

Cupules - the oldest surviving rock art

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Figure 1. Cupules at Sandy Creek Shelter 1, near Laura, north Queensland. They are probably between 30 000 and 40 000 years old.

Cupules (Fig. 1) are the earliest surviving rock art we know about in the world, but this does not necessarily make them the first rock art produced.

The oldest rock art we know about in every continent are linear grooves and cupules, especially the latter. It can date from Middle and even Lower Palaeolithic times in the three Old World three continents, so it is very considerably older than the celebrated Upper Palaeolithic art of south-western Europe. This has become evident despite the considerable bias against such forms of rock art, which have often been ignored by researchers, misunderstood or explained as utilitarian rock markings. However, cupules are such a ubiquitous feature in world rock art that they were made in many periods, and considerable experience is required to estimate their age (Bednarik 1997a, 2000). Numerically they are probably the most common forms of surviving rock art in the world, and they can be found not only in very early and archaic traditions, but also in very recent ones. In India, for example, cupules occur in the Pleistocene, but most are from the Holocene, and they were made from Acheulian to Historic times. In many parts of Europe, cupules are particularly numerous in the Metal Ages. It is therefore false to assume that cupules are always an indication of archaic traditions.

Purpose

It is also very doubtful that all cupules were made for similar purposes, and it is even possible that *some* of those found on horizontal surfaces were used for some utilitarian process. However, there are distinct differences between cupules and grinding hollows. The latter occur on near-horizontal surfaces only and are well over 10 cm in size, whereas cupules are frequently found on vertical walls and rarely exceed 10 cm diameter.



Figure 2. Cupule panel on Broad Arrow Creek, Northern Territory.

cupules anywhere else, but what it does tell us is much more important: that it is entirely futile to speculate about the meaning of rock art in the absence of reliable ethnographic information. Researchers who speculate about meaning on the basis of their own perception of rock art are merely examining their own cognition.

An ethnographic example of non-ceremonial cupules comes from southern Kenya, where Odak (1988) has described geometric assemblages of cupules. They are claimed to have been used in board games such as the *boa* game, but even in that region cupules were probably also used for other purposes (e.g. in ore processing). It is simply unwise to generalise about meaning and purpose, which applies to all rock art.

Ancient cupule traditions

Despite the still poor knowledge we possess about the age of rock art, we are on much safer ground here with any speculations. This is not so much because of the state of our knowledge, but because propositions about the age of rock art, in contrast to those about meaning, are falsifiable, hence testable and thus scientific. Whereas a future refinement of methodology is highly likely to result in increased veracity and precision of dating claims, no improvement of methodology can ever increase our confidence in interpretations of meanings of rock art. While the present state of our knowledge of rock art remains unsatisfactory, and the over-interpretation of scientific dating results by archaeologists is a cause for concern (Bednarik 1996a), it is fair to say that in some parts of the world we have acquired adequate data to construct preliminary rock art chronologies. These are based on a variety of archaeological (i.e. inductive) and geomorphological or geochemical observations. The advent of 'direct dating' methods, in particular, has led to a great improvement in chronological resolution. We can therefore in various parts of the world estimate the ages of cupules, as well as other rock art. The following picture has emerged in recent years.

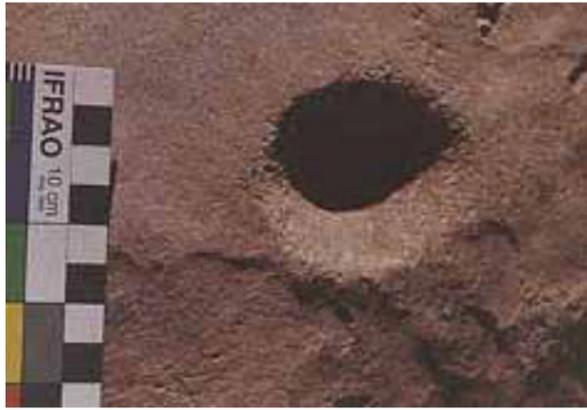


Figure 3. Acheulian cupule on very hard quartzite, Auditorium Cave, Madhya Pradesh, India.



Figure 4. Palaeolithic cupules on the southern wall of Daraki-Chattan, Chambal valley, India. (Photograph by Dr Giriraj Kumar.)

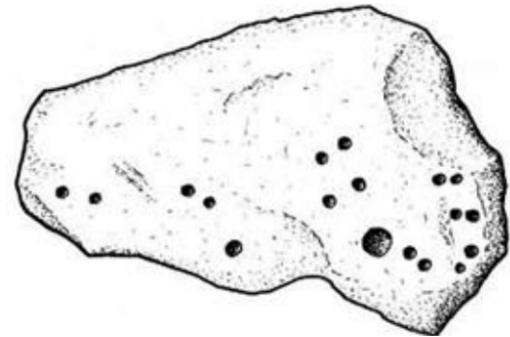


Figure 5. Mousterian cupules on a limestone slab covering Neanderthal juvenile burial, La Ferrassie, France.

Cupules rarely occur singly, they usually form groups, sometimes numbering in their hundreds or even thousands on a single panel (Fig. 2). In some traditions they tend to be arranged systematically, for instance in rows or multiple rows, while in others they were made randomly. In the few cases where ethnographic meanings have been secured for cupules, in North America, east Africa and Australia, they suggest that their function was often, though certainly not always, ceremonial or symbolic. For instance, Mountford (1976: 213), who witnessed the making of cupules in central Australia in the 1940s, reports that these were made as an increase ritual for the pink cockatoo (*Kakatoe leadbeateri*). The particular rock the cupules were hammered into was thought to contain the life essence of these birds, so the mineral dust rising from the activity was believed to fertilise the female cockatoos and thus increase their production of eggs, which the Aborigines valued as food. This example tells us nothing about the purpose of

The oldest currently known rock art is clearly in Asia. Eleven petroglyphs occur in Auditorium Cave, central India (Bednarik 1993a), of which two were excavated in an Acheulian occupation deposit directly covering them. The overlying Middle Palaeolithic stratum is so solidly cemented by calcite deposition that the stratigraphy could not possibly have been disturbed, hence we have no choice but to attribute at least two of the petroglyphs (one of which is a cupule) to the Lower Palaeolithic. However, I have argued that the remaining nine motifs (all cupules), although found above ground, are almost certainly of similar age (Bednarik 1996b). The Auditorium Cave petroglyphs occur on heavily metamorphosed, extremely hard quartzite that was extensively mined in the Lower Palaeolithic. Most Acheulian hand axes and cleavers at the site are made from it. The petroglyphs occur in the central part of the cave, well protected from weather, yet they are extremely corroded due to their extraordinary antiquity (Fig. 3). Although there is no radiometric dating available from the rock art site, the Acheulian of India is of an age similar to that in Africa and Europe, and all radiometric dates it has yielded so far are in excess of 290 000 years. It is thought to have given way to Middle Palaeolithic technologies some time between 200 000–150 000 years ago, which is thus a minimum age for the petroglyphs.

Recently Kumar (1996) has reported three further cupule sites in central India that appear to be of extremely great age. Daraki-Chattan is a small quartzite cave with Acheulian and Middle Palaeolithic tools occurring right on the surface of its floor deposit. The two walls of the cave bear 498 cupules, and although their true age still remains to be determined, there is a possibility that it might match that of the Auditorium Cave petroglyphs (Fig. 4). The same possibility has been suggested concerning cupule boulders Bajanabhat 1 and 2 (Kumar 1998; Kumar and Sharma 1995).

The oldest cupules known in Europe are also the oldest rock art we have found in that continent. Neanderthal burial No. 6 of the French cave La Ferrassie is of a child. After the corpse was placed in the grave, a large limestone slab was deposited over it in such a way that the 18 cupules on its surface came to be on its underside, i.e. were facing the child's corpse (Peyrony 1934: 34). This burial is part of a Mousterian graveyard of unknown age, but is in all probability between 70 000 and perhaps 40 000 years old. It is particularly interesting that 16 of the cupules are clearly arranged in pairs. The entire find suggests great cultural complexity (Fig. 5). Cupules have also been found at other sites of the late Mousterian (Leonardi 1988) and at sites of the period connecting the Mousterian with the Early Aurignacian of south-western Europe



Figure 6. Large sandstone boulder, entirely covered by cupules, Victoria River site, Northern Territory, Australia.



Figure 7. Sandstone block with cupules, West Baines, Northern Territory.



Figure 8. Extremely corroded cupules on granite floor boulder in Turtle Rock, Hervey Range, north Queensland, Australia.



Figure 9. The author recording very deep cupules in Ngrang Cave, Victoria.



Figure 10. Cupules in Cueva Epullán Grande, eastern Argentina.



Figure 11. Cupules on quartzite dyke at Inca Huasi, Mizque, Bolivia. They are the earliest rock art I have seen in Bolivia so far.

(Châtelperronian, Périgordian) (de Beaune 1993; Lalande and Bouyssonie 1946), as well as from more recent times, such as the Magdalenian.

Cupules are widespread in Africa, from the Sahara to South Africa, but apart from an archaeologically derived minimum age estimate of about 6300 years for a panel in the Chifubwa Stream rockshelter of Zimbabwe (Clark 1958: 21) we have no indications of their antiquity. Recently a series of quartzite petroglyph sites dominated by cupules has been found in the Korannaberg region of the southern Kalahari. Occupation evidence at these sites dates from the Middle Stone Age, the Fauresmith and the Acheulian (P. Beaumont, pers. comm. March 2002). In Australia, however, it is now widely agreed among rock art scientists that cupules are among the oldest rock art of the continent (Bednarik 1993b; Chaloupka 1993; McNickle 1993; Taçon et al. 1997; Welch 1993). They are particularly common in northern Australia, where they invariably seem to precede any other rock art present at sites. Here they occur at hundreds of sites, especially sandstone shelters, often in incredible numbers and concentrations (Fig. 6). It appears that their presence has often prompted the later artistic use of sites by other artistic traditions, particularly of rock paintings.

It has been suggested that one such site, Jinnium in the far north-west of the Northern Territory, provides sensational dating evidence (Fullagar et al. 1996). A series of thermoluminescence analyses on quartz grains from the shelter's sediment floor yielded results that were interpreted as indicating that the site was first occupied by humans between 176 000 and 116 000 years ago, and that an exfoliated rock fragment bearing two cupules occurred in a layer of between 75 000 and 58 000 years of age. This report was attributable to archaeologists' misunderstanding of the results of dating analyses: the results indicated in fact a maximum age of perhaps 20 000 years for the sediments, while the rock art was in all probability of the Holocene (Bednarik 1996c; Roberts et al. 1998). While practically no archaeologist or scientist of Australia accepts the Jinnium claims today, they are still making the rounds in the rest of the world, providing us with an illustration of how mythologies are easily created in this field, and how they may take many years to eradicate.

Nevertheless, the Jinnium affair aside, it is still true that cupules are extremely old in Australia, and the tradition of creating them was probably introduced from Asia at the time of first landfall (Fig. 7). Australia is currently thought to have been occupied initially by humans perhaps 60 000 years ago, and it is likely that rock art was created there from that time onwards. The chances that any of the earliest art has survived to the present time are remote, but some of the cupule sites in Australia are likely to be several tens of thousands of years old. For instance a small group of highly weathered cupules in the granite rockshelter of Turtle Rock in north Queensland would be a plausible contender (Fig. 8), as would be hundreds of cupule panels in the granitic part of the Pilbara (Bednarik 2002). Very deep cupules also occur in dark limestone caves of southern Australia, where they suffer little deterioration (Bednarik 1990) (Fig. 9). Although no age estimates are available for them, I have provided a minimum age of 28 000 years for simple line petroglyphs in these caves, through uranium-thorium analysis of a calcite deposit covering them.

Patterns of occurrence

No rock art of such antiquity is expected to exist in North America, but it is interesting that a similar pattern has nevertheless been observed among its early rock art traditions. Several authors agree that the earliest surviving petroglyphs in various regions seem to be either cupules, or 'pit-and-groove' marks (cupules and linear abrasions). Heizer and Baumhoff (1962) propose that the latter form the oldest rock art in the Great Basin, and Parkman (1992) suggests a pre-Hokan provenance of some cupule traditions in western North America, i.e. that they are of the final Pleistocene. Cupules occur in much of North America, but they are especially common in the west (Baumhoff 1980; Nissen and Ritter 1986). They occur also in Mexico (Mountjoy 1987), and a cup-and-groove boulder has been reported from Panama (Stone 1972: 101).

Corresponding patterns can also be observed among the most archaic petroglyphs in South America. Early petroglyphs in Brazil, such as those at Caiçaras or Riacho Santana, Piauí, are also deeply carved, fully repatinated and simple designs that could survive the longest (Bednarik 1989). The oldest dated petroglyphs of South America, simple lines, are in excess of 10 000 years old, in Cueva Epullán Grande, western Argentina (Crivelli M. and Fernández 1996), and cupules occur at the same site (Fig. 10). The deeply hammered and heavily weathered dense cupules on the granite boulders at Lungumari Puntilla, southern Peru (Parkman 1994), may also be of considerable age. I have not examined this site, but have worked further east in the same coastal region, where I studied Pleistocene terrace systems and the various lithic industries occurring on them (especially on the Río Majes and Río Sigwas). I found massive evidence of very early traditions of cobble tools and 'handaxes', no different from those found in Eurasia and Africa. As in North America, cupules occur in many parts of the continent, but they are generally not dated. Occurrences include those in Guyana, Surinam, Chile and Argentina (cf. Dubelaar 1986).

Of special interest here are the cupule sites of Bolivia, particularly as they have yielded the first 'direct dating' results from any South America rock art. The first such information is from Inca Huasi, near Mizque (Bednarik 2000), to be followed by rock art age estimates from four more central Bolivian cupule sites (Fig. 11). One of these is Toro Muerto near Saipina, also in the Mizque valley. I have previously commented on the antiquity of the petroglyphs in the small cave of Toro Muerto, and on those at the then newly discovered site Cabracancha (Bednarik 1988).

In short, there appears to be a worldwide pattern in the occurrence of the earliest rock art. It seems to indicate a great uniformity not only in rock art evolution, but also in the specific forms that occur early on. In addition to cupules and simple linear markings, other very early petroglyphs also show formal similarities: circles and multiple circles, 'trident' designs (often called 'bird tracks', but best described as convergent lines motifs), zigzags and wave lines, multiple arcs and maze

designs are widespread. They are often found with lithics of essentially Middle Palaeolithic technology (Bednarik 1994a). But perhaps the most pertinent uniformity is the consistent precedence of cupules, which satisfies the logic of those who look for evolutionary progress in motif designs: the earliest ought to be the simplest. We thus seem to arrive at the conclusion that very early petroglyph traditions were culturally very uniform across several continents.

This appearance is particularly reinforced when we consider how this pattern contrasts with that of more recent rock art traditions, those of the final Pleistocene and the Holocene. Wherever one looks, there is a proliferation of different genres, in terms of style, method and distributional characteristics. While the archaic petroglyphs of the Americas are without exception deeply pounded or incised, simple designs of great uniformity, matching in many ways those of the other continents, more recent art traditions differ greatly from one region to the next. This is such a strong universal, almost global pattern that one is tempted to assume the existence of considerable cultural uniformity among the early cultures, followed by cultural divergence and diversity, particularly with the appearance of colourful painting traditions towards the end of the Pleistocene. Indeed, all rock painting traditions of the Pleistocene seem to occur in well protected places, such as deep limestone caves which experience almost no weathering, or under silica skins in stable sandstone shelters, which has been interpreted as a preference for certain sites. Distribution is thus seen as a cultural factor: the art occurs in deep caves because it was religious, and if any evidence

contrary to this popular belief is found, it is explained away. For instance most of the Palaeolithic human footprints found on the cave floors in Europe are from juveniles, and children made most of the finger flutings on cave walls in both Australia and Europe. To the believers, this simply means that the youngsters attended initiation rites. This is the accommodative way in which orthodox archaeology explains everything in accordance with preconceived dogmas.

Application of taphonomic logic

Now I shall demonstrate how easy it is to fall victim to a persuasive combination of empirical data and the consistent deductions drawn from them. Practically all archaeological interpretation is based on 'recognition' of trends and patterns in the evidence, often reinforced by pigeonholing of the raw data or evidence, and their naive interpretation in accordance with intuitive logic. In my present example, this is a *Trugschluss* (a deceptive deduction), as indeed most popular interpretations in Pleistocene archaeology probably are. How can that be?

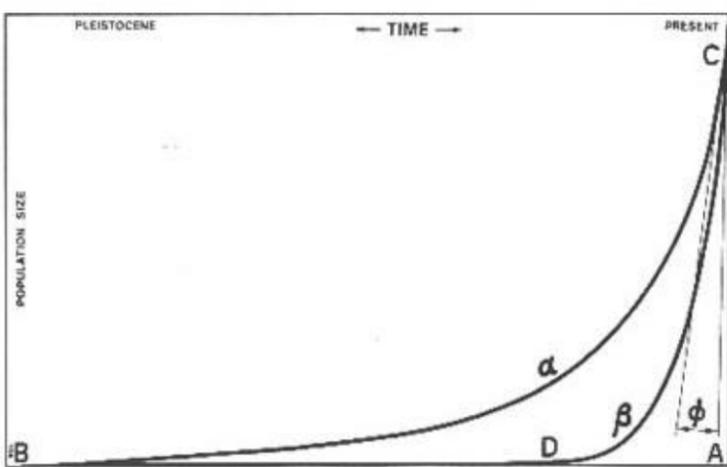


Figure 12. Principles of the relationship of total production of an archaeological phenomenon s_a to its surviving instances s_b as a function of angle j . These principles are the basis of taphonomic logic.

Far from advocating the view that cupules and simple linear markings represent the oldest rock art made, I emphasise that taphonomic logic implies the precise opposite (Fig. 12). It is not necessary here to rehearse the concepts of *metamorphology* (Bednarik 1994b, 1995), as they pertain to rock art (because all *good* archaeologists understand them fully now; those who do not need to review their understanding of archaeology radically) but I will briefly repeat some underlying rationales for other readers. Cupules are usually the deepest pounded petroglyphs we know of, so they are also among the most deterioration resistant. Taphonomic logic demands that any physical characteristic of rock art that may conceivably favour its longevity *must not be considered to be culturally significant*: it must not be seen as defining any artistic preference of technique, style, location or medium. In other words, if the oldest art being found in a region happens to be of a type that is most likely to survive the longest, then there is only a very slim chance that it is indeed the oldest art historically made in that region. It is simply the type of art that had the best prospect of surviving. Indeed, we have clear evidence that Acheulian people in both India and Europe used pigment pebbles to mark rocks hundreds of thousands of years ago (Bednarik 1994a), but we have not found any trace of such drawings, nor are we likely to ever find them. The probability that such markings could have survived is almost nil.

Moreover, the effort of producing deep petroglyphs is considerably greater than that of marking a rock surface with a crayon, and the earliest intentional, non-utilitarian rock markings were probably produced with *little* effort. If we see the occurrence of cupules in the oldest known art in this light it becomes obvious that they are *most unlikely* to have themselves been the oldest art ever produced. The longevity of various forms of rock art (in terms of pigment type, groove depth, location, even motif type) differs enormously, and even more so in differing environmental conditions (geology, moisture, pH, climate). Practically all the variables of such art affect its selective survival, and practically all surviving samples are thus distorted systematically. For instance, painted rock art rarely survives for many millennia, except haematite paintings in sandstone shelters, or paintings preserved by unusual conditions (under silica skins, or in deep limestone caves). Similarly selective deterioration processes apply to petroglyphs. In unsheltered positions, they can only survive from the Pleistocene if they are on exceptionally weathering-resistant rock, or are very deep, or are preserved under some form of case hardening (such as rock varnish). Clearly some types of rock art have vastly greater chances of survival than others, and they are the ones most likely occurring among the oldest surviving traditions. To then assume that they are *typical* of the tradition in question would be illogical, just as it would be to assume that the oldest rock art found in an area represents the oldest tradition that existed there. Almost universally, this must be expected to be untrue.

Discussion

The global pattern I have described among the archaic petroglyph traditions of all continents is in all probability the result of both cultural and non-cultural factors. It must be cultural to the extent that rock art can only survive if it was made in the first place. But the most important interpretational factor is the taphonomic truncation which age imposes on any sample of rock art. All 'samples' of rock art are taphonomically skewed, and the extent of this distortion clearly increases as a function of age. Therefore the archaeological practice of treating physical evidence as random samples of whatever activity it is thought to refer to is a fundamental error, and one whose distorting influence increases linearly with the age of the evidence.

Cupules were no doubt made very early, beginning with the Acheulian of some regions, perhaps ten times as long ago as the Aurignacian art of Europe. But it would be very wrong to draw the simplistic archaeological conclusion from this evidence that this was a tradition that produced only or primarily cupules. What the cupules do demonstrate, firstly, is the existence of a developed tradition of symbolism, which is likely to have included many other forms of expression. But taphonomic logic, the most powerful theoretical tool ever developed in archaeology, is also capable of telling us that the probability of this artistic tradition having been one of only cupules and other deep petroglyphs is almost nil. This is because it would be an incredible coincidence if the first rock art made was also the most deterioration resistant. It is far more logical to assume that the oldest surviving rock art survived because it was the most deterioration resistant.

Moreover, there is ample other evidence of extremely high cultural sophistication in the Lower Palaeolithic period, contemporary with and even preceding the earliest cupules we know about. We have known for 40 years that *Homo erectus* crossed the open sea to colonise several islands, and the early estimates that this occurred up to 830 000 years ago have now been completely confirmed by two different research teams, using different dating methods (Bednarik 1997b, 1999; Bednarik and Kuckenburger 1999; Morwood et al. 1998). Thus *H. erectus* clearly had language. We know that 400 000 years ago, European hominids made aerodynamically designed hunting spears, and subsequently they produced portable engravings (Schöningen and Bilzingsleben, Germany). Their contemporaries in Morocco and Israel made proto-figurines (Goren-Inbar 1986; Bednarik 2001). I have shown that the beads and pendants we have from the Lower Palaeolithic involved not only very sophisticated technologies in their making, but even more sophisticated cognitive and social system (Bednarik 1997c). They are perfectly consistent with what we know about these hominids, and have known for some time. After all, with seafaring capability at least 850 000 years ago we have to assume that language is at least a million years old, and language certainly is a system of symbols. Whatever non-utilitarian cupules meant at any time in human history, they were an integral part of some symbolic system. They are the oldest artistic monuments of hominids that deterioration processes have left for us to see. They do not, however, define the earliest forms of palaeoart, as simplistic archaeological reasoning would suggest.

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