

REPLY

On cupule interpretation

By ROBERT G. BEDNARIK

One of the great omissions in world rock art research has been the failure to appreciate the great importance of Tasmanian rock art. Indeed, if it were not for the efforts of Peter Sims, our knowledge of this crucial corpus of evidence would be negligible. Here he reports yet another cupule site, and from his description and photographs it certainly resembles, as he suggests, those recently reported from Meenamatta (Blue Tier), especially at site BT3 (Bednarik et al. 2007).

Tasmanian rock art consists almost entirely of petroglyphs, and its ultimate importance lies in the fact that it must all relate to mode 3 technologies (Foley and Lahr 1997) — which in Eurasia are called Middle Palaeolithic, and in sub-Saharan Africa Middle Stone Age. Whereas in mainland Australia, mode 4 technologies were introduced in the mid-Holocene, in all probability by new arrivals from Wallacea, Tasmania had become sundered from Sahul about 12 000 years ago. The use of mode 3 technology continued to European contact just over 200 years ago and beyond, providing a window of research opportunity that has not yet been adequately realised.

Globally, mode 3 technologies are marked by quite specific palaeoart traditions. Cupules can of course be found in some mode 2 (Lower Palaeolithic) technologies, and they occur in numerous later cultural traditions up to the Middle Ages of Europe and even from times that are more recent. However, certain combinations of attributes may be specific Middle Palaeolithic features. The tendency towards very small cupules and steep-walled forms (as described by Sims) is one such attribute. Another is the occurrence, sometimes, of one distinctly large cupule together with many small ones on single panels or boulders. Then there is the absence of linear abraded grooves, so common in certain more recent traditions. The steep-walled forms, which find their extreme expressions in those I have described from such sites as Ngrang Cave (see Fig. 39 in my paper), underline the same aspect Sims refers to in his description of very deep cupule morphologies. The cross-section in his Figure 5 seems impossible to achieve by percussion alone, so perhaps there was subsequent deepening by weathering processes at this very exposed site.

Certainly the cupules Sims presents here look very weathered and, being on basalt, may well be of great antiquity. But whatever their age, they would have to be the work of people with a mode 3 technology. Tasmanian rock art provides an immensely valuable

corpus of essentially Middle Palaeolithic symbolic production: great numbers of cupules of specific characteristics, circular forms and a few parietal hand stencils. But there are also some striking differences between Tasmanian cupules and those of other mode 3 technologies: in Tasmania they are often arranged in lines or multiple lines, and they sometimes occur at unusually high elevations. These features appear to be either absent, or extremely rare in other traditions of mode 3 technologies. However, these comments need to be qualified by the severe limitations of our data: not only is the surviving record catastrophically truncated by taphonomy, the traditional neglect of cupules has not helped much either.

Lombry's comments on the interpretations of cupules in a part of central Africa also add another valuable facet to the complex subject of cupules. In my paper I listed, all too briefly, the most commonly mentioned archaeological interpretations. To complement this I have provided (Bednarik 2007b) a more comprehensive and annotated list of proposed interpretations, grouping them into eleven classes based on purported uses:

1. *Unspecified or specified cultic or magic rituals*

- 1.1: Components of sacrificial altars (e.g. Anati 1968: 17).
- 1.2: Human or animal blood sacrifices (e.g. Magni 1901: 91; Tschurtschenthaler 1934a: 63; Schwegler 1992: 14).
- 1.3: Meeting places of witch covens (e.g. Tschurtschenthaler 1934a: 62; Ricchiardi and Seglie 1987: 54).
- 1.4: Magical charms protecting dwellings against witchcraft (e.g. Schgör 1970: 332, 1977: 7; Haller 1947: 272).
- 1.5: Fertility rituals related to rockslides, which are thought to occur widely in Europe, Africa and South America (e.g. Egger 1948: 59).
- 1.6: Ritual boring relating to the preparation of stone axes (e.g. Egger 1948: 57).
- 1.7: Snake symbolism (e.g. Pozzi 2000: 30).

2. *Utilitarian preparation of substances*

- 2.1: Preparation of paints.
- 2.2: Production of medicines of mineral or organic origins.
- 2.3: Pounding of pigments of mineral or plant substances.
- 2.4: Preparation of spices (Pohle 2000: 199).

3. *Mnemonic or record-keeping devices*

- 3.1: Measurement of time or as calendars (Innerebner 1937: 46; Parkman 1988).
- 3.2: Commemoration of major events, such as earthquakes (Magni 1901: 90).
- 3.3: Genealogical markers (Rizzi 2007: 93).
- 3.4: Recording of pregnancy months (Haller 1978: 168).
- 3.5: Records of stock animals (Magni 1901: 89; Šebesta and Stenico 1967: 127).
- 3.6: Records of administrators or warriors (Magni 1901:

- 89; Šebesta and Stenico 1967: 126).
- 3.7: Records of oaths, e.g. concerning land ownership (Gruber 1991: 23).
4. *Elements of belief systems*
- 4.1: Impressions of hands, feet or knees of saints (Fink 1957: 129; Casagrande and Pasquali 2003: 35, and Note 3).
- 4.2: Use of cupules as receptacles of holy water (Magni 1901: 88; Tschurtschenthaler 1934a: 63).
- 4.3: Use of the resulting mineral powder in amulets or talismans (Rizzi 2007: 110).
- 4.4: Use of cupules in funerary contexts (Magni 1901: 83, 85; Rizzi 2007: 111–114).
- 4.5: Release of a life essence in the form of the resulting mineral powder (Mountford 1976).
- 4.6: Use of the resulting mineral powder to induce pregnancy (Stevenson 1887: 539–540, 1904: 295; Fewkes 1891: 9–10; Barrett 1908: 164–165, 1952: 385–387; Loeb 1926: 247; Gifford and Kroeber 1937: 186; Heizer 1953; Grant 1967: 106; Hedges 1983a, 1983b).
- 4.7: To influence wind and weather (Spier 1930: 21; Heizer 1953; Querejazu Lewis 2007).
- 4.8: To attract or replace thunder (Parkman 1992: 367).
- 4.9: Use in reported supplication rituals in recent years (Querejazu Lewis 2007).
5. *Depiction of heavenly bodies*
- 5.1: Depiction of star constellations (Magni 1901; Leonardi 1954; Šebesta and Stenico 1967: 128; Dalmeri 1980: 95–97, 1985; Facchini 1993, 1998; Casagrande and Pasquali 2003: 40; Cairns and Branagan 1991; cf. Cairns and Yidumduma Harney 2003).
- 5.2: Depiction of the Moon or moon phases (Fink 1971: 254; Haller 1978: 172; Pace 1982: 39).
- 5.3: Depiction of the Sun (Pace 1982: 39).
- 5.4: Depiction of observed supernovae.
6. *Depiction of topographic elements*
- 6.1: Elements of pre-Historic maps (Anati 1994: 151).
- 6.2: Referents to nearby topographic features, including springs, peaks, rivers and mines (Rizzi 2007: 79).
- 6.3: Aids in orientation (Egger 1948: 57; Malfer 1976).
- 6.4: Markers of land property boundaries (Tschurtschenthaler 1934b; Haller 1972: 242–247; Ricchiardi and Seglie 1987: 64; Gruber 1991: 23).
- 6.5: Purported markers of deposited or hidden goods or treasures (Bednarik 2000).
7. *Board games*
- 7.1: Use in mancala games (Fu 1989: 179; Bandini-König 1999; Pohle 2000: 199–202).
- 7.2: Use in board games (Odak 1992).
- 7.3: Games involving the use of marbles or coins (Rizzi 2007: 107).
- 7.4: Use in the board game *huwais* in Arabia (Rice 1994).
8. *Symbolisms that are no longer recoverable*
- 8.1: Indeterminable cabalistic meaning (Magni 1901: 90).
- 8.2: Writing symbols or messages (Šebesta and Stenico 1967: 127; Haller 1972).
9. *Receptacles for offerings*
- 9.1: For offerings to deities or priests (Rizzi 2007: 97).
- 9.2: For offerings to goblins or lost souls (Magni 1901: 89).
- 9.3: For elves or spirits of nature (Šebesta and Stenico 1967: 127; Dondio 1970: 33–34; Santacroce 1987: 74).
- 9.4: For offerings by the sick (Tschurtschenthaler 1934a: 62).
- 9.5: To deposit supplication coins (Tscholl 1933: 440).
- 9.6: For offerings to flocks of birds to entreat them to spare the fields (Rizzi 2007: 98).
- 9.7: To place food tokens on the thresholds of churches (Wallnöfer 1946: 309; Egger 1948: 64).
- 9.8: For depositing coins or jewellery in cupules on stone crosses (Tschurtschenthaler 1934a: 61–63).
10. *Specific symbolisms*
- 10.1: Depiction of vulvae, occurring with or without anthropomorphs (Priuli 1983: 48).
- 10.2: To commemorate visit of a location (Mandl 1995: 65).
- 10.3: Production of cupules with coins to convert these into luck charms (Magni 1901: 102).
11. *Other purely utilitarian purposes*
- 11.1: Use as mortars (Huber 1995: 25).
- 11.2: Use as recess to keep door hinges in place (Huber 1995: 25).
- 11.3: Cooking of food (Magni 1901: 89).
- 11.4: Use as recess for salt for animals, such as cattle or deer (Fuchs and Huber 1995: 10).
- 11.5: Receptacles for bird food or to allow butter to melt (Rizzi 1994: 299).
- 11.6: Illumination or marking of paths with the aid of oil and a wick placed in cupules (e.g. Magni 1901; Bernardini 1975; Schwegler 1992; Pozzi 2000).
- 11.7: Receptacles of the first berries of the season (Fink 1983: 15; Rizzi 1994: 299).
- 11.8: Receptacles for smoke or fire signals (Haller 1972: 244).
- 11.9: Use as lamps (Egger 1948: 63–64; Tschurtschenthaler 1934a: 63; Rizzi 2007: 102–103).
- 11.10: Production of rock powder for ingestion (geophagy) by humans or animals for medicinal purposes (Trost 1993: 57; cf. Callahan 2004).
- 11.11: Receptacles for food and water for chickens (Egger 1948: 68).
- 11.12: Receptacles for pointed vertical posts in the construction of buildings (Rizzi 1995: Fig. 8, 2001, 2007).
- 11.13: Supports for the legs of beehives to prevent entry of specific insects (Egger 1948: 68; Rizzi 2007: 104).

- 11.14: Preparation for splitting of rocks (Dal Ri and Rizzi 1991: 626; Rizzi 2007: 104–105).
 11.15: Use to measure quantity of grain (Trost 1993: 57).
 11.16: Use as lithophones (Robinson 1958; Conant 1960; Singer 1961; Cooke 1964; Jackson et al. 1965; Montage 1965; Trost 1993: 94; Ouzman 1998: 38; Huwiler 1998: 148; Kumar et al. 2003: Fig. 2; Bednarik et al. 2005: Fig. 42; Bednarik 2008a: 74–76).

To this list of sixty-nine potential interpretations of cupules we can add those new ones Lombry offers above. His first, as use in the preparation of manioc (cassava) and palm oil, could be added to my class 2 above, but more correctly refers to mortars. Most researchers investigating cupules limit their sizes to below 10 cm, especially on horizontal surfaces (except where a large hollow occurs together with many small ones). Cupules, it is assumed, are non-utilitarian features. Lombry's second interpretation is far more interesting, and obviously falls under my group 4.6 above. Once again, the association of cupules with fertility or regeneration is apparent, and this is emphasised by the probable representation of menstrual blood in Lombry's example.

The next two explanations Lombry offers are covered in my above groups 1.1 and 2.1, also providing welcome ethnographic support. Particularly strong is his final interpretation of some cupules, as board games (see group 7 above). This has been recorded in equatorial Africa before (Odak 1992), and it seems most unlikely that games were invented or adapted to suit pre-existing cupule patterns that had been made for different purposes. Therefore patterns of geometrically arranged cupules on horizontal surfaces are very likely the surviving aspect of board games. This is one of the strongest ethnographic interpretations we have (Bednarik 2008a: 91), and Lombry's valuable observation only adds to its credibility.

However, the great majority of the potential interpretations found in the literature have little or no plausibility, as I have noted in my cupules paper. The number of secure ethnographic accounts we have globally remains minute. In Tasmania it may have been possible in the early 19th century to secure authentic interpretations for 'Middle Palaeolithic' symbolisms, including the purpose of cupules. That

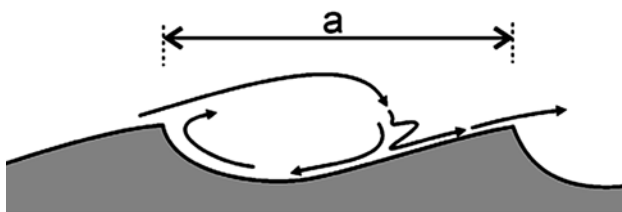


Figure 1. Typical section through solution scallop in the direction of water flow, showing the eddy current.

opportunity was missed; today we have the chance to preserve the last vestiges of an undoubtedly sophisticated cognitive system of Tasmanians, but again we seem to fail. The omissions of the 19th century may have been hard to avoid, but our present failures are inexcusable in a nation that regards itself as civilised. Tasmania has a government incapable of commitment to the protection of one of the world's most valuable cultural heritages — a heritage that could tell us so much about the origins of human cognition.

Spate and Wray provide a response to my paper that is just as valuable as the two previous, although it addresses a very different aspect. They add to the range of geomorphological phenomena that resemble cupules, and they provide a most welcome correction to my paper. I am grateful for that and I humbly accept that I should have been able to recognise that the features in Clottes' photograph are indeed solution scallops (i.e. *Fliessfacetten*; Fig. 1). It remains correct that the Mawanga Cave 'cupules' are a new discovery, as I said, but it is also true that I failed to diagnose their nature fully, whereas Spate and Wray did so on the basis of the same limited evidence. I stand corrected and I accept the correction unreservedly. This only serves to confirm the great value of open debate.

On the other hand, Spate and Wray err on terminology. 'Karren' is not a portmanteau term (i.e. a word made by telescoping two others); it is an old Austrian word (*Rillenkarrren*, *Rinnenkarrren*; from the northern limestone belt of the Alps) defining a specific phenomenon (the French equivalent term is *lapies*). Karren are formed by running water that seeks the direction of highest gradient (Fig. 2). Their formation is assisted by increased solubility through a solute's turbulence, which means that it is particularly effective in carbonate rocks and gypsum. They are therefore much more closely related to solution scallops than to *Verwitterungswannen*, which are formed by almost entirely stationary water, as well as the effects of vegetation and organic acids as pointed out by Spate and Wray. Ginés also makes this point ('still water') but then spoils it by referring to a '*kamenitza karren*', which I would regard as an oxymoron. This reinforces my view that one needs to fully understand the etymology of the scientific terms one uses, many of which are corrupted in English usage — hence my preference of *Verwitterungswanne* over solution pan. These phenomena occur on many lithologies, as Spate and Wray also observe, and I agree with them that the term *gnamma* is also redundant, for precisely the reason that it is a parochialism impeding scientific clarity. *Kamenitza*, on the other hand, refers apparently to carbonate rock, although it is indeed just a subset of 'solution pans'. *Opferkessel*, another term mentioned by Spate and Wray, is a complete nonsense I have rejected as 'severely misleading' (p. 67), because it refers to

an archaeological assumption that these entirely natural features were humanly made for the purpose of sacrifices. Any geomorphological phenomenon forming through standing water should have the same generic name, and bearing in mind that in scientific usage the first term published has precedence, I think my usage is valid. German terms in geology are always more precise, and Spate has the satisfaction of having correctly translated the German term in his 1999 publication; so if we preferred an English term, his *weathering basin* would be more correct. (Concerning the incommensurability of both languages and the social reality constructs they entail I subscribe to Sapir's [1929: 209] view that '[n]o two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same worlds with different labels attached.')

Which brings up the very useful above contribution by Clegg. He illuminates the world (framework, in relativist parlance) of archaeology, and the great gap between science and archaeology, by illustrating key aspects of the latter's operation. He recounts how he found a phenomenon he had not encountered before and therefore named it, without comprehensively checking whether it was already known to science. He also 'established' the relationship of his 'snames' to petroglyphs.

This serves very well in illuminating the epistemology of his field. A phenomenon he contends has not previously been defined occurs in the vicinity of petroglyphs, so he perceives a relationship between the two. If I refuted that relationship by pointing out that solution pans occur frequently elsewhere, and are usually not accompanied by petroglyphs, he would presumably reiterate that his 'snames' are not solution pans, hence his contention of relationship is justified. He seeks to establish a relationship by excluding refuting evidence on the basis that his 'snames' are a new and unique phenomenon, and by spatial proximity. Naturally I cannot demonstrate that the makers of the petroglyphs took no notice of the much earlier depression features. They were superb observers of natural phenomena and can safely be assumed to have noticed the much earlier natural features. They may well have invented explanations for the thousands of solution phenomena of the site, as do archaeologists. But mere co-occurrence at a site (a criterion frequently misused by archaeology) is not proof for this or any other cultural 'relationship' (see concept of favoured site; Bednarik 1989).

The gist of Clegg's comments is that he rejects the identification of his 'snames' as solution pans primarily because their floors are not perfectly hori-



Figure 2. Typical karren formations around Kamenitza; note the stromatolite structures on the floor of the solution pan. Limestone Gorge, Gregory National Park, Northern Territory (photograph by A. Spate).

zontal and flat. He is mistaken on both counts. The reason why they are not precisely horizontal is that they were formed at times when their support slab was tilted a little less than it is now. Like all sandstone slabs around Sydney, those of the Elvina Track site were originally, before erosion affected them, horizontally bedded. The site became structurally unstable, especially through fluvial action and the degradation of the less resistant supporting facies. So the main slab is gradually tilting towards the south, an ongoing process punctuated by the formation of numerous solution pans at various times. Therefore, what Clegg's Figure 5 does tell us is that these features are all of different ages: those that are tilted most can reasonably be assumed to be the oldest, subject to factors of imprecision. At the same time, features such as the solution pan in his Figures 4, 6 and 7 suffered much erosion; they became shallower and less pronounced. As the main slab tilted further, water was able to flow through. So what we can see from his data is that, since the time this particular feature was at its formative peak, it was worn away and became tilted 0.45%, and water retention (and hence solution) decreased correspondingly.

His second point, that the floor of a solution pan must be flat, is also false: some of these features are very flat, some are bowl-shaped (concave) in section, and the rest is intermediate (Fig. 3). Their varied morphology is related to such factors as lithology, hydrology, vegetation and climate. Clegg is also mistaken about the relevant terminology: both *gnammas* and *Kamenitzas* are *Verwitterungswannen* or solution pans, unless they can be qualified as being lithology-specific and are regarded as 'subspecies'



Figure 3. Solution pan with bowl-shaped floor and outflow channel on sandstone, Ubirr Rock, Kakadu National Park, Northern Territory (photograph by A. Spate).

of the latter. I can empathise with those wanting to retain the first term, because it is Aboriginal. But as the literature suggests, a *gnamma* is a solution pan on granitic support, a *Kamenitza* is usually a solution pan on carbonate rock or gypsum, whereas solution pan or *Verwitterungswanne* is the generic term for all these features, irrespective of lithology and related variables. Therefore Clegg's contention that one is a *gnamma* and another a 'sname' is mistaken (see also the point made by Spate and Wray above, that *gnamma* is an Australian synonym of solution pan). I repeat that *all large horizontal solution features caused by essentially standing water are solution pans*. The issue of naming is of course academic (i.e. a pointless argument) because the real question is how the features formed. One issue is clear: there is no justification for the use of 'sname', and Clegg needs to appreciate that this is not an issue of archaeology, where a Humpty-Dumpty terminology (words mean whatever we choose them to mean; Carroll 1871) can prevail because of the discipline's non-falsifiable status. And before Clegg paints himself into yet another corner (with his 'fire-scars'), I recommend

that he consult the relevant literature on fire damage of rock. Lack of modesty leads me to recommend starting with Bednarik (2007c: 89–90).

Clegg illustrates here what various epistemologists and social scientists (e.g. Quine 1960; Hollis 1967; Davidson 1984) have argued: that we can only understand or interpret others if they largely agree with us about what is true, reasonable, justified or the like. As Polanyi (1958: 151) states, academic disciplines exist in different worlds, and Kuhn (1970: 150) notes that their representatives 'see different things when they look from the same direction'. This is well illustrated here: when I, or another scientist (preferably a geomorphologist), look at the Elvina Track locality, what I see differs significantly from what Clegg sees. I perceive an eroding pile of sandstone slabs, some of very large sizes, which are inclined at various angles. I also see indications of a sequence of events that includes natural and anthropic rock markings, which date from different periods and which I slot into the manifestations of taphonomic processes of geomorphology. Clegg, as an archaeologist, apparently sees not structures and processes, but comparatively static conditions, which he seeks to constrain to his framework by naming them, by attaching labels to them.

As Hilary Putnam (1981: 52, his emphasis) observes, 'labels are just the *tools we use to construct a version of the world with such objects*'. In archaeology, all names of phenomena of the past are invented and etic; nobody would seriously suggest that entities such as 'Magdalenians' or 'Font Robert points' were real phenomena of the past, or that one Aboriginal ever said to another: 'Pass me that tula, this elouera is ineffective'. All cultural (and many other) designations made by archaeologists exist only in the minds and writings of archaeologists; they are untestable, free-standing constructs based on autosuggestion and authority (be they about artefacts, motivations, beliefs, intentions, social models or practices). Which is ironic, as Clegg seems to eschew authority, although I tend to think that he confuses 'authority' with the moderating role of specialists. This is apparently because when I write 'specialists' he reads 'experts'.

The fundamental difference between Clegg and myself is here (and elsewhere) that he believes phenomena need to be named, even if their defining characteristics are not fully clear and they may already have a name (numerous names, in this case; I listed well over a dozen). I, by contrast, believe that in naming a phenomenon we need to define it to the exclusion of all other, already named entities. Otherwise we could have named the 'new' phenomenon in Mawanga Cave 'znames', only to find out from two scientists, Spate and Wray, that we had made a blunder. Archaeologists are 'fortunate', they are not always obliged to admit to blunders because their postulates are so hard to test. Which is why

we 'know' that the tools of Boucher de Perthes are 'worthless pebbles'; that the Neander valley remains are those of an idiot; that those from Trinil are of an ape; that those from Liang Bua are a new species; and that the paintings in Altamira are fakes. Archaeology is such a fascinating subject of epistemology (see Bednarik 2008b for a comprehensive attempt to analyse it).

In the end I think most of us agree that when identifying scientific phenomena we should consult relevant specialists, like Spate and Wray. A degree in geology, by itself, does not make a specialist (as even Clegg has correctly noted; 2007: 58–59), just as a degree in archaeology does not make an 'expert' on the human past — or on cupules. Most archaeologists know literally nothing about cupules. This discussion has shown again that this is a ferociously complex subject. I have written about it at some length, and yet what I have said is merely an introduction. But as the first reactions to my observations already show, it is prompting a valuable intellectual response. That illustrates science in action, and I thank all commentators for their very diverse but greatly enriching perspectives.

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