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RECENT RESEARCH INTO THE PALAEOOLITHIC ARCHAEOLOGY OF TAMIL NADU, SOUTH INDIA

Shanti PAPPU*

Abstract

This paper puts forward results of a recent study of the Palaeolithic archaeological record of Tamil Nadu, South India. A reinvestigation of this classic area of the Indian Palaeolithic, involved studies of Pleistocene geomorphology, site formation processes and artefact technology, in an attempt to understand variability in the Pleistocene archaeological record. A brief note on ongoing excavations at a Palaeolithic site in this region is also discussed.

Introduction

Palaeolithic archaeologists in South Asia, have, in recent years increasingly focused on the need to periodically reexamine the prehistoric record of regions with a long history of archaeological research (Dennell & Hurcombe 1992; Dennell & Rendell 1991; Mishra 1995; Rendell *et al.* 1989). These studies, drawing on recent theoretical and methodological advances in the discipline, have yielded new insights into Quaternary environments and prehistoric lifeways. This paper presents results of such a study; being a reexamination of a classic region in Palaeolithic archaeology; viz. the Kortallayar basin, Northern Tamil Nadu (Fig.1). Several factors have contributed to the unique position this region holds in Indian archaeology. The discovery of the first stone tool in the Subcontinent was made here, at Pallaveram, by the British geologist, R. B. Foote in 1863 (1866). Subsequently, owing to the work of T. T. Paterson (de Terra & Paterson 1939) and V. D. Krishnaswami (1938), the Kortallayar basin was chosen as an ideal example of a coastal river system where prevalent ideas on stratigraphy, chronology, climate and industries could be tested and form another link in the attempt to build up a 'Grand Pan-Indian Prehistoric Cultural and Climatic Sequence'. Their construction of a four-fold river terrace sequence with associated prehistoric cultures; and the identification of a Lower Palaeolithic Acheulian handaxe based "Madras Industry" as contrasted with the flake-chopper facies of the "Soanian" continues to influence studies in Indian pre-

history. The series of excavations conducted by K. D. Banerjee of the Archaeological Survey of India (I.A.R. 1962-63, 1963-64, 1964-65, 1965-66, 1966-67, 1978-79), once again drew attention to the problem of terraces and culture sequences within this region, but were marred by the lack of published reports.

Thus, although the Kortallayar basin, is often cited in archaeological literature, research has been sporadic, marked by conflicting observations, and has yielded limited information on hominid lifeways. A new look at the nature of the archaeological record in this region, in the light of recent theoretical and methodological advances in the subject, was thus required. Five years of field investigations (1991-1995) were conducted by the author; utilizing a regional approach with a multistage survey and sampling methodology, whereby an area of 200 sq. km was surveyed. A total of 22 sites with a sample of 2012 stone tools, belonging to the Lower and Middle Palaeolithic and the Mesolithic were studied (Fig. 1). Studies included a consideration of Pleistocene geomorphology, site-taphonomy and lithic technology. The research forms a part of the broader objective of understanding the variability seen in the Palaeolithic record and of exploring alternate models of hominid behavioural strategies during the Middle to Late Pleistocene (Pappu 1996, 1997). Subsequently, the site of Attirampakkam was chosen for excavation; being the first in a series of excavations planned at Palaeolithic sites in this region.

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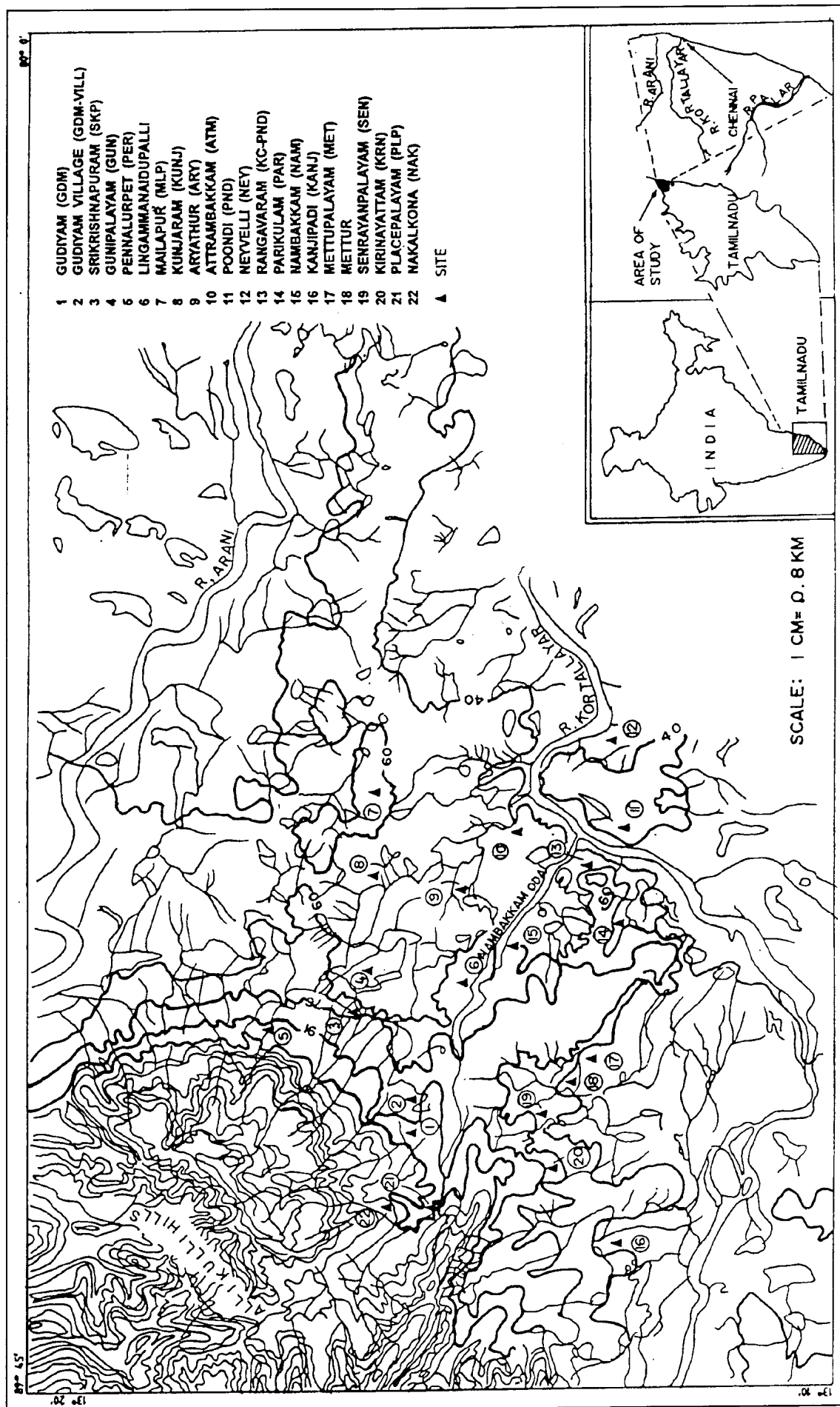


Fig. 1. Distribution of Palaeolithic sites in the study region (Kortallayar river basin, Tamil Nadu, South India).

The Region

The region comprises an area of 200 sq km (79° 40': 79° 56' E and 13° 17': 13° 10' N) in the Kortallayar basin, which forms a part of the Palar basin, Tiruvallur (formerly Chingleput, Chengai-Anna) District, Tamil Nadu. It is represented by the Satyavedu planation surface consisting of the north-northeast south-south-west trending Allikulli hill ranges (200–380 m AMSL) and surrounded by undulating lowlands. The area is drained by the river Kortallayar and a network of ephemeral streams. Geologically, overlying the Archaeans, are the Upper Gondwana Satyavedu, Sriperumbudur and Avadi formations represented by the Allikulli hill ranges and surrounding pediments, which constitute the bedrock in the study area. These are capped by Quaternary formations discussed later. Prominent fault lines are noted as well (Muralidharan *et al.* 1993). The region falls in an area of wet tropical moderate bioclimate and dissymmetric rainfall regime with an annual range of 105–125 cm characterised by cyclonic rains from September to November and a mean temperature of 36°C.

Quaternary Geomorphology

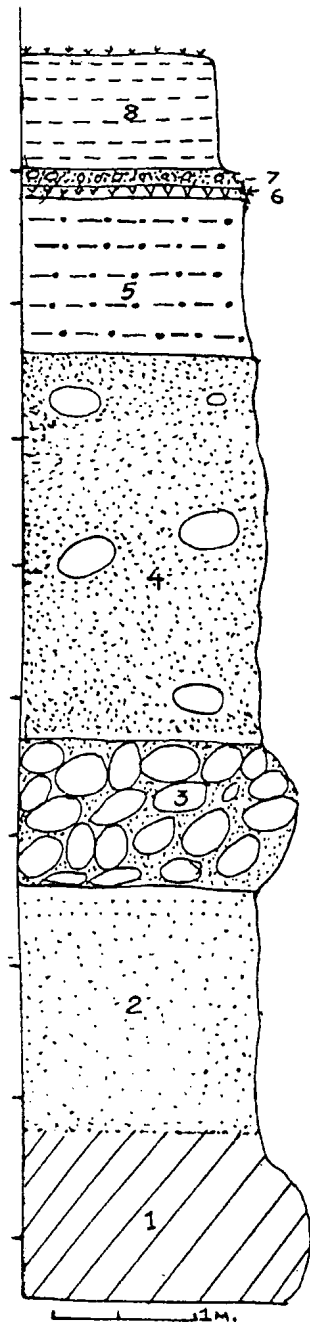
The Upper Gondwana formations are capped by Tertiary to Early Quaternary ferricretes as seen in the 4 m thick ferricrete profile at the site of Erumaivettipalayam, 33.83 m AMSL. Quaternary deposits in the Palar basin consist of the Erumaivettipalayam surface (fluvial erosional, comprising lateritic gravel), and the Palar-Kortallayar formation (comprising channel-bar, channel-fill, channel lag, flood basin, levee, pointbar and terrace deposits), ranging in age from the Middle Pleistocene to the Holocene (Muralidharan *et al.* 1993:9). The composite Quaternary stratigraphic sequence is presented in Figure 2. Quaternary ferricretes or ferricritised gravels containing, in general, Late Acheulian to Middle Palaeolithic artefacts, disconformably overlie the bedrock. Ferruginous gravels (30 cm to 4–10 m thick) and ferricretes cover most of the study area. Two phases of Quaternary ferricretes are noted. Older ferricretes/ferruginous gravels contain

Acheulian to Middle Palaeolithic tools. These are 1.5 m to 2.5 m thick and comprise mainly coarse sands to silts with a few outside clasts and pebble lenses. Ferricretes are capped by a ferricrete lag and sheet gravel containing Late Middle Palaeolithic artefacts and microliths. Localised deposits of clayey-silts and calcrete lag (extending over an area of 4 sq. km as indicated by satellite image studies) are noted as well.

Within the study area, weathering of the bedrock clasts, winnowing of their siliceous and ferruginous matrix as well as erosion of Tertiary ferricretes were the principal processes contributing source material in the form of gravels, silts, sands and clays which constitute the Pleistocene deposits in the region. Subsequent transport and deposition by colluvial processes, sheet and stream floods and stream channel processes (Pappu 1996, 1997), followed by weathering of the profiles and ferricritisation, has resulted in the formation of the Pleistocene landscape. Thus, although terraces of the Kortallayar are noted, these do not correspond to the terraces proposed by earlier scholars. Although, satellite image studies (Ramasamy *et al.* 1992), indicate that the river Palar once flowed along the course of the river Kortallayar and subsequently shifted south, these channels cannot be conclusively dated using archaeology (see Pappu 1997).

The Archaeological Record

Historically, the Kortallayar basin is well known for the identification and study of the 'Madras Handaxe Tradition' of the Lower Palaeolithic. Most Acheulian sites are, however, deeply buried within ferricretes and thus the artefacts assemblages discussed here comprise 1657 Middle Palaeolithic artefacts, collected from 22 sites. Sites have high artefact densities ranging from 3–4 to 28 artefacts/sq m extending over areas of 50 sq m to around 1 sq. km. The study of both Lower and Middle Palaeolithic sites however, involved a consideration of both natural and cultural processes, which could have resulted in the patterning of artefact assemblages observed.



Period	Sedimentary Deposit	Associated Sites
Holocene	Palar-Kortallayar Surface (silts, sands and clays of the Kortallayar, including levees, pointbars, channel-lag deposits), gullies Ferricrete lag	sterile microliths
Late Pleistocene	Sheet and stream flood deposits, (Ferricrete lag and sheet gravel) Clayey-silts and calcrete lag (palaeopond)	Late Middle Palaeolithic sterile
Middle Pleistocene to Early Late Pleistocene	Ferricitised and ferruginous colluvial deposits, stream and sheet flood deposits channel-lag and channel fill deposits, terraces.	Acheulian-Middle Palaeolithic
----- Unconformity -----		Early Acheulian
Tertiary to Early Pleistocene Ferricretes		
Upper Gondwana Satyavedu, Sriperumbudur and Avadi Formations		

1. Bed Rock (Satyavedu, Sriperumbudur or Avadi Formations)
2. Tertiary to Early Pleistocene Ferricretes
3. Ferricitised Gravels (Acheulian to Middle Palaeolithic Tools)
4. Ferricretes (Acheulian to Middle Palaeolithic Tools)
5. Clayey-Silts Sterile
6. Calcrete Lag Sterile
7. Ferricrete Lag and Sheet Gravel (Middle Palaeolithic Tools and Microliths)
8. Holocene Silts (Sterile)

Fig. 2. Composite Quaternary Stratigraphic Sequence.

Site Taphonomy

Prior to inferring hominid behavioural strategies, it was deemed necessary to conduct a study of geomorphic, biogenic and current landuse practices in order to determine post-depositional processes which influence artefact distribution and morphology (Goldberg *et al.* 1993; Nash & Petraglia 1987; Schiffer 1987). While the principle aim of this study was the identification of sites having a high potential for behavioural information, it was recognized that studying localities in differing contexts is essential for modeling natural formation pro-

cesses operating on a regional level. This has been discussed elsewhere and is briefly summarized here (see Pappu 1999). Sites were classified into different types on the basis of their sedimentary context, degree of integrity and potential for informing on behavioural variables. Sites fall into a continuum between in situ sites, indicating areas of hominid activity in varying degrees of integrity and 're-worked sites' where little to no information on behaviour can be obtained. This study is the first of it's kind in the Indian Subcontinent as applied to Palaeolithic sites occurring in a ferricrete landscape.

Type 1a

These consist of sites of high integrity, which were buried and exposed only recently, due to quarrying, construction and section scrapings. (Mailapur, Parikulam, Gunipalayam, Attirampakkam, Aryathur, Kunjaram, Poondi-Town). These contain Acheulian to Early Middle Palaeolithic tools and are in ferricritised low energy stream and sheet flood deposits. Subsequent to the deposition of sediments, weathering and ferricrete formation occurred pointing to relative stability of the landscape. Duricrust formation has led to the virtual immobilisation of artefacts. However, subsequent localised block weathering of the duricrust, has led to artefacts being transported as a block, within the confines of the site and released after disintegration of the duricrust. Variability is noted in abrasion patterns with four main trends prevailing, viz. intensely abraded; less abraded with worn flake facets and fresh edges, uniformly abraded flake facets and edges; and totally unabraded artefacts. Artefacts may also be differently eroded on the dorsal and ventral faces. The process of iron encrusting appears to be a major factor contributing to weathering of artefacts, in particular those on quartzitic sandstones. Artefacts range from those, which are deeply patinated to those, which are completely unpatinated, and this may be either attributed to age or to localised soil conditions.

Type 1b

These are sites located in sediments deposited by high energy processes such as channel fill deposits, channel lag deposits, reworked channel gravels (Kanjipadi), and colluvial gravels (Srikrishnapuram). Artefacts may be of all size ranges, but with a predominance of larger tools. Artefact density is low and size sorting with clasts occurs. Most tools have a clear orientation. Minimum behavioural information is obtained from such sites.

Type 2a

These consist of surface sites. Artefacts are exposed from underlying sediments owing to deflation or sheet wash (Attirampakkam, Aryathur, Mailapur, Gunipalayam, Neyvelli,

Parikulam). Artefacts erode out of the ferricretes or ferricrete lag and sheet gravel spreads as well. Sediments are fine to medium grained, low to medium energy episodic sheet wash deposits. Artefacts exhibit spatial clustering. At most of the sites however, no distinct orientation or inclination of tools was noted. In other cases it is unclear as to how far this is a result of natural forces or discard patterns or a combination of both. Artefacts from surface sites are in general unpatinated, although the presence of calcrete lag has influenced patination, this being subject to raw material and the position of the tool in the soil. The presence of a conjoinable artefact from the site of Erumaivettipalayam, points to the high integrity of some of these surface sites.

Type 2b

These consist of surface sites in colluvial ferricritised gravels and lag contexts (Nambakkam, Placepalayam, Mettur-Mettupalayam, Senrayanpalayam, Kirinayattam). They occur in ferricritised gravels, which are the result of reworking of weathered bedrock, on mantled pediments and in the case of Placepalayam on hillslopes. In general they occur on the surface of coarse-grained gravel beds and in lag contexts, smaller artefacts and debitage are winnowed, leading to a concentration of larger and heavy-duty tools.

Type 2c

This consists of transported surface sites, noted along the Attirampakkam *odai* (gully). They are isolated clusters of tools and gravels with mean areas of 50 sq m, parallel to water flow and with all artefacts and gravel oriented east-west.

Type 3

These include contexts where artefacts occur as findspots and are of unclear context (Placepalayam, Nakakalkona, Kirinayattam, Vellattukottai).

Type 4

Ongoing excavations at the site of Attirampakkam have yielded Acheulian artefacts on the surface of and within deposits of laminated clay, underlying ferruginous gravels (Fig. 3).

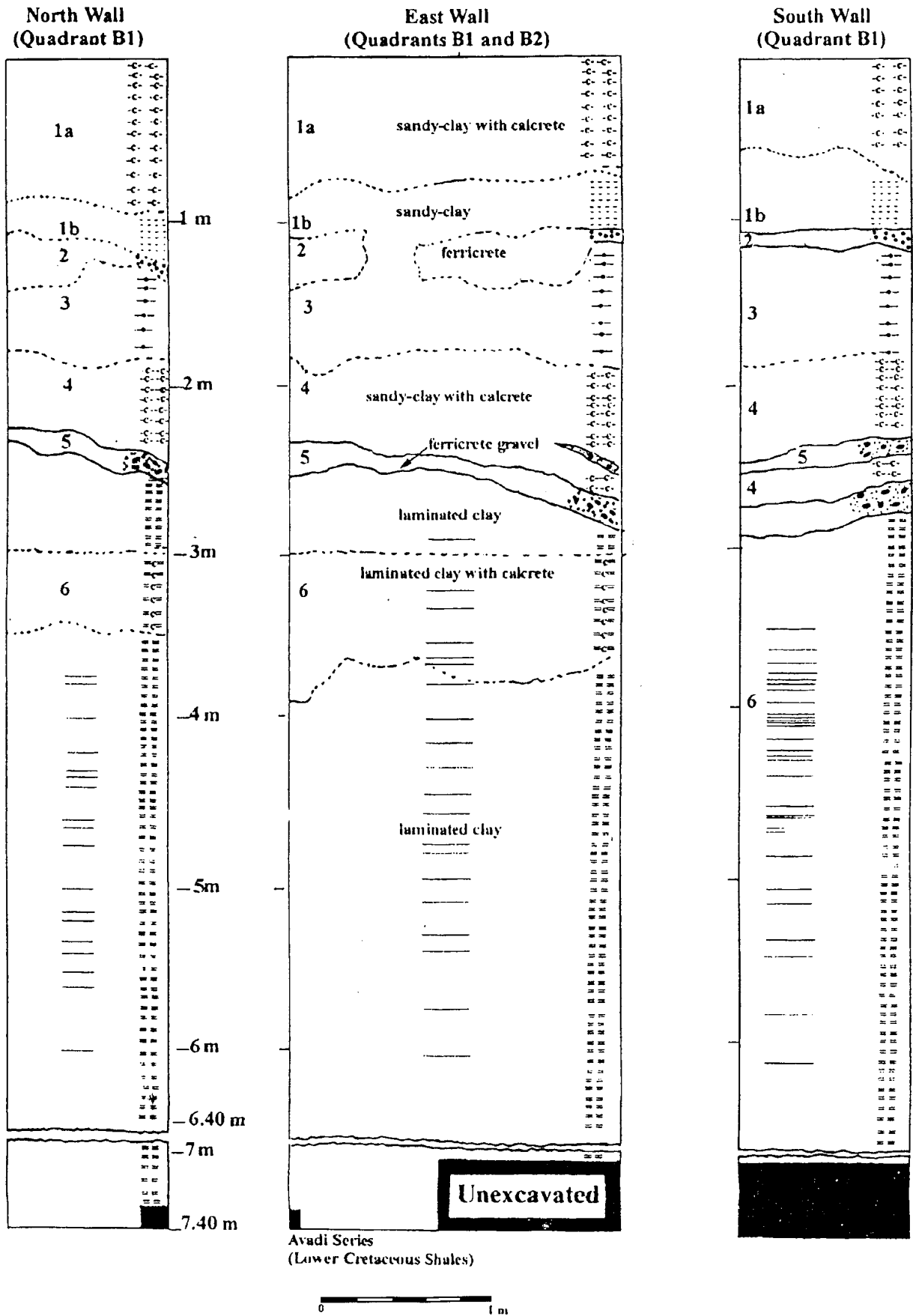


Fig. 3. Stratigraphy of Test-Pit T3, at the site of Attirampakkam.

A survey of Lower and Middle Palaeolithic sites along the east coast of India indicates that similar artefact contexts prevail in this region as well. Thus, the methodology adopted in the Kortallayar basin, would be of value for understanding sites in other areas where laterites/ferricretes predominate. Equally important is the discovery of Acheulian artefacts on and within a clay deposit at Attirampakkam, a context hitherto not noted in Peninsular India (Pappu *et al.*, manuscript in preparation).

Stone Tool Assemblages

An analysis of the Middle Palaeolithic assemblages is briefly discussed below (see Pappu 2000). Assemblages are characterised by a wide range of reduction strategies are noted; comprising flake, prepared core, flake-blade, point, blade and biface techniques; a lack of standardization of tool forms; mild retouch; reuse of older/broken tools/cores/debitage and use of unretouched flakes, flake-blades, blades and thermal fracture flakes (Fig. 4).

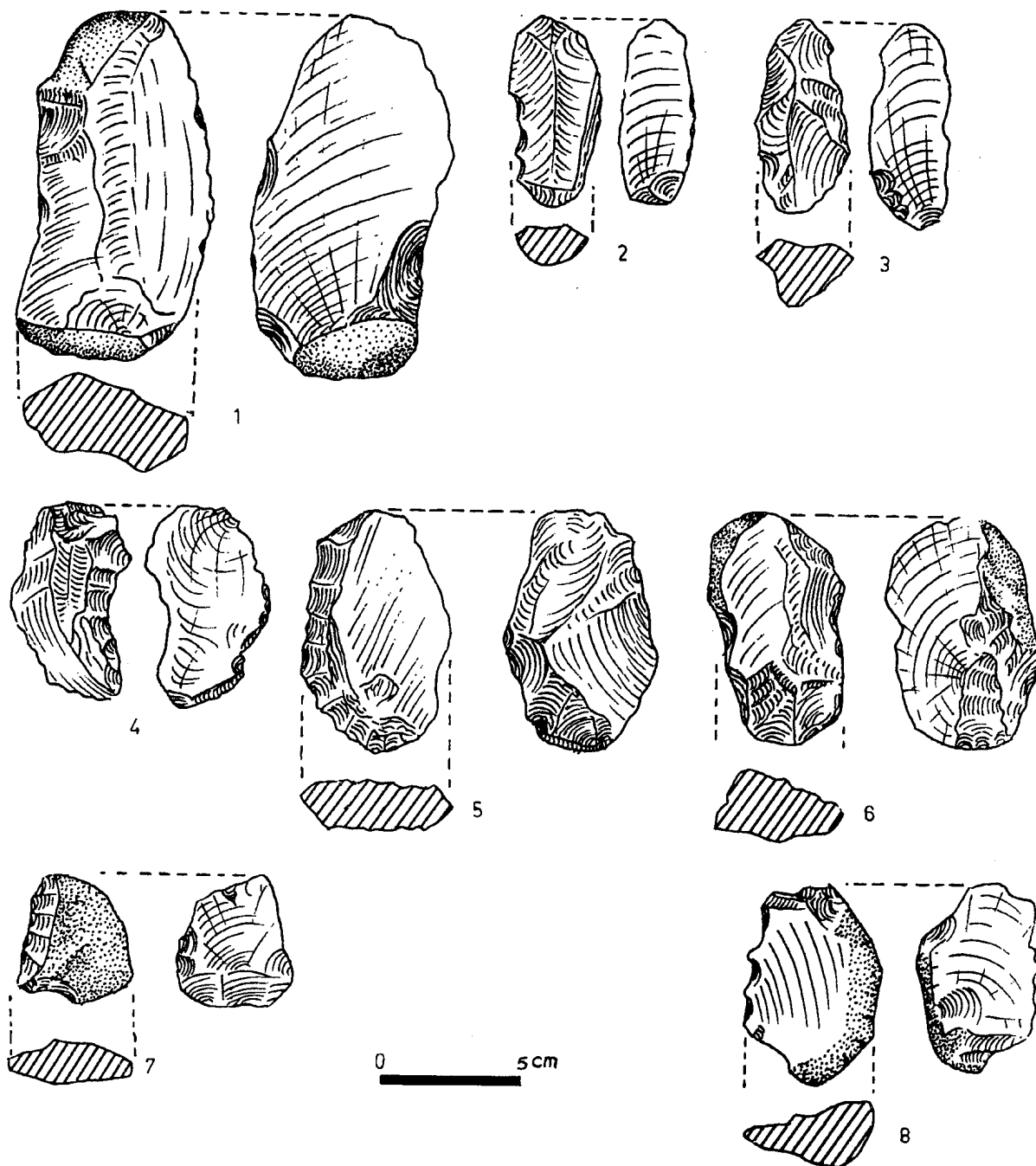


Fig. 4. Middle Palaeolithic artefacts (Finished Tools):
1-3: flake-blades; 5-6: knives; 4, 7: pieces with retouch; 8: denticulate.

Table 1. Middle Palaeolithic Artefact Types.

ARTEFACT TYPES	ATM	ARY	NAM	NEY	MLP	GUN
MODIFIED COBBLES	1 (0.24%)	5 (0.98%)	1 (0.93%)	—	4 (2.45%)	2 (1.00%)
CORES	14 (3.14%)	13 (2.56%)	2 (1.85%)	1 (1.75%)	19 (11.66%)	12 (6.00%)
CORES GRADING INTO CHOPPING TOOLS	3 (0.73%)	2 (0.39%)	—	1 (1.75%)	—	—
CORES GRADING INTO BIFACES	4 (0.98%)	—	1 (0.93%)	—	1 (0.61%)	—
DEBITAGE	284 (69.27%)	345 (67.91%)	55 (50.93%)	30 (52.63%)	92 (56.44%)	90 (45.00%)
FINISHED TOOLS	104 (25.36%)	143 (28.15%)	49 (45.37%)	25 (43.86%)	47 (28.83%)	96 (48.00%)
Scrapers	28 (6.83%)	20 (3.94%)	18 (16.66%)	10 (17.54%)	12 (7.36%)	25 (12.5%)
Scraper grading into notches	1 (0.24%)	6 (1.18)	3 (2.77%)	3 (5.26%)	3 (1.84%)	12 (6.00%)
Core scrapers	34 (8.29%)	26 (5.12%)	6 (5.55%)	9 (15.79%)	10 (6.14%)	4 (2.00%)
Denticulates	4 (0.98%)	12 (2.36%)	2 (1.85%)	—	3 (1.84%)	7 (3.5%)
Knives	5 (1.22%)	21 (4.13%)	—	1 (1.75%)	4 (2.45%)	9 (4.5%)
Notches	2 (0.49%)	6 (1.18%)	3 (2.77%)	—	2 (1.23%)	2 (1.00%)
Borers	—	—	1 (0.93%)	1 (1.75%)	—	—
Levallois points	—	15 (2.95%)	—	—	—	—
Points	1 (0.24%)	1 (0.19%)	2 (1.85%)	—	1 (0.61%)	7 (3.5%)
Pieces with retouch	25 (6.1%)	19 (3.74%)	7 (6.48%)	—	5 (3.06%)	25 (12.5%)
Bifacially flaked tools	—	—	—	—	2 (1.23%)	—
Chopper-chopping tools	—	13 (2.56%)	3 (2.77%)	—	2 (1.23%)	1 (0.5%)
Handaxes	2 (0.49%)	4 (0.79%)	3 (2.77%)	—	3 (1.84%)	4 (2.00%)
Cleavers	2 (0.49%)	—	1 (0.93%)	—	—	—
Hammerstones	—	—	—	1 (1.75%)	—	—
Total artefacts from each site	410	508	108	57	163	200

Table 1. (continued).

ARTEFACT TYPES	SEN	MET	KRN	PLP	NAK	GDM	PER
MODIFIED COBBLES	—	2 (5%)	—	3 (3.85%)			
CORES	1 (2.08%)	—	—	2 (2.56%)	—	1 (5.26%)	—
CORES GRADING INTO CHOPPING TOOLS				3 (6.41%)			
DEBITAGE	14 (29.16%)	29 (72.5%)	9 (50%)	55 (70.51%)	—	9 (47.37%)	1 (16.66%)
FINISHED TOOLS	33 (68.75%)	9 (22.5%)	9 (50%)	15 (19.23%)	2 (100%)	9 (47.37%)	5 (83.33%)
Scrapers	11 (22.92%)	4 (10.00%)	1 (5.55%)	3 (3.85%)	1 (50%)	6 (31.58%)	2 (33.33%)
Scrapers grading into notches	1 (2.08%)						
Core scrapers	10 (20.83%)	1 (2.5%)					
Denticulates	1 (2.08%)						
Knives	—	—	—	3 (3.85%)	—	2 (10.53%)	—
Notches	—	1 (2.5%)	—	2 (2.56%)	—	—	1 (16.66%)
Borers	—	—	2 (11.11%)				2 (33.33%)
Points	1 (2.08%)						
Pieces with retouch	5 (10.42%)	1 (2.5%)	6 (33.33%)	3 (3.85%)			
Bifacially flaked tools							
Chopper-chopping tools	—	1 (2.5%)	—	—	—	1 (5.26%)	
Handaxes	1 (2.08%)	—	—	2 (2.56%)	—	—	—
Cleavers	1 (2.08%)						
Anvil				1 (1.28%)			
Uniface	—	—	—	—	1 (50%)		
Hammer-stones							
Miscellaneous	2 (4.16%)	1 (2.5%)		1 (1.28%)	—	—	—
Total artefacts from each site	48	40	18	78	2	19	6

ATM: Attirampakkam; ARY: Aryathur; NAM: Nambakkam; NEY: Neyveli; MLP: Mailapur; PLP: Placepalayam; NAK: Nakalkona; GUN: Gunipalayam; SEN: Senrayanpalayam; MET: Mettur to Mettupalayam; KRN: Krinayattam; GDM: Gudiyam; PER: Pennalurpet.

Raw material includes pebbles, cobbles, boulders and natural thermal fracture flakes of quartzite, quartzitic sandstone, sandstone and quartz. These were derived from the weathering and reworking of the Upper Gondwana Satyavedu and Sriperumbudur formations constituting the Allikulli hills, outliers and surrounding bedrock pediments. No site is more than 4 km from raw material sources. In general elongated to subspherical clasts were preferred. In the case of sites located along the foothill zone and on hill slopes, artefacts are generally greater than 80 mm in size. Sites located in sheet and stream flood deposits, exhibit a decrease in clast sizes, which is in accordance with a decrease in the size of natural clasts available. Artefacts were made on cobbles, pebbles, flakes, debitage, older and broken tools and natural thermal fracture flakes. The bulk of tools are on flakes. Blanks include prepared core flakes, cortical flakes, noncortical flakes, flake-blades and blades; each of which display inter-site variability in their usage. Broken/exhausted cores and artefacts occur particularly in localities away from easily accessible sources of raw material. Tools on debitage (debitage flakes, chunks, thermal fracture flakes) are more in number in areas away from raw material sources.

Prepared cores, discoidal cores and irregular flake cores are noted. Cores may grade into chopping tools, pounding tools and bifaces. The highest number of cores is noted at sites further away from raw material sources of which Mailapur exhibits the largest number. At most all sites almost equal percentages of early and late stage debitage are noted.

Intersite artefact variability is given in Table 1. In general only a few tool classes are noted at each site. Most tools are on locally available clasts, have minimum retouch and considerable edge damage. This along with the fact that expedient use of natural thermal fracture flakes is important; could point to a relatively expedient strategy in the manufacture, use and discard of artefacts. At the same time, preparation of raw material in anticipation of use, and transport of cores/bifaces across the region is also noted. Most sites display evidence of both early and late stages of core reduction and artefact trim-

ming, and at all sites the cortex percentage is very low. At no site is the debitage commensurate with cores, thus suggesting considerable movement of tools across the landscape. The concentration of handaxes and cleavers at the sites of Attirampakkam, Aryathur; chopping tools at Aryathur; and points and denticulates at Aryathur and Gunipalayam could point to some functional differences between sites.

The large number of sites, located close together within a small area with evidence of re-occupation and high occupational intensity points to a high degree of mobility. Repeated reoccupation of sites through time could be tied to anticipation of reusable raw materials, in particular in those areas where they are scarce. Resharpening of older tools, if assumed to be linked to raw material constraints and a manifestation of a logistically organised system are noted at some sites, which have tools with more than one edge retouched (Attirampakkam, Aryathur, Gunipalayam). The existence of Levallois, blade and biface technology are thought to be associated with strategies representing fairly high mobility although these are always out-numbered by non-standardised tools.

Recent Excavations at Attirampakkam

The site of Attirampakkam (13° 13' 50" N and 79° 53' 20" E; 33.65 m AMSL), (Fig 1, Site No. 10) has been investigated for more than a century, and regarded as a type site for the 'Madras Handaxe Tradition' of the Lower Palaeolithic. Excavations were initiated in 1999, when five test pits (2 x 2 m) were sunk, and continued in 2000, with a 29 m² area being excavated. The main index trench-T3- was excavated to a depth of 7.30 m (Fig. 3), from which a total of 646 artefacts/natural clasts were recovered from test pit T3. Layers 1, 3 and 4 are archaeologically sterile, with sporadic redeposited artefacts. Artefact bearing horizons include Layers 2, 5 and 6. Layer 2 yielded possible Late Middle- to Upper Palaeolithic tools, while Late Acheulian to Middle Palaeolithic tools occur in Layer 5. The most significant discovery of this excavation, was the presence of 286 Acheulian tools in the clay deposit (Layer 6, Test-trench T3), occurring at depths of 2.7 to 6.90 m below the surface, in

what was previously termed the Sriperumbudur/Avadi series of Lower Cretaceous shales, and is the first occurrence of its kind in India. Their presence in this deposit raises important questions related to the age of the clays and their environmental significance. Artefacts include cores, debitage, handaxes, cleavers, scrapers, among others (Pappu *et al.* manuscript in preparation). Subsequently, 17 roughly oval impressions (15–20 cm in diameter) and a total of 6 possible bovid hoof impressions, were exposed on the surface of the clay of Layer 6, at the point of contact with the overlying ferruginous gravel of Layer 5; once again the first of their kind in the Indian Acheulian. Three fossil teeth were also recovered. Together, these indicate the immense potential of the site for informing on palaeoenvironments and early hominid behaviour strategies in South India.

Conclusion

The reexamination of a region, whose archaeological record was considered to be well known, has yielded new insights into Quaternary environments, Palaeolithic site taphonomy and artefact technology. The regional or distributional approach adopted here, moved away from a focus on high-density "sites" and led to the recording of both high and low density artefacts scatters across the landscape. Pleistocene geomorphology as related to terrace sequences put forward by previous scholars was questioned and the complexity of processes operating here was highlighted. For the first time, a study of site formation processes of sites occurring in ferricrete landscapes was put forward, and models constructed here may be of use for studying Palaeolithic occurrences in similar contexts elsewhere. This study highlights the immense importance of the nature of raw material (in this case quartzites) in shaping artefact reduction sequences and morphology in the Indian Middle Palaeolithic and has also brought out evidence for the reuse and resharpening of tools and movement of cores and tools across the landscape. Based on inferences drawn from lithic technology and ethnographic studies of South Indian hunter-gatherers (Pappu 1997), one possible pattern emerging is the wet season dispersion from Attirampakkam and

other sites located close to the river towards the hills and corresponding dry season congregation at sites within the river basin. At present, a project of systematic excavations at Palaeolithic sites in varied sedimentary contexts in this region, is in progress. These studies of the Palaeolithic archaeological record of Tamil Nadu, have clearly revealed the immense importance of this region in understanding hominid lifeways during the Pleistocene; and contribute another piece towards the building up of a more comprehensive picture of the Indian Palaeolithic.

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