Typological context of the Lower Palaeolithic lithics from Daraki-Chattan Cave, India

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Abstract: *In addition to housing some of the oldest known rock art in the world, Daraki-Chattan is also an important Palaeolithic site because it is one of the very few Indian locations where Mode 1 (pre-Acheulian) occupation evidence has been excavated in a stratified context. Overlain by a typical Acheulian with hand-axes, this deposit has yielded very simple, Oldowan-like stone artefacts made mostly of the local quartzite. Here we provide a brief description and of these tools, including several hammerstones that are presumed to have been used in the creation of some of the numerous cupules on the cave walls. We consider not only the typology of this assemblage, but also place it within the context of the Lower Palaeolithic of India.*

The very early cupule site Daraki-Chattan, in the Chambal basin of Madhya Pradesh, is of particular importance to exploring the Lower Palaeolithic (LP) industries of southern Asia, because it is one of very few sites of that region where Mode 1 (Oldowan-like) occupation evidence has been excavated below Mode 2 (Acheulian) remains. Indeed, it shares this characteristic with the only other Indian site where the existence of LP petroglyphs has so far been demonstrated, Auditorium Cave at Bhimbetka (Bednarik 1992, 1993). In both quartzite caves, substantial Acheulian deposits are underlain by pisolithic sediments indicating extensive laterisation, and by a basal sediment containing typical Mode 1 industries. In Auditorium Cave, the Acheulian and the pre-Acheulian are separated by a sterile layer containing pisoliths (Wakankar 1973, 1975), whereas in Daraki-Chattan (Kumar 1996), such a distinctive stratigraphical separation has not been documented (Bednarik *et al.* 2005).

Nevertheless, in both cases the Mode 1 technocomplexes comprise heavily weathered, saprolithic chopping tools, and in both cases the earliest petroglyphs are attributed to this phase. At Daraki-Chattan, this is demonstrated by the presence of the lowest exfoliated cupule slabs as well as by the occurrence of some of the hammerstones used in their manufacture (Fig. 1), and also by the presence of one in situ cupule among chopping tools. The attribution of the cupules and linear petroglyphs of both sites to the Mode 1 tool tradition raises the question of the antiquity of both this cultural phase and the rock art it produced, as well as the typology of the stone artefacts of the lower occupation of the cave.

Fig. 1. Freshly excavated hammerstone from the Lower Palaeolithic of Daraki-Chattan Cave; the bruised area is clearly visible.

The lithics from Daraki-Chattan

The LP stone tool sequence in the Daraki-Chattan sediments commences from the upper part of the floor deposit, which comprises only a very thin layer of more recent strata. In places an industry intermediate to Middle and Lower Palaeolithic typology was visible at the surface before excavations commenced (Kumar 1996). These intermediate tool types are underlain by a substantial deposit defined as Acheulian, but poor in typical hand-axes (Fig. 2) and cleavers. Six vague and fairly arbitrary layers were distinguished in the sediment, becoming progressively more reddish in Layer 5. The lowest sediment deposit, characterised by its red colour, contains the cobble tools as well as hammerstones.

The two uppermost, greyish-brown sediment units contain artefacts representing a transitional phase from LP to Middle Palaeolithic, mostly of purple red quartzite, a few of patinated chert. Small non-symmetrical bifaces resemble those found in the Eastern Micoquian of Europe.

Arbitrary layers 3 and 4 contain LP flake artefacts, some made from river cobbles, but most made of the local purplish quartzite. A few artefacts consist of patinated cherts. The brown soil becomes increasingly compact with depth. Layer 5 contains still much the same industry, but increasing iron content has effected a more reddish colour. Both stone tools and clasts show increasing effects of weathering and iron induration, which on large clasts may take the form of thick mineral crusts of primarily ferromanganeous composition.

Fig. 2. Typical Acheulian hand-axe from the Daraki-Chattan excavation.

The basal sediment layer features only very weathered stone tools and clasts. Tool types from the lower sediments (Fig. 3-12) include cobble tools, discoids, core choppers, flake scrapers and polyhedrons similar to the so-called Durkadian reported by Armand (1979, 1983, 1985). A few specimens resemble what have been called core-scrapers at Mahadeo-Piparia, another central Indian site, whose repertoire has been called the Mahadevian (Khatri 1963, 1966). These characteristic pieces are large blocks with a zigzagging edge produced by chunky flakes having been removed alternatively from each side.

Fig. 3. Chopper on a cobble found close to bedrock, in lateritic soil. One of the earliest artefacts, weathered, Oldowan/Mode 1 type.

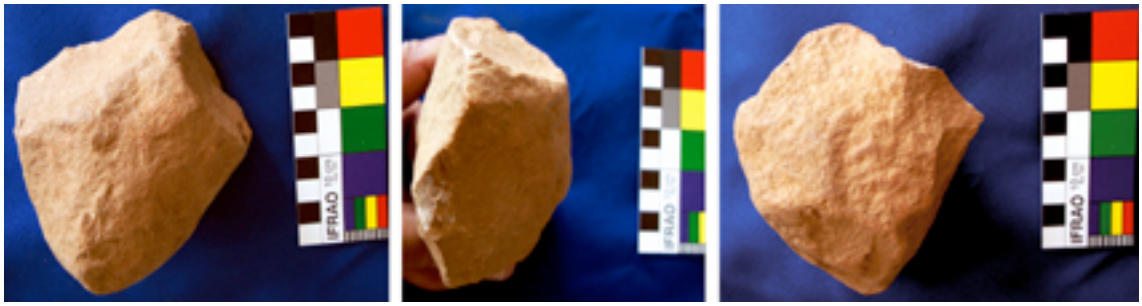

Fig. 4. Chopper on a cobble found close to bedrock, in lateritic soil. One of the earliest artefacts, weathered, Oldowan/Mode 1 type.

Fig. 5. Pebble from close to bedrock, weathered up to the core, corroborates the evidence from Bhimbetka about earliest weathered pebble tools on locally available pebbles and cobbles.

Fig. 6. Chopper on a big cobble from Layer 5.

Fig. 7. Core artefact on exfoliated cobble from Layer 5.

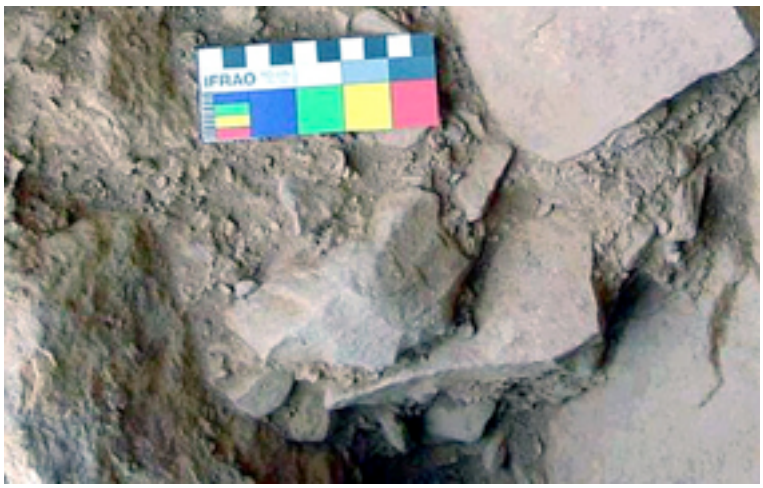

Fig. 8. Artefact on quartzite flake from Layer 5.

Fig. 9. Small hand-axe from Layer 4.

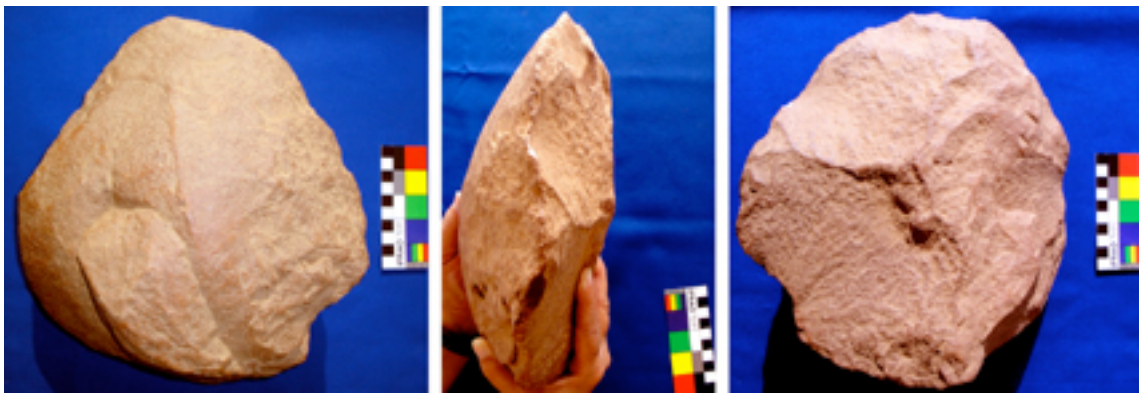

Fig. 10. Large core artefact on quartzite from lowermost part of Layer 3, dimensions 275 × 245 × 144 mm.

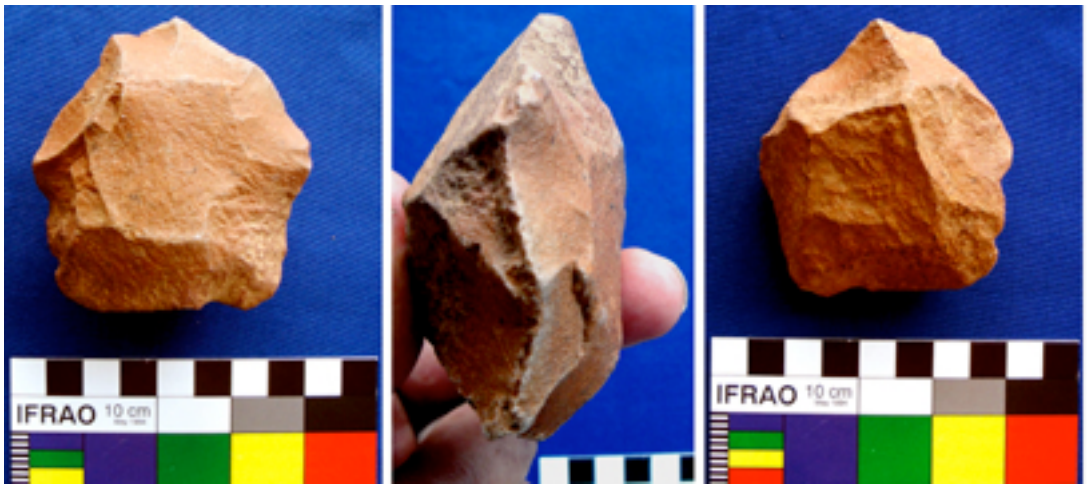

Fig. 11. Polyhedron on quartzite from lower part of Layer 3.

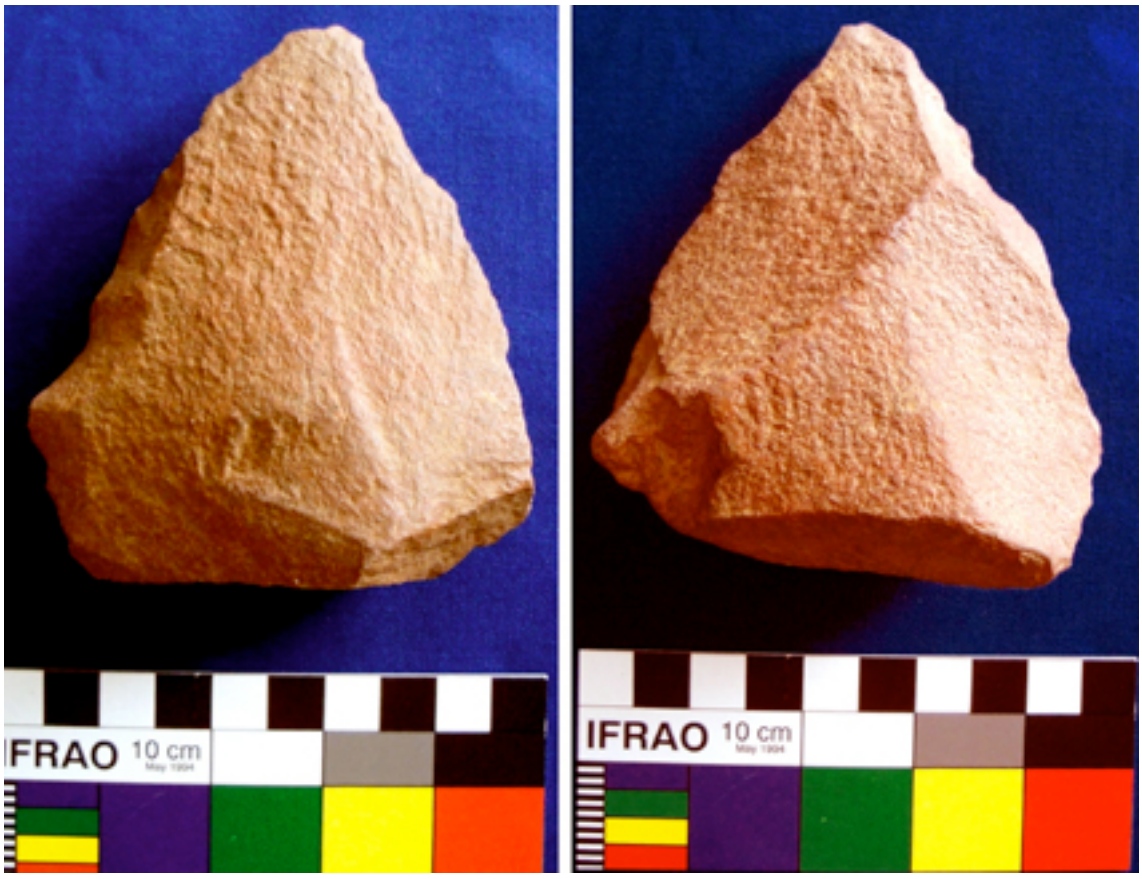

Fig. 12. Pointed artefact on quartzite flake from close to surface in the associated rockshelter, Daraki-Chattan.

The Lower Palaeolithic in India

Although LP and MP stone tool traditions are widespread in India (Petraglia 1998), represented in massive quantities and typologically accounted for (Korisettar 2002), their absolute chronology has remained largely unresolved so far. This is due both to a paucity of excavated sites (most known sites are surface scatters) and a pronounced lack of well-dated sites. For instance prior to the excavation of three Bhimbetka sites in the 1970s, only one primary Acheulian site had been excavated in India (Bose 1940; Bose and Sen 1948). Yet the Indian subcontinent is assumed to have been one of the most densely occupied regions in the world (Mishra 2006–7) for as long as hominins existed in Asia — which on present indications appears to be well over two million years (Verma 1975, 1989; Dennell *et al.* 1988a, 1988b; Rendell *et al.* 1987, 1989; Dennell 1998; Zhu *et al.* 2001; Hurcombe 2004).

It is therefore to be expected that cobble or chopping tools should precede the bifaces of the Indian Acheulian, as they do in Africa and Europe, but they have attracted comparatively little attention here. The Acheulian of India and Africa are thought to be closely related (Corvinus 2004; Petraglia 2006). Mode 1 assemblages remain remarkably neglected in India, apart from the notable syntheses by Dennell (1995) and Chauhan (2007). There appears to be also confusion between 'primary' Mode 1 assemblages (i.e. those that precede Mode 2 occurrences chronologically) and 'regressive' Mode 1 features (of essentially much later, perhaps impoverished pockets of technology, which can be found in many parts of the world and until well

into the Holocene) (cf. Guzder 1980: 79; Corvinus 2002; Gaillard 2006). The former are recognised by deep weathering, early geological or stratigraphic context, and by specific features, such as the massive choppers from Daraki-Chattan with their distinctive bi-marginal trimming (also reported from other sites of the central region, such as Mahadeo-Piparia; Khatri 1963) and lack of any Levallois features. Vaguely similar lithics can occur in much more recent traditions, but not in the distinctive combinations of genuine Mode 1 assemblages (for instance the tiny pebble tools of kalpi are quite unrelated to proper Mode 1 types; Tewari *et al.* 2002; see also Srivastava *et al.* 2003; Sinha *et al.* 2005). While it may be justified to argue that much of India presents sedimentary facies that are less than perfect for the preservation of osseous remains, which may partly explain the dearth of skeletal remains, this should not prevent the preservation of stone tools. Yet undeniably the lengthy first phase of human presence, so crucial to understanding hominin development in Asia, remains in effect largely unexplored.

The dominance of Acheulian forms may well be an artefact of collecting activities that may have favoured the easily recognizable Acheulian types, notably well-made hand-axes. Several attempts to use the thorium-uranium method, at Didwana, Yedurwadi and Nevasa (Raghvan *et al.* 1989; Mishra 1992), placed the Acheulian beyond the method's practical range (which ends at about 350 ka BP). But a molar from Teggihalli did yield such a date (of Bos, 287,731 +27,169/-18,180 230Th/234U years BP), as did a molar from Sadab (of Elaphus, 290,405 + 20,999/ - 18,186 years BP) (Szabo *et al.* 1990). However, an Elaphus molar from the Acheulian of Tegihalli is over 350 ka old. An attempt to estimate the age of a presumed LP cupule in Auditorium Cave, Bhimbetka, by microerosion analysis remained inconclusive because the age was also beyond the method's limit, which is conservatively thought to be in the order of 100 ka in this particular context (Bednarik 1996).

While the Lower Acheulian remains largely undated, preliminary indications suggest a late Middle Pleistocene antiquity for the Final Acheulian. Thorium-uranium dates from three calcareous conglomerates containing Acheulian artefacts suggest ages in the order of 200 ka (Korisettar 2002). These results are from the sites Nevasa (Pravara Basin), Yedurwadi (Krishna Basin) and Bori (Bhima Basin). The most recent date so far for an Indian Acheulian deposit is perhaps the uranium-series result from a conglomerate travertine in the Hunsgi valley (Karnataka), which seems to overlie a Late Acheulian deposit (Paddayya 1991). The travertine's age of about 150 ka at kaldevanahalli appears to confirm that the change from the LP to the MP occurred between 200 and 150 ka ago.

In addition to these very sparse dates from the early periods of Indian history, there are several presumed 'relative datings', but these were always subject to a variety of qualifications. Early research emphasised the relation of artefacts to lateritic horizons (but cf. Guzder 1980) and biostratigraphic evidence (de Terra and Paterson 1939; Zeuner 1950; Badam 1973, 1979; Sankalia 1974), which often resulted in doubtful attributions. Sahasrabudhe and Rajaguru (1990), for instance, showed that there were at least two episodes of laterisation evident in Maharashtra and that extensive fluvial reworking occurred. Attempts to overcome these limitations included the use of fluorine/phosphate ratios (Kshirsagar 1993; Kshirsagar and Paddayya 1988–89; Kshirsagar and Gogte 1990), the utility of which was affected by issues of re-deposition of osseous materials (cf. Kshirsagar and Badam 1990; Badam 1995). Similarly, attempts to use weathering states of stone tools as a measure of the

antiquity of lithics (e.g. Rajaguru 1985; Mishra 1982, 1994) are plagued by the significant taphonomic variables involved in weathering processes (cf. Bednarik 1979). The emergence of anomalous results and inconsistencies established in recent years illustrates a distinct need for a chronological framework based on a series of reliable numerical age estimations, especially from undisturbed LP and MP occupation deposits.

There remains wide disagreement about the antiquity of the Early Acheulian and the Mode 1 industries, reflecting similar recent debates in southern Europe. Based on the potassium-argon dating of volcanic ash in the Kukdi valley near Pune to 1.4 million years ago, some favour that magnitude of age for the earliest phase of the Acheulian (S. Misra and Rajaguru 1994; Badam and Rajaguru 1994). An age of well over 400 ka seems also assured by thorium-uranium dating (Mishra 1992; S. Misra and Rajaguru 1994). Others, especially Acharyya and Basu (1993), reject such a great antiquity for the Early Acheulian in the subcontinent. Similarly, Chauhan (in press) cautions that the ESR date of> 1.2 Ma for Early Acheulian finds at Isampur (Paddayya et. al. 2002) remains tentative. However, Chauhan *et al.* (in press) and Chauhan and Patnaik (2008) have shown that lithics at the Narmada site Dhansi, less than 3 km south of the hominin site Hathnora, occur in a major formation of the Matuyama Chron, presumably placing them in the Early Pleistocene.

The earliest phase of human presence in India, of Mode 1 assemblages, consists of limited but tantalising references to archaic chopping tools, cores and flake tools, sometimes compared to those of the Oldowan, sometimes referred to as Soanian. Most of these occurrences are surface finds (e.g. Salel, Chowke Nullah, Haddi, Guzder 1980; or Nangwalbibra A, Sharma and Roy 1985; or Pabbi Hills in Pakistan, Hurcombe 2004); or come from alluvial or colluvial deposits, including conglomerate horizons (e.g. Durkadi, Armand 1983; or Mahadeo-Piparia, Khatri 1963). At Pabbi Hills, dates ranging from 2.2 to 1.2 Ma have been acquired by palaeomagnetism. The few flaked quartzite cobbles from Riwat (Pakistan) appear to be in the order of 2.5 Ma old (Dennell 1998), rather than 1.9 Ma as previously proposed. The claims from Labli Uttarani near Jammu (Verma 1975, 1989), ranging from 1.6 to 2.8 Ma, are viewed sceptically (Mohapatra and Singh 1979; Mishra 2006–7). Reliably identified Mode 1 industries have been excavated from secure stratigraphies in very few cases, and they were found below Mode 2 strata at two sites. Cobble and flake tools were recovered well below extensive Acheulian evidence and separated from it by sterile sediments in Auditorium Cave at Bhimbetka (Wakankar 1973, 1975), as well as in Daraki-Chattan as noted above (Bednarik *et al.* 2005). These quartzite tools are partially decomposed at both sites and they were found in both cases below pisoliths and heavy ferromanganeous mineral accretions indicating a significant climatic incursion. In the case of the Bhimbetka finds, the objections (Jayaswal 1978, 1982) citing Misra's (1978) results in IIIF-23 are entirely irrelevant: the excavation in Misra's Shelter failed to extended below the Acheulian deposits (Bednarik *et al.* 2005), whereas that in IIIF-24, Auditorium Cave certainly did, as did the excavation in Daraki-Chattan.

The only hominin fossil specimens of Asia found between the Levant and Java/China, the Narmada calvaria and postcranials, were recovered at Hathnora (H. de Lumley & Sonakia 1985; Sankhyan 1999), about forty kilometres south of Bhimbetka, where Acheulian petroglyphs were first identified. The partially preserved cranium was initially described as *Homo erectus narmadensis* (Sonakia 1984, 1997;

M.-A. de Lumley and Sonakia 1985), but is now considered to be of an archaic *Homo sapiens* with pronounced erectoid features (Kennedy *et al.* 1991; Bednarik 1997). Its cranial capacity of 1200 to 1400 ml is conspicuously high, especially considering that this is thought to be a female specimen. A clavicle, however, is from a pygmy-sized individual, being under two thirds of the size of most modern human specimens. It is of an individual of a body size similar to Homo floresiensis. Both Hathnora specimens are among the most challenging hominin finds ever made, yet both remain widely ignored. The two sub-species co-occur in the Unit I Boulder Conglomerate of the Narmada valley site (H. de Lumley and Sonakia 1985). The rich accompanying fauna implies a mid or late Middle Pleistocene age for the hominin finds.

The hominin-bearing sediment at Hathnora has been suggested, without much tangible evidence, to be in the order of 200,000 years old. The only secure age information comes from a series of palaeomagnetic determinations, according to which the entire relevant sediment sequence at Hathnora is of the Brunhes Normal Chron, hence the human remains must be younger than 730 ka (Agrawal *et al.* 1988, 1989). On the other hand it is unlikely that they are under 150 ka old. Within this rather long interval, both tool typology and fauna point to the uppermost time zone. Having examined the Narmada calvaria, the authors agrees that its most likely age is in the order of 200 ka, because its essentially modern cranial volume renders a much greater age unlikely.

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