KEYWORDS: ***Petroglyph - Cupule - Acheulian - Microerosion - Central India***

The cupules on Chief's Rock, Auditorium Cave, Bhimbetka

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Abstract. The physical and archaeological context of a rock art panel in the central site of the Bhimbetka complex in central India is described. The petroglyphs are analysed, with particular attention given to their microerosion surface state. This leads to preliminary propositions about their possible age. Although these remain inconclusive, they do tend to support the possibility that the petroglyphs on Chief's Rock may be of the same period as the two Acheulian petroglyphs found a few metres from them, below a substantial sequence of undisturbed occupation deposits.

Introduction

This journal is dedicated primarily to the archaeology of the regions considered to form the Pacific rim. In a more general sense, however, this refers to the 'Pacific Hemisphere', which in an archaeological sense can be contrasted with that second hemisphere whose archaeological hub was first east Africa, later the circum-Mediterranean region. The most important archaeological feature of the Pacific Hemisphere is the way its geography has brought about that double-pincer movement of colonising peoples from eastern Asia — the western branch leading via the islands of South-east Asia to Australia and Tasmania, the eastern branch via Bering Strait into the Americas and presumably down the Pacific coast. However, in considering the origins of these Pleistocene people it may not be sufficient to consider only the Pacific regions of Asia. Southern Asia may be equally relevant in providing directly related evidence, which is why I would prefer to regard India as part of this hemisphere even though it is not part of the Pacific region as such. Here I shall consider an Indian site that may well underline the validity of this view, as we shall see in my conclusions below.

Auditorium Cave is a central feature of the Bhimbetka site complex south of Bhopal. The locality's general topography is dominated by a series of prominent quartzite towers. Being located on a hill top, they are visible from a distance of several kilometres. These residual structures range in height to about forty metres. Undercutting through weathering has facilitated the formation of hundreds of shelters, and several of the towers feature horizontal walk-through caves at ground level. Some of these cave systems have three or more entrances. The largest of them is located in Auditorium Rock.

Auditorium Cave, with its Gothic arches and soaring spaces, has a cathedral-like atmosphere. This is attributable to both the great sizes and the layout of the passages. In plan view, the cave resembles a right-angled cross, the four branches of which are roughly aligned with the cardinal compass points (Figure 1). The stem of this cross, the longer passage, points to the east, and it is the natural main entrance. Where it meets the much shorter, three other passages, a room of up to twenty-six metres height has been formed. Here, precisely in the natural focus of this layout, is a large boulder resting on the remains of some earlier rock falls. With the cave floor being fairly level, the boulder is clearly visible from all four entrances. It thus resembles a naturally formed altar or pulpit.

The distinctive spatial and topographical focus it provides for the entire locality is so obvious that it may well have been experienced by some of the cave's earliest human visitors. The boulder's side facing the cave's eastern passage bears a flat, near-vertical panel that is positioned square to that passage. That distinctive panel, visible from anywhere along the east passage, is undeniably the most central and the most focal feature of the entire cave. The cave itself may in turn be considered the most central feature of the whole Bhimbetka complex which extends for several kilometres. The complex includes 754 numbered rockshelters of which over 500 contain rock paintings that today are attributed to the Mesolithic and later periods (Misra 1978).

In recognition of the boulder's natural centrality, archaeologists have named it the 'Chief's Rock', or 'King's Rock'. There is no evidence of ritual use justifying such a name, but it is retained here in recognition of the pronounced spatial arrangement of the site's features, and the apparently realistic possibility that this aspect was perceived by its early occupants. Despite its spatial focus, the vertical panel on Chief's Rock bears only few remaining traces of human modification. Nevertheless, they are the principal subject of this paper, because of their outstanding importance to global studies of palaeoart.

Archaeological background

Serious archaeological studies began at the Bhimbetka complex only in the 1970s, especially with the work of V. S. Wakankar, S. K. Pandey and V. N. Misra. These and other scholars conducted excavations at several sites, beginning in December 1971. By 1975, excavations had

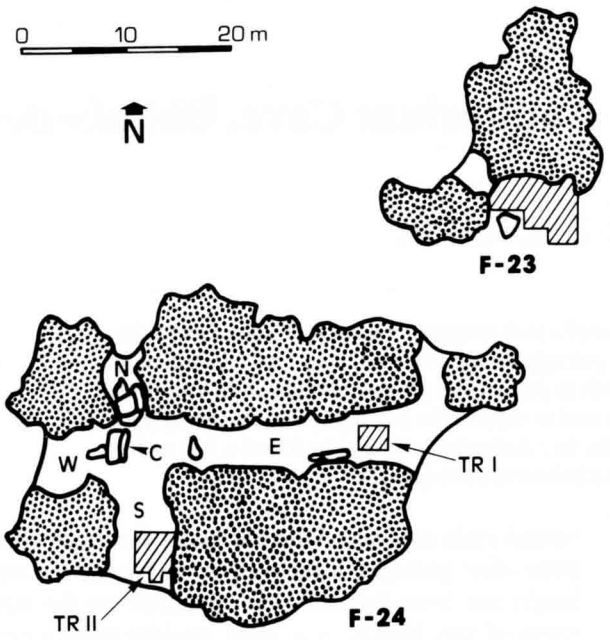

Figure 1. *Plan of Auditorium Cave, Bhimbetka IIIF-24, and adjacent Misra's Shelter, IIIF-23, south of Bhopal. C - Cupule panel on east side of Chief's Rock; N, E, S, W - the four passages of Auditorium Cave; TR I and TR II - excavations by V. S. Wakankar.*

been carried out in eleven sites of the Bhimbetka main hill: A-28, 29, 30 and 33; C-12 and 16; F-14, 16, 22, 23 and 24. The most important of these are trench II in site IIIF-24 (Auditorium Cave) by the late Professor Wakankar, and trench I in IIIF-23 (the adjacent rockshelter) by Professor Misra. Both sites yielded fairly similar archaeological and sedimentary sequences, consisting of a thin Holocene overburden covering substantial series of Pleistocene facies. The dominating components are in both cases the Acheulian strata, accounting for 2.4 metres of sediment in F-23, but only for about one metre in F-24. Hence our more complete information about the Acheulian of Bhimbetka comes not from Auditorium Cave itself, but from the adjacent shelter (IIIF-23, which I shall call Misra's Shelter henceforth), from which also the most comprehensive reports come (Misra 1978).

Bhimbetka has provided very important information about the Indian Acheulian because until its excavation, nearly all such information had come from alluvial sites and surface collections. Such sites are numerous in many parts of the country and have been examined (and selectively collected from) since the 1860s, but until the work at Bhimbetka, only one primary Acheulian site had been excavated in India (Bose and Sen 1948). It is obvious that Misra's painstaking work represents the first major attempt of analysis through time of such material in India. His findings suggest a gradual development from the Acheulian to the Middle Palaeolithic, with a few 'handaxes' and cleavers still occurring in the lowest 10-15 centimetres of the latter deposit in Misra's Shelter (Misra 1978: 71). Wakankar (1975: 15) notes that an evolution from the earlier pebble tool tradition he perceives in Auditorium Cave (and also at IIIA-30; unpubl. field notes by Wakankar) to the overlying Acheulian is not evident at Bhimbetka. Indeed, the two are separated by a substantial occupation hiatus in his Auditorium Cave trench II, of 50-60 centimetres.

It is therefore clear that Bhimbetka has been an important key site in the context of Indian Palaeolithic research, and that it is one of the great archaeological sites of the world. Of relevance here is also the geographical proximity of the find site of the Narmada cranial fragment. Despite its massive torus this fossil find is of an archaic *Homo sapiens* in my view, and whatever its true age is, it would seem to fit somewhere into the chronological sequence represented by the Bhimbetka strata. It is reasonable to assume that this hominid fossil relates chronologically to one of the Bhimbetka Acheulian levels.

In 1990 I discovered two petroglyphs on a large boulder in the base of Wakankar's trench II. It was clear that they had been covered by Palaeolithic strata, and although I suspected that they were located below the top of the Acheulian layers, I could not demonstrate this at the time. Apart from eye witness accounts, especially that of G. Kumar who had excavated there with Wakankar, I had for reference only Wakankar's excellent profile drawing of the north and east-facing sides of the trench (Bednarik 1993a: Fig. 2). However, on the third of my four trips to Bhimbetka, Dr Giriraj Kumar and I noticed that the effects of rain water washing in from the southern entrance had removed fine sediments that had remained attached to a recess in the western bedrock wall, leaving behind the coarse component, the clastics and four stone implements. Two of the latter were nondescript large flakes, but the two others permitted a cultural attribution: a large quartzite cleaver and a well-made 'handaxe', also of local quartzite. The biface, a typical pear-shaped, concave-sided late Acheulian 'handaxe', remains so tightly wedged into a cleft in the bedrock that its removal would involve the application of considerable force (Figure 2). This chance find permitted me to confirm the validity of Wakankar's section drawing, and it proves beyond doubt that the petroglyphs were concealed by a substantial part of the Acheulian deposit. They are located less than two metres laterally from the in situ tools, but nearly a metre below them. Since the overlying substantial Middle Palaeolithic layer consists entirely of carbonate-cemented material the possibility of post-depositional disturbance of the stratigraphy does not exist. Hence the petroglyphs are clearly of the Acheulian, and are thus the oldest currently known rock art in the world (Bednarik 1993a, 1993b, 1994a, 1995). Although we have a few portable engravings and other 'art' items from the late part of the Lower Palaeolithic (Bednarik 1995), no other rock art has so far been found from that period.

Figure 2. *Acheulian 'handaxe' found 1994 in situ in Auditorium Cave trench II, after monsoonal rainwater had removed the finer sediment grains around it. The artefact is tightly wedged into position, and together with three other stone tools indicates the upper extent of the Acheulian horizon in that part of the trench.*

The Chief's Rock

Auditorium Rock, like all of the Bhimbetka rock towers, is of a densely cemented quartzite of considerable colour variation. Munsell 7.5R-3/6 (dark red) with horizontal bands of a few centimetres width, of 7.5YR-8/4 (pink), occurs commonly, while Chief's Rock itself is around 4YR-7/4 (pink with brown tinge). The hardness of the quartzite is such that it has been extensively quarried at Bhimbetka sites (including Auditorium Cave and Misra's Shelter) during the Palaeolithic. It accounts for the vast majority of all known Lower and Middle Palaeolithic stone artefacts found at the complex, whereas imported stone predominates in the more recent periods. Quarrying marks are visible in various locations, and are very pronounced on the upper crest of a large boulder in Misra's Shelter.

Chief's Rock is over 2.5 metres high and 3.4 metres wide. The actual eastern panel of it, the face we are concerned with here, measures 2.2 metres in height (Figure 3). The massive boulder, weighing perhaps close to forty tons (an estimate based on its approximate volume), originates from the roof of the cave. It rests on other large boulders, the remains of earlier rock falls that remain largely concealed by sediment. Long after it had fallen to the cave floor, in recent geological history, it split into two portions, apparently along the bedding planes of the original sand grains. In sliding about a metre on its southern end, the eastern half of the boulder then came to rest in a position rotated relative to the larger western half by about 16 degrees.

The quartzite of Auditorium Rock shows many variations in surface preservation which are clearly related to factors of weathering. Most particularly, insolation has been active outside the cave, while the dense lithology has prevented granular exfoliation almost completely. Within the cave, moisture has affected a number of surfaces differently. Some bedrock surfaces in excavation trench II have been preserved almost without alteration since the time they became covered by Acheulian sediments. Others nearby were severely affected by scalar surface fretting, attributable to moisture. Granular fretting, however, which is such a dominant feature in the weathering of softer sandstones, is practically absent on the Bhimbetka quartzite. All its shelters and caves are relatively ancient geomorphological features, which contrasts sharply with the generally recent age of receding walls in northern Australian and north-eastern Brazilian rockshelters (i.e. in regions featuring corresponding Gondwanaland sequences).

The surfaces of the upper portions of Chief's Rock are generally well preserved. On the top of the rock there are clear traces of kinetic weathering (impact by rocks falling from the roof). Only the lower section of the eastern panel has suffered visible weathering damage. Several scales have become detached here, probably because of subcutaneous salt deposition from episodic wetting or capillary action. Cutaneous exfoliation continues on this part of the boulder. Chief's Rock is one of the driest locations in the

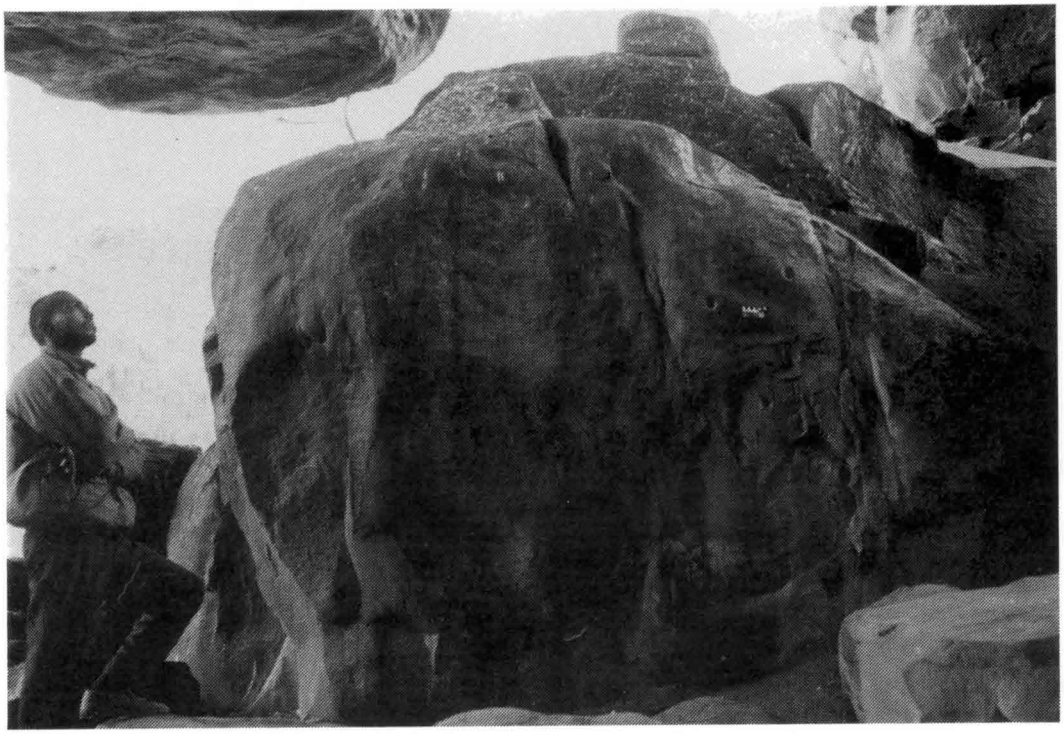

Figure 3. *East face of Chief's Rock, Auditorium Cave, with cupules visible near the scale. The large western entrance is visible in the background.*

cave, being free of major precipitate deposition, but during the monsoons rain may be driven in from the high north entrance. Moistening of the sediment has promoted some capillary moisture in the lower part of the panel, which has effected very slow weathering. Rock surfaces elsewhere have not been subjected to this process, and have survived since they became concealed under Acheulian deposits, with no more than superficial corrosion.

The fairly flat panel on the east side of Chief's Rock, measuring over five square metres, is nearly vertical, forming a natural 'blackboard'. It bears two types of rock art. Firstly, there are several barely perceptible marks of red pigment, presumably of an iron mineral such as haematite, which are clearly remnants of rock paintings. Significantly better preserved rock paintings occur elsewhere in the cave, especially high up on a wall a few metres south-east of Chief's Rock. None of the paint traces on the Chief's Rock art panel are superimposed over the petroglyphs.

All the petroglyphs on this panel are cupules (or cup marks; 'hemispherical' depressions made by pounding the rock with a pointed stone tool). There are nine cupules present, of greatly varying depths. They were produced by percussion with a stone tool which was probably hand held. Cupules are one of the most ubiquitous features in world rock art, they are extremely numerous and they occur in all continents except Antarctica. They feature prominently in very early rock arts, and all the earliest known occurrences of rock art in Europe, Asia, Australia and North America are of cupules. Numerous cupules in Europe and Australia are either known or suspected to be of Middle Palaeolithic antiquity (Bednarik 1993b). The large Acheulian cupule and pecked line in trench II are only a few metres from the nine cupules on Chief's Rock. The question of the latter's age is crucial.

An analysis of the cupules

Figure 4 shows an elevation view of the rock art panel on Chief's Rock. In order to describe the nine cupules on it effectively I have numbered them for identification. They are numbered from left to right, except number 9 because it is of slightly doubtful status. There is no reasonable doubt about the remaining eight marks, they were clearly made by multiple impact. Until there is evidence that non-human mammals also produced cupules I shall assume that this implies hominid action.

Table 1 provides the physical dimensions of the cupules. We see from it that they are of greatly varying depths, ranging from 1.1 mm to 13.4 mm. In most of them, their vertical extent exceeds their horizontal dimension somewhat. The deepest point of all seems to be below the centre of each cupule, which is probably related to the production process: blows were administered from above rather than from below or sideways. This is a common characteristic of cupules and similar rock markings whenever they occur on vertical surfaces; I have observed it in Europe, North America, South America, Australia and at other Asian sites. The 1.8-m-wide rock platform in front of the Chief's Rock art panel is likely to have been the floor the producers of the cupules were standing on. Most of the marks are between 1.5 m and 1.7

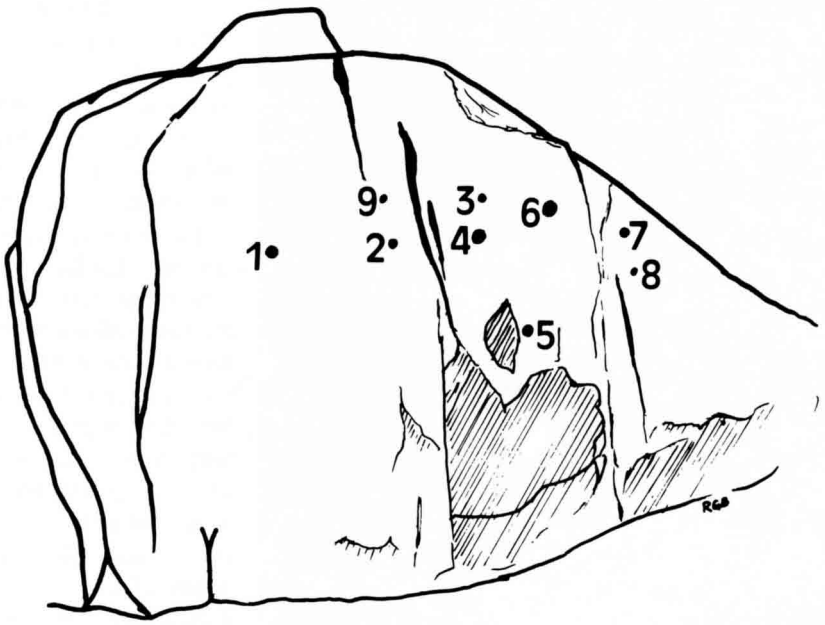

Figure 4. *Elevation of the eastern panel of Chief's Rock, Auditorium Cave, Bhimbetka, showing the distribution of the cupules (1-9). Their relative locations are shown correctly, but their individual sizes are exaggerated relative to the panel size.*

m above that platform, i.e. at ideal working height for an average-size adult human. Interestingly, if the entire block is rotated back into the position it was in before Chief's Rock broke in two (which means raising the southern end), the prominent cupules Nos 1, 2, 4 and 6 form an almost perfectly horizontal alignment. This might suggest that the cupules were produced before the boulder broke up, although it does not necessarily demonstrate that.

Cupule No.	Horizontal dimension	Vertical dimension	Maximal depth
1	35	37	3.7
2	44	49	3.9
3	36	35	3.5
4	52	58	11.9
5	40	45	9.4
6	54	64	13.4
7	45	44	12.0
8	22	24	1.1
9	60	79	8.8

Table 1. *The dimensions of the nine cupules on Chief's Rock, Bhimbetka. All measurements are in millimetres.*

Cupules Nos 3, 4, 5 and 6 (Figure 5) bear minor recent impact damage, and faint traces of it are also discernible in cupule No. 2. This damage was probably caused when people tested Wakankar's (1975) suggestion that Chief's Rock was used as a rock gong. Needless to say this was irresponsible, and under no circumstances should that practice be repeated. The markings are not related to the use as a rock gong (lithophone), they are cupules and thus a common form of rock art (Bednarik 1993b). Comparisons with known lithophonic rocks, e.g. in California, Kenya or Europe, and a consideration of the rock's probable acoustic properties would not support this idea (Dams 1985; Hedges 1993).

Microscopic examination of the cupules shows the presence of various types of small-growth lichens, the dominant species being dark-grey to black. An orange-coloured type occurs only sporadically in the form of very small thalli (visible only under magnification). The rock surfaces in and around the cupules are equally weathered, and there is no appreciable difference in surface structure evident at magnifications of 60× to 80×. The only weathering clearly visible on the upper part of the panel, next to most cupules, is microerosion (Bednarik 1992, 1993c). Although the percussion origin of the cupules is beyond question, microerosion has removed all traces of cleavage edges, crushing or crystal fracture, and no conchoidal surfaces have remained. Cupules Nos 9 and especially 2 are largely covered by tiny gnarled ridges of a carbonate-like precipitate forming 'terraced' arrangements visible only under magnification. These formations are darkly coloured and extensively corroded. It is possible that they are not related to meteoric water, but to the urine of monkeys who still inhabit the site complex and may have entered the cave. Very thick speleothems, mostly of reprecipitated carbonate, occur in the middle part of the cave's eastern passage, about twelve metres from Chief's Rock, where there is considerable seepage from the top of the rock tower.

The probable age of the cupules

There is no archaeological evidence available that would indicate the age of the petroglyphs on Chief's Rock. The presence of two Acheulian petroglyphs just six metres away, found below undisturbed archaeological layers, may be suggestive, particularly as one of them is also a cupule (Bednarik 1993a). However, mere co-occurrence at the same site does not provide conclusive evidence that the cupules on Chief's Rock itself also have to be of Acheulian age.

The only independent means of testing this proposition is by direct geomorphological evidence from the cupules themselves, and from features they are physically related to. So far, we have seen that the degree of micro-

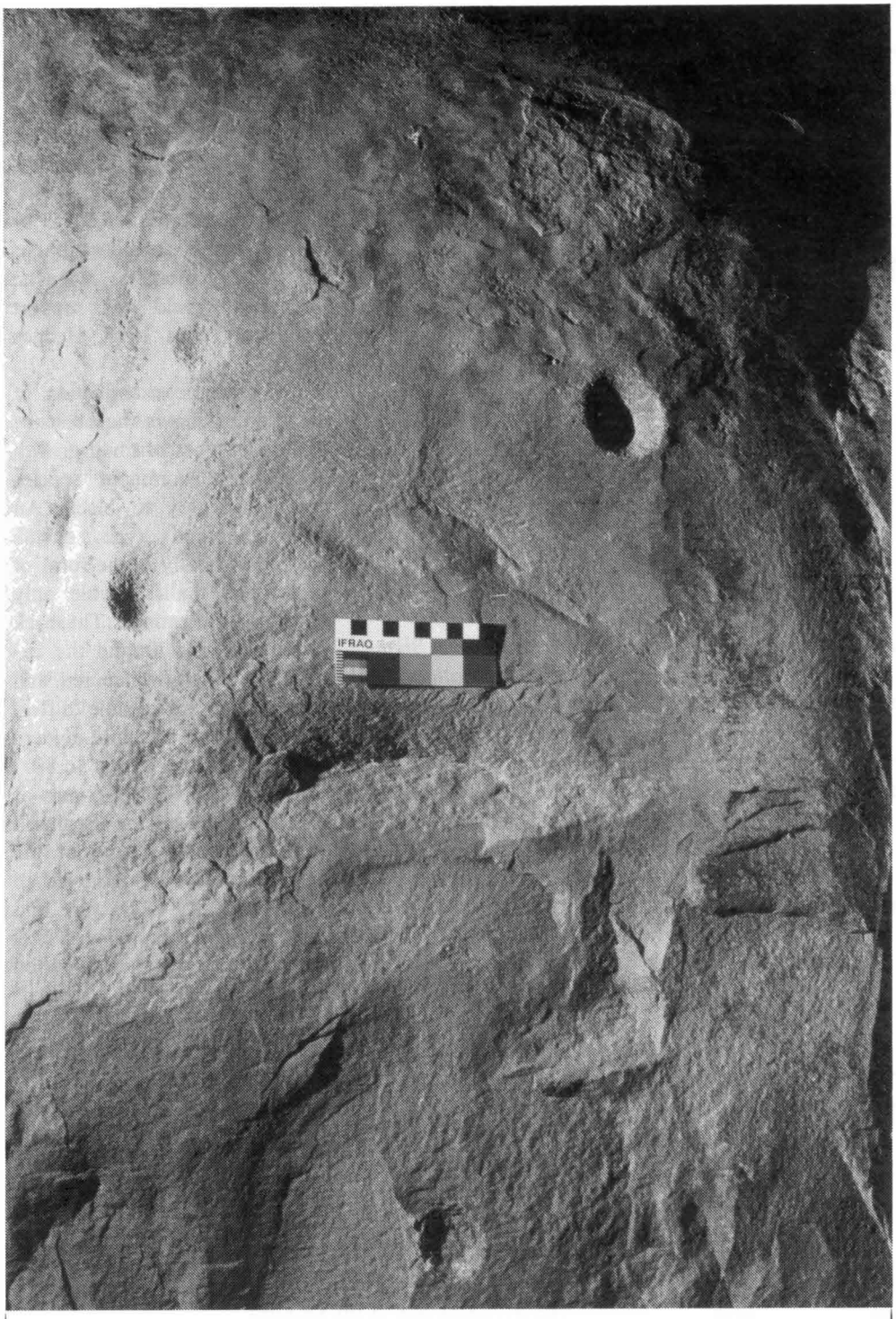

Figure 5. *Chief's Rock, cupules Nos 5 (centre bottom), 4 (left of scale), 3 (c. 15 cm above 4) and 6 (to the right of and above scale). The IFRAO Standard Scale is 10 cm long.*

erosion in all the cupules is such that a Holocene age is realistically out of the question. We know that the quartz micro-wanes at Besov Nos in Karelia, Russia, on 10 000-year-old crystal fracture edges are from 0.1-0.2 mm wide at median angles, and that fracture features have all survived well and are generally visible (Bednarik 1992). This is in a frequently wet environment on a lake shore, little more than one metre above the water, and fully exposed to rain, snow and ice rafting. On Rupe Magna in Valtellina, Italy, quartz fractures known to be about 12 000 years old produced micro-wanes averaging 128 microns (Bednarik in press). While the higher mean temperature in India would involve some minor acceleration of the solution process, the very limited exposure to water within Auditorium Cave virtually guarantees that the same degree of erosion would demand an age of several tens of thousands of years. However, since the actual degree of microerosion is significantly greater on the Chief's Rock cupules, such a figure would be extremely conservative (for detailed discussion of silica solubility, see Bednarik 1980).

More detailed information is available from cupule No. 5, which is located much lower than the main group (Figure 6). It occurs on a surrounding surface that is actually much more recent than the cupule, because it was formed by cutaneous exfoliation around it. In other words, only the deeper part of the original cupule is preserved. This area has itself since been subjected to a second cycle of the exfoliation process. Immediately to the left of the cupule, just 15 mm from it, begins a large exfoliation scar where the 10-20 mm thick lamina has become dislodged already long ago. The rock around the cupule is loose and 'drummy', and once it in turn also becomes dislodged only the very base of the cupule will remain behind. The remnant cupule will then be under one millimetre deep (see Figure 7).

The thin bridge between cupule 5 and the scar to its left, just 15 mm wide, is of considerable importance in the relative dating of the cupule. As depicted in Figure 7, the currently exfoliating rock lamina has a wafered appear-

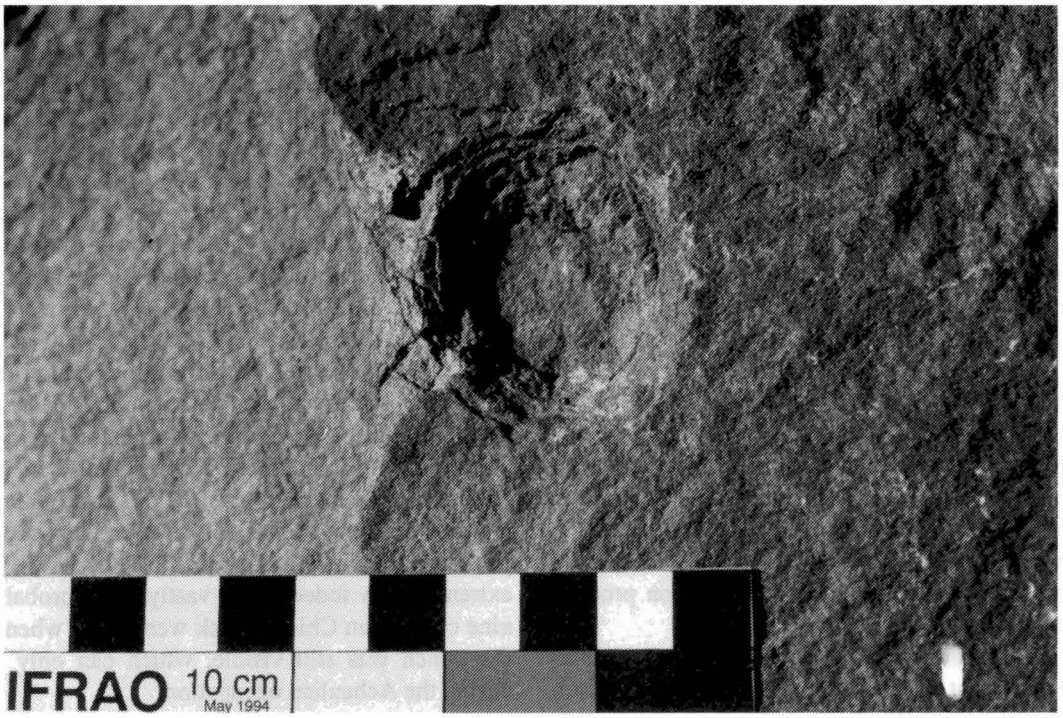

Figure 6. *Chief's Rock, cupule No. 5. The area to the left is the scar of the second exfoliation event since the cupule was made ('2' in Fig. 7). The wafer-like structure of the lamina in which most of the cupule survives ('3' in Fig. 7) is visible. Microerosion study was conducted on the margin of the lamina to the left of the cupule.*

ance in section, and while one might argue that this weathering process could have commenced before lamina 1 became detached, it is obvious that the edge of lamina 2 along the exfoliation scar must postdate the detachment of lamina 2 in that area. Hence the wafering along this margin must also postdate that event. Fortunately I detected several thin slivers of stone among these wafer-like laminae which protruded far enough so that I could examine them under the microscope. Their edges were well-rounded and there can be no doubt that this would have required some tens of millennia at least to develop to the stage observed, in this kind of environment. I have detected micro-wane radii of between 200 and 300 microns, and the degree of rounding is quite uniform on these quartz slivers.

We can be certain that the cupule was originally made

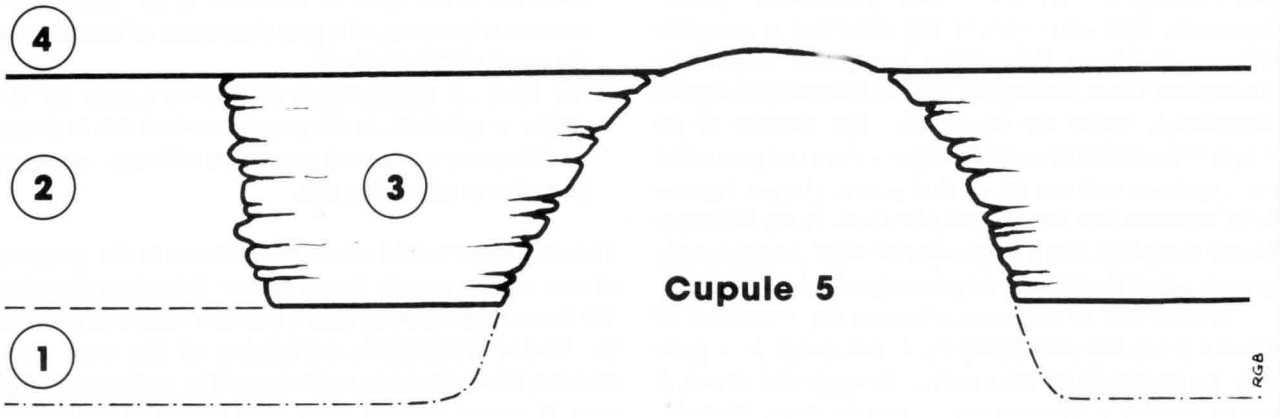

Figure 7. *Section through cupule No. 5 on Chief's Rock, viewed from top, showing the development of a wafered layer and the sequence of previously detached exfoliation laminae.*
1 - Exfoliated lamina 1; 2 - Exfoliated portion of lamina 2; 3 - Remaining portion of lamina 2, with wafered stratification; 4 - Sound rock core.

on perfectly sound rock, because if the rock had already begun to deteriorate, it would have fractured and shattered by the numerous percussion blows necessary to produce the cupule. It follows from this that we can construct a 'minimum' relative age for cupule No. 5, consisting of necessarily *successive* periods or processes: none of the following could have overlapped with the previous or subsequent:

1. The time span between the execution of the cupule and the commencement of the exfoliation of the first lamina. Its duration is unknown and cannot be estimated.
2. The duration of the laminar exfoliation processes that led to the detachment of the first lamina. Depending on moisture availability, this may be from a few millennia to several tens of millennia in this type of location, considering lithology and moisture availability.
3. The time span between the first exfoliation event and the commencement of the second exfoliation process. Its duration remains unknown.
4. The duration of the processes leading to the subsequent detachment of lamina 2 immediately to the left of the cupule. A similar order of time as in item 2 is probably involved.
5. The time span required to cause the wafering along the margin of the remaining lamina 2, e.g. just left of cupule 5. This would seem to require quite a number of millennia to develop to the present state.
6. The time span required for eroding edges on individual wafer laminae to attain the degree of rounding now evident, 200-300 microns, which we have noted would certainly involve several tens of millennia at least.

It follows from this that the actual age of cupule No. 5 would have to be at least in the order of many tens of millennia, and that it may easily be in excess of 100 000 years. Certainly, on geomorphological grounds it is impossible to accommodate the cupule in the Holocene. Similarly, it is very unlikely to be from the latest part of the Pleistocene, i.e. the Upper Palaeolithic period. Moreover, Wakankar (1975) has observed a complete absence of Upper Palaeolithic occupation deposit in Auditorium Cave, finding the Middle Palaeolithic deposit immediately under the Mesolithic. The absence of an Upper Palaeolithic occupation deposit does not prove that the cupules could not be of that period (Upper Palaeolithic evidence has been found elsewhere at the Bhimbetka site complex), but it does coincide with the apparently greater age of the cupules on geomorphological grounds.

Another line of argument concerns the separation of Chief's Rock into two boulders. If this event does postdate the execution of the cupules, as suggested above, it would provide a *terminus ante quem* for them. Unfortunately, the fracture surfaces on both halves are concealed by dark coatings of precipitates (resembling oxalates). The macro-wanes along the upper edges of both fractures are well developed, measuring up to several millimetres, but the edges are much less weathered along the sides. This does not seem to provide a reliable indicator of age. Besides, such reasoning would rely on the purported relationship between the splitting of the rock and the event of cupule manufacture, a relationship that remains unproven.

However, there does remain a third line of argument. The Acheulian age of the two petroglyphs in Wakankar's trench II, six metres to the south, can be demonstrated beyond reasonable doubt. They were certainly completely covered by sediment at the end of the Acheulian deposition phase, so they could not have been visible since then. Since there are no other cupules known from the entire Bhimbetka complex with its hundreds of rock painting sites, and indeed none from the entire region (the nearest known cupules are about fifty kilometres away, at Raisen; Bednarik et al. 1991), it seems an incredible coincidence that the cupules on Chief's Rock should have been created in the same location after the one in the trench became concealed. While such a coincidence is of course always possible, the statistical probability in its favour seems extremely low indeed. It is vastly more probable that the nine cupules on Chief's Rock were made when the one in the trench was still visible, which can only have been during the Acheulian occupation.

Discussion

On the basis of this geomorphological analysis and reasoning, the nine cupules on Chief's Rock are most probably of either Middle Palaeolithic or Lower Palaeolithic age. More cannot be said with any degree of certainty. Microerosion study of the cupules has been useful in investigating the possible durations of specific phases of their geomorphological history. However, this method cannot provide a reliable estimate of age, due to three difficulties:

a. The surface of the cupules is too much eroded to permit the identification of fracture edges or their micro-wanes. This in itself renders an age of over 100 000 years highly likely.
b. The past exposure to moisture, while certainly much less than in the open, is unknown to us. There is no evidence, however, of a past abundance of moisture on the panel of Chief's Rock.
c. We have no microerosion calibration curves for the region in question. In the present context this is irrelevant because we are not concerned with any degree of precision in estimating age.

The only other useful strand of evidence is the presence of one nearby cupule found below Acheulian deposits. We know with certainty that it was not visible at the time the Middle Palaeolithic occupation of the cave commenced, having become well covered by sediment by that time. It cannot possibly have been visible to the Middle Palaeolithic occupants, so it cannot have inspired them to copy it. It would then be a complete coincidence if the Middle Palaeolithic residents had used the same method of creating rock marks. This is of course possible, and we know that Middle Palaeolithic people of Europe and

Australia certainly created cupules (Bednarik 1993b). However, it would seem to be an odd coincidence if two peoples, one of the Middle and one of the Lower Palaeolithic, had created similar rock art at precisely the same location, independent of each other. Logic therefore suggests that it is much more likely that the cupules on Chief's Rock are of the Acheulian rather than the Middle Palaeolithic. In short, it is suggested here that they should be tentatively considered to be Acheulian, and that this proposition be subjected to refutation attempts in the future. Excavations in future years or centuries are expected to further clarify the issue, because it seems very likely that more petroglyphs will be uncovered in the vicinity of Chief's Rock once a greater part of Auditorium Cave is excavated.

Irrespective of their antiquity, the nine cupules on Chief's Rock are a most important feature of this site of world significance. Auditorium Cave contains not only the only dated Pleistocene rock art of India ('dated' in the sense of its archaeological attribution being secure), but also currently the oldest known rock art in the world. The two Acheulian petroglyphs (Bednarik 1993a, 1994a) in Professor Wakankar's trench II have now been re-buried by the Archaeological Survey of India for protection and preservation. The site is being nominated for World Heritage listing. The cupules on Chief's Rock, however, remain fully exposed to damage by site visitors. As noted above, under no circumstances must they be damaged further, and I have suggested to security guards that all stones of sizes suitable for hammering be removed from the whole of the cave floor. As the site is being nominated for World Heritage listing, due to the discovery of the Acheulian petroglyphs, visitation will probably increase, and further protection for the cupules should be considered. They should not be touched at all, and there is no reason why visitors should be permitted to enter the rock platform in front of the Chief's Rock panel. Perhaps this should be cordoned off, otherwise the deterioration of cupule No. 5 will be greatly accelerated. Finally, any vibration in the vicinity is to be avoided: there should be no running in the cave, for instance. Sweeping the floor of the cave has been discontinued at my request. The Archaeological Survey of India is considering to eliminate the entry of rainwater by grouting entry points on the top of the rock tower (R. C. Agrawal, pers. comm. December 1994). If this were successful, and if no moisture reached Chief's Rock, its preservation would be significantly enhanced, and I commend the Survey for its continuing endeavours to improve site preservation conditions in Auditorium Cave.

Global context

The question of the age of the cupules on Chief's Rock is of great importance to Indian rock art research. Their Pleistocene antiquity is geomorphologically almost self-evident, and no rock art of that period has so far been *demonstrated* to exist at any other site in India. However, such antiquity has recently been proposed for the large cupule assemblage of Daraki-Chattan, a cave in similar rock in the Chambal valley. This locality is 240 km almost due north-west of Bhimbetka, and the cave comprises 498 cupules on its two vertical walls (Kumar 1996). Acheulian stone tools occur right on the surface of that cave's floor, and Kumar notes the absence of any surface lithics postdating the Middle Palaeolithic tradition. It is therefore quite possible that the Daraki-Chattan cupules are of Acheulian or Middle Palaeolithic antiquity, as suggested by Kumar.

It is probably too early to generalise about a pre-Upper Palaeolithic petroglyph tradition in Asia. However, there are several relevant points to be considered here. To begin with, the oldest known pre-Aurignacian rock art in Europe consists of eighteen cupules hammered into a large limestone slab. Interestingly, these are arranged in pairs, except for two, one of which is significantly larger then the rest (as is the case at Bhimbetka). The slab was then turned over and placed on the Mousterian burial 6 of La Ferrassie, France (Peyrony 1934). The cupule-covered surface thus faced the corpse, which was of a Neanderthal child. Nevertheless, this is the only Mousterian rock art known from Europe, so it is a find even more isolated than the Bhimbetka cupules.

The three continents of North America, South America and Australia were all first colonised by Middle Palaeolithic people from eastern or southern Asia. In Australia, cupules are consistently identified as being among the earliest rock art (Bednarik 1993b). Australia was first occupied at least 50 000 to 60 000 years ago, but there are tantalising fragments of evidence that suggest to some a much earlier occupation, well over 100 000 years ago. These include a recent claim that a detached rock fragment bearing two cupules may be in excess of 58 000 years old at Jinmium, eastern Kimberley region. While this claim may appear very tenuous (Morwood 1996), and the existing, above-ground cupule panel at Jinmium is probably significantly younger than the exfoliated fragment (whatever its true age may be), there can be little doubt that the earliest surviving rock art in the Kimberley and Victoria River districts is consistently one of cupule panels. These are often more densely covered than even the impressive Daraki-Chattan cave walls in India. Moreover, Australian cupules have been found before in geomorphological contexts that suggest an extremely great age (Bednarik 1993b).

The timing of the first human occupation of North America remains highly controversial, but if the evidence from several South American sites is valid (Bednarik 1989), then Bering Strait was first crossed over 50 000 years ago. Be that as it may, even in North America it is recognised that the oldest surviving rock art consists of the 'pitted boulder tradition' (Parkman 1992) or 'pit-and-groove petroglyph style' (Heizer and Baumhoff 1962). A tradition of cupules and linear markings has also been identified as being very early in South America, notably at Toro Muerto in Bolivia (Bednarik 1988) and Cueva Epullán Grande, Argentina (Crivelli M. and Fernández 1996). The latter site includes the earliest dated petroglyphs in South America.

These considerations are likely to lead to the simplistic deduction that there were a cupule-producing, Middle Palaeolithic people who went on to colonise three continents from their Asian homeland. Taphonomic logic, an approach that is vastly more sophisticated than traditional archaeological model building dynamics, decrees that any physical characteristic of a petroglyph that may conceivably assist its longevity must not be used to define any preference of technique, style, location or medium (Bednarik 1994b: 70). The effectiveness of this rule increases linearly with increasing age, hence it would be naïve to perceive the surviving characteristics of such ancient art traditions as representative. In other words, we may assume that the tradition was very different from what the 'record' of it suggests. So we are probably not dealing with an art form that was dominated by cupules.

Nevertheless, the surviving evidence certainly tends to convey this impression, and it is an impression of widespread uniformity that is increasingly supported by new evidence as it comes to hand. The Bhimbetka finds fit perfectly into this emerging pattern, and these petroglyphs may well be of a tradition that was eventually introduced to new continents. In this sense, the Indian evidence is highly relevant to what happened later around the Pacific rim, in terms of very early rock art traditions.

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