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The known cave art of South Australia

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Abstract. South Australia is the cave art-richest state of Australia. So far, two concentrations of rock art occurring in limestone caves have been recorded, one on the Nullarbor Plain in the state's west, the other on the Mt Gambier karst in the far south-east. Both cave art regions extend into the two adjoining states, Western Australia and Victoria. The Mt Gambier corpus represents one of the two largest concentrations of cave art known in the world. The history of the discovery of South Australian cave art is presented, together with a brief evaluation of the research so far conducted and of its results.

The term 'parietal art' has been queried with me several times and it seems appropriate to begin this essay by qualifying it. The word 'parietal' has several meanings pertaining to the wall of a cavity, but in the sense it is used in rock art research it refers to the pre-Historic, consciously modulated, human markings on the walls and ceilings of caves, particularly deep limestone caves. *L'art parietal* of western Europe has until the 1970s remained the only Pleistocene art tradition that provides evidence of a pre-Historic preference for deep caves, but the former existence of a second such tradition has been established in Australia in the last few decades.

Archaeologists and others sometimes misuse the term 'cave art' to describe paintings in rockshelters and overhangs, and some writers have applied the expression 'parietal art' to virtually all painted rock art. The use of this colloquialism is not acceptable in a scientific context. Up to one half of the world's painted rock art occurs on vertical or only slightly concave cliff faces, while most of the remainder is found on the underside of loose boulders or in rockshelters, such as are frequently formed in granites and sandstones by granular and mass exfoliation processes. True caves are found almost exclusively in carbonate rock, predominantly limestone, and are usually formed by a combination of tectonic and solution processes. The distinctive feature of caves is that they possess a speleoclimate, and a speleofauna — in short, a parietal environment. Most non-troglobite animal species (troglobites are the species that live wholly and permanently in the dark zone of caves), including in many cultures man, find this a threatening environment, one they are loath to enter, and ethnographic evidence throughout the world indicates that indigenous peoples often shun caves.

Deep caves feature prominently in their myths, as the abodes of a multitude of malignant spirits or beings, and Australia is no exception. The reluctance of the Aborigines to enter caves, sometimes even deep rockshelters, is attributable to a mythology describing them as the dwelling places of sorcerers, witches, rainbow serpents and other creatures.

It was therefore not surprising that Australia seemed to be quite devoid of cave art, and there was no incentive in searching for something one knew could not be there. Nearly all the studies done on Australian rock art up to the mid-1960s were tied firmly to iconology and ethnographic interpretation — an approach that is still claimed by many researchers to be valid for rock art research. Little thought was given to the time depth rock art might possess (as, conversely, has been the case in North America right up to the 1980s). Lane and Richards (1966) mentioned the occurrence of hand stencils in four caves of the Nullarbor Plain, Murrawijinie Number 1 and Number 3 Caves, Knowles Cave and Abrakurrie Cave, as the only known Australian examples of what could reasonably be described as cave art (Fig. 1). Two more hand stencils were more recently located in Old Kudardup Cave, in the south-west of Western Australia (Morse 1984). But in nearly all cases these paintings are located close to the entrance of the cave in question, well within the reach of daylight. While these hand stencils are of considerable interest they do not constitute evidence of a major art tradition that, like that of the Franco-Cantabrian region of Europe, has survived only in limestone caves. Hand negatives are a very common feature in Australian rock art, and occur in fact in all states though they are rare in Tasmania and South Australia. Neither are they any proof that their makers regularly undertook



Figure 1. Ochre hand stencil in Abrakurrie Cave.

long and arduous underground journeys, as the artists of the Upper Palaeolithic of Europe certainly did. On the contrary, the Australian evidence published prior to 1968 suggested that the pre-Historic Australians never ventured beyond the safety of daylight. The concept that they could ever have engaged in systematic subterranean treks, be it for economic or ritual purposes, was quite alien to Australian archaeologists.

Koonalda Cave

It should therefore have come as no surprise to Alexander Gallus that there was no shortage of scepticism when he announced in 1968 that extensive wall markings found in Koonalda Cave up to 300 metres from the entrance and in complete darkness (Fig. 2), were made by humans during the Pleistocene (Gallus 1968, 1971). They had been found by A. Hunt in 1957. Gallus likened the finger markings to those known from French and Spanish caves, which are believed to often predate the earliest figurative art there, and he reported extensive evidence of chalcedony mining from the general vicinity of the markings. Many objections were raised against his first and subsequent reports. Alternative explanations for the finger and abrasion marks included that they had been produced by bats or owls; that they could have resulted from the sharpening of bone points; that they

are dissected solution tubes, or, alternatively, surface solution grooves. Even if they are of human origin, it was argued, they could have been made by recent visitors, or produced accidentally by people marking the soft walls with their fingers as they groped their way in the dark.

I must point out, risking the accusation of being wise in hindsight, that some of these alternative explanations border on the absurd. Limestone solution grooves (they are called Karren) cannot be formed in a parietal environment (vadose water is as a rule saturated with solute); solution tubes are easily recognised, and are very rare in Australian caves (we have observed them in only two caves out of the nearly 300 we have examined); the relative hardness of the Tertiary limestone wall in Koonalda Cave hardly exceeds 2 on the Mohs Scale, which would not have much effect on bone points; and the cave markings bats and birds are capable of producing, although extremely numerous throughout the world, differ significantly from finger marks (Bednarik 1991).

After studying these human markings from 1959, Gallus came to the conclusion that they must be pre-Historic, and of quite considerable age. His daring claims of 1968 followed a series of expeditions, and his perseverance led to a major investigation of the cave in 1967. R. V. S. Wright's expedition confirmed not only that the wall markings are indeed human, that they had been intentionally produced and they occur amidst extensive evidence of pre-Historic chert mining, it also confirmed that this use of the cave appeared to be restricted to the Pleistocene. Wright (1971a: 28) concluded from the results of his excavation that traces of human activity are present from roughly 22 000 to 15 000 bp. He suggests that Gallus' date of $31\ 000 \pm 1650$ presents a discrepancy in the stratigraphy, but I believe that the dating of the Koonalda sequence as a whole can only be taken as tentative in any case, and it would therefore be premature to omit any of the dates because it appears incongruous.

It should be emphasised that all carbon-14 dates reported by Wright are in fact incompatible at one standard deviation. Two different horizons yielded identical dates, whilst no two dates from any supposedly single stratum overlap within their errors. ANU-148 is dated some 2500 years younger than ANU-245, despite having been recovered 4.3 metres lower than the latter. Worse still, the 31 000-year-old sample was collected less than two metres below the surface, whereas a 19 400-year-old sample came from nearly six metres below the surface. Finally, V-92 is from a surface deposit in front of the Squeeze and Wright suggests contemporaneity of the wall markings and the carbon-14 sample. Curiously he states that this $19\ 900 \pm 2000$ -year-old charcoal 'was possibly European in origin, alternatively it was genuinely prehistoric', and he mentions that traces of decayed wood were also observed at the sample's collecting

site. Gallus reports a similar date ($21\ 200 \pm 700$) from surface-near strata in the vicinity of the Squeeze, and in a later paper mentions remnants of a torch, collected from a surface clast in the decorated passage; this is of a similar age (Gallus 1977: 374-5).

However, it is quite clear that the pre-Historic finger markings in Koonalda Cave were executed well before the cessation of the major tectonic adjustments to the profile of the Art Passage, and these major roof falls appear to precede the last-mentioned dates. It is also plausible that surface finds such as torch remains could mark some of the most recent human activity in a particular part of the cave. I consider Koonalda Cave to have a speleogenetically complex history, as have most large cave systems, and I believe that the wall markings can be related to tectonic phases, but not directly to charcoal found in the sediment deposits. Not only do large caves usually have such intricate and irregular stratigraphies that these are often of little archaeological use, most of the detritus in this cave consists of loosely packed boulder screes. The percolation of small material through the large openings in these deposits is well illustrated by Sharpe (1982: 21) when he reports how an exposed film fell down between the clasts. It could be seen among the rocks, some of which were removed until 'a thin person' was able to retrieve the film, only to find a panel of engravings some four metres below the floor. Had the film been left where it had fallen, some archaeologist might have found it, perhaps 3000 years hence, and she would have advanced it as indisputable evidence that these engravings were made in 1976. So much for the stratigraphy of Koonalda Cave, and for the reliability of the archaeological evidence so far available. It should be obvious that the greatest restraint must be exercised when interpreting the archaeological stratigraphy of such a site.

Let us briefly examine the evidence as it has been presented so far. The red sediment unit clearly shows that the Gallus Site was inundated during the late Pleistocene. The well-graded, compact beds of this unit were deposited by a slow-flowing stream (Frank 1971: 42-3). They have certainly remained undisturbed, whereas the white unit above them, consisting chiefly of autochthonous breakdown, becomes loose with increasing depth. One could therefore argue that stratigraphically, the most reliable of the carbon isotope 'dates' are those recovered from near the bottom of the red unit (ANU-244 and ANU-148). It seems impossible that they could have percolated down through the deposit. The more recent of the two samples is fairly conclusive proof that deposition of the lower part of the red unit was in progress, or commenced some time after 20 000 years BP — un-



Figure 2. Finger flutings in the Art Passage, Koonalda Cave.

less the sample is contaminated. The fairly great age difference between ANU-148 and ANU-244 suggests that these are composite samples — made up of fragments of varying ages. This is confirmed by Wright's description of the samples (Wright 1971a: 26). Thus the reported ages represent perhaps sample averages rather than actual ages, which means that the younger of them is the more reliable, that it is in fact a maximum age for the thin band of silt it came from, and that this band is in all probability younger than 19 400 years.

This invalidates at once the stratigraphical reliability of most of the dates from the overlying white sediment unit, not just V-82. Especially those from the 'bottom fire' are clearly disparate. Despite Wright's description as a 'hollow which had been dug into the red sediments' I find it more plausible to see in this 'very strongly defined mass of charcoal and ash' an accumulation of lighter material that was washed up by the stream in a hollow scooped out by the water. Alternatively, the lower part of the white unit in the vicinity of the excavation site could be an earlier deposit that had been standing above the water, and had collapsed after undercutting by the stream, thus burying the more recent deposit. This is made plausible by Frank's (1971: 42) assumption that Trench III is within a metre or two of where the edge of the pond was. But the presence of three very disparate radiocarbon results in a single charcoal stratum tends to support my first interpretation more than the second.

My reasoning concerning the white unit is of course pure conjecture, but it is not as far as the red unit is concerned, since there is no credible counter argument to it. Thus we have the following scenario:



Figure 3. Chert mining in Gran-Gran Cave, Mt Gambier. The limestone has been removed with long wooden wedges, whose traces are visible on the upper left, to gain access to the horizontal chert seam.

around 20 000 years ago, or soon after, a lake formed and the water rose to above Gallus's Site. We do not know how deeply the access to the Art Passage was submerged but it is quite likely that human access to it was no longer possible. Interestingly, we have observed above that surface remains, such as those of a presumed torch, may well be related to the most recent use of the art area, and those remains are also in the order of 20 000 years old. It would not seem too far-fetched to propose that human traffic to the Squeeze area ceased around that time, due to the rising water level. The final major roof falls in the Art Passage could quite possibly also be related to the appearance of the stream. According to this interpretative model the events around 20 000 BP would be terminus ante quem for the finger markings and would not, as is widely assumed, date the art. Such a minimum dating would favour the view propounded by Gallus, that human occupation of the cave extends considerably beyond 20 000 BP.

It is not my intention to advocate here one interpretation or the other, I merely wish to show that there are alternatives to the archaeological model favoured by Wright, and that at least one of them is more plausible. The site has been the subject of controversy ever since Gallus, in the face of very considerable opposition, advanced his views of its scientific significance. His more important postulates have been confirmed by Wright's expedition, only his typological description of the chalcedony assemblage found in the cave has been repudiated by Wright. Gallus utilised European terminology to describe implement types he believed to be present, while Wright interprets the entire corpus as quarrying débitage and 'blanks', which were to be taken elsewhere for refinement. While Wright's interpretation is probably correct, his arguments highlight an interesting dilemma inherent to 'stone-and-bone-archaeology'. He mentions the diffusionist implications which the

use of a foreign terminology may involve. If Gallus were to have responded by insisting that a spade should always be called a spade, irrespective of where it is found, I would have to agree with him. I am well aware of the phobia most Australian archaeologists experience towards any unfamiliar concept. In this case, the impasse is of course complicated by one more circumstance: Wright and Gallus disagree on what a spade is.

The reliance on tool types for identifying archaeological units in time and space is a fundamental limitation of the discipline of ecological pre-History. But Moustierian-type handaxes are no more cultural markers than are spoons,

chopsticks or computers. Wright accepts the pragmatics of Gallus' descriptive procedure elsewhere (Wright 1971b: 111), but still emphasises that he has seen none of the types listed by Gallus, in the lithic remains excavated in Koonalda Cave. This questions the validity of the implement types themselves, their acceptability as a descriptive device. An objective observer — assuming they exist — would be justified in summing up the situation by generalising: ecological pre-Historians use inadequately defined mental templates of implement types to identify what could not even be defined by readily identifiable types.

Wright's interpretation of the lithics from Koonalda Cave could have been substantiated easily. If the mined raw material had been taken out of the cave for reworking, the typology at these working floors should reflect the tool industries of the people who mined the chalcedony. Wright (1971b: 112) even mentions 'the more conventional archaeological debris of these people', and it was actually the presence of the large artefact deposits in the vicinity of the entrance sinkhole that had initially prompted Gallus to explore the stratification within the cave. Wright does not report any details of these external assemblages, which means that he has presented only one half of the evidence required to verify his interpretation of the chalcedony industry excavated in Koonalda Cave.

There are several other difficulties with the investigations of Koonalda Cave, and the way their results have been presented. One of them is of interest in the present context. Sharpe and Sharpe (1976) describe sets of sub-parallel scratch marks on boulders within the Art Passage and assume that these are also man-made. These markings have been drawn with a multi-pronged instrument that possesses up to four sharp points and some flexibility in the spacing of these points. Kevin Sharpe has given these boulder markings much attention, and attempted to study

them in the same way as Marshack (e.g. Marshack 1977) has analysed streams of linear incisions in pre-Historic European art (Sharpe 1982).

Having studied animal markings in hundreds of caves, in all continents except Antarctica, I find it disappointing that the publications on Koonalda Cave make no mention of the animal scratches within the cave. These are very numerous along the walls of the cave, especially commencing from the threshold of daylight. They generally reach to about 1.5 metres height, which indicates that those presently visible are more recent than the huge roof falls that have taken place. Many of the boulders are also marked by incisions, and it should be noted that they are now part of the uppermost, and thus most recent level of the talus. Since the finger flutings in the same area clearly precede the most recent rock falls, and are probably very much older than these, it follows that the markings on the clasts cannot be contemporary with the finger lines. Thus, if the boulder scratches were the result of human activity, it would in any case have to be attributed to a different occupation than that which caused the extensive finger flutings. However, the boulder markings include no configurations or groove characteristics demanding a human origin. They closely resemble marks I identify as mammal scratches elsewhere, and I would in fact find it remarkable if, of all the suitably endowed caves, Koonalda Cave would be the only site lacking animal scratch marks. Also, a human involvement should only be propounded if a natural origin can be ruled out with confidence. In my view, this has not been proven here. On the contrary, the location, arrangements and appearance of the marks render an identification as markings by non-troglobite animals more plausible. The subject of parietal animal markings has been discussed in considerable detail elsewhere (Bednarik 1991, 1994a, 1998a).

In more recent years, Sharpe (2004) and Sharpe et al. (2002) have sought to reopen the discussion of the status of the floor boulder markings in Koonalda Cave and to find new ways of investigating parietal finger flutings. Sharpe has extended this work to Europe, and has especially subjected those in Rouffignac Cave to detailed study. This has vindicated the methodology developed in Australia, but there is still a great deal of research required in this field (Sharpe and Van Gelder 2006).

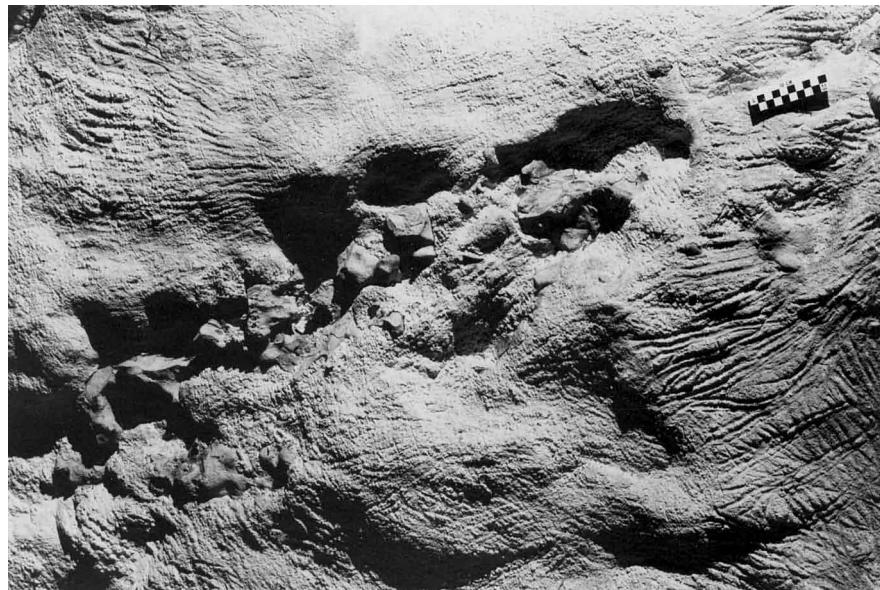


Figure 4. Traces of chert mining among finger flutings, Karlie-ngooinpool Cave, near Mt Gambier.

The Parietal Markings Project

It follows from the aforesaid that the controversies concerning Koonalda Cave remain unresolved, and I should mention that I have not raised all of the contentious matters. I have limited my discussion to matters I perceive as relevant to the petroglyphs in the cave, and to their chronological position.

At the same time, I have outlined the differences of opinion, and hinted at their reasons. Essentially, two opposing opinions on the subject of Australian cave markings have emerged over recent decades:

1. Some researchers have rejected the artefact status of most, if not all cave markings. If they accept any of them as humanly-made, such patterns are still claimed to be devoid of any cultural significance.
2. Another school of thought takes the precisely opposite view. Cultural meanings, including very sophisticated ones, are attributed to most or all cave markings, and some exponents of this extreme position are reluctant to accept the existence of natural cave markings altogether.

That such a polarisation of opinions should develop on such a simple subject is quite amazing, and it can be said that some of the protagonists have advocated their respective opinions with considerable fervour. The difficulty of distinguishing consciously-fashioned, non-iconic rock markings from natural or accidental marks has a parallel in archaeology, it is rather similar to the vexed question of distinguishing naturally from culturally fractured flints.

Through my early work on the Olschewian, a poorly-known tool industry in central Europe which seems to have witnessed the emergence of the Upper Palaeolithic, I had in the early 1960s become interested in the subject of the intellectual changes in



Figure 5. Finger flutings in Karake Cave, heavily modified by subsequent calcite reprecipitation in the form of pearly growth.

hominids just prior to the Aurignacian period, which supposedly led to the advent of art, mass production of blade tools, and other developments that are considered to be typically Upper Palaeolithic innovations (White 1982). This resulted in a commitment to the study of the most archaic rock art. By the mid-1970s I began to appreciate the necessity of developing expertise in distinguishing natural from artificial markings, and I also realised that the scientific acceptance of archaic rock art would suffer if debate about authenticity was allowed to dominate the subject.

I had observed animal markings in numerous caves already – in Europe, where I had studied the often enormous accumulations of cave bear scratches (Bednarik 1993a), as well as in a series of Australian caves. When the discovery of finger lines and other marks in a cave near Buchan, Victoria, was announced in 1977 I decided to examine sub-parallel ceiling marks in Orchestra Shell Cave, north of Perth, which Professor Sylvia Hallam had earlier described as having been made by people using hand-held animal claws (Hallam 1971). Expecting to find true animal marks, I was surprised to find in 1978 that most of these markings had been made with fingers, and that these finger flutings had later become distorted by the deposition of re-precipitated limestone (Bednarik 1986a). I realised at once that this discovery made it highly probable that similar sites exist in other parts of Australia, and I also realised that the parietal finger markings of Australia should be studied together with those of western Europe, because they could no longer be considered as a local phenomenon. It was astonishing that four decades after the 1957 discovery of human finger lines in Koonalda Cave, no one besides myself has bothered to compare them with those of Europe. Nor, for that matter, has anyone outside the Parietal Markings Project seen more than

two of these sites, with the exception of Marshack who has studied some of the European sites, and possibly some French scholars. By the mid-1980s, I had studied nearly all thirty-two then known sites of the world's most archaic rock art, yet when I requested access to New Guinea 2 Cave at that time, Peter Coutts politely declined, because the site was being subjected to 'specialist study'. (My special thanks here to Paul Ossa who then invited me to examine the cave.)

It concerned me initially that all Australian descriptions of 'unexplained' cave markings have been written by investigators who have only studied one single site, or two similar sites in the same area, of either anthropic or animal-made marks. Examples are Walsh (1964),

Gallus (1968), Maynard and Edwards (1971), Hallam (1971), Sharpe and Sharpe (1976), Sharpe (1982) and Gunn (1982). Excepting Gallus, none seemed familiar with the bulk of the relevant overseas literature (which is not in English). All these enquiries were therefore carried out in isolation, each researcher describing a phenomenon they had never encountered before. Yet not one of the dozens of known sites of parietal finger lines is typical of the phenomenon of pre-Historic finger flutings, and of the considerable variety of modification processes they have been subjected to (Fig. 5). There are subtle differences between all these sites. To complicate matters, none of these authors appears to have been conversant with the nature or behaviour of parietal travertine, or with the influence a cave environment could have on the object of their studies. This is borne out by the fact that only Hallam identified the *Montmilch* (or *Mondmilch*, *Bergmilch* or moonmilk) medium correctly, while others described it variously as ochre, clay or limestone powder (they are not alone in this, their French and American colleagues also habitually describe the medium as clay, which is quite unacceptable; cf. Bednarik 2000).

The medium's secondary calcite nature was not realised, preventing researchers from capitalising on its archaeologically significant quality of being datable, by three archaeometric methods (Bednarik 1998b, 1999). In fact, Sandra Bowdler managed to convince me that most Australian archaeologists are completely unfamiliar with the subject of limestone precipitate formation and are poorly equipped to deal with karst phenomena. Perhaps Collcutt (1979: 295) should have refrained from calling this a 'ferociously complicated subject'.

Foreseeing the complications that were likely to arise I began in 1978 in earnest what soon became

the Parietal Markings Project. I selected as its points of reference, apart from reviewing certain Australian hypotheses, the following general aims: to demonstrate that man-made incisions and similar markings by animal or geological agency can be distinguished; to introduce new methods for dating rock art; and to evaluate the merits of various interpretations of parietal finger flutings (Bednarik and Bednarik 1982).

To decide upon a course of action I applied the following reasoning: the three Australian sites of finger lines I knew to exist in 1979 occur in three of the four limestone regions in southern Australia, the Tertiary ridges in the far south-west, the karst plain of the Nullarbor, and the Devonian limestone cliffs at Buchan, near the south-eastern tip of the continent. It was obvious that the Mount Gambier district, another Tertiary limestone karst, warranted detailed examination. This area possesses more caves than the other three and I recalled that the caves I had seen there earlier contained extensive animal markings. I resolved to combine a long-term study of this region with a reinvestigation of the known parietal finger line sites of Europe.

Obviously such a major research effort would not have been warranted just by the desire to gain confidence in recognising cave petroglyphs — I had other motives too. Most importantly, the finger lines in Europe had long been considered to be older than any other rock art. But apart from this relative dating, European archaeologists remained undecided about these markings, and how to study them. Their purpose or meaning remained completely obscure and primarily for that reason they were often ignored. Only after Marshack claimed that they form the most sophisticated and important element of the cave art have scholars begun to pay them some attention.

If it could be established that the Australian finger flutings also precede most other forms of surviving art, I reasoned, it might be a clue to the way the human intellect evolved during the mid to final Late Pleistocene. Quite obviously a direct, cultural connection between the finger marking traditions of France and Australia is highly unlikely, so we would have to assume a parallel evolution at two opposite sides of the globe which, furthermore, represented the two extreme ends of the territory we know to have been occupied by humans at the time anatomically modern man is said to have appeared (but see Bednarik 2007). The processes involved in this evolutionary step seemed important enough to warrant detailed consideration of these fossilised behavioural traces.

My initial strategy was to not accept any cave markings as human unless a natural origin could be conclusively ruled out. There was no methodology available for such systematic discrimination and I had to improvise techniques as I proceeded. Late in 1980, during reconnaissance along the coast near Mount Gambier, I located two caves south of Kongorong (Fig. 6). Malangine and Koongine Caves, as



Figure 6. Hand-like petroglyph in the first-discovered of the Mt Gambier cave art sites.

I named them (Bednarik 1994b), were subjected to an intensive, but certainly unorthodox investigation. Some of the techniques and instruments we employed had never been used before in Australia, and when I submitted a report in 1981 I found that it could not be published because Australian archaeologists were unaccustomed to both my terminology and methodology. I found myself in a Catch-22 situation: without being able to establish the significance of the find I could not demonstrate the relevance of the methodology. Without being able to persuade the hostile archaeological establishment that parochial adherence to an established set of variables was not conducive to new ideas, I could not convince them to give them any thought.

My thorough reinvestigation of the French sites in 1981 and my formulation of the Phosphene Theory at about the same time provided much impetus to the project (Bednarik 1984a, 1984b). With my wife Elfriede I embarked on a program of locating and examining further caves in the Mount Gambier region, which remained unsuccessful for two years. Although we found literally millions of animal scratch marks in the numerous caves we examined, we were unable to locate one single marking that could be identified as man-made. I began to suspect that we had just been incredibly lucky in finding the markings in Malangine and Koongine Caves and that,



Figure 7. Petroglyphs on the ceiling of Malangine Cave that have been the subject of the first scientific dating attempt in the world in 1980.

contrary to my expectations, there may not be any further ones in the district at all.

Early in 1983 we were contacted by Geoffrey Aslin who expressed his interest in joining the project. Being a life-long resident of the Mount Gambier area, an avid naturalist and enthusiastic caver, Aslin also has a long-standing interest in the pre-History of South Australia's south-east. He had been associated with archaeological and palaeontological work in the area, and G. Pretty suggested that he ought to join our effort. We checked a number of caves he directed us to in May 1983 and promptly located finger markings in one of them, along with evidence of chert mining. Encouraged by this success, and having become aware of what to look for, Aslin continued searching and discovered within weeks a small panel of finger markings in a cave we called Koorine Cave (Aslin and Bednarik 1984a). A combined effort then resulted in the finding of cave art at two more sites, Karake Cave (Aslin and Bednarik 1984b) and Marmine Cave. Then, with the help of his intimate knowledge of the area, Aslin discovered the still largest site of non-figurative cave art in the world, and called it Karlie-ngoinpool Cave (Aslin and Bednarik 1984c). Next, we located together a minor panel of engravings at Walnut Cave, and after that a whole series of minor and major cave art sites were found, most of them by Aslin, some with other members of the Australian Rock Art Research Association or with members of the Cave Exploration Group of South Australia.

By 2006, the authenticity of thirty-five sites of cave art has been confirmed within a radius of sixty kilometres of Mount Gambier, twenty-five within

South Australia, the others in western Victoria. While some of the rock art corpora are certainly very small, others are of most impressive dimensions, comprising many thousands of design elements. This corpus of rock art now represents one of the two greatest regional concentrations of cave art in the world, approaching in this respect the Dordogne in France (which has about forty-six cave art sites in the same area).

The Parietal Markings Project has grown from its humble beginnings to a major scientific effort (Aslin, Bednarik and Bednarik 1985; Bednarik, Aslin and Bednarik 2003). Specialist assistance had been

received from many people and organisations, in Australia and abroad. Physicists H. H. Veeh (Adelaide), M. A. Geyh (Hanover) and Y. Liritzis (Athens), geochemist T. C. Hughes (Melbourne), pedologist P. Hädrich (Freiburg), archaeologists D. Frankel and M. C. S. Godfrey (Melbourne) and speleologists K. Mott and P. Horne (Adelaide) are among the individual specialists who have contributed to provide the project with a sound scientific basis. Over the years we have enjoyed the co-operation of a variety of organisations, such as the Australian Rock Art Research Association, the Millicent Field Naturalists Society, the Cave Exploration Group of South Australia, the South Australian Heritage Conservation Branch, the South Australian Woods and Forests Department, and the Division of Prehistory at La Trobe University, Victoria.

The success of the project is already exceeding the original expectations in many areas. These were, as I have mentioned above, to achieve the ability of distinguishing artificial from natural markings; to attempt dating of the cave art; and to evaluate the merits of the interpretation attempts that have been published so far.

In response to the first demand we have attained the experience to designate almost all cave markings with complete confidence. We distinguish a great variety of natural cave markings (Bednarik 1991, 1994a), the majority of which are animal scratches. The identification of non-iconic cave markings is a complex specialist task, and should in our opinion not be attempted by a researcher who has not studied such markings in at least one hundred caves.

The dating requirement has been covered in vari-

ous papers (Bednarik 1998b, 1999) and we have located more recent art together with finger flutings at several of the sites. This has enabled us to establish that, as in Europe, pre-Historic finger flutings tend to predate any other form of consciously modulated marking strategy. This satisfied my initial research design, and although absolute dating is feasible and certainly still being pursued by us, it is no longer a priority for me.

The project's third aim has been met completely: all previously published attempts to interpret the meaning of the finger flutings have been invalidated, including those that I had contributed myself. Some were found to be too subjective, others appear tenable at some sites, but are easily refuted at others. I have demanded a more objective approach (Bednarik 1986b, 1986c) and, emulating Gallus' (1977) example of using psychological argument, and taking the view that the question of derivation had precedence over questions of 'meaning', arrived at concepts which have appeared in embryonic form (Bednarik 1984a, 1987). The scientific main purpose of the study of non-figurative cave art is to establish the underlying behaviour patterns, which are always much clearer with parietal art than with open-sites rock art, because the latter are inevitably more affected by taphonomic processes.

But in addition to being well on the way to satisfying the initially stipulated demands, the Parietal Markings Project has produced some very unexpected bonuses. The discovery of one of the world's two major traditions of cave art is attributable to it. Of the forty presently known sites of the Australian cave petroglyph traditions, thirty-seven were located in the course of this project, and a further two were only correctly interpreted by us (Bednarik 1986a). We have also added considerably to the knowledge of some of the French sites (Bednarik 1984b, 1985, 1986a). It took one hundred years and the dedicated labour of numerous researchers to discover and assess the French series of cave art sites, while most of the South Australian sites were located within a few years, by just a few people.

While this unexpected result probably illustrates the immediate success of our work more than any other, I attribute far greater significance to certain other developments, such as the archaeo-psychological concepts that have been derived from the base provided by this project. These concepts are derived from analyses of behavioural evidence secured by a variety of new methods developed in the course of this project.

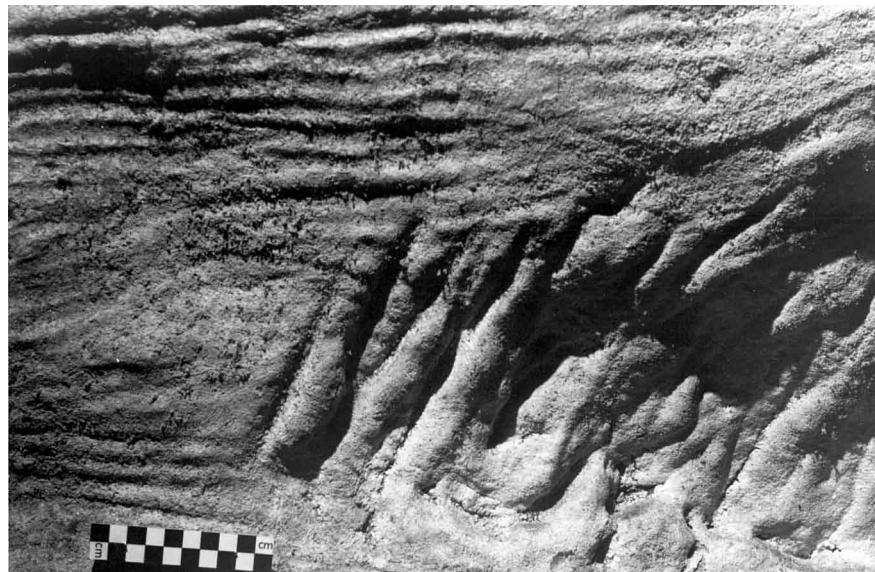


Figure 8. Deep gashes superimposed over finger flutings, Karlie-Ngoinpoo Cave.

The cave art at Mount Gambier

South Australian cave art is known to occur at two localities: on the Nullarbor Plain, in Koonalda Cave and a few caves with hand stencils, and in a number of caves in the area around Mount Gambier. Having described the project that is responsible for the discovery of the latter occurrence, I shall briefly outline what has so far been found at Mount Gambier. Descriptions of several of the sites have already been published but only few of the caves have been studied in any detail. Being accountable for the published references to the Mount Gambier sites I am not able to review critically this literature, as I did some of that pertaining to Koonalda Cave, and the following is of necessity biased. Many of the published papers on these caves suffer from one common shortcoming: they are too preliminary, too brief, and they lack a holistic approach to the various traditions of rock art. The unexpected broadening of the database through the discovery of an unexpectedly large body of art has so far not permitted us to produce much more than preliminary, descriptive reports.

The cave art of South Australia is emerging as one of the most fascinating phenomena of pre-Historic culture in the world, and has received wide international attention (Bednarik 1984b, 1985, 1986b, 1986c, 1993b). It does not present us with beautiful pictures of pre-Historic animals, or with works of art that we consider to have great artistic merit, like much of the cave art of Europe. Like the markings that have attracted Marshack's attention in France, Mount Gambier cave art consists of very basic, archaic motif types and techniques: meandering finger patterns shaped on the once soft walls, deeply carved designs of obscure meaning forming strange circle mazes, and a small range of motifs that are repeated over and over. While we find it so easy to relate to



Figure 9. Three convergent lines motifs (CLMs) in Karlie-ngeinpool Cave.

the Palaeolithic art of western Europe because of its immediacy and its apparent concurrence with our own world view (which is probably deceptive), the cave art near Mount Gambier is stunningly remote. It clearly belongs to a culture with which neither European nor present-day Aboriginal can communicate or identify.

The Mount Gambier cave art does not consist of one single tradition. Already at the first-investigated site, Malangine Cave, we were able to discern the three generations of petroglyphs that we have subsequently identified in others of the caves. At Malangine Cave, the rock art sequence is actually stratified, not just in the sense of Anati's (1961) stratification by superimposition and differential patination, but by physical separation. The petroglyphs are 'sandwiched' between cutaneous laminae of carbonate speleothems. We believe that a similar sequence of rock art and calcite deposits does not exist anywhere, but we have another site, Prung-kart Cave, where just one generation of finger markings is sandwiched between two layers of calcite precipitate. The age of the art has to be between the ages of the underlying and overlying calcite laminae. The deposits are datable via their radiocarbon content, and also by uranium-thorium dating. In addition, their thermoluminescence may be utilised in age estimation. I have used the first two methods at Malangine Cave (the first application of 'direct dating' of rock art in the world; Bednarik 1981a, 1981b), and later applied carbon-isotope analysis also in the study of deposits in Prung-kart Cave (Bednarik 1998b, 1999).

The multiple finger lines in Australian caves closely resemble the older generation of the European 'macaronis'. They represent one of the oldest surviving artistic traditions in the world. While they remain undated in Australia we have seen from the above that a minimum age of about 20 000 years can

be postulated for the incised grooves in the vicinity of the Squeeze, in Koonalda Cave. These may be contemporary with, or younger than the finger flutings in the same cave (Bednarik 1985: 85). For comparison, the parietal finger line traditions of western Europe are often ascribed to the early Aurignacian. It is interesting to note that some of those workers who have examined them most closely have suggested that they may in fact date back much further. Marshack first mooted the idea (e.g. Marshack 1976) and Bahn (1984) reminds us that 'there is no reason whatsoever why this type of decoration may not have originated in the Middle Palaeolithic' at such sites as Gargas. I have pointed out, without advocating a particular antiquity, that the evidence favouring an Aurignacian provenience for the earliest finger flutings of western Europe is no stronger than the case for their earlier age (Bednarik 1986a, also 1984c). Besides, both the Aurignacian and the Middle Palaeolithic are probably traditions of Neanderthals (Bednarik 2007).

At many of the Australian sites the finger flutings occur together with, or in the general vicinity of short linear abrasions or grooves that were produced with a tool. They usually form groups of roughly parallel marks, and they occur also at all four Australian sites with finger markings besides those at Mount Gambier. Where these tool marks are well preserved, very fine, longitudinal striations can often be discerned in the individual grooves. In some cases these are so distinct that I have been able to determine by experiment that the material used to create them was in all probability the locally occurring, grained aeolian limestone.

Both finger flutings and tooled linear marks tend to follow and emphasise topographical features of the cave walls and ceilings, a propensity that is particularly conspicuous in Mooraa Cave (Aslin and Bednarik 1985). It is to be stressed, however, that we have so far not secured any conclusive evidence for the contemporaneity of finger flutings and tool marks. Where superimposition occurs, the finger lines always precede the tooled incisions. The latter's appearance often indicates an element of impact besides abrasion which has prompted a comparison with the gash marks in Malangine Cave, and with the 'behavioural pattern evidenced by the densely scored panels of rock that take on monumental dimensions in Karlie-ngeinpool Cave' (Bednarik 1986a). Much more detailed research is required to determine whether the tool marks are contemporary with the finger flutings, or represent a reaction to them by later people.

Similarly, the deep gashes, pits and grooves which occur on several large, vertical wall panels in Karlie-ngeinpool Cave (Aslin and Bednarik 1984c) cannot be safely attributed to either the finger flutings tradition, or the subsequent petroglyph tradition. Nor would it be plausible to interpret them as traces of mining activity, although there are quite conspicuous

signs of chert mining in Karlie-ngeoinpool Cave (Fig. 4). The silica occurs in three distinct seams, and the mining traces are restricted to these. Perhaps the described impact marks were produced by the chert miners, and have some kind of ritual significance, but at this stage that could only be pure conjecture. I should also stress, as I have repeatedly emphasised, that contemporaneity of chert mining and finger lines has not been demonstrated, at Koonalda Cave or any of the other sites where the two phenomena appear together. The mere evidence that two activities were carried out in the same cave, even in the same part of the cave, is no proof that they relate to the same people. I have, however, formed the opinion that the deeply gauged circular holes often found in the Mt Gambier caves, and particularly prominent in Ngrang Cave (western Victoria) are related to cupules at open sites. The morphological differences are simply a function of the hardness of the rock. Cupules are the oldest known form of rock art in the world, and the Middle Palaeolithic seafarers that first occupied Australia may well have introduced this distinctive tradition.

Fortunately, not all relations between the pre-Historic traces in these caves have remained as vague. There is a distinct chronological gap between the early finger line tradition and the subsequent generation of deeply abraded petroglyphs of the Karake Style. This gap is represented by significant tectonic changes in some caves, by deposits of calcite skins in others. It needs to be appreciated, however, that not all South Australian parietal finger flutings are of the Pleistocene. For instance those of Prung-kart Cave have been dated to the late Holocene (Bednarik 1998b) and similar antiquities are thought to apply at other sites. In one of the Victorian sites, Yaranda Cave, megafaunal scratch marks postdate the finger flutings, which shows that the latter can be assumed to be older than 20 000 years. The most conspicuous tectonic adjustments one can detect in any of these caves have all occurred *after* the finger flutings were executed. The best examples of this relationship are those provided by Koonalda, Orchestra Shell, Koongine and Karlie-ngeoinpool Caves. The subsequent Karake Style, on the other hand, clearly post-dates all major tectonic changes to the cave morphology. A period of low sea level has been suggested to be responsible for them, by draining the phreatic reservoirs and thereby affecting the structural stability of the extensive subterranean systems. Karlie-ngeoinpool Cave (Aslin and Bednarik 1984c), in particular, has been subjected to 'major upheavals, rendering some finger line panels well beyond human reach,



Figure 10. Maze or lattice dominated by circular patterns, of typical Karake Style, Karlie-ngeoinpool Cave.

whereas all Karake Style petroglyphs follow the present floor contours. The latter even occur on a vertical rock face that only came into existence when a whole rock ledge, on which the finger line artists had once stood, broke away and tumbled into the lower part of the cave.

The Karake Style has been named after the cave where it was first recognised as a stylistically homogeneous tradition (Aslin and Bednarik 1984b), and consists of a narrow range of motifs. They are as a rule deeply carved into the walls, averaging groove depths of ten to fifteen millimetres, but much greater ones have been observed, such as forty millimetres. The range of the style includes the convergent lines motif (two to five lines converge towards a point; they may meet there, or remain unjoined); the dot arrangement; groups of short or long linear, parallel grooves; radial figures, including variants; and a variety of circles or vaguely circular forms: oblong or distorted circle shapes, dissected circles, concentric circles, and a variety of mazes and often intricate lattices consisting of circles or incorporating circular or curvilinear elements (see Fig. 10). At one of the more spectacular sites near Mount Gambier, Paroong Cave (Aslin, Bednarik and Bednarik 1985), a few further motifs were added, giving the impression that the art at that site is stylistically more evolved. Multiple wave lines occur here, and two unusual motif types, each combining two of the more archaic types: circle with internal vertical barring, and circle with internal lozenge lattice.

The described motif range is very similar to the older part of the so-called Panaramitee style (Nobbs 1984); it closely resembles the range of petroglyphs at several Tasmanian sites (Sims 1977); and it is reminiscent of the similarly archaic rock art Andreé Rosenfeld excavated in Early Man Shelter, Cape York

Peninsula (Rosenfeld 1975; Rosenfeld, Horton and Winter 1981). A similar range of motifs has recently been reported from a major petroglyph site in the Mt Isa area, north-western Queensland (Morwood 1985).

The most impressive previous evidence for the dating of Australian rock art has been provided by Rosenfeld. Helped by a well-defined stratigraphy and an apparently very consistent rate of sedimentation, she has been able to assemble a chronological framework and relate it to the art sequence of Early Man Shelter. A substantial frieze of petroglyphs extending virtually to the base of the sediment deposit was uncovered by her excavation. The strata covering the lowest of the peckings yielded several fairly consistent radiocarbon results suggesting an antiquity of at least 15 000 years for the art, although Rosenfeld (1981: 30) only proposes a minimum age of about 13 000 years — apparently cautious not to rely on the very small lowest sample, ANU-1567.

Preliminary dating suggests that the Karake Style petroglyphs at Malangine Cave are likely to date from the late Pleistocene. It has further been suggested that this style, possibly the evolved phase, was introduced into Tasmania via the Bassian Isthmus, before the final severance of the island from the mainland at perhaps 11 000 years ago (Aslin and Bednarik 1984b). While refraining from attaching a particular age to the tradition at this stage I consider it likely that the Karake Style is contemporary with the rock art excavated by Rosenfeld.

Finally, a few of the caves near Mount Gambier also contain a generation of shallow incisions that were executed with single strokes of a tool, and are much younger again. At one site they are separated from the preceding Karake Style by a substantial skin of reprecipitated calcite that had concealed the older markings. These engravings appear to indicate a reaction of the artists to the previous art because they are sometimes copies of it, and the older designs are occasionally filled in or modified by the more recent markings. In contrast to the preceding rigid, formal figures these shallow engravings appear more impulsive and spontaneous. Preliminary dating of the carbonate speleothem deposit on which this third generation of cave art has been executed in Malangine Cave suggests that it dates possibly from the mid-Holocene.

In summary, a relative chronology is established for the three art traditions in the caves of Mount Gambier. Several other elements have yet to be placed within this sequence. It is useful to reflect on one very fortunate circumstance: the order in which the principal sites were found in the course of our project. Malangine Cave, where all three art traditions occur and where their chronological order can be readily established, was one of the first two sites to be located. There is no doubt that this facilitated our early appreciation of the chronological depth pos-

sessed by this cave art.

A start has been made in understanding the archaeological aspects of the cave art of South Australia, but a great deal still requires clarification. Frankel (1986, 1989) has excavated Koongine Cave, but was prevented from reaching the lower sediments by the extensive debris of the roof fall that occurred apparently towards the end of the Pleistocene. This roof fall postdates all rock art in the cave (Bednarik 1989), and the sediments above it date from the very early Holocene.

Whilst keeping the relevant state agencies informed on our activities we avoid disclosure of exact site locations until the caves are adequately protected. So far, only four of them have been closed: Malangine, Koongine, Paroong and Gran-Gran Caves. Besides ensuring that the sites are safe from vandalism there are other reasons for our reluctance to publicise the sites unnecessarily. One of them is that we often depend in our work on the trust and co-operation of landowners, and a frequently encountered stipulation is that the location of a find is to remain confidential. So far we have found every landowner co-operative, and in some instances owners have specifically requested to be kept informed of research results, or they pressed for sites to be closed. Some have even shown genuine concern for matters of conservation, especially the owners of Moora and Paroong Caves. In particular I wish to make mention of the highly commendable measures taken by the Tantanoola office of the Woods and Forests Department.

We have also taken steps to raise the awareness of local field naturalists, introducing them to an outstanding pre-Historic phenomenon of the district they operate in. Lectures on the local rock art have included instructions on what to do, or more specifically, on what not to do, when one happens to find apparently anthropic rock markings in a cave.

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About the age of the Chauvet rock art

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Abstract. The Chauvet Cave rock art in southern France can reasonably be regarded the most beautiful cave art in the world, and certainly as the most sophisticated. Its chronological position at the very beginning of the European Upper Palaeolithic art tradition, rather than at its end, destroys all models of an evolutionary development of this art, from the most primitive to the most complex. Rather, the most complex appears first. This collapse of the traditional model has prompted a few critiques of the dating of this cave art. Here, it is explained why the dating is valid, and in fact probably understates the true age of this art. It is also shown that, in view of the most recent developments in European dating of human remains of the period, the probability that the Chauvet rock art was created by Neanderthal-like hominins is much greater than the alternative, that it was made by anatomically modern people. This renders the African Eve or replacement model of Europe soundly refuted, and suggests that the origins of art have been hopelessly misunderstood by mainstream archaeology — as has also been shown in India recently, by the EIP Project.

The most painstakingly studied and perhaps also the most pristine Palaeolithic cave art site known is Chauvet Cave in the French Ardèche (Chauvet et al. 1995; Clottes 2001). The standard of the fieldwork being carried out there is peerless (Bednarik 2005). The site's rock art is also the best-dated of the Palaeolithic sites so far subjected to any form of scientific dating (Clottes et al. 1995; Valladas et al. 2004). Interestingly, the Chauvet Cave dating endeavours have attracted more sustained criticism than any of the other attempts to date European Pleistocene cave art (Zuechner 1996; Pettitt and Bahn 2003). The reason for this is that the Chauvet results have severely challenged the traditional stylistic chronology of Upper Palaeolithic rock art (Bednarik 1995). There is considerable disagreement on this point, with some authors defining Chauvet as blending in well with aspects of style and content of secure Aurignacian art, such as the series of portable objects from south-western Germany, while others reject the Aurignacian antiquity of Chauvet on the basis of their individual stylistic constructs, and favour its placement in the Magdalenian.

It is very healthy to subject scientific propositions to falsification attempts, and all current dating claims for rock art, anywhere in the world, are tentative and based on experimental methods. They are presentations of testable data, and need to be interpreted in the context of the considerable qualifications that apply to them all (Bednarik 2002). However, the use of stylistic argument (i.e. rhetoric based on untestable

cognitive processes involving autosuggestion) needs to be questioned. The issue is not whether stylistic constructs are valid; the issue is that they are intuitive. To see how such revisionist efforts fare in the case of Chauvet Cave, I offer the following for consideration.

Among the 3703 identified faunal remains found on the floor surface of the extensive cave, those of the cave bear account for 91.8% (Philippe and Fosse 2003), and there are about 315 identifiable cave bear hibernation pits preserved in the cave. Clearly it was a bear hibernation site, like thousands of others across Europe (Bednarik 1993), and probably so for tens of millennia. The most recent cave bear finds in the main cave are about 24 000 years old, while the Salle Morel appears to have remained open to that species until 19 000 years ago. The timing of the collapse of the cave entrances is confirmed by the recent dating to 18 000 BP of a stalagmite grown on one of the uppermost collapse boulders inside the blocked original entrance. The collapse must have occurred significantly earlier, and since about 24 000 years ago, the cave was only entered by small animals, such as snakes, martens and bats. On present evidence a Magdalenian age of the rock art is therefore precluded by this context. It is also precluded by the simple fact that clear depictions of cave bears occur in Chauvet, and that this species is thought to have been extinct in the region by the beginning of the Magdalenian (Rabeder et al. 2000: 107).

So far, three instances of anthropic deposition of cave bear remains have been observed on the cave floor, two in the Salle des Bauges and one in the Salle du Crâne (Clottes 2001; Bednarik 2005: Fig. 1). They are of importance to the relative dating of the human activity in the cave. Evidence for cultural placement of cave bear skulls and long-bones has been reported from many caves, especially in central Europe, but it is temporally restricted to the final Mousterian and Aurignacoid traditions, most notably the Olschewian (Abel 1931; Andrist et al. 1964; Bächler 1940; Bayer 1924, 1928, 1929a, b, 1930; Bednarik 1993, 2007; Bégouën and Breuil 1958; Brodar 1957; Cramer 1941; Ehrenberg 1951, 1953a, b, 1954, 1956, 1957, 1958, 1959, 1962, 1970; Kyre 1931; Malez 1956, 1958, 1965; Mottl 1950; Rabeder et al. 2000; Rakovec 1967; Stehlin and Dubois 1916; Trimmel 1950; Trombe and Dubuc 1946; Tschumi 1949; Vértes 1951, 1955, 1959, 1965; Zotz 1939, 1944, 1951). This cave bear 'cult', as it was unfortunately called in the mid-20th century, remains unrefuted, despite the endeavours of Koby (1951, 1953; Koby and Schaefer 1960) and others (Jéquier 1975). Generally, this evidence is in excess of 30 000 years old at the known sites, and if the finds in Chauvet are of the same tradition, which seems very likely, the first phase of the cave's human use must also predate that time. That does not necessarily prove that the cave's early rock art phase has to be of the same period, but the onus to demonstrate that it is not is on those rejecting the Aurignacian attribution of this art. No such refuting evidence has been offered, and the doubters seem to be inspired by traditional stylistic reasoning alone.

Some of their arguments are mistaken or simply false:

Nevertheless, the rock and cave art which is definitely known to be Aurignacian looks pretty crude and simple, a long way from Chauvet – which of course is why the Chauvet dates caused such a shock. [...] what are the chances that a single Aurignacian cave would contain so many different features, themes, styles and techniques which, over a hundred years of study, have become so strongly and indubitably associated with later periods? (Pettitt and Bahn 2003: 139)

Very little rock art can be attributed to the Aurignacian (or for that matter to any other period, anywhere in the world) with adequate confidence to make such sweeping claims. The conceptually most complex portable art of the Upper Palaeolithic is of the Aurignacian, including the two therianthropes from Swabia (Hohlenstein-Stadel, Schmid 1989; and Hohle Fels, Conard et al. 2003) and the anthropo-

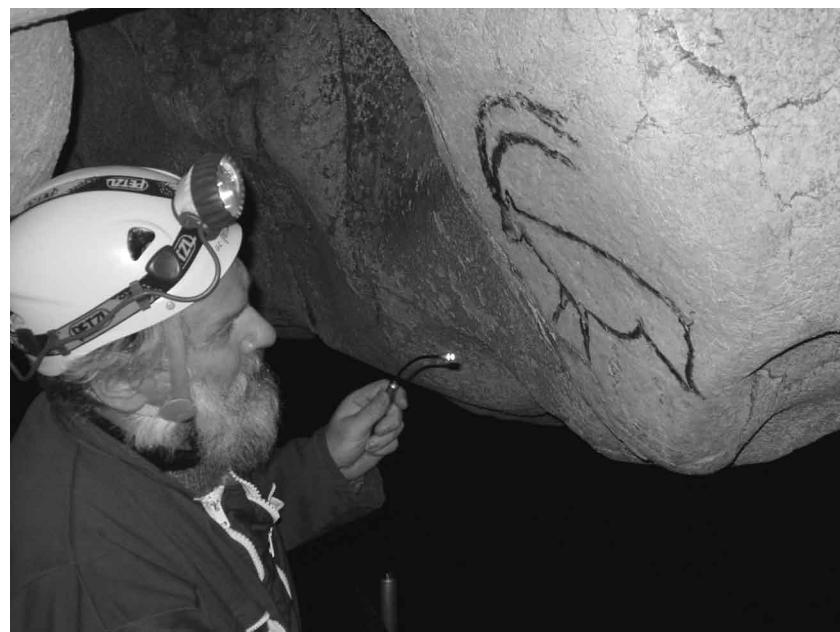


Figure 1. The author working in Galerie des Mégacéros, Chauvet Cave
photograph by J. Clottes).

morph from Galgenberg (Bednarik 1989), so why should we be 'shocked' to observe a similar level of sophistication in Aurignacian rock art? (See Fig. 2) 'Aurignacians' seem to have been somewhat interested in 'dangerous animals' and vulvae, and these do feature prominently enough in Chauvet. More-

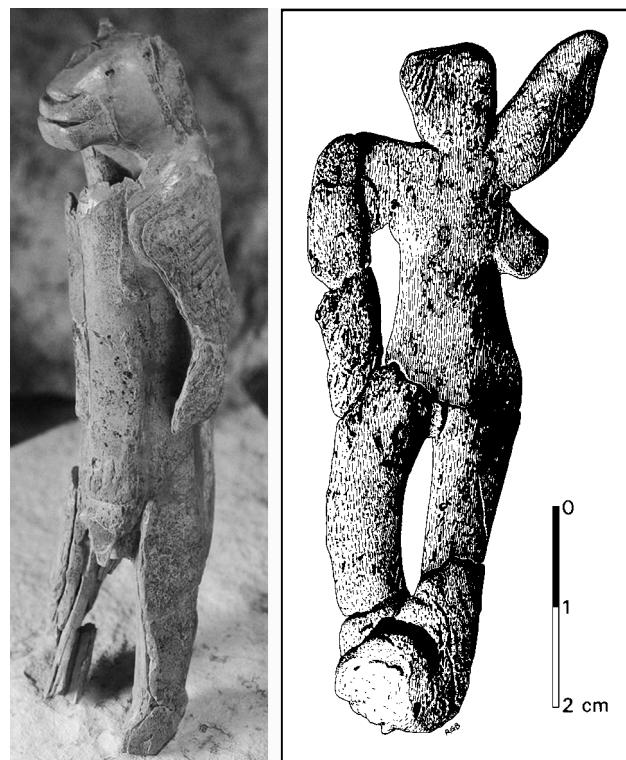


Figure 2. The Hohlenstein-Stadel therianthrope of ivory
(on left) and the Galgenberg female serpentine sculpture (right). Both are about 32 000 years old and of the Aurignacian.

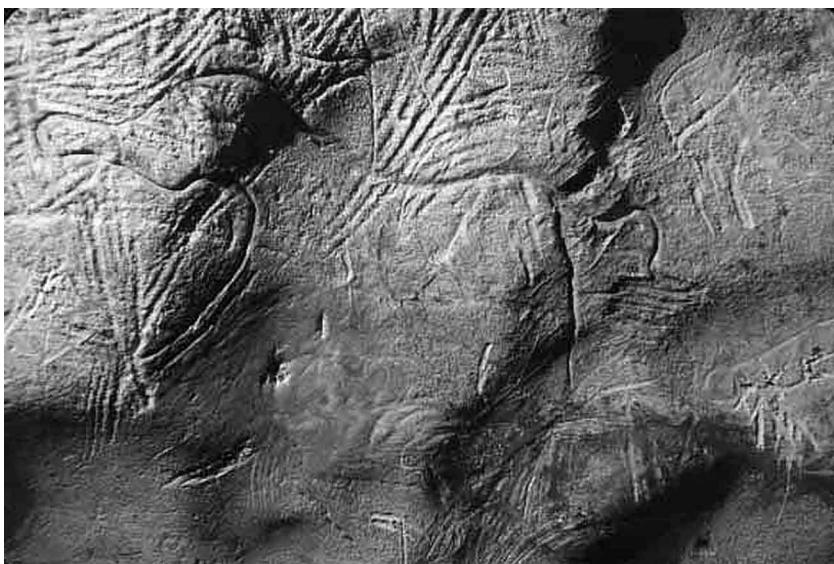


Figure 3. Petroglyph and finger flutings in Baume Latrone, southern France, very probably of the Aurignacian.

over, it is obvious that Chauvet comprises two art traditions, so the variety of content and techniques is also no surprise to those with an open mind. Finally, Chauvet is certainly not alone. I have long considered the early phase of the cave art in Baume Latrone to be of the Aurignacian (which is also very complex, see Fig. 3; Bégouën 1941; Drouot 1953; Bednarik 1986). Moreover, the small corpus of l'Aldène, reflecting the principal faunal elements in the Chauvet art, was created before the decorated passage became closed $30\,260 \pm 220$ BP (Amber et al. 2005: 276–7; Amber and Guendon 2005). Other sites will no doubt be found to belong to those early traditions, and the stylistic daters will need to significantly revise their ideas of Aurignacian art.

It is more appropriate to ask, what are the chances that Zuechner's idea, that all of the charcoal images so far analysed in Chauvet are derived from fossil wood, is correct. There are over forty radiocarbon dates from the site now, including of charcoal from the floor. Far more likely than the involvement of fossil wood would be the use of much earlier charcoal, but that argument is not even made in respect of Chauvet, perhaps because some of the dates come from torch marks. The possibility of a systematic error in all of these internally or stratigraphically consistent dates, implied by Pettitt and Bahn, is also specious: why should this affect all the dates from Chauvet, but none of those they are in agreement with from other sites? Their argument can be made if they presented some evidence that points to a systematic distortion at just the one site, but without such data their case remains one of *ignoratio elenchi* (mistaken refutation) or is supervenient upon the empirical data.

The real problems with Chauvet are not even considered by the critics of the dating attempts, who

seem only concerned with salvaging a stylistic chronology. Two issues are of paramount importance: all carbon isotope determinations of the European Late Pleistocene Shift in southern Europe need to be considered sceptically, because of the effects of the Campanian Ignimbrite event and the cosmogenic radionuclide peak about a millennium or two earlier (Fedele et al. 2002). The best available ^{14}C determinations for the CI eruption place it between $35\,600 \pm 150$ and $33\,200 \pm 600$ carbon-years BP (Deino et al. 1994), but the true age of the event is thought to be $39\,280 \pm 110$ BP, derived from a large series (36 determinations from 18 samples) of high-precision single-crystal $^{40}\text{Ar}/^{39}\text{Ar}$ measurements (De Vivo et al. 2001). Alternatively, Fedele and Giaccio (2007) have proposed that a

significant volcanogenic sulfate signal in the GISP2 ice core, occurring precisely 40 012 BP, represents the Campanian eruption. Therefore, in southern France, carbon isotope dates only marginally lower than the carbon age of the CI event may well be several millennia too low, and the true age of the early Chauvet phase could theoretically be as high as 36 to 38 000 BP.

The second important issue to be considered is, what kind of people made the Chauvet art? Now that the only securely dated 'anatomically modern' human remains in Europe are 27 700 years or younger, earlier dated finds should be considered to be of Neanderthals. The entire issue of dating nearly all Würmian human remains from Europe has undergone incredible changes in just the last few years. For instance, the sensational exposure of all datings by Professor R. Protsch as fraudulent means that there are now no post-Neanderthal remains in Germany that are more than 16 000 years old (Bednarik 2007). The recently dated Mladeč fossils, between 26 330 and 31 500 carbon years old (Wild et al. 2005), lack credible stratigraphic provenience and are not modern, but intermediate between robust and gracile *Homo sapiens* (Fig. 4a, b). The same applies to some degree to the Cro-Magnon specimens (Fig. 4c), which in any case now appear to be of the Gravettian rather than the Aurignacian (Henry-Gambier 2002). The similarly ambiguous Peștera cu Oase mandible (Trinkaus et al. 2003) and the subsequently found facial bones from a different part of the same large cave, thought to be 35 000 years old, are both without archaeological context and also neither modern nor Neanderthal (Fig. 4d, e). Much the same applies to the six human bones recently dated from another Romanian cave, Peștera Muierii (Fig. 4f), which are clearly intermediate between robust and gracile Eu-

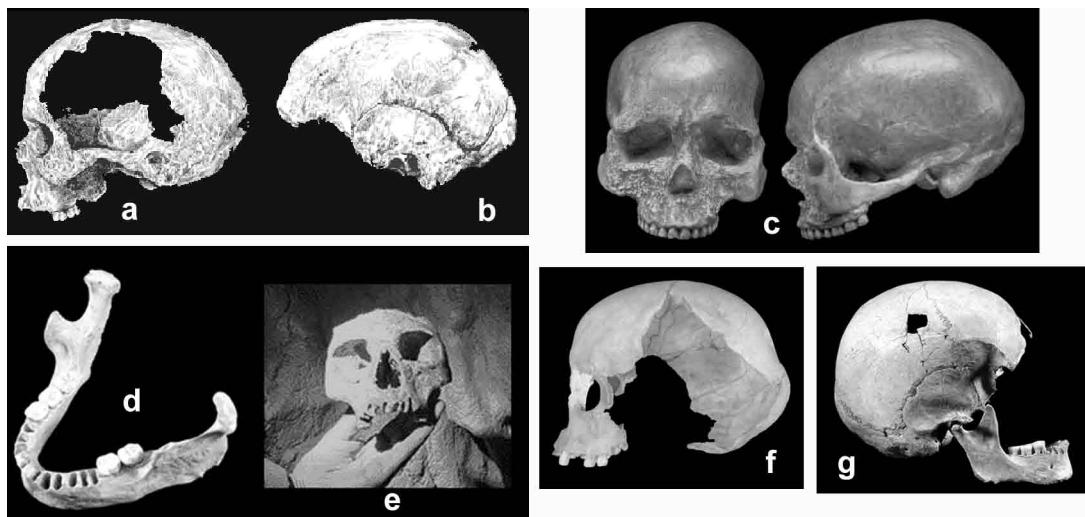


Figure 4. European hominin remains from: (a and b) Mladeč Cave, Czech Republic; (c) Cro-Magnon, France; (d and e) Peștera cu Oase, Romania; (f) Peștera Muierii, Romania; (g) Vogelherd, Germany. Specimens a to f are between 27 000 and 35 000 years old and are intermediate between anatomically modern people (Graciles) and Robusts such as Neanderthals. Specimen g is of the Neolithic and fully modern, not 32 000 years old as has been claimed widely.

ropeans (Soficaru et al. 2006). The four specimens from Vogelherd, however, are clearly modern (Fig. 4g), but their claimed age of 32 000 years has now been rejected convincingly: they are Neolithic and are all between 3980 and 4995 years old (Conard et al. 2004). The 'Neanderthaloid' Hahnöfersand skull, formerly 36 300 years old, is now Mesolithic (Terberger and Street 2003), and the Paderborn-Sande skull, also dated by Protsch, is not 27 400 years old, but only 238 years. Another specimen often cited by the African Eve advocates as an early modern, though still fairly robust individual is from Velika Pećina, now safely dated to about 5045 carbon years. The list goes on and on, and there are now virtually no reasonably 'modern' specimens in Europe prior to the Gravettian, but there are numerous Neanderthaloid finds up to 28 000 years ago. In five cases, Neanderthal remains have now been found in occupation layers containing the tools of early Upper Palaeolithic traditions: from the Châtelperronian of Saint Césaire and Arcy-sur-Cure, from the Aurignacian at Trou de l'Abîme, the Olschewian in Vindija Cave, and from the Jankovichian found in Máriaremete Upper Cave.

As the house of cards built by the African Eve advocates is collapsing, they have to prepare themselves for the possibility that not only the Aurignacian proper, but also the Bohunician, the Szeletian, the Olschewian (which I consider relevant to Chauvet), the Bachokirian, the Uluzzian, the Uluzzo-Aurignacian, the Proto-Aurignacian and the Alt-mühlian might all relate to humans other than their so-called 'moderns'. Twelve years ago I pointed out that we have no evidence whatsoever that the Early Aurignacian is the work of 'moderns', to which I can now add that the ethnicity of the makers of any stone tool tradition of the entire first half of the so-

called Upper Palaeolithic — including the entire Aurignacian — appears to be that of robust, Neanderthal-like humans, or of their direct descendants. Chauvet Cave contains not only the world's most stunning cave art, it also contains thousands of human and animal tracks on its floor. Some of these are exceedingly well preserved, and in examining these closely I found that they appear to be of Neanderthals rather than anatomically modern humans (Fig. 5). Naturally the presence of Neanderthal footprints



Figure 5. Human footprint in Chauvet Cave, of an 8 to 10-year-old Neanderthaloid child.



Figure 6. The Chauvet panel of three highly naturalistic cave bear depictions, demonstrating that the artists were familiar with that species, which renders a Magdalenian age of the art out of the question (photograph: J. Clottes).

does not prove that the rock art was also made by these people, but surely the possibility needs to be seriously considered. The traditional response, that the Neanderthals could have never been sufficiently advanced to produce such masterworks, is simply no longer adequate now that the Aurignacian appears to be a Neanderthal tradition.

European Pleistocene archaeologists need to adjust to this new scenario, and unless they can demonstrate that Chauvet was made by what they call 'moderns' or 'Cro-Magnons', they are obliged to equally consider the possibility that this art is the work either of Neanderthals or of their descendants who experienced genetic drift rather than 'replacement'. On the basis of the present archaeological and palaeoanthropological evidence, the latter scenario is the more likely: we have Neanderthal remains from the time, and we have no 'moderns'. Science works by falsification, and the proposition to be tested now is that the Chauvet art was created not by 'moderns'. The proposition of its Aurignacian age, too, can be tested – but not by facile and circular stylistic argument as has been proposed.

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