The research presented here is an attempt to understand and enunciate the position of the Black-and-Red Ware within the ceramic assemblage of three selected Chalcolithic sites in southeast Rajasthan and north Gujarat. Since Black-and-Red Ware has served as a culturally diagnostic tool in understanding sites found in various temporal and spatial contexts, it presents an interesting example of how pottery has been used in the study of the past.

**Black-and-Red Ware: The creation of an ‘enigma’**

The term Black-and-Red Ware is generally understood to designate a class of pottery characterised by a red slip on the exterior surface and a black slip on the interior surface, which is the result of a firing process that produces two colours from the same slip.

Between 1955 – 1962, some important Chalcolithic sites excavated in western India, such as Rangpur (Rao 1962-63) Lothal (Rao 1979), Somnath (1955-57), Amra and Lakhabaval(I.A.R. 1955-56) in Gujarat, Ahar (IAR 1954-55, 1955-56, Sankalia et al 1969) in south-east Rajasthan and Maheshwar-Navdatoli (Sankalia et al 1952-53) in Central India confirmed that certain kind of Black-and-Red Ware also had a strong presence in the Chalcolithic. The underlying theme in the various theories put forward to explain the wide occurrence of this pottery, was to regard the Black-and-Red Ware as a single ceramic ‘culture’ and a distinct people, and the issues addressed revolved around a search for its authors and origins, both in ancient communities and in archaeological entities.

Different scholars have considered the Black-and-Red Ware to be the defining cultural equipment of ethnic groups whose existence is known through traditional literature and linguistics but who have eluded identification in tangible material terms. Sankalia (1963), Dixit (1969), Srivastava (1969), Agrawal (1966) and Sinha (1961) ascribed the authorship of the Black-and-Red Ware to the Aryans while Subbarao (1962) and Soundararajan (1962) argued for the Dravidians. Thapar (1975-76), by examining ancient lineage accounts traced the development of Black-and-Red Ware by connecting...
them with the Yadavas while Champaklakshmi (1975-76) believed that it represented the Velirs. The spread of the Black-and-Red Ware across the land is then ascribed to the movement of these communities and its changing forms and decorations to acculturation and contact.

Attempts have also been made to trace the origin of the Black-and-Red Ware in archaeological cultures through the primacy of its occurrence at various sites. The Black-and-Red Ware in later cultures in North, East, Central and South India is conceived to have come from a single source, either from Ahar or from Gujarat (Harappans) and several routes are cited for the movement (Agrawal 1967-68; Dhavalikar 1970-7; Dikshit 1969; Thapar 1975-76; Singh 1982). A generic relationship between the 'Ahar Fabric' and the megalithic Black-and-Red Ware is also suggested.

The above review of archaeological literature on Black-and-Red Ware reveals that, this ware provided a vital explanatory link to archaeologists who were in search for a common element which could serve to tie up the various and divergent material culture traits that had emerged following research in post-independence times. The use of the Black-and-Red Ware in this was rather flexible, depending upon the larger question, which sought to be answered.

The crux of the older approaches was the treatment of the Black-and-Red Ware as a single culture complex identifiable with an ethnic group, despite the stated diversity of temporal, spatial and material contexts and its own variable nature in them. At the other extreme the same variability led to a dismissal of the Black-and-Red Ware as 'just a firing technique' with no cultural or typological identity, following the shapes of the major wares it was associated with in the different contexts.

Keeping in mind the many ways and contexts in which the Black-and-Red Ware has been studied and divergent opinions on its significance, this piece of research maintains a selective regional focus. It chooses, as case studies, three sites from differentiated cultural-geographical and temporal contexts with a view to studying the Black-and-Red Ware at these sites. It also chooses to step beyond the conventional typological route used so far, by employing the method of Fabric characterisation, which is done by using the petrographic technique of thin-section analysis.
The primary objective of the work is to evaluate the position of the Black-and-Red Ware in the specific framework of three Chalcolithic sites, each in a different cultural and temporal context, from two separate regions. The sites are Balathal in southeast Rajasthan which is a Banas Culture site, Nagwada in north Gujarat which has been classified as an Anarta Chalcolithic site with mature Harappan affiliations and Ratanpura, a Late Harappan site, also in north Gujarat. To gain an understanding of the different aspects of the Black-and-Red Ware and its relationship with the associated wares an integrated approach has been adopted, for which it is proposed to:

1. carry out a typological study of the Black-and-Red Ware and the associated wares at all three sites.
2. carry out Fabric characterization and textural analysis on the Black-and-Red Ware and associated pottery at the above mentioned sites to gain an insight into:
   a. the modification of the raw material and paste characteristics
   b. the relationship between different Fabric groups within each site and the position of Black-and-Red Ware in this respect
   c. the relationship of Fabric groups with specific pottery types
   d. the provenance of the raw material
3. conduct physical tests of hardness and porosity on the ceramics of the three sites to see how they relate to the manufacturing processes of the ceramics such as paste character, surface finish and firing and in this respect, and how they differ in the different ceramics and through these methods,
4. elucidate the position of Black-and-Red Ware at the above mentioned sites

Methods of Study

The pottery that provides the data for this research comes from stratified horizons of the three Chalcolithic sites of Balathal in southeast Rajasthan, and Nagwada and Ratanpura in north Gujarat. These belong to the Banasian (Aharian), Mature Harappan affiliated Anarta and Late Harappan cultural contexts respectively.

The pottery at each of these sites was classified on the basis of morphological features of form (features of rim, base and body), finish (colour, slip, wash, burnish and decorations),
forming and finishing impressions (striations, joints, undulation) and fabric\(^1\) (core and firing characters, pores, inclusions, fineness/coarseness).

The pottery encountered at the three sites was differentiated into very fine, fine, medium fine, medium coarse and coarse to very coarse fabrics. The criteria adopted to differentiate between clay paste characteristics are defined below. At different sites, these fabrics present individual characters of the core, pores and inclusions and that variability is detailed separately while describing the wares.

**Very fine fabric**: A fabric which has a smooth, very well refined and processed clay paste, virtually free of inclusions, is well fired with uniformly coloured core and margins (grey, red or buff) and pores, if present, are miniscule.

**Fine fabric**: A fabric which has a finely levigated clay paste and small as well as thin, longitudinal pores.

**Medium fine fabric**: A fabric which has a fine sandy to sandy clay paste. There are comparatively few more degraissants (roughly 15 – 20% and visible in the core) in this fabric than in the fine fabric, but the degraissants are still small in size, with the rare occurrence of bigger inclusions. 

**Medium coarse fabric**: A fabric in which the clay paste is sandy and inclusions are many, making up roughly 30-40% of the fabric. The size of the inclusions are also larger – approximately 0.5 – 1mm and occur at frequent intervals. The clay paste is probably tempered and feel of the fabric is rough. Pores are larger and longitudinal and fabric well to medium or even ill fired and core colour can vary accordingly from uniformly oxidised to partly unoxidised zones with lighter margins.

**Coarse to Very Coarse Fabric**, contains abundant and large degraissants that occur at close intervals and comprise approximately 40 – 50% of the fabric. Inclusions range from approximately 0.5 – 2mm in diameter, but mostly lie on the larger side of the range.

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\(^1\) The word ‘fabric’ is used at two levels – the macroscopic and the microscopic. In references to macroscopic characters of the wares, the term fabric is used with a lower case ‘f’, while for microscopic connotations, ‘F’ in the upper case is used.
This initial classification served as a basis for choosing samples for Fabric analysis and characterisation using petrographic methods.

**Fabric Characterisation**

Fabric characterisation is an optical method of micromorphological analysis of the fired clay paste which uses various criteria such as the nature and birefringence of the matrix, mineralogical composition of the non-plastic inclusions and their textural features of shape (angularity-roundness), sphericity, size range, frequency, sorting\(^2\), orientation, size-distribution character and the nature and size of voids. The microstructural characteristics of the clay paste were studied using compositional and textural criteria as mentioned above. Based on an assessment of the above-mentioned Fabric features, Fabric Groups were formed. A Fabric group thus comprised of thin-sections which shared common features of mineralogy, matrix birefringence and colour, character of clay mass, size, shape, frequency and sorting of non-plastic inclusions within a small variation limit.

**Textural Analysis**

Fabric characterisation of the pottery of the three sites revealed that pottery sections from the same site fell into several Fabric groups and subgroups on the basis of some mineralogical factors, but mostly on grounds of texture and fabric. Thus a need was felt to quantify the textural and mineralogical differences that could have ensued from modifications of the clay (Darvill and Timby 1982). Sections that were most representative of the entire Group were chosen for qualitative and quantitative textural analysis. Textural analysis is a quantitative method used to assess the intra-site variability in ceramic Fabrics which share similar mineral suites (Betts 1982, Darvill and Timby 1982, Streeten 1982, Middleton *et al* 1985). The aim was therefore to obtain a quantitative assessment of intra-site variability in the fabric groups both in terms of the

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\(^2\) The degree of sorting of components in the thin-section is an expression of the variation in particle size. The classes used (after Bullock *et al* 1985 : 26) are:

- **perfectly sorted**: normally only one size fraction is present
- **well sorted**: 5-10% of fractions other than those stated
- **moderately sorted**: 10-30% of fractions other than those stated
- **poorly sorted**: the sorted component is not the dominant one
- **unsorted**: the particles are of a variety of sizes with no fractions appearing more sorted than others
grain-size distribution and the relative abundance of mineral inclusions to assess how far the variability reflected paste-making techniques and source differences.

**Environmental Setting and Archaeological Background of Rajasthan**

In this Chapter, the sites taken up for study are set within their broad geographical and archaeological contexts. Geographically, Rajasthan comprises certain very striking features such as the Thar Desert in the west and the Aravalli range running tangentially (NE-SW) across the State which dissects it into two very broad physical, climatic and even cultural regions – Marwar (an arid/semi-arid land with sandy terrain and low rainfall located to north and west of the range) and Mewar (well-drained, fertile and semi-humid, located to the east and southeast of the range). These two regions are constituted by distinct physiographic zones such as the Thar Desert (characterised by sand-dunes, low hills and limestone outcrops) and a pediplain merging with the Ghaggar flood plain (Western Plain), the Aravalli Hill range with multiple erosional surfaces, the pediplain of south and central Rajasthan (Eastern Plain), a ridge and valley province in North Rajasthan and the Vindhyan upland merging with the Malwa plateau including the Chambal Valley (Sinha-Roy *et al* 1998:18). Rural as well as urban settled agricultural communities of the Chalcolithic period in Rajasthan are found concentrated in three areas:

1) The Ghaggar Basin in the extreme northwest corner of the State gives evidence of Pre/Early Harappan or Sothi-Siswal deposit followed by the Mature Harappan occupation, best represented at Kalibangan. This area forms a part of Indo-Gangetic divide and although a thick concentration of Harappan sites occur along the dry beds of the Ghaggar-Saraswati-Drisadvati in Northwest Rajasthan, the main spread of sites lies further north in Harayana, Southern Punjab and westwards in Cholistan (Bhawalpur region) in Pakistan (Dikshit 1984, Stein 1942, Misra 1984, A. Ghosh 1952, Possehl 1999). No Black-and-Red Ware occurs at these sites in the Chalcolithic period. It occurs generally in a much later context in this area, associated with the Painted Grey Ware.

2) The Shekhawati Plains covering the districts of Sikar and Jhunjhunu in the west and fertile Jaipur plains east of Aravalli forms the core region of the Ganeshwar-Jodhpura (Ochre Coloured Pottery or OCP) Complex. Sites of this complex are contemporary
with the pre/Early Harappan and Mature Harappan phase in the Ghaggar Basin. About 200 sites of this culture have been discovered through explorations in Sikar, Jhunjhunu and Jaipur Districts (IAR 1972-73, 1973-74, 1977-78) of which four have been excavated, namely, Ganeshwar in Sikar, Jodhpura in Jaipur, Noh in Bharatpur and Sunari in Jhunjhunu Districts. An important aspect of the excavations was that they confirmed the stratigraphic position of the unpainted BRW which is said to occur in a separate horizon above the OCP and below PGW. The C\textsuperscript{14} date of the Black-and-Red Ware – Painted Grey Ware overlap at Jodhpura is 383 cal. BC (Possehl 1993) and the upper OCP levels range between 2500 and 2200 BC. Thus, Black-and-Red Ware in this region seems to belong to a much later date.

3) The predominant archaeological entity in the Eastern Plains, specifically the Mewar Plains spanning the valleys of River Banas and its main tributary, the Berach is the Ahar or Banas Chalcolithic in which the white painted Black-and-Red Ware formed the most definitive trait in association with a thick red slipped ware, a tan ware and thin red ware. Until recent interest in this area, the entire Banas culture was understood solely on the basis of Ahar (in 1954-55), partially reported Gilund (in 1957-58) and on explorations. In the last decade, extensive excavations at Balathal (24° 43' N, 73° 59' E, District Udaipur), renewed excavations at Gilund (25° 01' N : 74° 15' E, District Chittorgarh) and others at Ojiyana (25° 53' N : 74° 21' E; District Bhilwara) and Purani Marmi (25° 06' N : 74° 25' E; District Chittorgarh) are helping form a more complete picture about the beginnings, development and internal dynamics of this culture. One of the sites chosen for the present study is Balathal.

**Balathal**

Balathal (24° 43' N : 73° 59' E; Vallabhnagar Tehsil, Udaipur District) was excavated by the Deccan College, Pune, for seven seasons from 1993-94 to 1999-2000. It revealed a habitation deposit of seven meters which is divisible into two periods. The lowermost is a substantial Chalcolithic habitation followed by the Early Historic Period, with considerable stratigraphic and chronological gap between the two. The C\textsuperscript{14} dates place the chalcolithic occupation between 2800 – 1500 BC. (Misra 1997, Misra et al 1997). There are three dates for the middle phase of the Chalcolithic period ranging between 2350 B.C. and 2300 B.C.
The Chalcolithic deposit is divided into two Phases. Phase A represents the early settlement and Phase B represents the mature phase. Chalcolithic Phase A is represented by the early occupational deposits and is characterised by simple architectural features such as circular mud floors with post holes around the periphery of the floors and burnt pieces of clay plaster suggest superstructure plastered with clay. Silos lined with grass and lime are also found in this phase and they are associated with a number of large, heavily worn querns. There is a marked change in construction activity and material in Phase B, which evinces extensive use of semi-dressed and undressed stones of locally available granite and gneiss and mud-bricks for construction. Four structural phases have been identified for this Phase, of which the most prolific is Structural Phase II in which there is evidence of massive construction activity in the form of a fortified enclosure made of mud walls revetted on both faces with stones and by three multi-roomed complexes with stone foundations and walls of mudbrick and mud. This also gives evidence of the beginning of planned architecture at Balathal and witnessed a remarkable increase in prosperity. An outer periphery wall and two pottery kilns were also found.

The ceramics were predominantly wheel made and comprised of Thin Red Ware, Black-and-Red Ware, Tan Ware, Thick Bright-Slipped Red Ware, Plain Red Ware, Burnished Grey Ware and Plain Grey Ware. There was a small amount of Reserve Slipped Ware and were of two types; imported and locally made imitations. Apart from the ceramics and structural remains, the remaining material evidence is in the form of copper, stone, terracotta, shell and stone objects. There was an established lithic industry and a variety of semi-precious and other stones were used. Terracotta bull figurines, copper-bronze objects (choppers, knives, razors, chisel, tanged and barbed arrowhead etc) were also found in small numbers. Balathal represented a mixed economy based on farming (wheat, barley and mustard and a variety of pulses and oil-seeds) (Kajale 1996), stock raising and occasionally hunting and fishing (Thomas and Joglekar, 1996).

**Environmental Setting and Archaeological Background of Gujarat**

Physiographically, Gujarat consists of five broad geographical regions, namely, the alluvial plains of Gujarat divisible into South, Central and North Gujarat Plains with a chain of rocky highlands forming a backbone to the Plains on their eastern side, Kutch with the Great and Little Rann, the Plateau of Saurashtra and the Coastal Lowlands. Gujarat has a much more enduring and widespread Harappan presence than Rajasthan,
but the archaeological picture is not as straightforward as most of these sites in Gujarat present strong evidence of a non-Harappan indigenous nature that runs either antecedent to, coeval with or subsequent to the Harappan phase. Mature Harappan sites in Gujarat are few and found mainly in Kutch and some coastal sites in Saurashtra.

Explorations in Kutch over the last four decades and subsequent small and large scale excavations at sites like Desalpur (23°25'N : 60°10'E), Surkotada (23°37'N : 70°50'E), Dholavira (23°53'N : 70°13'E) and Shikarpur (23°16'N : 70°41'E) have yielded a material assemblage that is distinctly Mature Harappan, relating them with the Harappan sites in Sind, Punjab and Rajasthan. At these typically Harappan sites, white painted Black-and-Red Ware occurs in small amounts but only in the late stage.

Saurashtra represents an eclectic mix of Mature Harappan and regional Chalcolithic cultures. A few Mature Harappan sites are present on coastal fringes (Lothal on the eastern margin, Nageshwara, Bagasra and Kuntasi in the western coastal region, across from the southern coast of Kutch). Except Nageshwar, the other Mature Harappan sites cited above also incorporate indigenous Chalcolithic traits from Saurashtra and north Gujarat. The majority of the other ‘Harappan’ sites, specially in Saurashtra show some commonality in ceramic fabric and manufacture with those of the Harappan but are still overwhelmingly individualistic in their material assemblage (Rangpur, Rojaji, Padri, Prabhas). New concepts and terminology were evolved which culturally link these different elements into the larger Indus tradition as sub-regional cultures or rural manifestations of urban traditions, evolving out of interactions between the Harappans and indigenous Chalcolithic communities (Possehl and Raval 1988, Ajithprasad and Sonawane 1993). Thus came about concepts of the Sorath and Sindhi Harappan, demarcating between typical Harappan settlements and those which are largely indigenous but contemporary with the mature Harappans and show a strong influence, specially in the pottery fabric. The chronological scheme as well as the terminology of Sorath and Sindhi Harappan has been questioned from various quarters for the connotations it carries (Verma and Menon 1999, Koiso 1994, Ratnagar 1991, Chitalwala 2000). However, what is of interest for the present study is that these sites in Saurashtra (barring Rangpur), which at present have been classed as Sorath Harappan or Rangpur IIB/IIC sites carry negligible amounts of Black-and-Red Ware in their ceramic repertoire.
The only region in Gujarat which yields substantial amounts of Black-and-Red Ware in the Chalcolithic context is North Gujarat, where a regional Chalcoithic culture (Anarta Chalcolithic) has been identified (Ajithprasad and Sonawane 1993). These sites are mainly located along the edge of the Little Rann of Kutch or close to low lying salty wastelands. Habitational deposits are thin (20 cms to 1.5 m.) and sites are small in size, ranging from .10 ha to 7 h.a. and sometimes activity in an area survives as just discrete ephemeral clusters of artefacts .02 ha - .5 ha. Another characteristic is the occurrence of many such small mounds or localities with differing cultural affiliations within a radius of a few kilometres in the same area. Evidence of large number of bones of domesticated cattle and sheep from these sites is suggestive of a pastoral economy with live-stock raising as the mainstay and limited subsistence agriculture. However, there are also few sites such as Nagwada and Moti Pipli which evince a longer and a relatively more intensive occupation. Sites such as Zekhada present an interesting picture of short-lived successive occupations as their small deposits (50cms– 1.5m in different parts of the mound) (Momin 1980-81) produce evidences of late Mature to Late Harappan periods along with the regional Chalcolithic present throughout. Pre-Harappan burials with burial pottery similar to pre-Harappan Amri, Nal and Kot Diji are also found unassociated with any other cultural deposit at many localities around Nagwada, Datrana and Santhli. In and through these various elements is the over-riding evidence is of a regional Chalcolithic pottery tradition represented by a distinct range of pottery types such as the Gritty Red Ware, Fine Red Ware, Burnished Red Ware and Burnished Grey/Black Wares, which differ from Harappan and other pottery in terms of clay paste, vessel form, surface treatment and firing. They thus represent a regional Chalcolithic ceramic tradition of North Gujarat and have been called Anarta wares.

The Anarta Chalcolithic sites in North Gujarat incorporate a fair amount of Black-and-Red Ware in their assemblage. It varies from forming 12.5% of the assemblage at early Anarta sites like Loteshwar to a maximum of 27.6% at later sites like Kuwar (RGP II) and 30.5% in Khandia (Anarta/RGP IIC-III), but mostly ranges between 16-25% of the assemblage (Mahida 1992). Thus the presence of Black-and-Red Ware and the eclectic nature of Chalcolithic sites in North Gujarat provide a very interesting backdrop for studying the Black-and-Red Ware in different contexts. Two sites of various affiliations were chosen from this region for the present study: Nagwada, a mature...
Harappan affiliated Anarta Chalcolithic site with evidence of pre-Harappan burials and Ratanpura, a Late Harappan (Rangpur III) Lustrous Red Ware site.

Nagwada:
Nagwada (23° 18' N, 71° 42' E; Surendranagar district, Dasada Taluka) lies on the edge of a vast fertile alluvial plain, close to the eastern margin of the Little Rann of Kutch. Of the five mounds situated close to the village, NGW I and IV are of Anarta tradition with Mature Harappan affiliation and pre-Harappan burials while NGW II, III, and V are late Harappan (Bhan 1992, Ajithprasad and Sonawane, 1993), coeval with RGP IIC and III.

Excavations at mound Nagwada I (NGW) yielded a single culture site, 15,400sq.m. (140 X 100m) in area, with a deposit of 90-110 cms. The earliest evidence of human activity consists of six burials (both symbolic and inhumation), with pots as burial goods. Stylistically, the burial pots bears very close resemblance in fabric, shape and decorative features to the pre-Harappan burial pottery reported from the first period of Amri, Kot Diji and Nal and on these grounds, have been dated to the early Harappan time period (3000 - 2600 B.C.) (Possehl 1992, Sonawane 1994-95), preceding the beginning of the urban phase occupation. The burial pottery does not occur in the later habitational deposit of the site. There is also no habitational deposit or material that can be associated directly with the burials. Thus the evidence of early activity is confined to these burials and their grave goods.

The occupation coeval with the Mature Harappan phase starts from Layer 5, but develops more from Layer 4-1. There is little by way of structural activity apart from a few post-holes and mud floors in layer 5 (Sonawane 1992, Hegde et al 1988), but subsequent layers have yielded material relics coeval with the Mature Harappan phase. The ceramic evidence corresponds to that of Surkotada I B and I C and Lothal AIV. Structural remains consist of a series of mud-brick and rubble structures. Brick sizes are 8 x 16 x 32 and 7 x 14 x 28, giving the standard Harappan ratio of 1:2:4. The ceramic assemblage is dominated by non-Harappan ceramics like Gritty Red Ware, Black-and-Red ware, Burnished Grey and Black Ware, Fine Red Ware etc. Coarse Red and Grey Wares are also found. The Harappan sherd are very little, but are represented by characteristic mature Harappan ceramics like sturdy red, buff and chocolate-slipped ware in this type fossils like perforated jars, 'S' profile jars, beakers, dish-on-stand etc.
Nagwada is believed to have thrived because it developed a craft-oriented economic base. Although no separate area for bead or shell manufacturing could be identified, a large number of beads and objects of shell, agate, steatite, faience, amazonite, carnelian, and lapis-lazuli, along with unfinished beads and drill bits, finished and unfinished bangle pieces and other shell working debris indicates local working of shell and bead. Other artifacts of interest were an inscribed clay sealing, a spherical shell object with concentric circles it, variety of gold and silver ornaments, long parallel sided chert blades, cubicle agate weights, copper celts, chisels, knives, pendants, inlay pieces etc. One radiocarbon date of 2133, 2067 cal BC (A 4555) is available for the mature phase.

Ratanpura
Ratanpura (23° 28' N : 71° 48'E Taluka Sami, District Mehsana) is a Late Harappan/Lustrous Red Ware site coeval with Ranpur Period IIC/III. Cultural material occurred here in four distinct concentrations spread over a stabilised dune.

Excavation revealed a single culture Late Harappan/Lustrous Red Ware habitation deposit of about 60 cms, comprising of four layers and three structural levels. Structural evidence was limited to outlines of rammed earth floors of circular huts with 9-10 post holes and ‘U’ shaped chulah’s of mud built on the floor. The upper structural phase was devoid of delineated structural evidence as above and comprised mainly of hard rammed mud floors as working areas (Sonawane 1994-95).

The pottery comprised of plain and painted Sturdy Red and Buff wares, Chocolate Slipped wares, Lustrous Red Ware, white painted Black-and-Red Ware, Coarse Black-and-Red Ware, Polychrome and Rusticated ware and Coarse Grey and Red Wares. The ceramics compare well with RGP III and certain ceramic types and wares have also been compared with Ahar Phase IC (Buff and Cream slipped Ware, Chocolate and Tan slipped wares and Coarse Red Ware) (Bhan 1989). There is no Carbon 14 date available for this site.

The pottery from Nagwada and Ratanpura in North Gujarat and Balathal in Rajasthan was analysed using typological and petrographic methods.
Ceramics at Balathal

At Balathal, the major wares encountered were the Black-and-Red Ware, Tan Slipped Red Ware, Thick Coarse Red Slipped Ware, Thick Coarse Grey Ware and Thin Red Slipped Ware. Black-and-Red Ware was present in three fabrics. The fine Black-and-Red Ware was well fired and made with a finely levigated smooth clay paste with tiny mica flecks and miniscule pores. The medium fine fabric is micaceous and slightly sandy in comparison to the fine fabric and contains tiny degraissants while the medium to coarse variety was very sandy and grittier with abundant big degraissants and flaky mica. The convex sided bowl has an everted featureless rim and carinated bowls with everted rims, giving concavo-convex profiles were the main types present. The Tan Slipped Red Ware had a fine, lightly sandy fabric. The surface had fine degraissants and tiny mica flecks. The most popular shape was the deep dish/basin and pot/jar with many rim variants. The Thin Red Slipped Ware was characterised by very thin vessel walls, well slipped and smoothly burnished exterior surface and generally an unslipped grey interior, which sometimes bears a pale red wash. The fabric is very fine and lightly sandy, like that of the Tan Slipped Red Ware. It is well fired with a red to grey core. Thick Coarse Red Slipped Red Ware has a coarse to medium fabric with plenty of large quartz pieces as degraissants along with tiny mica pieces and many pores. It is moderately well fired and the core is generally grey coloured with red margins. Pot/Jar and bowls are the common forms in this coarse ware. The variants are bowls with an externally bevelled rim, convex sided bowl with simple featureless rim, bowl with a slightly inverted rim, and a blunt carinated bowl with featureless rim. Thick Coarse Grey Ware is coarse, sandy and porous with abundant quartz and white degraissants.

Fabric Characterisation of the pottery from Balathal divided into eight Fabric groups (Fabric Groups 1-8) and several subgroups (2A, 2B, 3A, 3B, 4A - 4C, 5A, 6A, 6B, 7A-7C and 8A) based on textural differences of frequency and grain size of the aplastic inclusions.

Provenance of Pottery at Balathal

The mineral suite met with in the ceramic sections of Balathal reveal a predominantly Quartz-Feldspar fabric, constituting 65% – 85% of the mineral inclusions. Micas, both biotite as well as muscovite, is the next widely occurring mineral present as fine fractions in the matrix, as laths in coarser sections and as a constituent of rock fragments like.
granite, biotite and muscovite mica schists/gneisses as well as fibrous aggregates. Quartz is both clear and with undulatory extinction, its other occurrences being as sandstone fragments, sheared quartz, cryptocrystalline silica, poly-crystalline quartz with sutured boundaries and sheared quartz. A variety of Sodic and Potassium feldspars are present—microclines, plagioclases, altered feldspar with inclusions of muscovite and zoisite which is a result of low-grade metamorphism, altered plagioclase with mottled appearance in PPL, and Perthite as well as anti-perthite. Feldspars of the nature described here, specially the altered ones are abundantly encountered in the granitic fragments present in the clay-paste and are probably derived from the exposures of granite in the area. Mineral grains of calcite are relatively less, and carbonates occur mainly as crypto-crystalline calcite finely disseminated in the matrix as an intimate part of the clay paste, as Calcretets or kankar fragments and argillaceous inclusions. Bioclasts are also present in small amounts in the clay-paste, which are probably skeletal bioclasts of shells/molluscs detectable as thin curved, sword-like fragments. Garnet is detected in minor amounts in some sections. Lastly, minerals of the Pyroxene and Amphibole groups (mainly augite, orthopyroxene (?) and hornblende) are present.

The nature of the mineral inclusions in the pottery sections of Balathal match the metamorphic lithology of the Banas-Berach Basin and most of the pottery was made with raw-material derived from a local source. Thus, the nature of the minerals suggests a metamorphic and sedimentary source area for the clay. However, some non-local material is also detected and is represented by Fabric Groups 8 /8a and Fabric group 5.

Paste-Preparation Techniques at Balathal

The clay paste preparation techniques at Balathal may be broadly studied under two headings: a) that of the fine wares and b) that of the coarse wares.

Fine wares comprising the Black-and-Red Ware, Tan Slipped Red Ware and Thin Red Slipped Ware fall into the first four (1-4) Fabric Groups. Within these groups and their subgroups, textural differences are evident in the frequency of grain size ranges, the sorting and in the relative abundance of non-plastic inclusions, which reflect the differences in clay refinement. Technologically, Groups 1, 2 and 3 illustrate one method of clay processing at Balathal with a little variation in the degree of refinement of the clay-paste. It is possible to visualise a progression here wherein by a more stringent
refinement of group 3, the state of refinement of Group 1 can be attained. The mean porosity of these three groups falls at 20%.

The second method of clay paste preparation was used for the production of both fine and coarse wares. Groups 4 – 4B represent the finer processing of the clay-paste while 7C represents its coarsest expression, with 4C forming the intermediate stage. In the fine group, the clay is well levigated with the frequency of inclusions varying from 15-30% between the subgroups. This method of refinement indicates a sorting process whereby some larger inclusions, sub-angular to sub-rounded in shape, ranging from high MS to VCS (15%) made their way into a fabric dominated by smaller angular grains. In 7C, the smaller size fraction lies between Silt-low MS and the larger ones are from High MS-VCS, with coarse-fine ratio of 1 : 5. The frequency of non-plastic inclusions is 50% and the widely varying grain sizes indicate a poor sorting and bimodal distribution. This textural link between coarse and fine wares is evidence indicating a conscious manipulation of the raw material to meet the production requirements for wares that served different functions. The coarse wares comprise of Thick Red Slipped Ware, Thick Coarse Grey Ware and the coarser varieties of Black-and-Red Ware. Groups 6 and 7 represent these ad their subgroups represent the variability in the clay–paste making.

To sum up, the compositional and textural analysis of the ceramics at Balathal indicate that at least three sources of raw material were exploited, of which two may be non-local. The majority of the ceramics are manufactured with locally available raw-material. Two modes of clay preparation is indicated for the fine wares and two for the Coarse wares. The second mode of clay paste preparation represented by Group 4 develops more fully in Stage B. There is a genetic textural link between the second mode of fine-ware clay preparation (represented by group 4) and that of a Coarse Ware (represented by Group 7C), which indicates that the same raw material was manipulated to produce end products differing widely in their quality. There is a difference in the physical properties between Black-and-Red Ware and the other wares most closely associated with it. Black-and-Red Ware shows a comparatively lower apparent porosity than the other wares. This is in all probability a function of the type of surface treatment. As compared to the Tan Slipped Red Ware, Thin Red Slipped Ware and the other Coarse Wares, Black-and-Red Ware (both fine and coarse variants) has a comparatively thicker slip and very well burnished surfaces.
Nagwada

At Nagwada, Black-and-Red Ware occurs in two fabrics - fine and medium. This shape is common in the bowls of Gritty Red Ware too. The clay is finer than the other Black-and-Red Ware and contains only small white degraissants. The Gritty Red Ware (GRW) in coarse, medium and fine varieties forms the majority of the ceramic assemblage at Nagwada. The ware is medium to well fired and sturdy and usually has a reddish yellow, light brown and reddish brown to pinkish grey and dark to very dark grey core. Most of the sherds bear a slip (or remnants of it) in shades of red, yellowish red and painting is done in black, chocolate or red, on a red or cream surface. Coarse Grey Ware and Coarse Red Ware are similar in clay category and forms. The core is unoxidised and varies from grey to black and dull red. A majority are rim sherds of globular pots with a flaring mouth, an everted rim and a concave neck. Both Coarse Red and Grey ware also have the scooped groove at the neck, like Gritty Red ware. Fine Red Ware at Nagwada is of three types. Fine red ware of type 1 comprises very small, thin sherds which have a red, plum red, chocolate or buff slip. Fine red ware of type 2 is very few in number, varying from 1.5% - 0.8%. The surface of the vessel is brick red and well fired. Fine red ware of type 3 form only 3% - 4% of the entire assemblage and is distinguishable from the other wares in their sturdy, well fired and well refined sherds. The clay is very well levigated and well fired. The body is pale red-pinkish.

Provenance of the Pottery from Nagwada

The major mineral grains present in the ceramic sections of Nagwada are Quartz, feldspars, calcites and mica. Quartz (both with clear extinction as well as pitted and highly fractured grains) is also present in other forms such as schistose quartz, small pieces of sandstone, poly-crystalline quartz, cryptocrystalline silica (also with iron oxide inclusions and diffused grain boundaries), quartz with spherulitic texture and sheared quartz. There is a high amount of Perthitic Feldspar in the sections and there is also some slightly altered Plagioclase as well as some highly pitted ones with fine twinning. Microcline (sometimes pitted), altered feldspar with inclusions, mermekitic feldspar are also present. The calcareous component in the pottery of Nagwada is quite high. Muscovite, Biotite, Mica lath and biotite flecks, iron oxide patches and opaque inclusions, hematite, Pyroxenes such as Augite and sporadic Olivine, Argillaceous inclusions, Calcareous and Carbonaceous argillans are present in fair amounts. Rock pieces of Basalt
also occur in one section and the other commonly occurring rock fragments are fine and coarse sandstone and mica schist. A distinguishing element in one set of sections is Bioclasts or Foraminifera (Gastropods, oolids, shell and carbonaceous material which is filled in with calcite). Thus, the mineralogy and the nature of the minerals present in the ceramic thin-sections of Nagwada seems to point to a metamorphic and calcareous source area for the clay, which would also have high amounts of mica.

A comparison of the mineral detritals in the Nagwada sections with the lithology of the North Gujarat plains shows that the majority of the ceramics represented in groups A, B, C, E, F, G, H and J exploited the same clay source with the differences in mineralogy relating to their clay paste preparation or more preferential raw-material choice exercised within the larger common source area. Fabric I, with foraminifera and shell/mollusc indicates a different exploitation of clay. Such mollusc shell and foramenfera occur most commonly in the tidal muds of the Rann, formed in the late Holocene. These tidal muds also show an abundance of clay minerals like Illite and Montmorillonite (Merh 1995: 161). Nagwada being located right on the margin of the Little Rann, it is quite probable that one of these clays may have been exploited for production of some pottery. Lastly, Group D is a third source, which is high in rock particles, is basaltic, is non-calcareous and very ferrigenous.

Clay Paste Preparation Techniques at Nagwada
In terms of textural characteristics of the clay-pastes, the pottery of Nagwada shows much diversity. The three types of Fine Red Wares with some degree of variation in the macroscopic fabrics fall into five Fine – Medium Fine Fabric Groups (A, B, C, F and G). Fabric Groups B, C, F and G show links with medium-fine and coarse wares. Fine Red Ware of type 2 falls into Fabric Group A. Fabric Group C is largely represented by Fine Red Wares of type 3. Fine Red Ware of type 1 falls into many fabric groups and is represented in Fabric Group B, F, G and in sub-groups of Group C. Thus, these Fabric Groups reflect the variability in the clay paste preparation of the Fine Red Wares.

The differences between them lie in the homogeneity of the clay matrice and size of inclusions and their frequency. The frequency of inclusions in these groups varies from a low of 5 – 15% in Groups A-C to a high of 25% - 45% in F and G. Fabric Group A is a fine calcareous Fabric with particles sized between FS – Silt and lower, stippling the
matrix. The crypto-crystalline calcite is not so intimately a part of the matrix as it is in Group B. Group B has grains ranging from Silt to CS, but is an open-spaced fabric, with a compact matrix that is not crowded with minute particles. It also has a higher proportion of Feldspars. Group C is a ferruginous Fabric with low frequency of 10 - 15%. The majority of the grains are below 2 microns, but the few larger particles are in all sizes from MS-CS. There is also a higher rounding of grains. Group F has a high frequency of inclusions (25% - 30%) but they all lie in the finer size fraction between VFS and FS. The grains are very angular to subangular and the matrix is very dark. The matrix of Group G has very high birefringence and there is an absence of calcareous inclusions. The higher frequency of inclusions in Groups F and G makes them texturally medium-fine and sandy. Thus, technologically, Groups A, B, C, F and G represent the different paste preparation techniques practiced for achieving a fine – medium fine clay paste.

By an increase in grain size as well as in frequency, most of these fine Fabrics (namely B, C, F and G) show a graded progression into coarse Fabrics represented by Coarse Red and Grey Wares and Gritty Red and Buff Wares. Some mineralogical differences also creep in with the increase in coarseness. Such Fabric links help understand the technological similarities and which underlay the production of Fine and Coarse Wares at the same site. One such continuation is represented by Group E and E1, which illustrates one method of producing Gritty Red and Buff Ware. This Fabric is a coarse progression of Group C. The frequency of inclusions is higher, ranging from 25% - 35% and there is an increase in the number of coarser inclusions. The occurrence of CS in the Fabric goes up from 4% in Group C to 14% in Group E1 with 7% of VCS. Most of these coarser particles are of quartz, quartz rock (sandstone) and crypto-crystalline silica and calcrete. They are rounded in shape and may have been derived from fluvial or lacustrine sediments.

A second method for the preparation of clay paste of Gritty Red Ware is represented in Group J with links with Group B. This is quite a different fabric, being open-spaced with coarser, but lesser inclusions (20%) that are almost equally distributed between FS and CS. It has a compact, highly birefringent matrix with occasional occurrence of Bioclasts.
Groups F, G and H represent the full progression from a medium-fine to coarse Fabric which charts the technological course of Coarse Red and Grey Wares and some Gritty Red Ware. Group F and G have already been discussed above as exhibiting a higher frequency of inclusions in the smaller size ranges and absence of coarse particles. CS increases in percentage occurrence from nil in G to 4.76 in G1 and 12.34 in G2. These larger grains are mostly of Quartz. Calcites have a very low presence in this Group, which largely represents the Fabric of Coarse Red Ware. In Group H, particles are of even higher ranges incorporating 3.20% – 4.46% of VCS. The larger grains are mostly contributed by Quartz, some Feldspars and Calcretes. They usually have a higher roundness compared to the smaller grains, which are angular to subangular. There is a corresponding decrease in the percentage of Silt and VFS. Mineralogically, small amounts of Augite and occasional bioclasts are detected. Group H largely illustrates the Fabric of Coarse Grey Wares.

Black-and-Red Ware at Nagwada represents a completely different technological tradition in terms of raw material selection and processing. Its clay paste characteristics are illustrated in Group I and I-2. The clay used for this Group of wares is very rich in shell/mollusc. It is very calcareous and matrix is highly birefringent. The inclusions range from Silt to small amounts of VCS, but most lie between VFS and FS. Silt sized particles are comparatively less. Thus, there is no really fine Black-and-Red Ware at Nagwada. Most of it grades as medium-fine texturally, with variation in the grade of medium-fininess. The coarser manifestation into subgroups I-2 and I-3 define the third mode of production for Gritty Red Ware. These groups have a higher frequency of inclusions (30 – 45%) and an increase in the proportion of grains of specially Medium Sand and Fine Sand. CS grains are mainly of Calcite and Quartz. A notable feature is that grains of these larger sizes also have angularity and are not rolled like those in Coarse Red Ware and Gritty Red Ware of earlier mentioned traditions.

Thus, the key points that emerge from the above provenance and comparative Fabric analysis of the pottery of Nagwada are that three different clay sources were exploited for the production of the wares at Nagwada. One clay source was basaltic, the second was calcareous and bioclastic (with shell/mollusc), represented by Black-and-Red Ware and Gritty Red Ware and the third was highly metamorphic sedimentary in nature, of which the majority of the other wares - Coarse Red and Grey Wares, some Gritty Red Ware and
Gritty Buff Ware and Fine Red Ware is made. No stratigraphic correlation is found to exist between Fabric groups and wares, so all techniques were practiced contemporaneously. Black-and-red ware represents a distinct production mode and source. It is related with textural differences with some Gritty Red Ware. The three common modes of Fine Ware Production (indicated in Fabric groups B, C, and F and G (taken together) and their correlation with Coarse wares (Fine Fabric B reflecting in coarse Fabric J; fine Fabric C reflecting in coarse Fabric E and E1 and fine to medium-fine Fabrics F and G progressing into coarse Fabric H) indicates that they were not sporadic occurrences, but represented separate technological traditions each. Only one of these modes of paste preparation represented the Coarse Red and Coarse Grey Wares while the Fabric of Gritty Red Ware can be traced to Black-and-Red Ware, and Fine Red Wares represented in Fabric Groups B and G.

Thus the ceramic-paste preparation data indicates that at Nagwada, many paste-preparation modes were followed concurrently wherein the same, typologically conventional category of wares were made in different manners.

**Ceramics at Ratanpura**
The major ceramics encountered at Ratanpura were the Black-and-Red Ware, Lustrous Red Ware, Coarse Wares, Grey Ware, Fine Red Ware, Buff Ware and Micaeous Red Ware. The Black-and-Red Ware is found in profuse quantities in Ratanpura. The exterior slip is mainly red and reddish brown and the fabric has a fine sandy texture with few inclusions visible in the core. The only major shape present is gently concavo-convex blunt carinated bowls. No stratigraphic change is perceived in the forms, fabric and paintings on the Black-and-Red Ware. Lustrous Red Ware is distinguished by its highly polished red slip. Both medium-fine and fine Lustrous Red Ware is found. Lustrous Red Ware of medium fabric has a sandy clay paste with few grits visible in the core whereas in the fine Lustrous Red Ware, the clay-paste is well levigated and smooth. The central part is unoxidised and varies in shades of grey, very dark grey and dark grey, while the interior and exterior margins are oxidised and are various shades of brown, red and yellow. Apart from the classic Black-and-Red Ware are sherds of a coarse pottery, which has a thin dull red slip on the exterior and a black slip on the interior rim. The external slip is generally red, light red to weak red and in sherds which are smoke marked or burnt, the colour is reddish brown and very dark grey. The unslipped interior is very
dark grey to black. There are small amounts of Fine ware, comprising Fine Red, Fine Buff and Micaceous Red Wares. As with the Lustrous Red Ware, the slip in these cases also extends only to the inner rim. The fabric is very fine and has an even coloured oxidised core, completely free of any inclusions. There are small amounts of Buff ware and Micaceous Red Ware also present.

Provenance of raw-material and pottery from Ratanpura
Quartz is the main mineral encountered in the thin-sections of the pottery of Ratanpura. Apart from clear mineral grains, it occurs in various other forms also as Sandstone, Sandstone with sutured grain boundaries showing evidence of compaction, cryptocrystalline silica with sutured and diffused boundaries, sheared quartz and schistose sheared quartz. Quartz with spherulitic texture is also sometimes found. Other minerals generally occurring in the sections are perthitic feldspar, altered feldspar of low-grade metamorphism with inclusions of muscovite and zoisite, microcline, clear plagioclase, high amounts of iron oxide, biotite, acicular Muscovite and small aggregates of fibrous muscovite, few calcite/dolomite fragments and small amounts of hornblende and augite. Calcite and other forms of calcium carbonates such as aggregates of crypto-crystalline calcite, well-rounded, dull brown and muddy calcareous argillans and argillaceous inclusions, calcrites and finely disseminated micrite in the matrix are present in variable amounts. There is a deficiency of calcites in some Fabric Groups where they seem to occur mainly as post-depositional crumby precipitates in voids, while others are markedly calcareous. Bioclasts are rare in most sections.

The mineral detritals present in the ceramics at Ratanpura seem to conform to the general lithology of North Gujarat. The main mineralogical difference observed in the different Fabric Groups was the varying proportions of calcareous inclusions and calcareousness of the Fabric, which can be related to a variability created in paste manufacturing or a preferential selection of raw material within the larger common clay source. Thus at Ratanpura, Groups I, II, IV, V, VIII and IX indicate a common source of clay. Of these, Subgroup IVE and Group IX probably indicate a more selective exploitation within a common source. Groups III, VI and VII indicate three other sources and probably a different provenance for the pottery.
Clay Paste Preparation Techniques at Ratanpura:

Three main paste preparation techniques were practiced at Ratanpura which can be studied under the following heads – 1. that of the Black-and-Red Ware and Coarse Wares 2. that of Lustrous Red Ware and some Fine Wares and 3) that of Fine Red Wares.

The clay-pastes of Black-and-Red Ware and Coarse Wares, exemplified by Fabrics II and I respectively, show close correspondence with each other. They are medium-fine to coarse sandy Fabrics with a majority of the inclusions in the well sorted size range of Silt – FS, with a dominance of VFS and a grain frequency of 40 – 50%. The inclusions are predominantly of sharp, angular Quartz grains with clear, straight grain boundaries. The paste is homogenous and ferruginous. Fabric I and subgroups (Coarse Wares) has about 10 – 30 % of larger, well rounded inclusions (CS-VCS) added to the clay-paste, comprising mainly of Quartz and altered Feldspar. This clearly seems to be an addition of sand temper. The Fabric of the Black-and-Red Ware (Fabric II and subgroups) shows remarkable consistency and textural differences between them is very marginal. Macroscopically, too, this ware shows a standardization in shapes and surface finish. Thus Fabrics I and II are essentially the same clay-paste, with some manipulation of the paste to produce the Coarse Wares.

The Red Wares, mainly Lustrous Red Ware, represents the second paste preparation technique practiced at Ratanpura as evinced in Fabric Group IV and its sub-groups IVA, IVB, IVC, IVD, and IVE and Fabric V. The clay paste has many small to large, well rounded iron oxide clots. A clue to what this may signify in terms of clay-paste preparation was obtained in the fabric of Subgroup 4A, where there is a very large, roughly oval clot of iron oxide which is well defined on one side, while on the other side, it gradually merges with the matrix. Thus, these discrete iron oxide clots probably reflect an inadequate kneading and homogenising of the clay paste. Both macroscopically and microscopically, the matrix has a sandwiched appearance, with dark cores and brighter margins. This shows that the outer surfaces were oxidized whereas the carbon in the core remained unoxidised. In terms of firing behaviour, a sandwiched core may indicate that it was a rapid firing in which high temperatures were reached long enough for only the outer surface of the sherd to be oxidized, the duration of the high temperature proving inadequate for all the carbon in the core to burn out.
Group IV and its sub-groups, (IVA to IVE), indicate a progressively finer refinement of the clay paste with a consistent drop in the frequency of inclusions from 30 – 35% in IV to 10- 15% in IVE with a corresponding change in the predominant grain size from VFS - FS in Group IV to Silt - VFS in IVE. This is accompanied by an increase in the percentage of feldspar. The grains are angular. Group V represents a coarser variety of the above with grains ranging into VCS.

The third technique of clay paste manufacture encompasses the Fine Red wares including Micaceous Red Ware and Buff Ware and these are represented by Groups VIII and IX. Both macroscopically and microscopically, this is a smooth and homogenized paste. It is very well levigated and the grain size lies in the range of Silt –VFS, but most of these forming a part of the matrix. It has a uniformly fired matrix. Group IX representing the Buff Ware is the same as the above except for a higher amount of crypto-crystalline calcite.

Group VI is a medium fine fabric with majority of the grains falling within VFS - FS. This is a calcareous fabric with a few bioclastic inclusions. It is a smooth, homogeneous fabric. It is also uniformly fired. Most of the minerals present are clear and unaltered, especially the feldspars.

Group VII is also a medium fine calcareous and bioclastic fabric. It is texturally unlike any other fabric encountered at Ratanpura. It is an open-grained Fabric where the matrix is very compact and the inclusions are widely scattered.

Implications:
Firstly, no stratigraphic correlation can be established in the groupings and each Group includes Wares from different layers. Ratanpura is a single culture site and thus it seems that the wares as well as paste-preparation methods indicated above were practiced concurrently and were constant over the length of occupation of the site.

Secondly, the three kinds of paste-preparation techniques described above confirm largely to a whole category with an occasional overlap. Texturally, there is little similarity between them, except in nature of inclusions and minerals. For instance, Groups I and II represent the clay paste for Black-and-Red Ware and Coarse Wares and forms one
technique. The second technique conforms largely to the Lustrous Red Ware with some Fine Red Wares made like them too, specially in the finer progressions of the technique. The third technique indicating a superior refinement of the clay conforms to Fine Wares.

Thus there seems to be a level of skill and specialisation achieved in the production of different wares at Ratanpura. From the above discussion, it appears that at Ratanpura, Black-and-Red Ware as well as the other wares represented a skilled production.

This piece of research has thus demonstrated that at each of the selected sites, Black-and-Red Ware occupied different positions within the ceramic repertoire. It formed an integral part of the larger ceramic tradition at Balathal, represented a different technological tradition at Nagwada and a skilled mode of production at Ratanpura. Thus it is clear, that in terms of techniques of paste preparation, Black-and-Red Ware had specific contextual existence, which was not apparent from conventional typological studies alone.

Thus, the need to pursue different lines of research, other than typological analysis of pottery is clear from this study. Technological studies such as studies of ceramic paste variability possess the potential to extract, to some extent, past human behaviour reflected in aspects such as paste preparation techniques and can serve to illustrate the extent and nature of ceramic variability at the microscopic level. Analysis and understanding of forms and decorations on pottery are not, by themselves, capable of revealing other aspects of technological behaviour. For instance, this study has pointed to the existence of technological streams within a larger cultural context.

Thus, the real potential of this work lies in laterally widening each of the contexts of the study within the cultural geography of the Black-and-Red Ware. From this, it may become possible to extrapolate on wider socio-technological issues such as identifying a regional Fabric or technological stream.
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