance of a certain stylistic concept. It appears in some sites much earlier, whereas in other, contemporary sites the same feature occurs later or is not known. Another simplification is to mention that 'delicately eyed needles' are appearing with the introduction of Upper Palaeolithic technology. They first appear in Solutrean assemblages, i.e. at least 15 000 years later than the earliest Aurignacian assemblages. I mention here several of these rectifications to show that innovations, including technological ones, appear in a patchy way, and if the use of these facts in argumentation is not precise it is misleading, giving a false picture.

In other important features Layton is nevertheless right, for instance when mentioning that 'some blade tools originated much earlier' than the European Upper Palaeolithic, or when stressing that there is an absence of narrative scenes in Europe when compared with South African San rock art.

Another group of simplifications appears in paragraphs on modern humans in Australia, where Layton considers two reasons why simple stone tool technology persisted for so long in Australia. Mentioning the role of adaptation to local conditions (so far so good) he gives as an example the scarcity of good raw materials. But my personal knowledge from Arnhem Land tells me that there is certainly not such a scarcity in the Arnhem Land region, where rich sites with igneous rocks, chert and highly silicified sandstone are found, all frequently used as good and rich raw material resources. We should avoid premature generalisations. The right adaptive view is represented at the end of this chapter: 'To appreciate the cultural contexts of Australian rock art we need first to consider other aspects of that culture'.

Layton finally reasons that the cultural context of recent Australian rock art is linked with more patchy and less predictable resource distribution with the end of the postglacial climatic optimum after 2000 BP. In western Europe he considers Palaeolithic rock art as cultural adaptation to the ecology of the last glacial, but he is critical of his own ideas, pointing to some weaknesses in his comparative considerations.

The whole volume *Essays in Palaeolithic art* is an up-to-date collection of papers written by prominent scholars. The themes are selected from the study of social context to the essays on interpretation and on comparisons with the recent artistic activities of hunters and gatherers. In this way, certainly only some themes are presented from the immense field of related problems. Nevertheless, for all students of Palaeolithic art, but also of origins of art, of its psychology, of links with ecology, environment and economy, this is a new important book which they need to read. The Prehistoric Society has again contributed in an important way to the study of this perennial subject of broad interest. Let us hope that the next publication of this kind will consider also other, now numerous, extra-Franco-Cantabrian art objects, like the finds from Italy, Germany, central Europe, Ukraine and Russia.

Professor Jan Jelínek
Brno, Czech Republic

RAR 10-277

The Bolivian Rock Art Research Society, SIARB (Sociedad de Investigación del Arte Rupestre de Bolivia), offers its publications to members of IFRAO-affiliated organisations at special discount prices:
Annual *Boletín*: US$14.00 instead of US$17.00.
The *Boletín* includes news items, articles and bibliography on rock art in Bolivia, Argentina, Peru, Chile and Brazil, with detailed English summaries. *Boletín* No. 5 (1991) has 110 pages, *Boletín* No. 6 (1992) has 94 pages.
Occasional monographs *Contribuciones al Estudio del Arte Rupestre Sudamericano* (Contributions to the Study of South American Rock Art):
No. 1, December 1987, 72 pp., English summary, Matthias Strecker: *Arte rupestre de Bolivia*: US$14.00 instead of US$17.00. No. 2, December 1988, 72 pp., English summary, Carlos J. Gradin and Juan Schobinger: *Nuevos estudios del arte rupestre Argentino*: US$14.00 instead of US$17.00. No. 3, July 1992, 231 pp., English summary, Roy Querejazu Lewis (ed.): *Arte rupestre colonial y republicano de Bolivia y países vecinos*: US$24.00 instead of US$29.00.
Order from: SIARB Secretary, Casilla 3091, La Paz, Bolivia.

ORIENTATION

MINUTES OF THE SECOND GENERAL MEETING OF AURA
Cairns, Australia, 4 September 1993

The Second General Meeting of the Australian Rock Art Research Association was held in the Cairns Hilton Hotel, Cairns, on the afternoon of Friday, 4 September 1993. The meeting was opened at 16.10 p.m. and attended by 85 full members and over 40 guests.

The meeting was opened by the Chairman, AURA President George Chaloupka, A.O., who welcomed members and guests. Apologies were received from Andrée Rosenfeld and Alan Watchman. A list of those in attendance was noted.

1. MINUTES OF THE 1988 MEETING

Moved that the minutes of this meeting be taken as read.

Moved: Y. Forrest; Seconded: J. Campbell; *Carried*.

There was no business arising from the minutes.

2. CORRESPONDENCE

No correspondence was tabled. (The Secretary receives about 2500 items of correspondence per year.)

3. TREASURER'S REPORT

There was no Treasurer's report tabled, however, the report has been circulated to all full members in the *AURA Newsletter*.

Moved that the following subscriptions be ratified and that the Executive Committee be empowered to review subscriptions on an annual basis: Members: $A25.00 per annum; Students and members in developing countries $A10.00 per annum; Journal subscription $A20.00 for individuals, $A30.00 for institutions per annum.

Moved: G. Ward; Seconded: S. Hallam; *Carried*.

Noted that a membership drive should be undertaken.

4. ELECTION OF OFFICE BEARERS

The following members were nominated and accepted positions on the new Executive Committee:

President:

Nominated: **Michael Morwood**

Moved: G. Chaloupka; Seconded: P. Trezise

Vice President (Overseas):

Nominated: **Paul Bahn**

Moved: J. Campbell; Seconded: M. Rowe

Discussion followed as to whether, under the present constitution, we could have a second Vice President (Australia). It was decided to have a 'shadow' Vice President.

Vice President (Australia):

Nominated: **Patricia Vinnicombe**

Moved: G. Walsh; Seconded: J. McDonald

Secretary:

Nominated: **Robert Bednarik**

Moved: J. McDonald; Seconded: M. Bullen

Treasurer:

Nominated: **Elfriede Bednarik**

Moved: P. Trezise; Seconded: M. Haginikitas

Committee Members:

Nominated: **Graeme Ward**

Moved: P. Trezise; Seconded: L. Gillespie

Nominated: **Noelene Cole**

Moved: E. Hatte; Seconded: P. Trezise

Discussion followed as to whether a third Committee Member should be nominated by Aboriginal groups.

Noted that the constitution allows persons to be co-opted onto the committee, perhaps representing a specialist interest group.

Moved that a third position as a Committee Member be left vacant so that the Aboriginal participants at the Cairns Congress can nominate a participant.

Moved: S. Hallam; Seconded: N. Draper; *Carried*.

Michael Morwood then took the Chair and a vote of thanks was proposed to the outgoing Committee.

5. RECOMMENDATIONS

5.1 Symposium J: no document submitted.

5.2 Symposium L (Workshop on indigenous perceptions):

Leah Louie and Kim Orchard were invited to present these recommendations:

Moved that the recommendations be accepted.

Moved: J. Evans; Seconded: J. Drew; *Carried*.

Discussion ensued noting that the document presented had wide-ranging implications and that all AURA Members should have the opportunity to see, discuss and reply to it.

Noted that this could not wait four years until next meeting.

Moved that the document be published and that the Executive Committee ensure that decisions are made by the whole AURA membership by next Annual Meeting (the document has been published in *RAR* 9: 155-6).

Moved: G. Ward; Seconded: J. Drew; *Carried*.

Moved that those members present vote on point 4 of the Code of Ethics, *noting* that there is a quorum of members present.

Moved: R. Bednarik; Seconded: N. Draper; *Defeated*.

The general feeling was that members already work under a recognised code of ethics.

Moved that AURA Members present support the spirit of the document and congratulate the participants for the work and effort that had gone into the recommendations put forward, making them an excellent basis for discussion.

Moved: L. Jaffe; Seconded: N. Cole; *Carried*.

6. GENERAL BUSINESS

B. White read a document relating specifically to Queensland, asking for support from AURA Members.

Moved that a vote be taken on each point separately.

Moved: B. White; Seconded: J. Clegg; *Carried*.

6.1 The AURA Congress requests effective Aboriginal and Torres Strait Islander (ATSI) heritage protection in Queensland.

Moved: B. White; Seconded: J. Campbell; *Carried*.

6.2 Should new ATSI heritage protection legislation be drafted in Queensland, the Australian Rock Art Research Association notes that it must undergo a minimum of one year's negotiation with ATSI groups.

Moved: B. White; Seconded: J. Campbell; *Carried*.

6.3 The Australian Rock Art Research Association notes that ATSI groups negotiating heritage legislation must be resourced with independent expertise and advice.

Moved: B. White; Seconded: J. Campbell; *Carried*.

6.4 Discussions took place concerning the location of the Third AURA Congress; among the possibilities mentioned were Alice Springs/Uluru and Kununurra.

As there was no further business the meeting adjourned at 17.50 p.m.

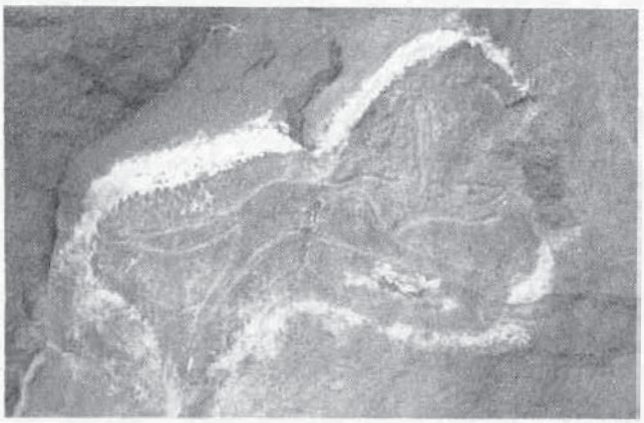
Yvonne Forrest
Northern Land Council, Darwin

Letter to the Editor

Cher Monsieur,

Veuillez nous excuser de vous écrire en Français, mais, bien que lisant couramment l'Anglais (scientifique), nous ne pouvons prétendre nous exprimer correctement par écrit dans cette langue.

Permettez nous de vous féliciter pour vos différents articles concernant la préservation de l'art rupestre, et pour votre récent papier particulièrement ferme et précis paru dans *Sahara* No. 4, 'Rock art researchers as rock art vandals'.



Petroglyph of a dog or fox, at El Auer, Mathendous, Libya, with extensive damage by recorders. The tins of the chemicals used in this vandalism, of German origin, were left in the sand below the art.

Nous avons étés particulièrement sensibilisés à ce problème depuis que nous étudions une région particulièrement riche en pétroglyphes du Fezzan Libyen. En effet, sans compter les repassages à la craie, psychologiquement interprétés et hélas tenaces (identifiés dans le wadi Mathendous 8 ans après leur publication, avec les mèmes erreurs et omissions), nous avons constaté d'énormes dégats causés par la prise d'empreintes aux élastomères synthétiques sur plusieures dizaines de pétroglyphes parmis les plus intéressantes du wadi Mathendous et du sud du Wadi Geddis (voir photos ci-jointes). Des cires de démoulage et des restes de résine subsistent, profondément incrustées dans le grès une dizaine d'années après leur réalisation, sans compter les petits éclats peu adhérents qui ont été emportés au démoulage. De plus, ces 'travaux' n'apportèrent que très peu d'informations originales, la plupart des pétroglyphes ayant déjà été publiées par L. Frobenius et P. Graziosi.

Dès nos premières publications, nous avons également insisté sur l'importance d'une éthique d'observation que les techniques photographiques actuelles permettent de respecter en toute occasion: *'See but don't touch!'* est une régle que nous essayons de propager.

Axel et Anne-Michelle Van Albada
Arzens, France

RAR 10-280

Exposition on world rock art

The Sociedad de Investigación del Arte Rupestre de Bolivia (SIARB) is planning an exposition of posters under the title *Rock art - World heritage*. SIARB, a founding member of IFRAO, has already organised two major expositions. The last, on rock art of the Dept of Santa Cruz, was inaugurated in the City of Santa Cruz in June 1991, on the occasion of the Third International Symposium by SIARB, and later toured six other Bolivian cities.

The new exposition will be prepared by Matthias Strecker (SIARB Secretary) and Freddy Taboada Téllez (SIARB and National Museum of Ethnography and Folklore). It is scheduled for 1994 and will be shown in the National Museum of Art, La Paz, and then in other Bolivian cities. It will consist of posters featuring rock art in different parts of the world, maps and texts. The following rock art regions are expected to be included: France, Valcamonica, South Africa, Australia, Canada, northern Chile, Patagonia, Bolivia. However, the organisers will gladly include material from other regions readers may decide to donate. Please address your correspondence to:

Matthias Strecker, SIARB Secretary, Casilla 3091, La Paz, Bolivia.

THE KÄTHE AND FRANZ SCHIPFER AWARD

Entries are invited for the annual Schipfer Award for excellence in rock art and palaeoart studies. Any unpublished essay is eligible, and the winning paper will appear in *Rock Art Research*. Any subject relating to rock art, or to forms of early symbolism, human cognitive evolution or presumed evidence thereof will qualify. A panel of judges, consisting of RAR Editorial Advisors and other office holders, will judge entries in terms of their originality, scientific rigour and scholarly merit. Their decision will be final. Papers of between 2000 and 20 000 words are eligible.

Entries for the 1994 Käthe and Franz Schipfer Award should include a very brief, single-paragraph curriculum vitae of the author(s), and a letter stating any relevant information the applicant chooses to provide. The Award will be presented on 26 January 1994, and will in this case include prize money of $500.00. Entries must be received by no later than 1 October 1993, and must be addressed to: Schipfer Award, AURA, P.O. Box 216, Caulfield South, Vic. 3162, Australia.

Forthcoming events

SYMPOSIUM ON ARCHAEOLOGICAL DATING: International House, University of Melbourne, Australia, 3-4 July 1993. Weekend seminar with major public participation, includes several contributions relevant for rock art dating, held by the Archaeological and Anthropological Society of Victoria. For details contact *RAR* editor.

XVth INTERNATIONAL CONGRESS FOR CARIBBEAN ARCHAEOLOGY: San Juan, Puerto Rico, 26-31 July 1993. Contact Programa de Arqueología, Instituto de Cultura Puertorriqueña, Apartado 4184, San Juan, Puerto Rico 00902.

HOMINID EVOLUTION IN AFRICA: Arusha, Tanzania, 8-14 August 1993. International conference in honour of Dr Mary D. Leakey, includes rock art field trip. Contact Dr F. T. Masao, Archaeology Unit, P.O. Box 35050, Dar Es Salam, Tanzania.

ICOM CONSERVATION MEETING: Washington, DC, U.S.A., 22-27 August 1993. The 10th Meeting of the ICOM Committee for Conservation will include a session on rock art. Contact Ivan Haskovec, P.O. Box 71, Jabiru, N.T. 0886, Australia.

1993 CHACMOOL CONFERENCE: University of Calgary, Canada, 11-14 November 1993. The subject is 'Cultural complexity in archaeology'. There is no rock art symposium planned. Contact Department of Archaeology, University of Calgary, Calgary, Alberta T2N 1N4, Canada.

GLOBAL SPECIALISTS CONFERENCE ON ROCK ART: Indira Gandhi National Centre for the Arts, New Delhi, India, end November to early December 1993. To include the 1993 Meeting of the International Federation of Rock Art Organizations (IFRAO). Contact IGNCA, Janpath, New Delhi 110 001, India.

ROCK ART - WORLD HERITAGE: Flagstaff, Arizona, U.S.A., 30 May to 4 June 1994. International Rock Art Congress 1994, including the 1994 Business Meeting of IFRAO, hosted by the American Rock Art Research Association (ARARA). This major rock art event includes the following symposia: Preservation and conservation; Rock art and religion; Archaeoastronomy; Advances in dating techniques, Snake motif in rock art; Shamanism in rock art; Early art in the Americas; Arizona rock art; Rock art of Oceania. Symposia proposals are accepted until 1 August 1993, the deadline for paper and poster abstracts is 1 October 1993. For information and registration forms contact ARARA, P.O. Box 65, San Miguel, CA 93451, U.S.A.

ROCK ART CONGRESS IN ITALY: Pinerolo-Torino, August/September 1995. This international conference will include about eleven symposia, and will incorporate the 1995 Business Meeting of IFRAO. The event will be hosted by the Centro Studi e Museo d'Arte Preistorica. Contact Professor Dario Seglie, Centro Studi e Museo d'Arte Preistorica, Viale Giolitti 1, 10064 Pinerolo (TO), Italy.

MEMBERSHIP FEES AND SUBSCRIPTIONS

are now due for 1993. In accordance with the decision of the Second General Meeting of AURA, revised fees have been introduced. Those for student members and members in developing countries remain unchanged, and have remained unchanged since the founding of AURA. Journal subscription increases to $A20.00 per annum, full membership to $A25.00; for overseas air mail delivery add $A8.00 in either case.

While these increases are regrettable, readers are reminded that AURA has been substantially subsidised by the editor since inception (and continues to be so, primarily because large numbers of copies of *RAR* are being sent free to researchers in economically depressed countries), and that *RAR* remains by far the cheapest major archaeological or anthropological journal published in the world that is not funded by a government agency (with the exception of *The Artefact*, which is also produced by the AURA editor). *RAR* contains between 170 000 and 190 000 words per annual volume, and is therefore also the largest archaeological journal in Australia. At 9000 words per $A, *RAR* still costs only about one third of the price of comparable refereed journals in Australia.

IFRAO Report No. 10

MINUTES OF THE THIRD BUSINESS MEETING OF IFRAO
Cairns, Australia

The Third Business Meeting of the International Federation of Rock Art Organisations (IFRAO) was held on the evenings of 1, 2 and 3 September 1992, in Lecture Theatre 3 of the Hilton Conference Centre in Cairns, north Queensland. On 1 September, an open consultation had been announced, which could be attended by any delegate of the Second AURA Congress, providing a forum for raising and discussing matters concerning the discipline. However, the attendance of this meeting was adversely affected by the considerable popularity of the public lectures (J. Clottes and P. Bahn) coinciding with it. The meeting was adjourned with only one recommendation: such events should in future be timed so as not to coincide with predictably popular academic sessions. The Business Meetings on the following two days were closed sessions, attended only by Official IFRAO Representatives.

PRESENT:

Ken Hedges (ARARA); Dr Jean Clottes (ARAPE and Ariège-Pyrénées); Robert G. Bednarik (AURA, Chair); Dr Mila Simoes de Abreu (proxy, CeSMAP); Prof. Osaga Odak (EARARA, and proxy, SARARA); Dr Michel Lorblanchet (Groupe de réflexion); Nobuhiro Yoshida (JPS); Maurice Lanteigne (RAAC); Prof. Jaek Steinbring (RAAM); Prof. Chen Zhao Fu (RARAC); Dr Giriraj Kumar (RASI); María Mercedes Podestá (CIAR-SAA, and proxy, SIARB); Ludwig Jaffe (Le Orme dell'Uomo) and Prof. B. N. Saraswati (observer, Indira Gandhi National Centre for the Arts). Consequently, sixteen of the twenty-one member organisations were represented.

1. APOLOGIES

Prof. Ben K. Swartz (ACASPP); Mario Consens (CIARU); Prof. Herbert Nowak (IC).

2. PREVIOUS MINUTES

Minutes of the Cathedral Peak meeting in 1991 as reported in *RAR* (9: 158-61) and other affiliated journals were taken as read, and were accepted with three very minor modifications.

3. MATTERS ARISING

Additional matters arising from the previous Minutes are reported regularly in affiliated journals.

4. REPORTS BY REPRESENTATIVES

Several reports were given by Official IFRAO Representatives, and it was decided that such presentations should be more formalised in the future, and made generally accessible. It was agreed that member organisations should each prepare short reports, of up to 500 words, on their recent and current activities. M. S. de Abreu proposed to publish a book of about 200 pages, summarising the work of IFRAO members: their activities and organisational work, education programs and specialist courses, research conducted, publications produced etc. [It is noted that brief activity statements by six members are contained in the minutes of the 1991 meeting, Item 6 (*RAR* 9: 158-9).]

5. EXCHANGE

5.1 G. Kumar reiterated the role of IFRAO as an information exchange network, and proposed that all members should automatically send their publications to all other members. The postage costs were queried, but it was argued that many members already adhere to this system, which has the very considerable benefit that each member receives all the publications of the others in return.

5.2 Discussion established that the earlier proposed waiving of copyright among members, for texts of up to 1000 words, is confirmed. Consequently all members may reprint short published texts by other members without having to obtain permission, provided they acknowledge the source of the material. However, for longer articles and research papers, the permission of the authors would be required. Such arrangements are to be encouraged, especially for the purpose of producing translated versions of existing work. In such cases the journal that originally published the material still needs to be contacted concerning copyright releases.

6. NEW MEMBERS

J. Steinbring moved that matters concerning the approval of new members be given priority, and that Argentina be assured to be considered in this session. K. Hedges, N. Yoshida and M. Lanteigne requested clarification of the status of the CIAR-SAA, which was explained by M. Podestá, and after establishing that nomination referred only to the rock art organisation within SAA (Sociedad Argentina de Antropología) and some debate of IFRAO membership conditions, it was *moved* that CIAR-SAA be accepted as a member of IFRAO.

Moved: ARARA; Seconded: RAAM; *Carried.*

7. NEW BUSINESS

7.1 G. Kumar raised the possibility of introducing a two-year probationary period for new members of IFRAO. J. Steinbring proposed that selection should be in sufficient depth so that we would not have to have a probationary period, and we should have sufficient confidence in candidates before we elect them as members. While the motion had the support of some members, others argued against it. In response to the view of G. Kumar and O. Odak, that observance of ethics needs to be monitored, M. S. de Abreu pointed out that adherence for a limited period does not necessarily guarantee continued adherence, and that we must distinguish between organisations and their individual members. G. Kumar cited the example of a European member of IFRAO, whose executive committee members are said to continue conducting unethical recording methods in India. A mechanism of addressing such matters needs to be developed within IFRAO, and the issue of research permits was considered. L. Jaffe and J. Clottes suggested that the organisation concerned be asked to respond to the claims by the Indian scholars, and J. Clottes emphasised that the actions of individual members should not be held against organisations they are members of. It was *moved* that a letter be sent to the senior officer of the organisation in question, expressing concern and asking for clarification.

Moved: ARAPE; Seconded: ARARA; *Carried.*

7.2 The proposal of the Indira Gandhi National Centre for the Arts in New Delhi to host an IFRAO Meeting in late 1993 was debated, bearing in mind that no proposal had been received from an IFRAO member for that year. The proposal had strong support from some delegates, and K. Hedges queried whether there were any restrictions excluding nomination of an event by a non-member. R. Bednarik suggested that we should be guided by what was considered in Darwin in 1988, and J. Steinbring pointed out that the principal consideration was to support whatever would enhance the exchange of information. G. Kumar suggested that a RASI Meeting be held as part of the New Delhi

proceedings. After consultation with B. N. Saraswati and detailed discussion, it was *moved* that an IFRAO Meeting be held in New Delhi at the end of November 1993.
Moved: ARARA; Seconded: RAAM; *Carried.*

7.3 K. Hedges asked what the status of the IFRAO constitution was. A draft constitution has now been published (*RAR* 9: 160-1), subsequent to the deliberations at the Cathedral Peak meeting, and proposals concerning it have been invited from IFRAO Representatives.

7.4 O. Odak raised the subject of organisations composed of researchers conducting work in continents other than those they reside in. J. Clottes argued that IFRAO members are not necessarily national organisations, and that their individual members may work in a variety of regions. This led to a discussion of sizes of member organisations, their spheres of influence, and political considerations. It was observed, however, that ultimately it is the IFRAO executive which accepts or rejects candidates for membership.

7.5 L. Jaffe presented arguments in favour of accepting the bid by CeSMAP to site the 1995 IFRAO Meeting in Pinerolo-Torino, Italy. The proposal had good support, but O. Odak expressed concern that the event will coincide with a major archaeological meeting in the same region, and feared that this could have adverse effects. Debate showed, however, that delegates are confident of the discipline's strength and perceive more potential benefits than disadvantages from such concurrence.

8. GENERAL

The experience of the previous IFRAO Meeting had shown that future meetings should be conducted in the form of short sessions of several hours per day, rather than in one long session. This had been taken into account in planning the Cairns event. However, only one third of the items on the Agenda were actually discussed, and it became clear that future business meetings need to be timed so that they will not compete with any other sessions or lectures, i.e. they need to take place on the day(s) immediately before or after the proceedings of the host event.

9. ADJOURNMENT

The meetings were adjourned at 8.30 p.m. on 3 September.

Robert G. Bednarik
Secretary, AURA

RAR 10-2B1

THREE NEW MEMBERS OF IFRAO

At its 1992 Annual General Meeting, the Association des Amis de l'Art Rupestre Saharien (AARS) has unanimously decided to apply for IFRAO membership. The submission has been placed before the IFRAO Representatives, and the fourteen ballot papers so far received all support the admission, therefore a majority vote is assured, and AARS becomes the twenty-second member of IFRAO.

The new member specialises in the study of Saharan rock art, its conservation, and exchange of information about documentation and events related to Saharan rock art. The Association's constitution emphasises that 'membership implies commitment to personal respect of, and, as far as it is possible, prompting other people to respect, the archaeological heritage of Saharan countries'. The executive board is democratically elected, with terms of office limited to one or two years. There are no restrictive or discriminatory membership rules.

AARS was founded in 1991, with an initial membership of 184, and publishes a newsletter in French. The contact address is:

Association des Amis de l'Art Rupestre Saharien
Alfred Muzzolini (President)
7, rue J. de Rességuier
31000 Toulouse
France

The establishment of the Associaçao Portuguesa de Arte e Arqueologia Rupestre (APAAR) had been foreshadowed by its founders, Dr Mila Simoes de Abreu and Ludwig Jaffe, at the Cairns congress. It has recently become a reality, with an initial membership of over fifty, and the new organisation immediately sought IFRAO affiliation. The constitution of the Association declares it to be a non-profit organisation dedicated to interests concerning rock art, including teaching, research and protection. It has a democratically elected executive and membership is open to all. Working groups have already been formed in several universities in Portugal. The first issue of a newsletter has been produced, and a lecture series by international speakers has been initiated. One of the priorities of APAAR is to compile a detailed rock art inventory of Portugal, a small country with a substantial rock art heritage that extends back to the Palaeolithic period. A specific aim, reflecting an admirably strong commitment by the executive committee, is to eradicate physical enhancement recording methods in Portugal.

The preliminary result of a postal ballot is: thirteen votes received, twelve for acceptance, one abstention. Consequently APAAR becomes the twenty-third member of IFRAO. The contact address is:

Associaçao Portuguesa de Arte e Arqueologia Rupestre
Dr Mila Simoes de Abreu (Chairperson)
Av. D. José I, n. 53
2780 Oeiras
Portugal

Another very recent application for IFRAO membership is from the Centar za Istrazuvanje na Karpestata umet nost i Praistorijata na Makedonija (Rock Art Research Centre of Macedonia). The society's members are elected democratically, it has non-profit status as a scientific organisation, and there are no restrictive membership rules. The President is Professor Dusko Aleksovski, and his application was accompanied by a supporting letter from the Minister of Science of the Republic of Macedonia, Dr A. Selmani. It had been submitted and vetted by Professor Dario Seglie, the IFRAO Representative of Italy, who reminded fellow members that 'our acceptance will be important, especially in this time when the young Macedonian Republic (formerly part of Yugoslavia) is asking for, and going to receive, international approval'.

The preliminary result of the postal ballot suggests that the IFRAO members have heeded Dario Seglie's words: thirteen votes received so far, all of which approve the nomination. Consequently the Macedonian Centar becomes the twenty-fourth member of IFRAO. We take this opportunity to wish the young Republic of Macedonia well for the difficult times it faces. The contact address of the new member is:

Centar za Istrazuvanje na Karpestata umet nost i Praistorijata na Makedonija
Professor Dusko Aleksovski (President)
91320 Kratovo
Republic of Macedonia

ADDRESSES OF IFRAO REPRESENTATIVES

The number of IFRAO members has grown rapidly, and in order to facilitate correspondence and the exchange of publications as per IFRAO policy, an updated and complete list of the current IFRAO Representatives is provided below. Three new members are listed above, bringing the total of rock art organisations affiliated with IFRAO to twenty-four. They are essentially the twenty-four largest and most active rock art societies in the

world, and they include in their combined memberships virtually all scholars active in this discipline.

Professor B. K. Swartz, Jr
American Committee to Advance the Study of Petroglyphs and Pictographs (ACASPP)
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Alice J. Bock
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U.S.A.

Dr Jean Clottes
Association pour le Rayonnement de L'Art Pariétal Européen (ARAPE)
11, rue du Fourcat
09000 FOIX
France

Robert G. Bednarik
Australian Rock Art Research Association (AURA)
P. O. Box 216
CAULFIELD SOUTH, Vic. 3162
Australia

Mario Consens
Centro de Investigación de Arte Rupestre del Uruguay (CIARU)
C.C. 18.007
MONTEVIDEO
Uruguay

Professor Dario Seglie
Centro Studi e Museo d'Arte Preistorica (CeSMAP)
Viale Giolitti, 1
10064 PINEROLO (TO)
Italy

Lic. María Mercedes Podestá
Comite de Investigación del Arte Rupestre de la Sociedad Argentina de Antropología
Av. Santa Fe 983, 4 piso A
1059 BUENOS AIRES
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East African Rock Art Research Association (EARARA)
Archaeology Unit
University of Dar Es Salam
P.O. Box 35050
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Gesellschaft für Vergleichende Felsbildforschung (GE.FE.BI.)
Geidorfgürtel 40
A-8010 GRAZ
Austria

Dr Michel Lorblanchet
Groupe de réflexion sur les méthodes d'étude de l'art pariétal paléolithique
Chargé de recherches au CNRS
46160 CAJARC
France

Dr Shyam K. Pandey
Indian Rock Art Research Association (IRA)
C/79, Gaur Nagar University
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Professor Herbert Nowak
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Postfach 48
A-5400 HALLEIN
Austria

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Japan Petrograph Society (JPS)
P. O. Box 11
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Japan

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Professor Chen Zhao Fu
Rock Art Research Association of China (RARAC)
Central Institute for Nationalities
100081 BEIJING
P. R. China

Dr Giriraj Kumar
Rock Art Society of India (RASI)
Faculty of Arts
Dayalbagh Educational Institute
DAYALBAGH, Agra 282 005
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Roy Querejazu Lewis
Sociedad de Investigación del Arte Rupestre de Bolivia (SIARB)
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COCHABAMBA
Bolivia

Ludwig Jaffe
Società Cooperativa Archeologica Le Orme dell'Uomo
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25040 CERVENO (Brescia)
Italy

Dr Jean Clottes
Société Préhistorique Ariège-Pyrénées
11, rue du Fourcat
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Shirley-Ann Pager
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PARKHURST 2120
South Africa

NOTES FOR CONTRIBUTORS

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

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

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

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

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Bradshaw anthropomorphs with detailed tassels from headdresses, elbows and waists, and a splayed-neck dilly bag. Red-brown paintings, top figure 113 cm, Kimberley, Australia.
(Refer to article by D. Welch, Figure 8, page 24)