[Supplementary material]

Palaeolithic occupation and cultural transition in the Wainganga River Basin, India

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Regolith: the geomorphological context of Palaeolithic sites

It was observed that the main context of all Palaeolithic sites is regoliths which are derived from local weathering of the bedrock *viz*., ferruginous rubble regolith deposit derived from weathered sandstone bedrock of Talchir and Kamathi formation, weathered shale, and regolith derived from weathered basalt dominated by core stones of Inter-trappean Deccan trap. All the artefacts erode out from these regolith deposits. Pain & Ollier (1996) defines the regolith, as the bedrock which has been altered by the processes near the surface. Regolith materials can be of any age (Taylor & Eggleton 2001). Hill tops particularly in areas of arid or old landscapes, have extensive areas of flat ground. In the inter-bedded sandstone and shale the sandstone crop out because they are very resistant to both physical and chemical weathering compared to the shales (Ollier 1984). A soil profile is superimposed on the regolith and it involves all the profile or only the upper part. The weathered zone may grade imperceptibly into unweathered rock, especially on porous sedimentary rocks, but sometimes there is a knife-sharp contact between the unweathered and thoroughly weathered rock. This is especially common on massive igneous rocks such as granite and basalt.

Local geological variations influence the nature of the composition of the regolith (Ollier 1984; Taylor & Eggleton 2001). In India, many sites show that they are in the regolith context derived from the weathering of local bedrock. In Maharashtra regolith derived from basalt was observed (Mishra 2006–2007), in Karnataka regolith derived from limestone weathering is the context of the artefacts (Paddayya & Jhaldiyal 2001), in Jharkhand lateritic regolith is derived from Rajmahal trap bedrock (Akhilesh 2008), at Lalitpur regolith is derived from weathering of granite (Agarwal 2014) and in Orissa regolith is derived from granite (Padhan 2014) is the context of the artefacts. In the present study region, regolith derived from sandstone bedrock is more angular to sub-angular than the regolith derived from basalt which is more clayey silt with core stones. Most sites are within thin (< 5m thick) regolith, developed over the pediments of Precambrian rocks, Proterozoic sandstones,

limestone, and sandstone shale boulder beds of Gondwana group and Deccan Trap of Cretaceous.

For the first time, it was recognised that the context of the Acheulian and Late Middle to Late Palaeolithic sites in Wainganga river basin are in the regolith. The present study region is located on the boundary of the semi-arid, sub-humid zone of north east Maharashtra, India (Maharashtra State Gazetteers 1973, 2003). The geology of the region is a border zone between Archaean, Gondwanas and Deccan trap (Geological Survey of India 1993; Deshpande & Pitale 2014). The geology and ecology of the region are important factors for the regolith formation (Ollier 1984; Taylor & Eggleton 2001).

Thin section analysis

Thin section analysis was conducted under the guidance of courtesy, Dr. M. Kale at Savitribai Phule University, Department of Geology.

Provenance studies of Acheulian assemblage

Provenance studies indicates that a quartzitic sandstone artefact at Bhatala was comparable with sources of the same from Ramdegi (Figures S1 & S2). Both samples shows Kamathi sandstone features—interlocking of the silicious cement and presence of feldspar.

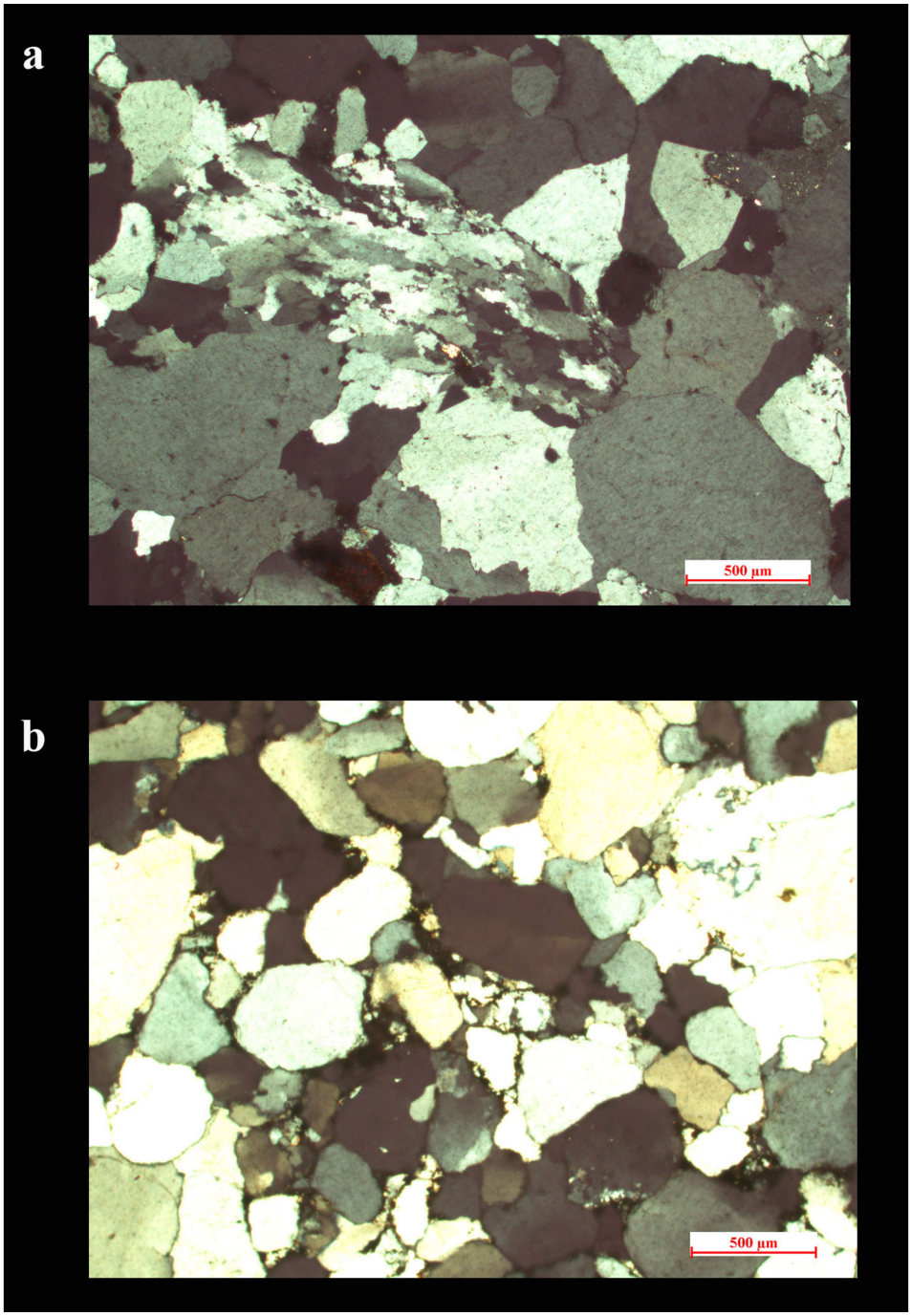

Figure S1. Thin sections demonstrating similarities in quartzitic sandstone used for a) scraper from Bhatala; and b. natural slab collected from Ramdegi. It is noted that both the samples demonstrate features typical of the Kamathi sandstone formations (siliceous cement and presence of feldspar) (courtesy: M. Kale).

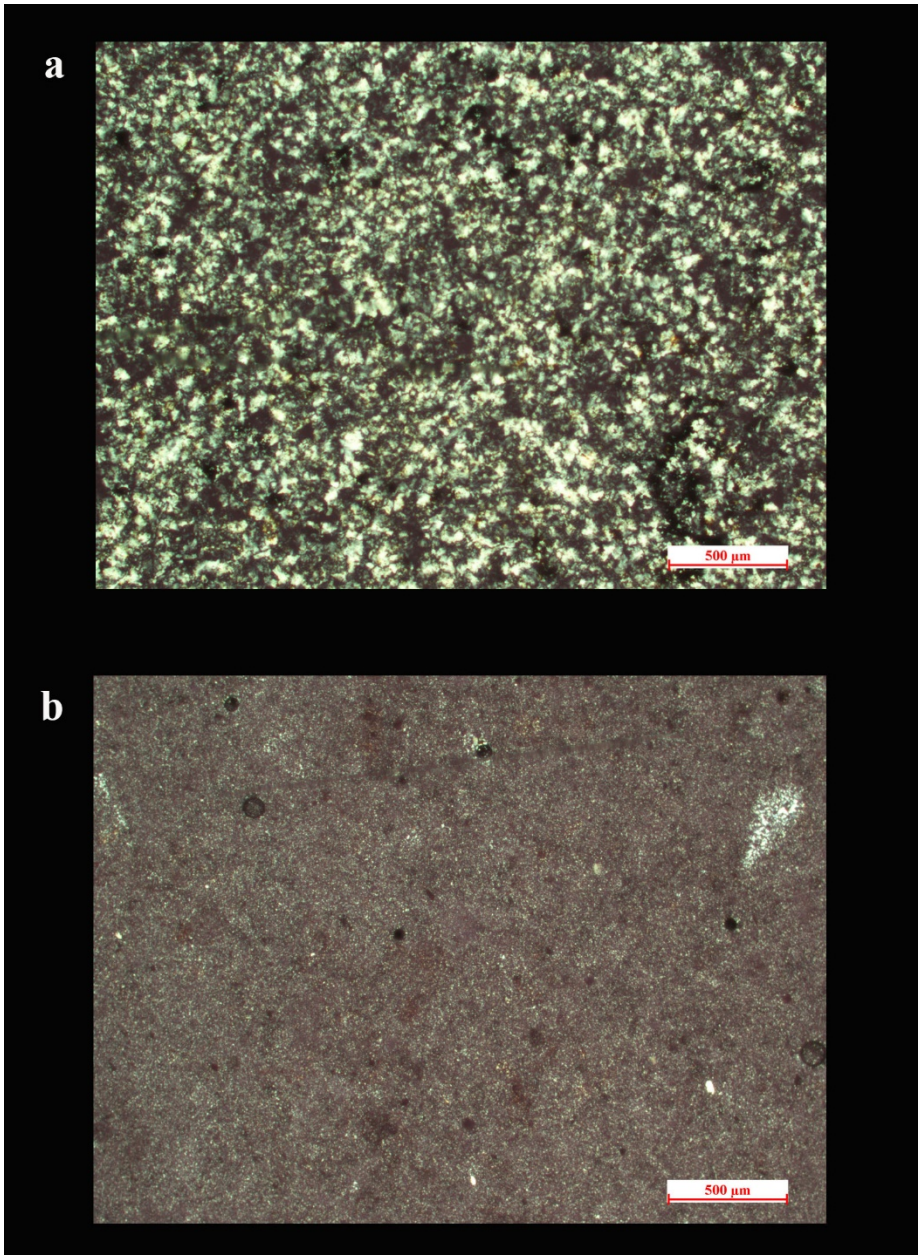

Figure S2. Fine grained greenish chert used in debitage which is similar to the natural piece collected from the Bhojapur site (a: debitage; b: natural piece), patches of ferruginous clay is present (courtesy: M. Kale).

Provenance studies of LMP to LP assemblage

Provenance studies demonstrate that locally available chert was utilized to make tools at Bhojapur and Telang Kheri. Artefacts and natural pieces selected were those on the predominant brown and green chert. All chert samples are very fine grained with silica in a greenish matrix (Figures S1 & S2). There is some ferruginous stain present which is not identifiable as yet. The presence of fibrous chalcedony is noted that is a characteristic of the intertrappean chert. Evidence for recrystallisation in the chert sample is seen. This indicates

that the chert samples are very fine grained. This study indicates that the chert samples in natural rocks at these sites and that used to make the tools on are similar, suggesting local use of raw materials. Raw material types as per artefact types is discussed in relevant sections below.

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Table S1. Site wise distribution of Palaeolithic artefacts (counts and % of total number of tools at each site).

Cultural phases	Types of artefacts	BJPR	TLNG	BTLA	TMBD	BGMR	USGN	NDRL-2	WDMN
Acheulian	Cleavers			52 (11.38%)	5 (1.18%)				
	Handaxes			39 (8.53%)	5 (1.18%)		1 (2.04%)		
	Bifacially Flaked Tools			29 (6.35%)	1 (0.24%)				
	Small Flake Scrapers			10 (2.19%)	5 (1.18%)				
	Waste products			22 (4.81%)	10 (2.36%)				
	Pick			1 (0.22%)					
	Flake Core			1 (0.22%)	1 (0.24%)				
Possible Middle Palaeolithic	Choppers						1 (2.04%)		
	Large scrapers	2 (0.49%)			2 (0.47%)				
	Wastes	1 (0.24%)							
Late Middle Palaeolithic–Late Palaeolithic	Blade Cores	39 (9.55%)	34 (20%)	19 (4.16%)	40 (9.46%)	17 (20.48%)		1 (4.34%)	5 (8.77%)
	Finished Tools on Blades and Blade core management pieces	29 (7.12%)	11 (6.47%)	22 (4.81%)	46 (10.87%)	11 (13.25%)			8 (14.04%)
	Blade core management pieces	30 (7.35%)	25 (14.71%)	30 (6.56%)	43 (10.16%)	9 (10.84%)	1 (2.04%)		6 (10.53%)
	Flake Cores	26 (6.37%)	16 (9.41%)	10 (2.19%)	12 (2.84%)	8 (9.64%)	11 (22.45%)	9 (39.13%)	6 (10.53%)
	Waste products on flakes	165 (40.44%)	41 (24.12%)	157 (34.35%)	186 (43.97%)	18 (21.69%)	22 (44.89%)	7 (30.43%)	14 (24.56%)
	Finished tools on flakes	106 (25.98%)	40 (23.53%)	54 (11.81%)	66 (15.60%)	20 (24.09%)	11 (22.45%)	6 (26.09%)	17 (29.82%)
	Miscellaneous	10 (2.45%)	3 (1.76%)	11 (2.41%)	1 (0.24%)		2 (4.08%)		1 (1.75%)
Total		**408**	**170**	**457**	**423**	**83**	**49**	**23**	**57**

Table S1 (continued).

Cultural phases	Types of artefacts	NDRL-2	WDMN	RIPR	KLLR	KLLR-1	RJRA	MNDP	MNRA	NDRL-1	KSMB
Acheulian	Cleavers										
	Handaxes										
	Bifacially flaked tools										
	Small flake scrapers										
	Waste products										
	Pick										
	Flake Core										
Possible Middle Palaeolithic	Choppers			1 (2.33%)							
	Large scrapers			2 (4.65%)							
	Wastes										
Late Middle Palaeolithic-Late Palaeolithic	Blade Cores	1 (4.34%)	5 (8.77%)	3 (6.97%)	17 (15.45%)		2 (3.70%)	1 (1.92%)	1 (3.70%)	2 (3.39%)	
	Finished tools on blades and blade core management pieces		8 (14.04%)		9 (8.18%)		15 (27.78%)		3 (11.11%)	1 (1.69%)	3 (30%)
	Blade core management pieces		6 (10.53%)		11 (10%)	3 (33.33%)	7 (12.96%)		1 (3.70%)		
	Flake cores	9 (39.13%)	6 (10.53%)	7 (16.23%)	3(2.73%)			1 (1.92%)	3 (11.11%)	7 (11.86%)	2 (20%)
	Waste products on flakes	7 (30.43%)	14 (24.56%)	8 (18.60%)	22 (20%)	1 (11.11%)	10 (18.52%)	16 (30.77%)	6 (22.22%)	34 (57.63%)	3 (30%)
	Finished tools on flakes	6 (26.09%)	17 (29.82%)	20 (46.51%)	47 (42.73%)	5 (55.55%)	20 (37.04%)	34 (65.38%)	13 (48.15%)	15 (25.42%)	2 (20%)
	Miscellaneous		1 (1.75%)	2 (4.65%)	1 (0.91%)						
	Total	**23**	**57**	**43**	**110**	**9**	**54**	**52**	**27**	**59**	**10**

Table S1 (continued).

Cultural phases	Types of artefacts	MUL	LHRI	ADGN	KDSG	ZARI	KHRI	RMPR	ERAI	KLRA	Total
Acheulian	Cleavers			1(100%)	1 (11.11%)						59 (2.83%)
	Handaxes					1 (9.09%)					46 (2.21%)
	Bifacially flaked tools										30 (1.44%)
	Small flake scrapers										15 (0.72%)
	Waste products										32 (1.53%)
	Pick										1 (0.04%)
	Flake core										2 (0.09%)
Possible Middle Palaeolithic	Choppers								1 (50%)		3 (0.14%)
	Large scrapers										6 (0.29%)
	Wastes										1 (0.04%)
Late Middle Palaeolithic–Late Palaeolithic	Blade cores		1 (12.5%)							1 (11.11%)	183 (8.78%)
	Finished tools on blades and blade core management pieces										158 (7.58%)
	Blade core management pieces		3 (37.5%)								169 (8.11%)
	Flake cores				4 (44.44%)	3 (27.27%)		1 (16.67%)	1 (50%)	1 (11.11%)	131 (6.28%)
	Waste products on flakes	1 (33.33%)	3 (37.5%)			2 (18.18%)		3 (50%)		4 (44.44%)	723 (34.67%)
	Finished tools on flakes	2 (66.67%)	1(12.5%)		4 (44.44%)	5 (45.45%)	2 (100%)	2 (33.33%)		3 (33.33%)	495 (23.74%)
	Miscellaneous										31 (1.49%)
	Total	**3**	**8**	**1**	**9**	**11**	**2**	**6**	**2**	**9**	**2085**

Key: BJPR=Bhojapur; TLNG=Telang Kheri; BTLA=Bhatala; TMBD=Temburda; BGMR= Bhagi Mohari; NDRL-2=Nandara Locality-2; WDMN=Wardhamana; RIPR=Raipur-Hingana; KLLR=Kollar River; KLLR-1=Kollar River Section; RJRA=Rajura; MNDP=Mandapa; MNRA=Manora; NDRL-1= Nandara Locality-1; KSMB=Kosambi; MUL=Mul; LHRI=Lahori; ADGN=Adegaon; KDSG=Khadsangi; ZARI=Zari; KHRI=Khairi; RMPR= Rampur; ERAI=Erai; KLRA=Kolara.