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ABOUT LITHOPHONES

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Abstract. Cupules occur commonly on lithophones, and there is thus no sharp discrimination possible between such markings on lithophones and other cupules, because the two form part of a single continuum. Rather, one needs to determine whether a particular clast may have the acoustic qualities essential to yield the appropriate sound, and if that appears to be the case and the typical percussion marks occur on it, we can safely assume that it was used as a lithophone. Therefore this presentation focuses on recognising lithophones without damaging them, by examining their physical properties.

Keywords: Lithophone, Cupule, Europe, India, Africa, U.S.A.

Phenomena that certainly do fall within the definition of cupules often occur on lithophones, in many parts of the world. As a generic term, 'lithophone' defines a musical instrument consisting of a number of rock pieces (usually discs or slabs) that produce musical notes when struck (Figure 1). The use of lithophones appears to have considerable antiquity. One of the most suitable natural features are stalactites in limestone caves, and impact traces on series of such speleothems in caves of the Franco-Cantabrian region containing also other Upper Palaeolithic activity traces have been interpreted as evidence that these were used as lithophones, e.g. at Nerja, Les Fieux and Pech-Merle (Dams 1984, 1985). Each stalactite yields a particular tone when struck, its acoustic properties being determined by its dimensions and material properties.

Figure 1. *Modern lithophone made from Solnhofen limestone discs.*

However, such assemblages of a number of stones yielding different sounds are not readily available in nature, except in some limestone caves. The far more common kind of lithophone occurs in the form of individual rocks found to have good acoustic properties, i.e. yielding a high-pitched metallic sound when struck. Such lithophones or rock gongs (Montage 1965) have been used widely around the world, but have been reported most often from Africa, Asia and North America. They can be of many different rock types, but there does appear to be a preference for granitic stones. It is important to note that the crucial characteristics are not those of the material, but those of shape and contact with the supporting mass. Irrespective of rock type, the best lithophonic sound results are always obtained from rocks that are thin, discoid or elongate, and only supported at very limited contact surfaces. Ideally, they are long and slender, and supported only at one end, which is why stalactites are excellent candidates. To function best, the stone must be as free as possible to resonate unhindered when struck, which allows it to increase the intensity and prolongation of sound by sympathetic vibration. This is achieved through minimal contact with other rocks, often less than 5% of the boulder's total surface area, and some of the best sound effects seem to be generated by free-standing stone spires attached to bedrock at one end. However, these are susceptible to breakage, precisely because of their resonant characteristics: if the build-up of the sympathetic vibration exceeds the stone's mechanical strength, it can snap, a fate manifested in many broken stalactites. Figure 2 shows two lithophones side by side, one still in use, and the other, to the right of it, broken off relatively recently (as evident from the fresh fracture surface), almost certainly because it was overtaxed. This site, located on the eastern shore of the Ghandi Sagar Reservoir in India, features several lithophones, some consisting of long, finger-like rock spires measuring almost 2 m length. The rock type is in this instance a well-metamorphosed quartzite, and the site features substantial deposits of Acheulian and Mesolithic artefacts. Lithophones at the Kinderdam site in South Africa, illustrated by Coulson (2007), appear to be of the same morphology and bear similar large cupules.

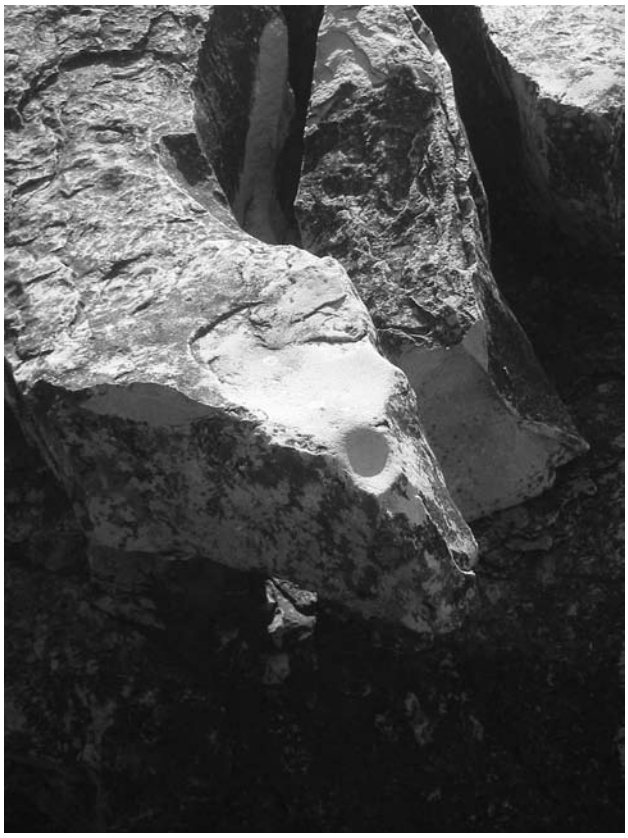

Figure 2. *Two quartzite lithophones at Pola Bhata, Madhya Pradesh, India. The one on the left bears a single large cupule at its point which is still being used, the one on the right has broken off recently.*

Numerous stones formerly used as lithophones may be difficult to detect, the only traces of their use being faint impact markings that may have weathered away or may go unnoticed. For instance, clusters of random percussion marks are found in many parts of southern Africa, thought

Figure 4. *Lithophonic gneiss boulder covered on both sides by cupules, at Morajhari, Ajmer, India.*

Figure 3. *Granite lithophone boulder in the Serengeti Plain, near Banagi, northern Tanzania, featuring both patinated and recently used cupules.*

to be the residue of 'rituals at which the production of percussive sound such as hammering or drumming was required' (Ouzman 1998: 38). Those of interest in the present context are specimens that bear cupules. They occur frequently in sub-Saharan Africa (Singer 1961), for instance in Nigeria (Conant 1960), Uganda (Jackson et al. 1965) or Tanzania (Figure 3). Trost (1993: 94) mentions two cupule lithophones near Daramandugu in Burkina Faso, used ethnographically for communication purposes. Several granite lithophones from Zimbabwe are described by Huwiler (1998: 148), who reports that they are locally called *mujejeje*. These occur near burial places and were still used recently to communicate with ancestors interred in the vicinity. Other rock gongs in Zimbabwe are mentioned by Robinson (1958) and Cooke (1964). A superb slab lithopone with distinctive rows of deep cupules from Lewa Downs, Kenya, graces the front page of the *TARA Newsletter* No. 6, March 2005. It is quite probable that the considerable cupule concentrations of Twyfelfontein in Namibia and Spitskop in South Africa (Viereck and Rudner 1957; van Hoek 2004) are the result of the use of boulders as lithophones. Coulson (2007) illustrates a rock gong from Kinderdam, a petroglyph site near Vryburg, South Africa.

There can be little doubt that the gneissic rock disc at Morajhari near Ajmer, India (Kumar et al. 2003: Fig. 2; Bednarik et al. 2005: Fig. 42), is a rock gong (Figure 4), and there are many other instances known in India. An excellent example is the large rock flake at Jhiri Nala, located about a kilometre from the ancient cupule site Bajanibhat, east of Kotputli, also in Rajasthan. Bajanibhat in fact means 'Rock that gives sound'. The lithophone of Jhiri Nala is a thin flake measuring several metres length that split from a huge granite boulder by natural agency (probably natural impact, as there is no discernible evidence of lightning; see Bednarik 2007: 62), remaining in vertical position but standing almost free (Figure 5). It is therefore an excellent candidate for use as a lithophone,

Figure 5. *Two large cupules on the tip of a granite lithophone at Jhiri Nala, near Kotputli, Rajasthan, India.*

and even though it is in a most inaccessible location, it bears two very large cupules attesting to its use.

Numerous 'ringing rocks' have been reported from the United States, and some limited ethnographic evidence is available. In southern California, DuBois relates them to girls' puberty rites of the Luiseño (1908: 115) as well as to the boys' ant ordeal ritual (DuBois 1908: 92, 95, 121). Roberts (1917: 110–117) provides a narrative relating the use of a Kumeyaay ringing stone in an apparent supplication ritual, although in this case Hedges (1993) reports no cupules from the site. In another case, in Tulare county, California, Hedges did locate cupules on a Yokut lithophone site reported earlier (Latta 1977: 196). Bell Rock, a 7-tonne granite boulder moved to the Bowers Museum in Santa Ana, bears numerous cupules (Knight 1979), and Hedges (1990) has also reported cupule sites from Menifee valley, some on lithophones.

The significance of sound to pre-Historic societies, and in particular the possible connection between some rock art and the acoustic qualities of rock art sites has been extensively investigated by several scholars, especially by Waller (1993). In the case of lithophonic cupules, the connection is indisputable. But to produce the required harmonics frequency in the stone, it merely has to be struck, there is no need to produce cupules. Replication has shown conclusively that the striking precision required to achieve sharply demarcated cupules involves very deliberate targeting (see my chapter on technology, as well as the paper by G. Kumar, both in this volume). It therefore needs to be explained why the users of rock gongs did in certain cases not just strike the rock indiscriminately, or even restrict their blows to specific areas, but instead very deliberately produced cupules that may be several centimetres deep. One utilitarian explanation is that once a location on a lithophone was determined to yield the best possible sound, subsequent use focused on that particular spot, which eventually, after generations of use, resulted

Figure 6. *The use of a cupule lithophone demonstrated at Pola Bhata, India.*

in a cupule. This appears most plausible where only one cupule occurs on a large lithophone, appearing to occupy its optimal position (as in Figure 6). However, this is not usually the case, and where numerous cupules appear to be randomly arranged over a boulder it is more likely that the convention of making cupules is not purely utilitarian. This question is certainly in need of further and much more detailed empirical investigation. The subjective impression I have formed from my observations is that distinctively delineated cupules are made very deliberately: the impact blows have to be aimed at a very small area. This would suggest a conscious connection between the production of sound and the act of creating the cupule.

Judging from the few recorded instances it seems the utilitarian role of lithophones or rock gongs relates primarily to the communicating or carrying ability of the produced sound, and the metallic sound of effective lithophones can carry over distances of several kilometres. As mentioned above, in one report it serves to communicate with ancestors. The local villager shown in Figure 6, who offered spontaneously to demonstrate the traditional use of the large and very deep cupule, has provided a detailed explanation. The purpose of sounding this rock gong is to prompt all local villagers to assemble at a predetermined location. The man explained that several cupules at the site are still in regular use today for this purpose, and this was confirmed by the very recent use traces observed in them (Figure 7). Trost (1993: 94) has provided a similar explanation from

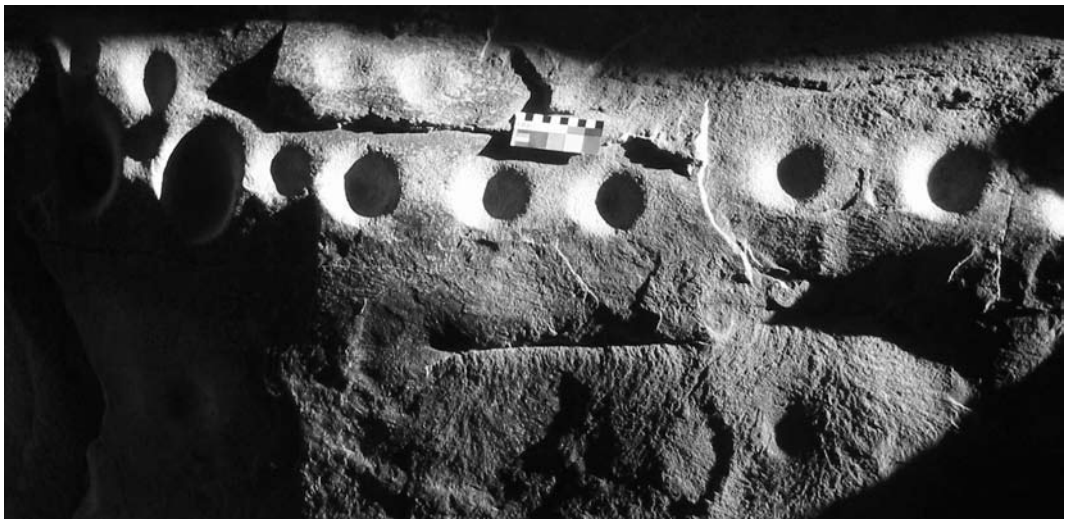

Figure 7. *Recently used/renewed cupules at Pola Bhata, central India.*

western Africa, noting that modulation of sound and rhythm correspond to spoken language and form a language similar to that produced with drums.

The remaining question is, how does one distinguish between cupules on a rock gong and 'general cupules', or how does one recognise a rock gong from its cupules? To be effective as a gong or lithophone, a rock must have quite distinctive physical characteristics as described above. However, it is highly possible that there is no hard and fast discrimination, because one class effectively grades into the other. Perhaps the audible aspects of cupule making were of significance even when the boulder being worked upon had relatively poor lithophonic qualities, at least in specific traditions. We do know, however, that there were at least some circumstances where the acoustic side effects of cupule production were apparently of no consequence, from the other recorded ethnographic productions of cupules mentioned in the chapter on ethnography.

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