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A unique stone-age collection from the late mid-Holocene terraces of River Satluj in the NW sub-Himalayas of India

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ABSTRACT

The Soanian tools have since been reported from various sites in India and Pakistan, but their typochronology was poorly understood. Until now the Soanian tools have been procured from undated surfaces with their times of fabrication based on outdated Alpine glacial chronology. Because of meager collections and sporadic finds the Soanian tools were usually represented with chopper/chopping tools and associated flakes with few tools fabricated on them (Early and Late Soan). Here we report many new tool types like pitted cobbles, small and large core tools and a flake rich assemblage, mostly associated with Black and Red Ware potsherds and Harappan type potsherds from the terraces of River Satluj near Nangal (Punjab: India). The chronology of the tool-bearing terraces has been established using quartz OSL ages which are deposited between mid-Holocene and late mid-Holocene times. It is suggestive of convergence of different societal communities (mainly late-Harappan) close to the remnant sources of water during the mid-Holocene Global aridity.

Keywords: sub-Himalayas, Satluj terraces, mid-Holocene, Soanian tools, pitted cobbles, late-Harappan.

1. INTRODUCTION

The Soanian tools were first discovered from the Soan valley of Potwar, Pakistan (de-Terra and Paterson, 1939) and have been subsequently documented from various sites from India and Pakistan (Paterson and Drumond, 1962; Johnson, 1973; Mohapatra, 1974; Karir, 1985). Since the time of de-Terra and Paterson (1939), numerous workers have explored the Northwestern region of the sub-Himalayas but their interpretations and conclusions about the Soanian (name given to the tool types because they were first discovered from the Soan valley of

Potwar, Pakistan) are unsatisfactory mainly due the reason that meager collections were made by them in totally undated contexts. This resulted in a confused state of affairs regarding the typochronology of the Soanian tools. The Alpine glaciations chronology of terrace formation that had invariably been applied even to later assemblages in the northwestern sub-Himalayas (Mohapatra and Singh, 1979; Karir, 1985; Singh et al., 1998; Mohapatra, 2007) has been found to be erroneous (Rendell et al., 1989; Chauhan, 2007). Also, there is as yet no clarity about the distinct status of 'Early Soan' or 'Late Soan' because the tool-types assigned to both of them are found on all young as well old Siwalik surfaces (Chauhan, 2007; Soni et al, 2008; Soni and Soni, 2011) and are even recovered from an excavation (Soni and Soni, 2009). Such large assemblages belonging to mid-Holocene times (Soni and Soni 2007, 2009, 2010) were never reported earlier from the Northwestern sub-Himalayas.

Surface collection from three sites on dated young terraces of River Satluj near Nangal is being presented and discussed in the following.

2. GEOLOGY OF THE STUDY AREA/SITES

The study area falls in the Soan Dun in the Northwestern Indian Sub-Himalayas. Physiographically, the Sub-Himalaya might be divided from north to south into mountainous Siwaliks, Soan Dun, and Outer Siwalik hills. The drainage system is controlled by Satluj River and its tributaries. In the Sub-Himalaya, the Satluj River cuts across the Siwalik Mountains in the north and enters the Soan Dun near Nangal and follows a course parallel to the valley and again cuts across the outer Siwalik ranges and flows to the plains of Punjab.

Based on quartz optically stimulated luminescence (OSL) dating, in Soan Dun and in Satluj River valley, the Barera Fan is assigned an age between 36 and 29 ka (Suresh and Kumar, 2009). i.e., the fan aggradation phase was initiated well before 36 ka and terminated after 29 ka (Suresh and Kumar, 2009). Both the Satluj River sequence and the fan sequences have surface continuity and hence expected to have time equivalent aggradation and abandonment.

In the Satluj River valley in the Soan Dun, Sub-Himalaya four levels of depositional terraces, dominated by gravels and/or sand and mud, are documented. These terraces were formed during late Pleistocene and Holocene and shows a marked variation in depositional phase with late Pleistocene event is thicker and Holocene events are thinner. The topmost terrace is visible on the right bank and have thicker depositional phase (>17 m thick) and is a Late Pleistocene terrace. The terrace comprises rounded to sub rounded, 5 to 20 cm thick (long axis), clast to matrix supported, poorly sorted, fining upward and imbricated and consist dominantly of quartzite with granite gneiss, volcanics, and limestone clasts showing preferred orientation with paleo flow is toward SSE, parallel to present day Satluj River. In Holocene, three levels of terraces were deposited, but their aggradational phases are thinner (2 to 5 m thick) and are capped by mud representing last flooding events. These terraces comprises rounded to sub rounded, clast to matrix supported, poorly sorted, fining upward and imbricated and consist of dominantly quartzite with granite gneiss, volcanics, and limestone clasts. Characteristic features reveal deposition by perennial river deposits.

Three terraces are visible on the left bank of River Satluj above its flood plain near Nangal Township which also make the left bank of a stream 'Samteni-Khad', a tributary of River Satluj (Fig.1). The archeological material is found intermittently spread over almost whole area of each terrace, so the terraces and sites are assigned a common name as NGT-1, NGT-2 etc. Site NGT-1 (area~0.10Km^2) is the first terrace and the sites NGT-2 (area~0.13Km^2) and NGT-3 (area~0.018Km^2) are respectively the next two higher terraces. The lowest terrace (site NGT-1) is 360m amsl and is about 8m above the Satluj River bed. The next higher terrace (site NGT-2) is at 371m amsl and the third terrace (site NGT-3) is at 380m amsl. The terraces comprise dominantly of gravels (pebble to boulder sized) sand and mud units. The clast compositions of all the terraces are similar and are dominated by quartzite, granite-gneiss and basic rocks derived from upper Himalayas by Satluj River. The topmost layer of terrace NGT-2 is muddy sediment drawn from a background hill. Temporary stability in the overall process of downcutting is indicated by deposition of flood plain which contains a mixture of boulders, gravel and mud (Figs.1, 2) underlain by gravel deposit of River Satluj.

3. CHRONOLOGY AND METHODOLOGY

The chronology of the terraces was established using quartz optically stimulated luminescence (OSL) dating techniques. A pit was excavated on the muddy surface of terrace NGT-2 and three sandy samples were collected by hammering metallic pipes into the cleaned surface exposed on the wall. The samples were taken at depths of 1.35m, 1.0m and 0.54m (Fig. 3) respectively from the top for OSL measurements and were processed under subdued red light conditions in the luminescence dating laboratory at Wadia Institute of Himalayan Geology, Dehra Dun. The samples were transferred into a beaker after removing light exposed materials from both the ends of the pipe. They were then treated for removing carbonate and organic matter using 1 N HCl and 30% H_2O_2 respectively, and were then sieved to obtain 90-125 μm size fraction. From the separated size fraction (90-125 μm), quartz grains (density 2.65 gm/cc) were extracted from feldspar and heavy minerals by density separation using high density liquid (sodium polytungstate solution). The extracted quartz grains were etched for 80 minutes in hydrofluoric acid (48%) to remove the outer layer (the HF treatment also removes any feldspar contaminations) and subsequently treated with HCl and washed in distilled water and re-sieved. The purity of the etched quartz (i.e. any feldspar contaminations) is confirmed by infra-red stimulated luminescence (IRSL) technique.

The etched quartz grains were then fixed into the center of stainless steel discs (i.e., about 3 mm diameter mono layer of samples in 10 mm diameter steel discs) using silicon oil (adhesive agent) for determining the radiation energy received by the sample after its burial (i.e. paleo dose or equivalent dose (De). 35 aliquots per sample were prepared and Single Aliquot Regeneration protocol (Murray and Wintle, 2000) was used for equivalent dose (De) determination. The Optically Stimulated Luminescence (OSL) measurements were carried out in an automated Riso TL/DA-20 reader equipped with blue light emitting diodes. Each aliquot is subject to a series of cycles of measurements. First measured [240^o pre-heat, 40sec blue light stimulation at 125^oC] the natural luminescence (L_n) and then measured the test dose signal (160^oC cut heat and 40sec blue light stimulation at 125^oC), by applying a laboratory beta irradiation (about 15% of De), for sensitivity correction. Subsequently the regenerated luminescence (Lβ1, Lβ2, Lβ3, Lβ0 and Lβ1 by applying variable irradiation doses from beta irradiator) and corresponding test dose signals. The De value for each aliquot is calculated by Duller's Annalyse software, using the initial integral (0.8sec) of the OSL. For the annual dose rate estimation, concentrations of uranium, thorium and potassium were measured by XRF and the percentage of moisture content was determined by heating the sediment [(water loss/dry sediment weight) X 100].

The soil samples taken at depths, 1.35m, 1.0m and 0.54m gave dates 11.3ka; 6.75ka and 4.8ka respectively (see Table-1A). Earlier, a sample taken at 80cm below the top of the silt/sand deposit on NGT-1 gave an OSL date of the terrace as 6.25 $\pm$ 0.84 (Soni *et al*. 2008; Table-1B). The results of the soil samples taken increasing at depths (Table-1A) show increasing dates of deposition of the sediment on NGT-2 surface. The archeological material of the site NGT-2 was collected from the top of its muddy surface dated to ~4.8ka, so the stone tools and potsherds appeared much after the laying down of the clayey sediment and so their time-bracket falls in late mid-Holocene. The site NGT-3 has not been dated, but since typologically the representative material from all the three terrace sites is almost similar (see Chart-1), it is provisionally presumed that the same human groups occupied these sites.

4. ARCHEOLOGICAL FINDS FROM DIFFERENT SITES:

Each terrace site had several spots where quite large concentrations of stone artefacts were found in surficial context. At every spot some potsherds were also noticed and as judged from the chronology of the sites (particularly the minimum age provided by OSL dating of NGT-2), the ceramics were inferred to be almost contemporaneous with the stone tools since most of the potsherds are late-Harappan types, the stone tools cannot be dated to much earlier times. A date around 4ka or a bit later is the possible time for the fabrication of stone tools. The material was only surficial (Fig.4) and test pits at some places yielded only clayey deposit, devoid of artefacts.

4.1 Archeological finds fromNGT-1.

During a few field visits, an assemblage of 505 lithic specimens (Table-2) was collected from this surface. Heavy duty core tools (Figs. 5, 6e, 7, 8d-f), large flake-tools (Figs. 8a-c, 9), choppers (Fig.6a-d, f), small flake tools (Fig. 10e, g-i), pointed cores (Fig. 11a) and battering tools (Fig.11c, d). Pitted cobbles (found for the first time in India; from this site complex) are one of the rare tools found from this site complex (Fig. 13a, b) and this site is represented by eight pitted cobbles. At many spots 'Red Ware' and 'Black and Red Ware' potsherds were also recovered. Around 24.8 % of the flaked pieces and 18.6% of the detached pieces had a size greater than 10cm. The size of the largest core was 22.4 cm (Fig. 5a) and the largest flake was18.0 cm long (Fig. 8a-c). Large size cleaving tools (Fig.7, 9d), cutting tools (Figs. 8a-c, 9a-c) and wedges (Fig. 8d-f) are included in these finds. Since all these collections including large specimens were made from very young terraces (dated to around 6ka or 4ka), this observation is quite at variance with some earlier assertions (Karir, 1985; Mohapatra, 2007) that diminution of the stone-tools occurred with the passage of time. This fact is justified by collections from other sites also (Soni and Soni, 2009, 2010).

Apart from the pitted-cobbles, other typical tools on flaked pieces are shallow-flaked cobbles (Fig.10c), sub-peripherally/vertically flaked specimens (Fig.12f). Flake tools like backed knives, Levalloisian points and scrapers (Fig.12a-e, g) were also recovered from this site. Elongate pricks/knobs (Fig. 10b, d) and numerous cores/core fragments are also present in this assemblage (Table- 2).

4.2 Archaeological finds from NGT-2

The archaeological material was recovered from the surface and the upper 10-15cm layer of a silty/clayey deposit, which is mostly disturbed by the present day agricultural activity. As shown in Table-1A the top surface of this terrace which underlies the collected material is younger than 4.8ka and thus lies in the late mid-Holocene time bracket. The flake-rich lithic assemblage (similar to that obtained from NGT-1) was found mixed with weathered and ill burnt late-Harappan type as well as Black and Red Ware potsherds (Figs. 4A; 19a-e). The stone-tool using humans might have come a few centuries after 4.8ka and their contemporariness with the late-Harappans is considered due to the fact that the Soanian type tools are also found from the late-Harappan site Bara (Fig.19 f, g) and also, the late-Harappan pottery (Fig.19 h) has been recovered from an excavation along with Soanian type tools (Soni and Soni, 2008). The association of Soanian tools with Harappan pottery has been repeatedly observed by us (more sites yet to be reported). The stone artefacts have not been transported substantially as they are almost fresh and show no signs of rolling. Though they were not recovered from exact primary positions, the agricultural activity could have disturbed them only by a few meters. As in case of the terrace NGT-1, in NGT-2 also the potsherds and the lithic specimens had simultaneous rich concentrations at different spots (see Fig.4A1, A2). Contemporaneity of stone tools and pottery can be accepted from the fact that around 4 ka, it was only the Harappan society which had occupied the still rainier region of the Siwaliks after being displaced from their earlier abodes during aridity (Giosan et al., 2012). Obviously the late-Harappans could be using these stone tools in their later phase after the exhaustion of the remnant metallic tools.

The lithic material (Table-3) also consisted of a few tools resembling Hoabinhians and Sonvians (Fig.11 e, f) and mainly the pitted cobbles (13c-d, 14a-c), chopper/chopping tools (Figs. 15, 18), cores and core fragments (Table-3), flakes (complete and broken), tools fabricated on cores and flakes (Figs. 16-17). A hexagonoidal core with wide grooves on both its plane opposite faces (Fig.14a) along with 44 pitted cobbles (Figs. 13c, d, 14) was an important find from this site. Two ring stone (Fig.16a-b) and 2 hoes (Fig.16 c-e) were also recovered from this young terrace surface. Tools fabricated on cores and flakes were similar to those recovered from NGT-1 and in the total collection of 621 lithic specimens, 65.5% were the flakes and flake tools.

4.3 Archaeological finds from NGT-3

The implementiferous area on terrace of NGT-3 was small (just around 500 square meters) and only 48 lithic specimens were collected from this site of which 28 were flakes or flake tools (see Table-4). A few Black & Red Ware potsherds were also present in this site and the tool typology was similar to the assemblages from NGT-1 and NGT-2 sites.

Most parts of the above mentioned terrace-sites being under present day agricultural activity, the stone tools as well as the potsherds associated with them are not expected to be at their original positions. However, their shifting due to plowing may not be that large.

5. DISCUSSION AND CONCLUSION:

Till now the Soanian tools have been reported from various surfaces but their typochronology has not yet been confirmed. Soanian-like tools have been reported from Pakistan and Nepal in late Pleistocene context, though the discoverers did not assign the name ‘Soanian’ to them. G. C. Mohapatra (1966) excavated Soanian tools from the upper layers of a terrace of River Beas in un-datable context, but he later admitted that it was a result of secondary deposition (Chauhan, 2004; p-299). It may be mentioned here that tools collected from higher terraces are not necessarily to be older (though they were termed as Early Soanian) than occurring on lowest terraces as all those Lower, middle or upper Soan type tools have been found by us on the lowest young terraces. Big size chopper-chopping tools and large flakes are usually assigned to the Early Soan and it has been claimed (Mohapatra, 1974, 2007) that miniaturization of the stone tools and increase of flake contents occurs with time culminating in Late Soan. However, large surface collections from the Indian part of the sub-Himalayas reported recently (Chauhan, 2007; Soni et al, 2008; Soni and Soni, 2009; 2011) hint at quite a different typochronological scenario of the lithic industries of the sub-Himalayas. The assemblage collected from Ror (Mohapatra, 1966) is an isolated small assemblage on fine grained raw material, does not justify the decision (Mohapatra, 2007) that in general, miniaturization occurred with time. Specific typology of tools was made in accordance with regional needs; there can be nothing temporal in this. We see no trend of diminution of tool types with passage of time as tools of all sizes, big or small, are encountered by us on all the young sites as reported above. In their meager collections, the earlier workers mostly picked up chopper/chopping tools ignoring small flakes in Soanian industries as flakes were considered to be a byproduct of chopper fabrication (Singh, 1998; Karir, 1985). Also the chopping tools were shown less than 40% of the number choppers (Karir, 1985). Here in our collection also, the number of chopping tools is about 37.8% of the number of choppers (Chart-2) and in this context, the same trend seems to have continued from the so-called Early Soan to this mid-Holocene sub-Himalayan lithic industry.

In the present study, many new tool types have also been discovered by us along with the usually known Soanian tools from the Nangal sites situated on the mid-Holocene terraces on the left bank of the Satluj River (which were either not encountered by earlier workers or were ignored by them). In addition, the Black & Red Ware potsherds, reported from late mid-Holocene sites elsewhere (Gupta et al.,2006; Shinde et al., 2006), and weathered red ware with coarse fabric (some resembling the pieces of Harappan pottery) have also been found from all the three sites mentioned above. Pitted cobbles, which have first time been reported to have existed in the Northwestern sub-Himalayas (Soni and Soni, 2011), were already known from many sites in the world (Breschini and Haversat, 1993; Fitzgerald and Jones, 1999; Adams, 2001). Such artefacts found from Northern and central California were associated with milling stones and a lot of casual artifacts containing among others, the scrapers, knives, points and cutting tools (Fitzgerald and Jones, 1999). The sites of those findings have been dated from mid to late mid-Holocene though their cultural significance is yet unknown. The sites generating pitted cobbles in Nangal terraces also fall in the mid to late mid-Holocene time bracket as per the dates of deposition of these terraces (see Table-1). However, the pitted cobbles, noticed by us have somewhat different morphology from those found elsewhere (Fig.20 of True and Baumhoff, 1985) as multiple pits are also seen on many cobbles in our collection (Chart-3, Fig.13). All these tools have been fabricated on coarse to medium-grained quartzite, generally available in this region. Some of the cobbles also show unifacial or bifacial shallow flaking leaving intact the cortex around on the usually flat cobble surface (Fig.10 c). Some large flake and core tools used to perform the function of cleavers (here we name them as cleaving tools) have been found from these sites in quite good numbers (see Figs.7, 9k). Hoabinhian-like tools (Tables-3, 4) which are known from Southeast India (Anderson, 1990; Bellwood, 2007) have been found in these sites dated to mid-Holocene. It is very much possible that there could have occurred a convergence of different societal communities close to the water sources in this part of the sub-Himalayas during the mid-Holocene aridity.

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Table 1A. OSL dates of soil samples from NGT-2

Lab No.	Sample No.	Depth from surface (cm)	U (ppm)	Th (ppm)	PotassiumK (%)	Moisture Content (%)	Equivalent Dose (De) Gy	Dose rate (Gy/ka)	Age (ka)
LD874	NGT-2C	54	2.64±0.3	14±1.4	1.64±0.2	7.06	14.84±1.6	3.10±0.2	4.79±0.6
LD782	NGT-2A	100	1.9±0.2	14.3±1.4	2.01±0.2	8.72	21.77±1.9	3.2±0.2	6.75± 0.7
LD873	NGT-2B	135	2.12±0 .2	20±2	1.55±0.2	1.41	39.25±5.8	3.47±0.2	11.31±1.8

Table1B. OSL date of a soil sample from NGT-1

Sample No.	Depth from surface	U (ppm)	Th (ppm)	K (%)	Water content (%)	Equivalent Dose (Gy)	Dose Rate (Gy/Ka)	Age (Ka)	Lab No
AS-4	80 cm	2.3±0.23	18.6±1.86	1.75±0.17	0.90	23.98±2.89	3.834±0.231	6.254± 0.842	LD 53

Table-2. Lithic specimens from siteNGT-1

Artifact type	**Number**	**% of total**
General cores & core-fragments	110	41.97
Tools on cores	56	21.40
Choppers	41	15.65
Chopping tools	11	4.20
Tanged pieces	13	4.96
Hammer stones	13	4.96
Discoids	6	2.28
Pitted cobbles	8	3.05
Cobbles with shallow flake scars	4	1.53
Total flaked pieces	**262**	**100**
Flakes	137	56.38
Flake Tools	106	43.62
Total flakes & flake tools	**243**	**100**

Table-3. Lithic specimens from siteNGT-2

Artifact type	**Number**	**% of total**
General cores and core-fragments	80	30.08
Tools on cores	31	11.65
Choppers	31	11.65
Chopping tools	17	6.39
Tanged pieces	14	5.26
Hammer stones	3	1.13
Discoids	10	3.76
Cobbles with shallow flake scars	6	2.26
Steeply flaked cores	5	1.88
Resembling Hoabinhian tools	20	7.52
Ring stones (half)	2	0.75
Pitted cobbles(one with grooves)	45	16.92
Sonvian type	2	0.75
Total flaked pieces	**266**	**100**
Flakes	198	52.24
Flake Tools	181	47.76
Total flakes & flake tools	**379**	**100**

Table-4. Lithic specimens from site NGT-3

Artifact type	Number	% of total
General cores/core-fragments	8	40.0
Tools on cores	3	15.0
Chopper	2	10.0
Chopping tool	1	5.0
Discoid	1	5.0
Resembling Hoabinhian tools	2	10.0
Pitted cobble	3	15.0
Total flaked pieces	**20**	**100**
Flakes	14	50
Flake Tools	14	50
Total flakes & flake tools	**28**	**100**

Chart-1. Comparing some prominent items in the three assemblages

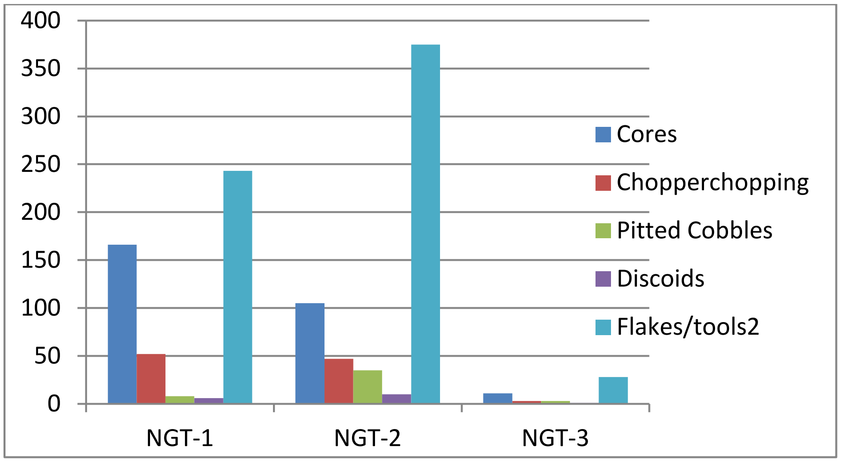


Chart-2. Relative abundance of choppers, and chopping tools in NGT-1, NGT-2 and NGT-3

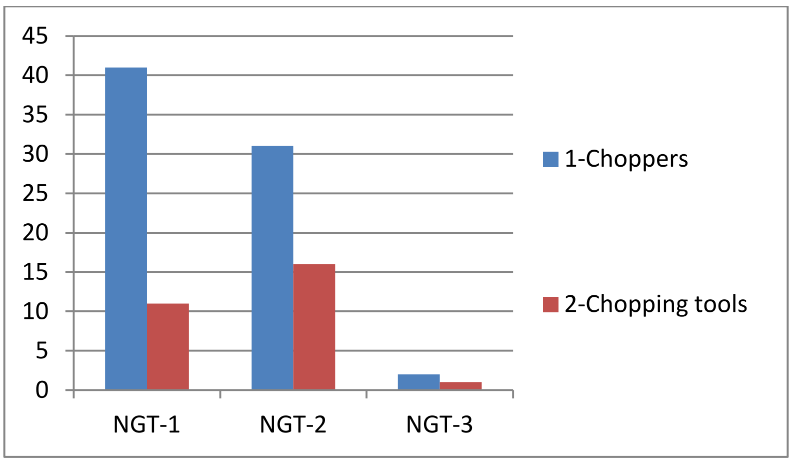
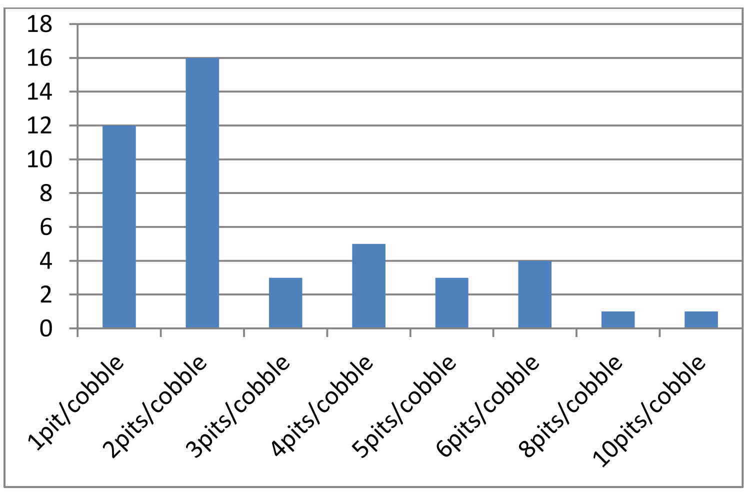


Chart-3. Count of cobbles showing number of pits per cobble



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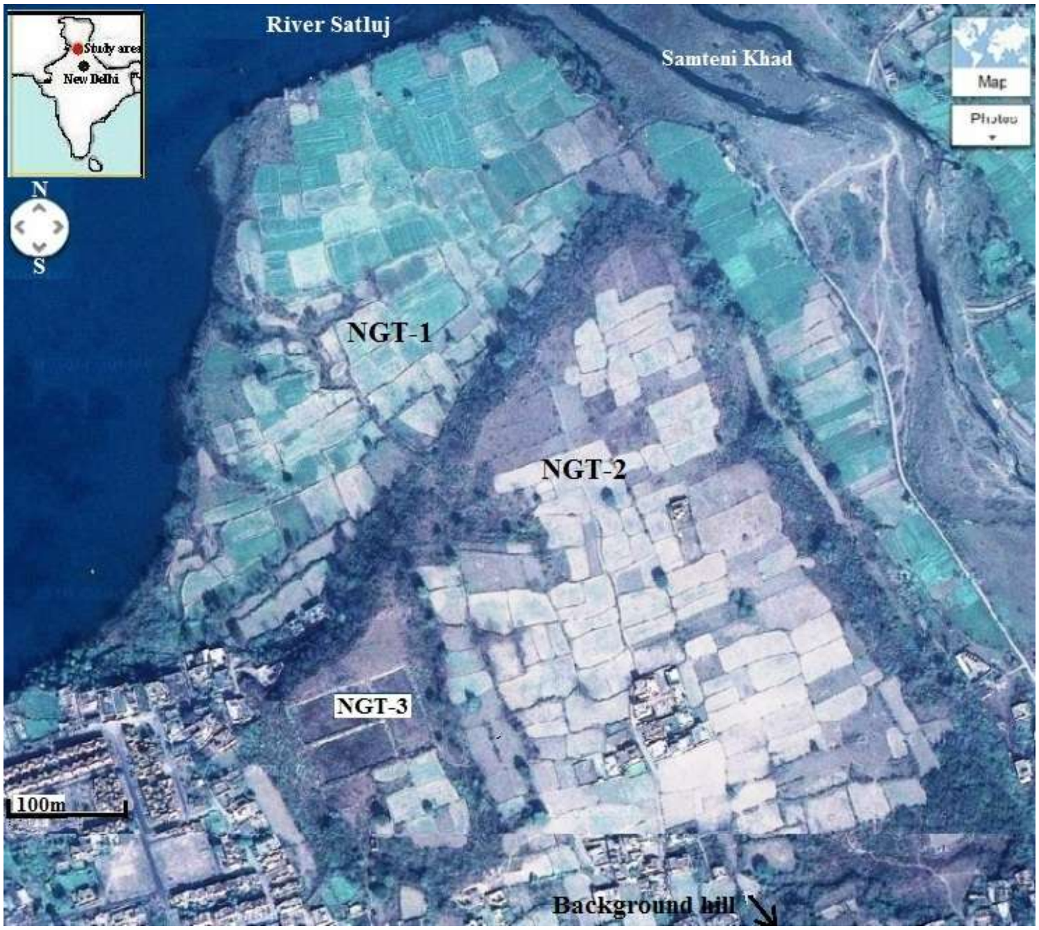

Figure 1: Google view of the sites NGT-1, NGT-2 and NGT-3.

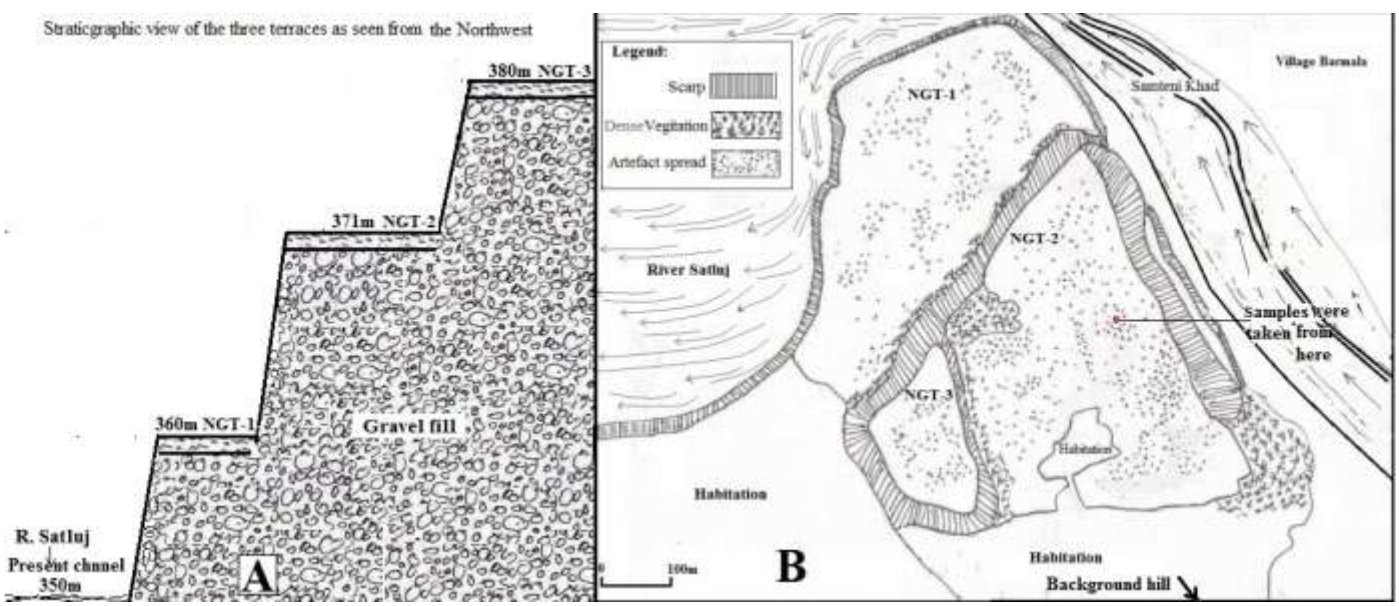

Figure 2: (A) Stratigraphic sections of 3 sites. **(B)** Concentration of stone tools on three surfaces.

Figure 3: Show the points where the samples were taken below the top of the surface site NGT-2: (A) At 0.54m, (B) at1.0 m and (C) at 1.35m below the top.

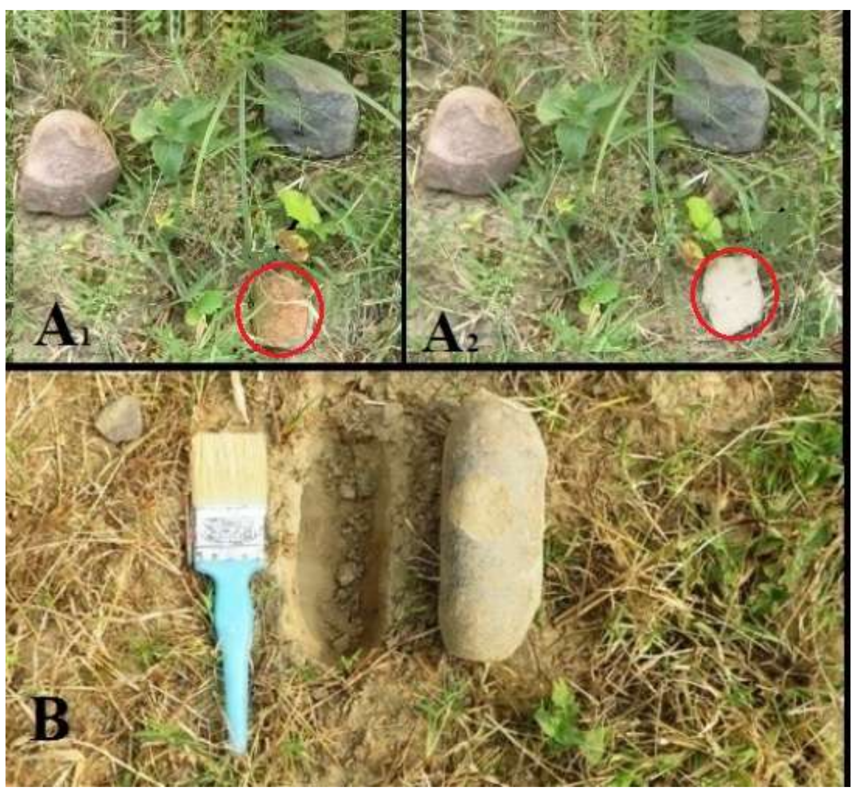

Figure 4: (A1) Spread of stone tools and potsherds visible on the surface; (A2) same as A1 but showing opposite face of the marked potsherd; (B) a pitted cobble found deposited on the surface at a point (picture in 13c-d).

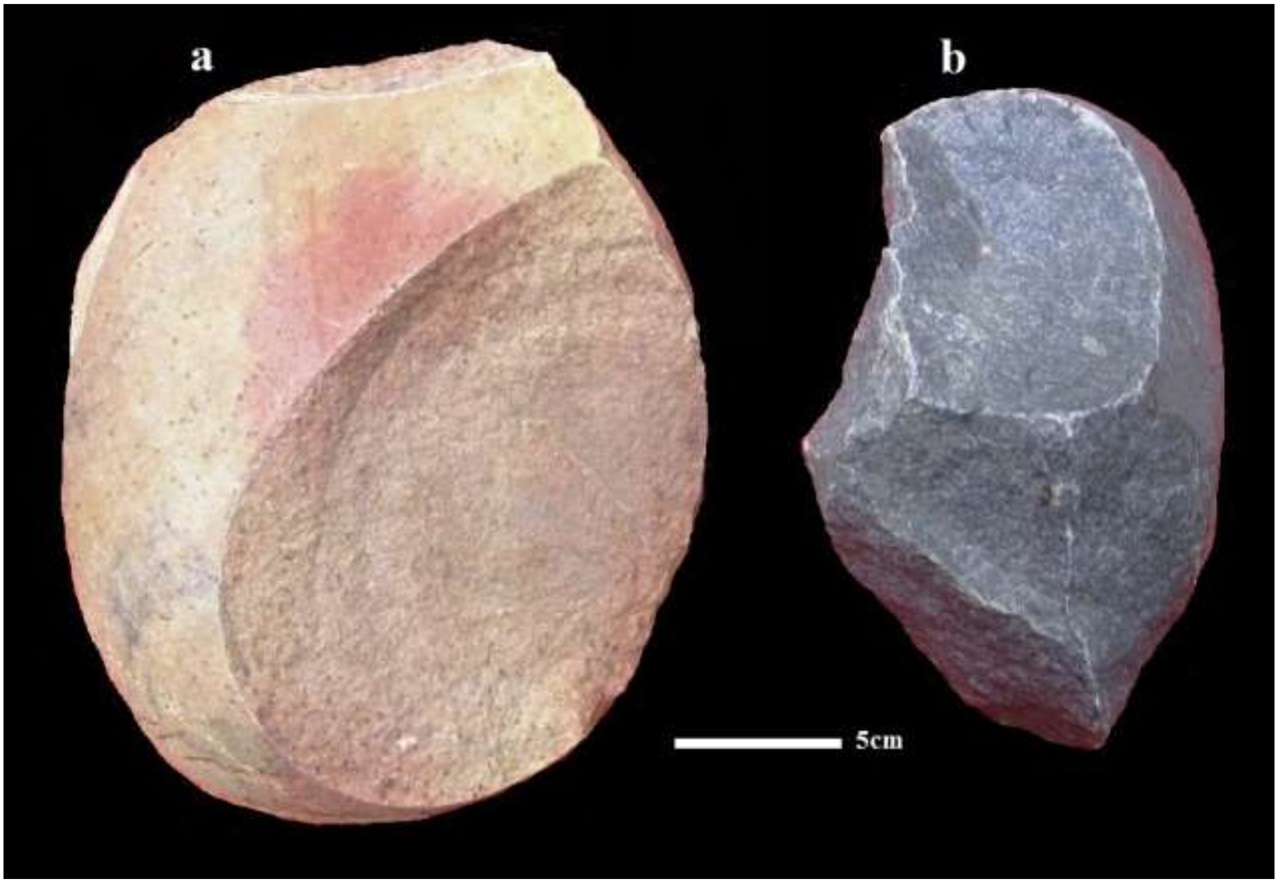

Figure 5: (a, b) Bifacial cores with large flake scars from NGT-1.

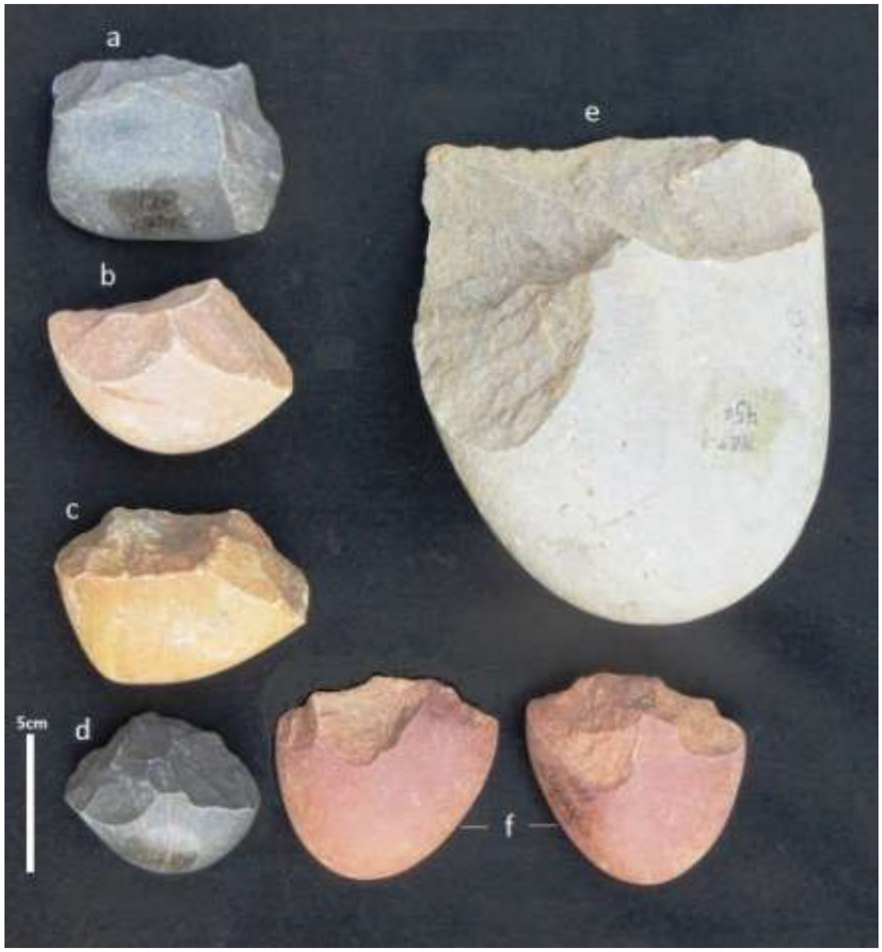

Figure 6: (a, c) medium size disto-lateral choppers; (b, d) medium size side choppers; (e) Large disto-lateral chopper; (f) both faces of a chopping tool; all from NGT-1.

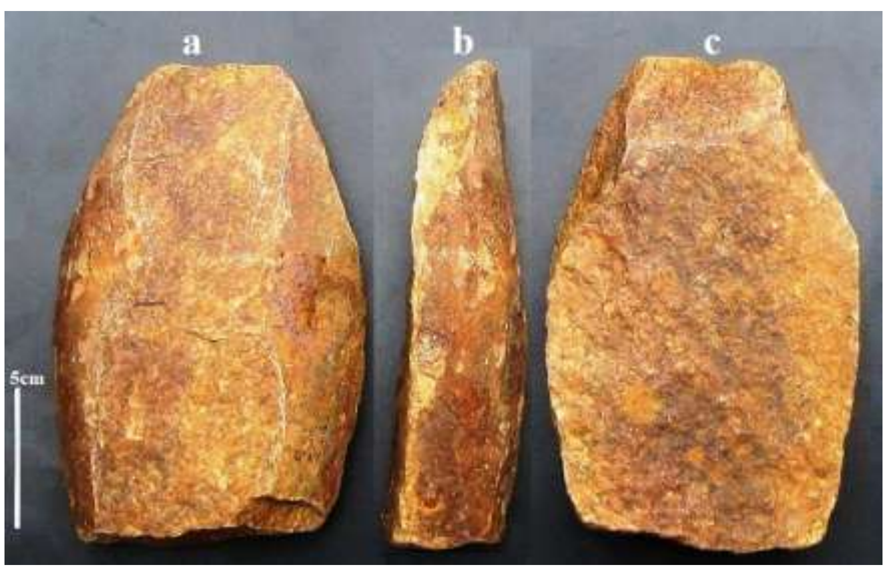

Figure 7: (a. c) Both faces and (b) left side of a large cleaving tool from NGT-1.

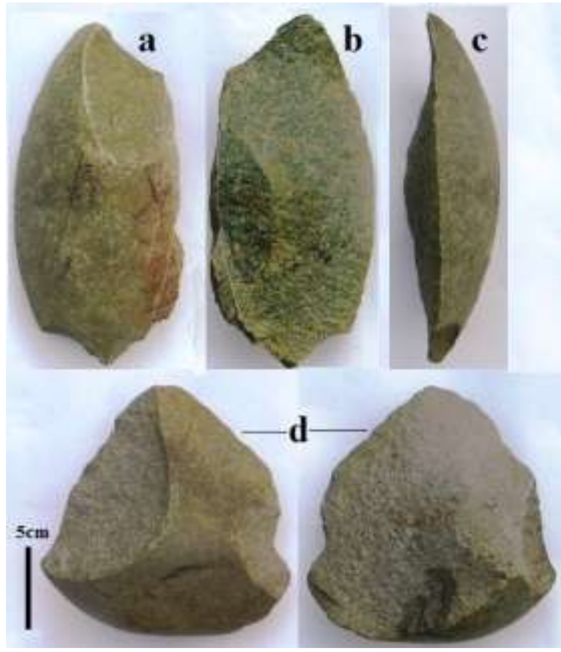

Figure 8: (a, b) Both faces and (c) the cutting edge of a backed knife made on a thick flake; (d) two faces of a pointed cleaving tool on a thick flake; both from NGT-1.

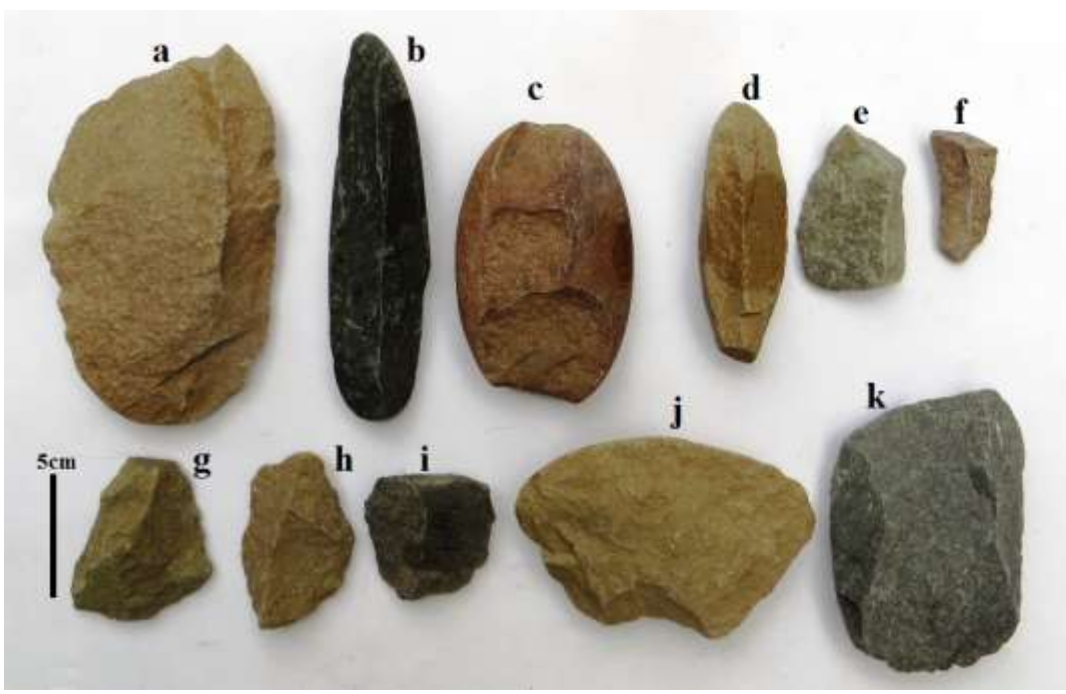

Figure 9: (a) Lateral scraper on a type-1flake; (b) all-round longitudinally peeled elongate cobble; (c)) three shallow flake scars on a bifacial oval cobble having a sharp cutting edge (d) Prick; (e) backed blade; (f) rectangular stone peg; (g, h) Levalloisian flakes; (i) type-5 flake; (j) scraper on a type-1 flake; (k) unifacial cleaving tool; all from NGT-1.

Fig.10. (a) Thick bifacial triangular (pointed) core and (b), a thick unifacial scraper from NGT-1; (c) unifacial chopper and (d), its battered distal edge, from NGT-2; (e) Hoabinhian-type tool tool and (f) both faces of a Sonvian tool from NGT-2.

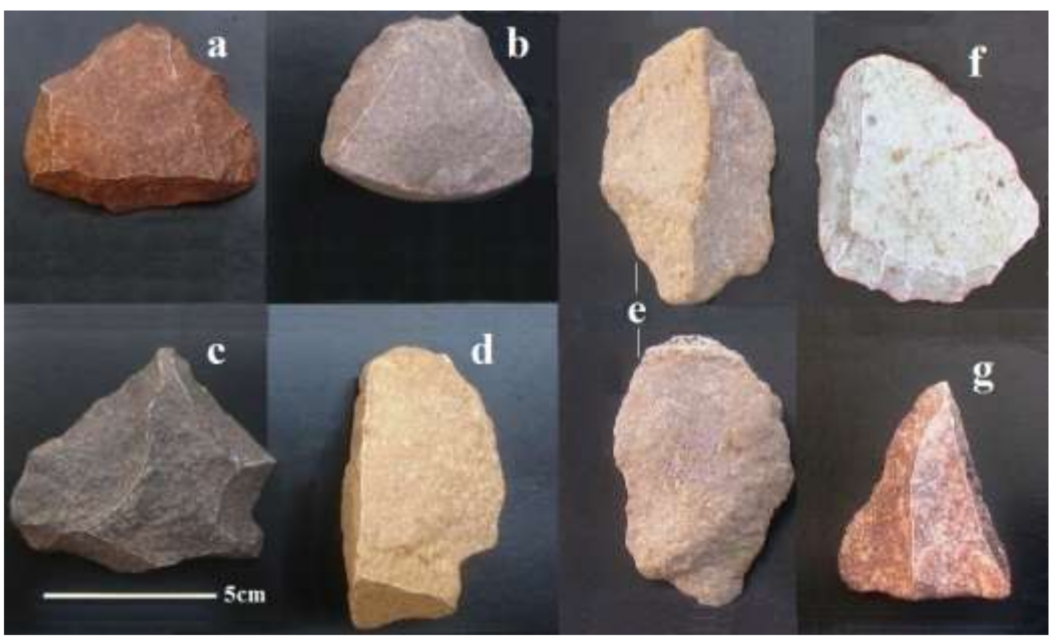

Figure 11: (a) Unifacial scraper on type-4 thick flake; (b) scraper on a thick Toth type-1 flake (Toth, 1985); (c) unifacial peripheral scraper; (d) backed knife on a type-3 flake; (e) both faces of a Levalloisian type-3 flake; (f) unifacial end-scraper; (g) Levalloisian point on a type-6 flake; all from NGT-1.

Figure 12: Pitted cobbles: (a, b) Both faces of 2 multi-pit cobbles from NGT-1; (c) both faces of a multi-pit cobble from NGT-2 and (d), its lateral views.

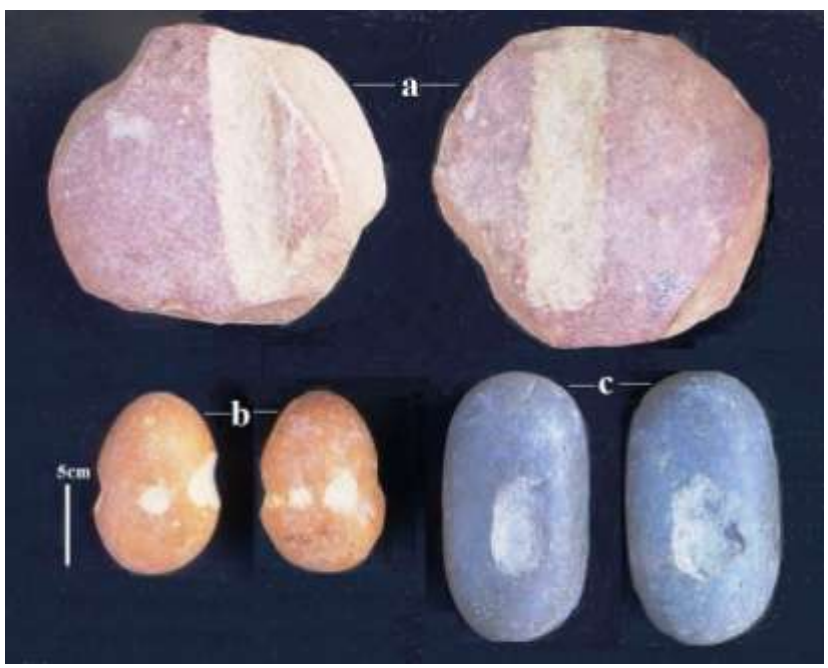

Figure 13: (a) Both faces of a hexagonoidal core having deep elongate grooves; (b) both faces of a small multi-pit, pitted cobble; (c) both faces of an oval cobble with one elongate pit on each face; all from NGT-2.

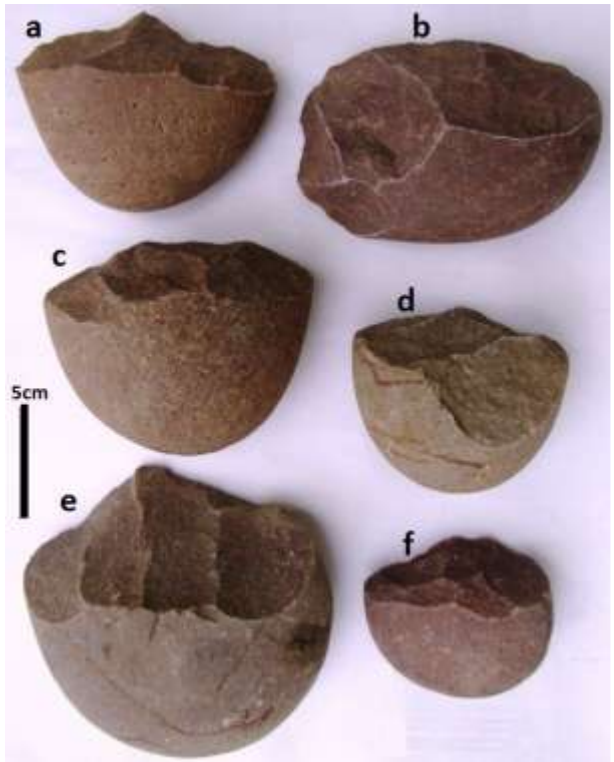

Figure 14: (a, c-f) side choppers and (b), a large disto-lateral chopper; all from NGT-2.

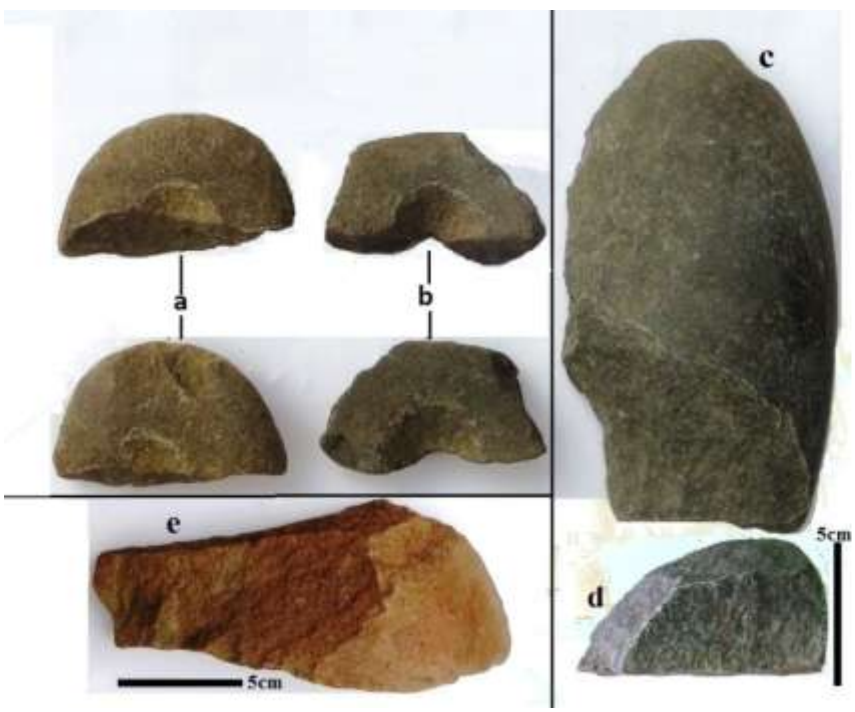

Figure 15: (a, b) both faces of two half ring-stones from NGT-2; (c) dorsal face of a bifacial hoe-like tool from NGT-1, having a prepared platform and worked on the dorsal face for easy handling; (d) view of proximal end/platform; (e) another hoe from NGT-1.

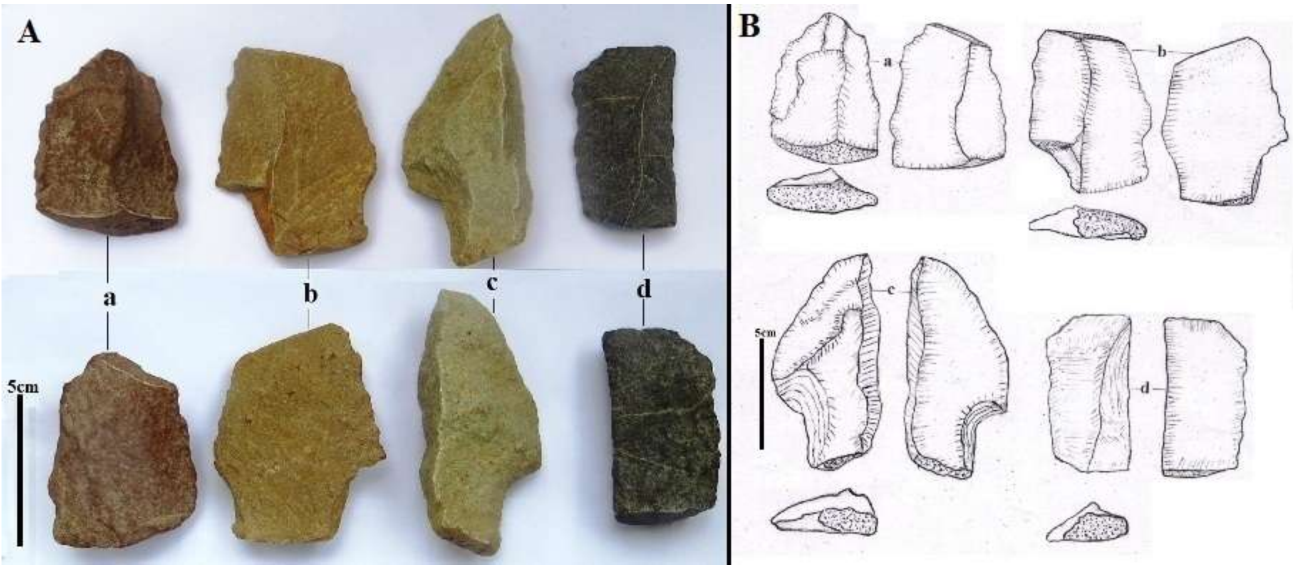

Figure 16 A: (a) Both faces of a converging flake with cortical proximal and distal ends; (b) both faces of a tanged sub-rectangular cutting tool; (c) backed pointed knife having a tang; (d) both faces of a blade on type-3 flake; all from NGT-2. **16B:** (a-d) Line drawings of pictures shown in A.

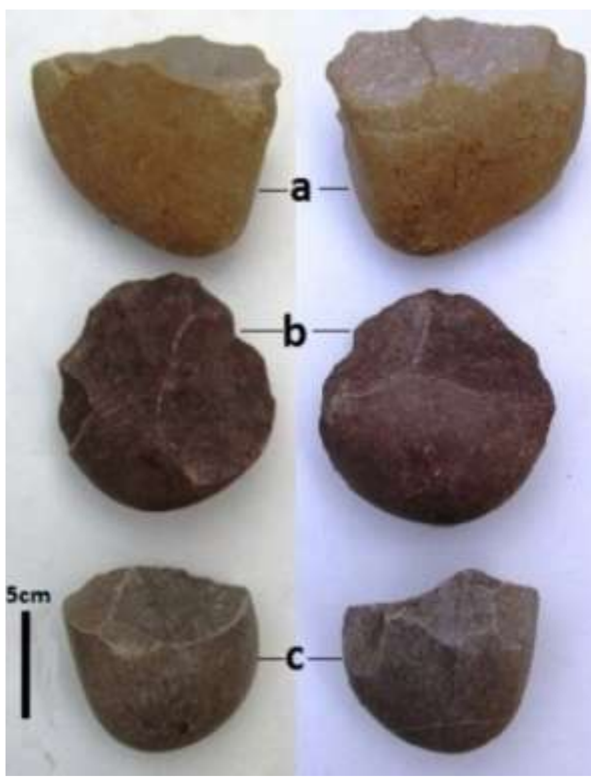

Figure 17: (a-c) both faces of chopping tools from NGT-2.

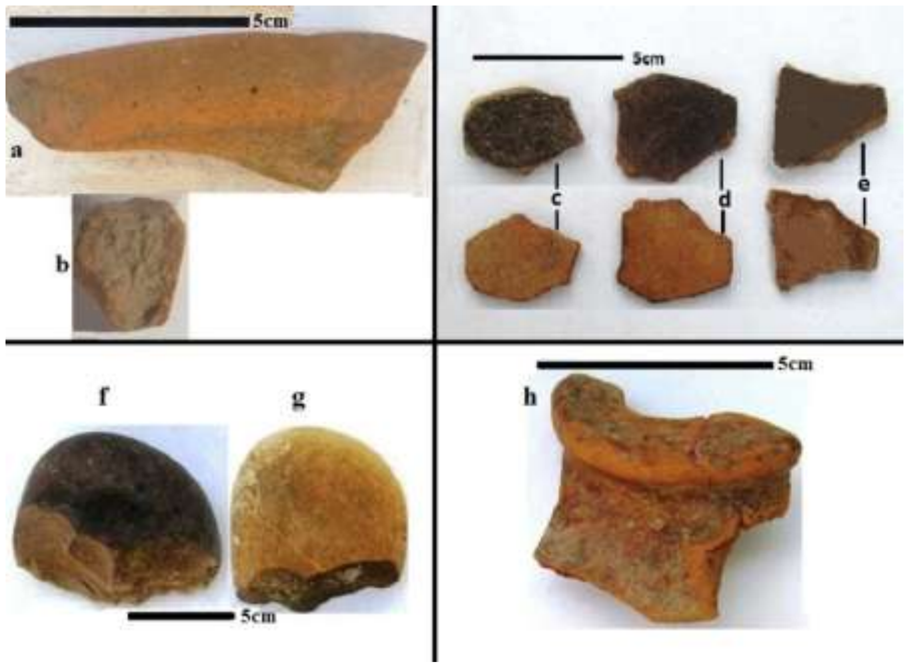

Figure 18: (a) Rim of a vessel and (b), cross-sectional view of that rim from NGT-2; (c, d and e) inner and outer views of Black & Red ware potsherds from the surface of NGT-2; (f, g) choppers from Bara; (h) late Harappan potsherd from Jandori excavation found in association with Soanian tools.