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A Diachronic Examination of Lithic Exchange Networks During the Urban Transformation of Harappa

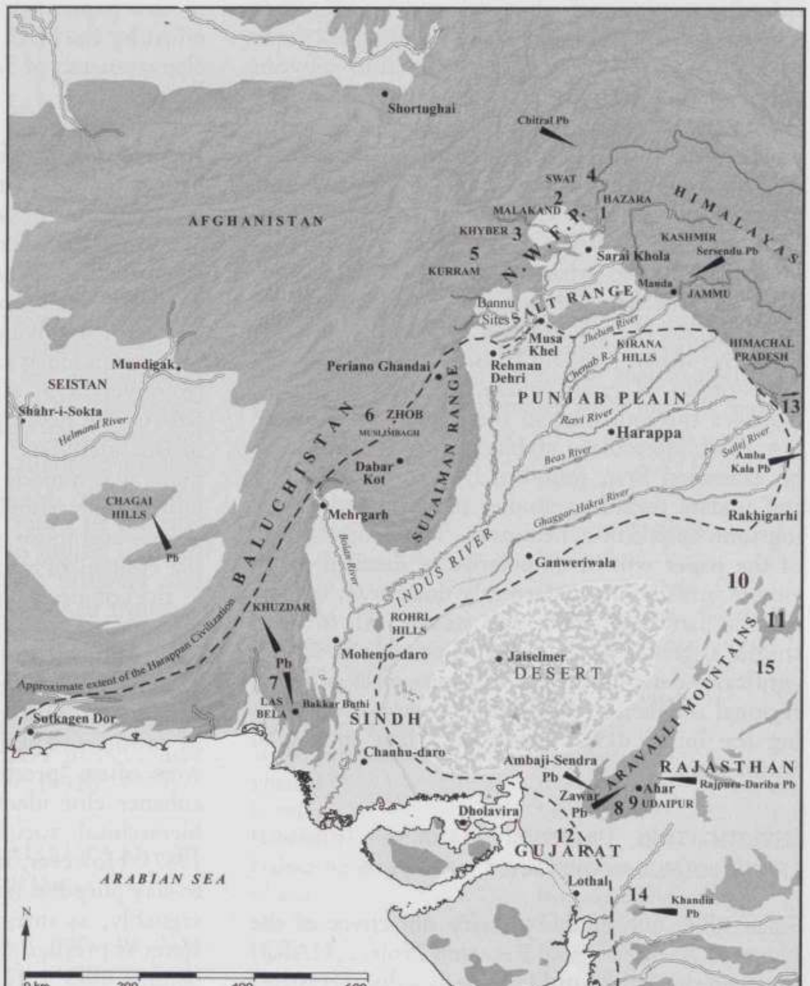

Fig. 1. Sites and sources areas discussed in text. Lead (Pb) sources are indicated with arrows. Steatite source areas are identified by number: 1 (Hazara – *Dolomitic*); 2 (Malakand – *Ultramafic*); 3 (Khyber – *Dolomitic*); 4 (Swat – *Dolomitic*); 5 (Kurram – *Dolomitic*); 6 (Zhob – *Ultramafic*); 7 (Las Bela – *Ultramafic*); 8 (Udaipur-Dungapur – *Ultramafic*); 9 (Udaipur – *Dolomitic*); 10 (Jhunjhunu – *Dolomitic*); 11 (Alwar – *Dolomitic*); 12 (Sarbarkantha – *Ultramafic*); 13 (Bageshwar – *Dolomitic*); 14 (Panchmahals – *Dolomitic*); 15 (Jaipur – *Dolomitic*).

Introduction

The Indus Civilization city of Harappa, founded in the mid 4[th] millennium BC on an alluvial terrace deep within the Punjab plain (fig. 1), lies hundreds of kilometres from any significant source of stone. Yet manufacturing debris representing several dozen rock and mineral varieties has been recovered from each period of the site's long occupation (c. 3300 to c. 1700 BC). The distant regions from which these lithic raw materials were brought to Harappa can now be identified with a high degree of confidence through geologic source provenance studies. When provenance determinations are con-

Period	Phase	Dates	Number of steatite samples analyzed per period	Percentage of all steatite recovered from that period
1	Ravi Phase	> 3900 BC to c. 2800 BC	1	16%
2	Kot Diji (Early Harappa) Phase	c. 2800 BC to c. 2600 BC	30	69%
3 A	Harappa Phase A	c. 2600 BC to c. 2450 BC	28	77%
3 B	Harappa Phase B	c. 2450 BC to c. 2200 BC	58	≈ 5%
3 C	Harappa Phase C	c. 2200 BC to c. 1900 BC		
4	Harappa/Late Harappa *Transitional*	c. 1900 BC to c. 1800 BC	9	80%
5	Late Harappa Phase	c. 1800 BC? to < 1300 BC	2	50%

Fig. 2. Harappa chronology and steatite analysis.

sidered together with the site's increasingly well understood stratigraphic sequence (fig. 2), it is possible to examine trade and interaction between Harappa and the resources-rich highlands of the greater Indus Valley region from a new, diachronic perspective.

This paper will examine how certain lithic raw material acquisition networks of the Harappans (here meaning residents of Harappa) changed over the course of the urban transition of their settlement and society. The periods encompassing this transition are the pre-urban Ravi Phase – Period 1, the proto-urban Kot Diji Phase – Period 2, and the fully urban Harappa phase – Period 3 (fig. 2). Changes through time in the composition of the raw lithic assemblage at Harappa as a whole will be examined first, followed by a brief summary and update regarding studies of chert and grindingstone acquisition networks. The central focus of the paper will be summaries of detailed provenance investigations, currently underway, on two specific materials: galena and steatite. All of these studies together have begun to provide new, scientifically-derived insights into processes of interregional interaction and resource acquisition during the initial development of urban society in South Asia.

Investigating urbanism Harappa through lithic source provenance studies

Since 1986, one of the primary objectives of the Harappa Archaeological Research Project (HARP) has been the "study of Harappa as a discreet urban phenomenon" (Dales 1991, 1). Past investigations into craft production (Kenoyer 1992a; Miller 1999) and subsistence exploitation (Belcher 1998; Meadow 1991; Weber 1999) suggested that shifts in these activities took place as the settlement grew from a village during the Ravi Phase into a large urban centre during the Harappa Phase. These shifts no doubt reflect the significant social, political, and economic changes that accompanied this period of urban transformation. The study that is the subject of this paper, while new, is part of the ongoing effort by the HARP to understand the origins and characteristics of South Asia's first urban phenomenon.

It now appears that from its earliest period the site of Harappa (fig. 3) was composed of multiple habitation areas (mounds) that may represent the local domains of competing social-political groups (Meadow/Kenoyer 2001). These groups, and/or those that ruled them, are thought to have derived much of their social power through economic strategies involving control of access to essential resources such as land, livestock, and raw materials (Kenoyer 1995). Among the resources most essential for the development and functioning of early urban, state-level societies were raw rock and mineral commodities. If the mounds at Harappa indeed represented the domains of different social groups and those groups generated power through the control of such commodities, then variations in the compositions of lithic assemblages between mounds, if observable, would have important implications for understanding changing socioeconomic strategies of the site's residents.

Rare or exotic rocks and minerals are important to consider in studies of this kind as such stones were often "prestige" symbols used to define or enhance elite identity, create power, and support hierarchical social stratification (Brumfiel/Earle 1987). However, lithic materials required for day-to-day purposes (such as grinding or cutting) were, arguably, as integral to the functioning of early states as prestige stone. Controlling such utilitarian commodities may also have been an important political-economic strategy for elite ruling groups (D'Altroy/Earle 1985), especially at a city such as Harappa where there are no local stone resources of any kind. Identifying and determining the sources of the lithic commodities (prestige and utilitarian) found at Harappa, can provide valuable insights into various aspects of the urban phenomenon such as trade and inter-regional interaction, access and control of resources, craft production, and intra-site group competition.

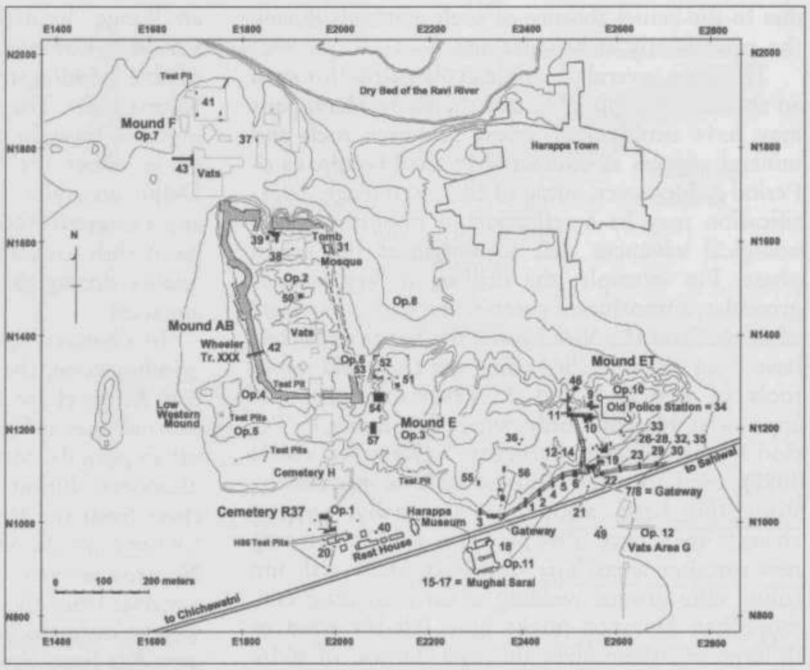

Fig. 3. Harappa site plan.

In the absence of readable texts that identify resource extraction areas, geologic provenance analysis of archaeological stone is the most secure method with which to identify the area(s) from which a raw material type originated. Harappa's assemblage of raw lithic manufacturing debris and unmodified ores is the focus of this study rather than finished stone or metal artefacts, which could have been made elsewhere and traded to the site. This approach obviates the need to subject finished artefacts to potentially destructive analyses and avoids the issue of source mixing in metal artefacts. Such a study is possible only because of the foresight of past and present HARP directors who anticipated the questions now under investigation and saw to it that all lithic materials encountered during excavation and survey were meticulously collected and recorded (Kenoyer 1992b, 1993).

The raw lithic assemblage at Harappa and its broad-scale compositional changes

Forty varieties of raw rocks and minerals have been identified at Harappa (fig. 4) using methods ranging from basic mineralogical tests, like specific gravity, to x-ray diffraction and electron microprobe analyses (Law 2001). Of those 40 varieties only 11 (denoted in fig. 4 with an asterisk) are present each in Periods 1 and 2 – the pre and early urban phases. In Period 3, however, all varieties have been recovered. Much of the apparent lithic raw material diversity during the urban phase is no doubt due to the fact that strata from this phase are widely exposed across the site and a significantly greater volume of Period 3 occupation layers have been excavated as compared to the deeply buried Periods 1 and 2 levels. However, it is suggested here that some of the disparity in assemblage diversity between these periods may be

Almandine Garnet
Basalt
Calcite
Cerussite
Chalcocite
Dolerite
"Ernestite"
(aluminum silicate w/ mullite-cristobolite)
Fluorite
Fossils
Gabbro
Galena-Antimony*
Gneiss
Goethite
Gold
Granite
Gypsum
(var. alabaster, selenite)
Hematite*
Lapis Lazuli*
Limestone*
Malachite
Massicot Litharge
Microcline*
(var. amazonite)
Microcrystalline Silicates*
(var. agate, chert, jasper)
Prehnite
Quartz Crystals
Quartzite*
Rhyolite
Rock Crystal
Sandstone*
Schist*
Serpentine
(var. lizardite)
Siltstone
Slate*
Steatite*
Sulfur
Tourmaline
Tremolite
Turquoise
Vesuvianite-Grossular
Wulfenite

Fig. 4. Raw rock and mineral varieties identified at Harappa. Varieties present in periods 1 and 2 are marked with asterisk (*).

due to the actual absence of such materials during the pre-to-early urban periods.

There are several plausible explanations for such an absence. It is possible that the Early Harappans may have simply had access to fewer rock and mineral sources as compared to the Harappans of Period 3. However, some of the assemblage diversification may be a reflection of important technological advances that accompanied the urban phase. For example, the drilling of vesuvianite-grossular, a translucent green stone with a hardness of 6½ to 7 on the Mohs scale, for beads could not have been accomplished using the chert and jasper tools of Periods 1 and 2. Vesuvianite-grossular appears at Harappa only when, beginning in Period 3, the material "ernestite" (Kenoyer/Vidale 1992), used to make drills capable of perforating stone this hard, also appears. Finally, societal changes may have also played a role in opening new resource areas. The various ethnic, social, and ruling elite groups residing at an increasing cosmopolitan Harappa might have felt the need to differentiate themselves through the use of more diverse and exotic materials, hence stimulating more exploration of, and/or trade with, new regions.

Whether or not it is a reflection of disparities in excavated strata or the product of cultural-technological change (further exposure of Early Harappan levels will help to determine which), the increase in Harappa's raw lithic assemblage diversity at the onset of the urban phase is dramatic. However, this diversity is, for the most part, fairly uniform across the site's many mounds. Raw steatite and agate, the two most abundant bead-making materials, have been recovered in great quantity from each major mound. A notable exception to this pattern is vesuvianite-grossular debris, over 90% of which is found on mounds E and ET (Law, in press a). It is of course possible that groups living on Harappa's different mounds used the same suite of materials but acquired them from different sources. This possibility will begin to be explored in the sections to follow.

Chert and grindingstone acquisition networks

A preliminary assessment of both Harappan grindingstone (querns and mullers) and chert sources was made in 2001. Those results will be briefly recounted (refer to fig. 1 for locations mentioned) and updated here.

Initial studies (Law, in press b) have suggested that prior to Period 3 Harappans acquired the majority (86% in Period 1 and 64% in Period 2) of their grindingstone from poorer quality sources located nearest to the site in the Kirana Hills (120 km the north). Much of the remaining Early Harappan period grindingstone was identified as the higher quality Pab Sandstone from the Sulaiman Range, located 220 km west of the site. By Period 3, however, less than 3% of source identifiable grindingstone derived from sources in the Kirana Hills. The majority (nearly 70%) of grindingstone brought to Harappa at this time originated in either the Sulaiman Range or outliers of Delhi quartzite in southern Haryana, located approximately 400 km to the southeast of Harappa. A shift towards more distant sources of higher quality during the urban phase material is clearly apparent.

In a pattern similar to that which is evident for grindingstone, the closest sources of chert in the Salt Range (Law 2003) were apparently the most utilized ones at Harappa in the pre-urban and early urban periods. Material from those sources all but disappears during the urban phase when, evidently, chert from the Rohri Hills of Sindh becomes by far the most dominant variety brought to the site. Neutron activation studies of Harappan chert and material from these and other sources are underway in order to confirm this pattern, which until now has been based solely on visual comparative of the archaeological and geologic samples.

Although the grindingstone and chert studies remain ongoing, it is now evident that a shift towards more distant, often higher quality sources of those materials roughly coincided with Period 3 at Harappa. This shift might indicate that beginning around this time a certain group or groups within Indus society took control of the exploitation and/or distribution of utilitarian essentials such as these. It may also signal a marked increase in the overall capability of Harappans to transport bulk commodities long-distances during the urban phase. And while the de-emphasis on chert and grindingstone sources north of Harappa could be taken to reflect a general abandonment of this region during the urban phase, provenance data recently generated for galena and steatite (discussed below) suggests this is probably not the case.

Harappan galena acquisition networks

Fragments of raw lead (galena) have been recovered from Periods 1, 2, and 3 at Harappa. The mineral galena might have been used in metallurgical craft activities or even as a mineral cosmetic such as *surma (khol)*. While not an abundant variety in the Harappan lithic assemblage (less than 20 fragments in total have been recovered), identifying the potential source(s) of this galena is fairly unproblematic.

There are four isotopes of lead (^{208}Pb, ^{207}Pb, ^{206}Pb, ^{204}Pb) that, where the element is present, vary in absolute amounts depending on its geologic age (Guilbert/Frank 1986, 286–90). Since lead is a common impurity in metal ores and/or additive in metallurgical processes, these isotopes are frequently used in attempt to match metal artefacts to ore sources (see Budd et al. 1995 for a discus-

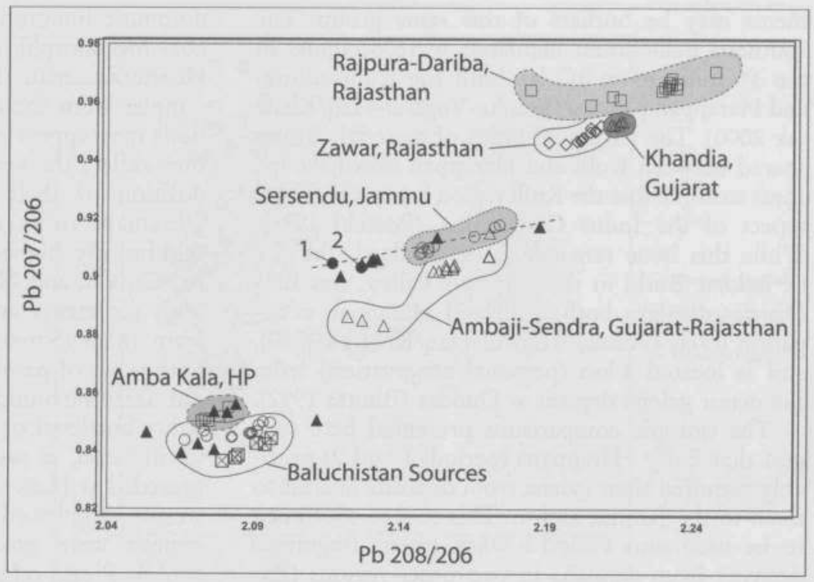

Fig. 5. Isotopic ranges of galena sources vs. isotopic values of galena fragments recovered at Harappa (black triangles = Period 3 finds; the period of black circles is individually indicated). The straight dashed line represents the range of the Jammu galena deposits *projected* to appear when additional samples are analysed.

sion). Provenance studies involving raw lead ores (Hassan/Hassan 1981; Farquhar/Fletcher 1984) like the Harappan galena fragments have been especially successful due to the fact that source mixing (a problematic possibility when analysing finished metal artefacts) is not an issue. To begin such as study it is necessary to have a reasonably comprehensive database of the isotopic characteristics of regional sources. While the number of isotopic assays that have been done for galena sources in the greater South Asia region does not approach the numbers done in other parts of the world (e. g. North America or Europe), there exists today a fair amount of published data regarding the lead isotope characteristics of many of the deposits that would have been accessible to Harappans. In total, 110 determinations on 10 galena source areas (identified on fig. 1) now exist with which to compare archaeological samples.

Isotopic assessments of the Harappan galena fragments were conducted using a minimally destructive sampling procedure for lead artefacts developed at the Laboratory for Archaeological Chemistry in the Department of Anthropology, University of Wisconsin-Madison (Law/Burton, in preparation). Each fragment was placed for five minutes in a solution consisting of purified water containing 0.02% ethylenediaminetetraacetic acid (EDTA), a chelating agent that easily bonds with heavy metal ions like lead (Nowack/Sigg 1996). Brief immersion in this weak EDTA solution is sufficient to obtain enough lead for isotopic analysis and does not affect the samples in any visible way. The isotopic composition of a sample can then determined by analysing the solution using an ICP-MS.

Seventeen galena fragments recovered from Harappa were prepared and analysed using the above method and the resulting data was plotted against published isotopic ratio from lead ore fields surrounding the Indus River Basin (fig. 5). Galena at Harappa appears to have been derived from at least three distinct sources. Nine fragments (falling toward the centre of fig. 5) may derive from galena deposits found in the Udhampur District of Jammu. Although at present only a single fragment from this group directly corresponds to the isotopic values published for Jammu galena, it is highly probable that it and the remaining eight may belong to the same source region. Note that other well-characterized source regions, such as the Ambaji-Deri and Rajpura-Dariba ore fields of southern Rajasthan, when plotted often follow an extended curvi-linear trend. Characterization of other related outcrops in Jammu may extend the isotopic boundaries of this source along a similar trend (projected as a dashed line). There are additional geologically related galena sources in Kashmir as well as the Hazara region of Pakistan that remain to be isotopically characterized[1]. It is significant, however, that the Jammu deposits are the closest galena sources to Harappa and are located beginning less than 30 km north of the site of Manda, where Joshi and Bala (1982) identified a Harappan cultural phase.

Three Harappan galena fragments appear most closely related to a deposit found at Amba Kala in southeastern Himachal Pradesh. This source, located approximately 200 km east of the Harappan Period city of Rakhigarhi (Nath 1997–98), would have been most accessible from protohistoric sites located in northern Haryana (Bhan/Shaffer 1978).

Three galena fragments closely resemble lead from sources in Balochistan. Two additional frag-

1 As this publication went to press, new analyses of galena from the source at Buniyar, Kashmir did indeed extend the isotopic boundaries of lead ore deposits in that region along the projected trend line.

ments may be outliers of this same group. The southern Balochistan highlands were occupied in the 3rd millennium BC by both the Kulli culture and Harappan peoples (Franke-Vogt/ul-Haq/Khattak 2000). The strong affinities of material culture shared between Kulli and Harappan sites have led some to argue that the Kulli region is but a highland aspect of the Indus Civilization (Possehl 1986). While this issue remains to be resolved, the site of Bakkar Buthi in the Kanrach Valley, Las Bela District displays both Kulli and Harappan occupation levels (Franke-Vogt/ul-Haq/Khattak 2000), and is located 1 km (personal observation) from the major galena deposit at Duddar (Bhutta 1992).

The isotopic comparisons presented here suggest that Early Harappans (periods 1 and 2) probably acquired their galena from deposits nearest to them in the Jammu region. This source continued to be used into Period 3 when galena fragments deriving from deposits in two other regions (Balochistan and Himachal Pradesh) also begin to appear in those levels at Harappa. While this does seem to indicate that in Period 3 Harappans began to access new and more distant galena sources, this apparent trend towards source diversity during the urban phase should be treated with caution. Prior to the urban phase, only two galena fragments have been recovered; one each from periods 1 and 2 (individually identified on fig. 5). All other fragments were recovered from Period 3 contexts. The trend towards source diversity is therefore admittedly based on a very small number of samples that are heavily biased toward the urban phase. However, in light of the similar temporal shifts in lithic assemblage composition and utilitarian stone acquisition that were discussed above, the trend observed in the galena provenance data becomes much more robust.

Harappan steatite acquisition networks

Steatite (soapstone) was a vital component of the Indus Civilization lithic assemblage. Wafer-like steatite disc beads are so common that their presence alone could almost be considered a marker of the Harappan character of a site (Vidale 1989). Steatite seems to have been the stone of choice for the manufacture of seals and tablets – objects with significant political and/or economic value that would have only been used by certain elite segments of Harappan society (Meadow/Kenoyer in press). An ongoing provenance study using instrumental neutron activation analysis (INAA) is providing insights into the source areas from which craftspeople at Harappa acquired this important stone during the different occupational phases of the settlement.

Steatite is a rock composed primarily of the mineral talc in its massive form (Read 1979). The parent-rocks that steatite derives from are either magnesium-rich (ultramafic) igneous rocks or dolomitic limestones (dolomite) that have undergone metamorphic or metasomatic alteration (Deer/Howie/Zussman 1992, 327). Although steatite samples from these two types of geologic formations may appear visually identical, geochemically they reflect the very different trace element composition of their respective parent formations. Ultramafic rocks, as compared to dolomite, have significantly higher concentrations of metals like Fe, Cr, Co, and Ni and these may be reflected in both sediments and secondary minerals derived from them (Simandl/Ogden 1999). Steatite from both types of parent-rock can be found in numerous areas surrounding the Indus Valley that were either bordered or encompassed by the Harappan Civilization, as well as the regional cultures that preceded it (Law 2002). To date, more than 300 steatite samples collected from 15 potential source regions were geochemically characterized using INAA. Please refer to figure 1 for the location of these regions (plotted by number) and the caption to that figure for information on the source parent-rock (ultramafic or dolomitic).

Over 2000 fragments of steatite manufacturing debris have been recovered and tabulated at Harappa. One hundred twenty-eight of these fragments from secure, stratified contexts were selected for analysis using INAA. The fourth and fifth columns in figure 2 indicate the number of samples analysed from each chronological phase at the site and the percentage that they represent of all steatite fragments recovered from those phases. For most phases the number of fragments analysed represents a 50% to 80% sample of the total assemblage. The substantially smaller sample size (~ 5%) for Phase 3B/3C once again reflects the fact that strata from those levels are widely exposed at the site, and a significantly greater portion of them have been excavated. However, for Phase 3B/3C, and indeed for all periods, samples were selected from all excavation trenches on each mound at Harappa from which steatite fragments have been recovered. It is therefore argued that this sample (6.4% of the total assemblage) is well representative of the varieties (sources) of raw steatite present at Harappa diachronically, as well as synchronically between various areas of the site occupied during the same period.

Sample analysis using INAA was conducted at the University of Wisconsin's Nuclear Reactor research facility under the supervision of lab director Mr. Robert Agasie. This method provides precise data on the elemental composition of irradiated materials (see Gibson/Jagam 1980 for further details on this method). After irradiation and detection, a combination of eleven rare earth elements and transition metals (Al, Co, Cr, Eu, Fe, Mn, Na, Ni, Sc, V, Zn) were found to be suitable for use in multivariate statistical analysis. Elemental data was converted to log 10 values to provide a normal distribution (Baxter 1994,189–90) and

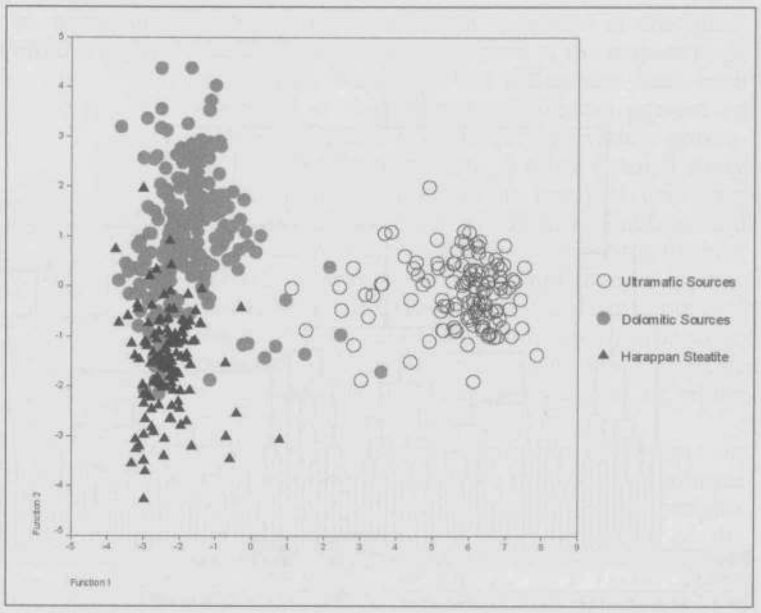

Fig. 6. Harappan steatite (black triangles) vs. all dolomitic and ultramafic sources.

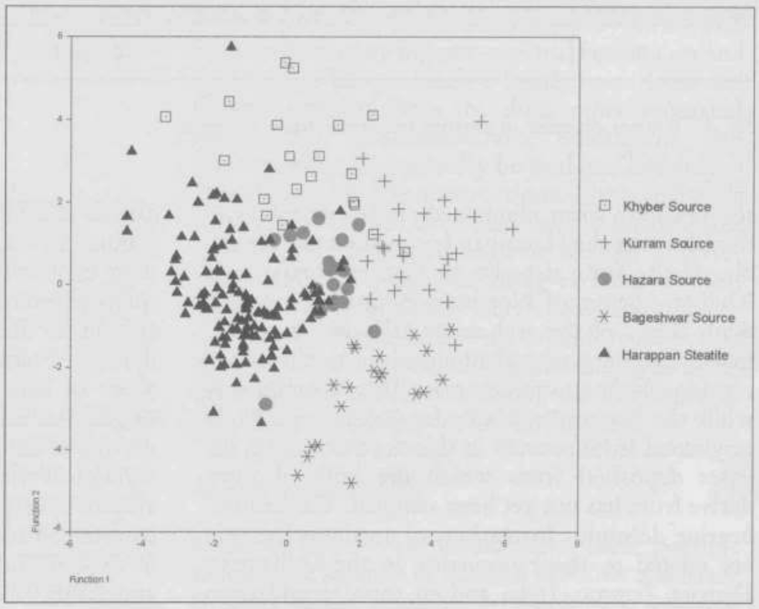

Fig. 7. Harappan steatite vs. select dolomitic sources.

subjected to exploratory canonical discriminant analyses using SPSS 10.1 to evaluate the extent that sources could be separated based on their geochemistry and the degree to which archaeological samples could be assigned those sources.

An incremental assessment strategy was used to assign geologic provenance to the fragments of steatite from Harappa. Due to space limitations only the first and final steps will be displayed here. The initial observation was made at the broadest level – that of parent-rock type (ultramafic or dolomitic). Figure 6 shows all archaeological and geologic source samples analysed thus far plotted by their discriminant functions. In this view, geologic samples from dolomitic sources (solid circles) and those from ultramafic sources (clear circles) form two clusters that, despite a minor degree of overlap in the centre, are quite distinct. When the archaeological steatite fragments are superimposed upon this (as black triangles), it becomes evident that all of the Harappan steatite fragments analysed in this study derive from dolomitic sources. Significantly, this eliminates all known deposits in Balochistan as potential sources as well as nearly half of the deposits in Rajasthan.

Subsequent steps of the examination focused only on dolomitic steatite deposits located in ten districts and agencies in India and Pakistan – Jhunjhunu, Alwar, Jaipur, Udaipur, Panchmahals, Bageshwar, Hazara, Swat, Kurram, and Khyber. At each stage the source(s) most geochemically dissimilar to the archaeological samples was discarded. Figure 7 displays a later stage in the analysis when over half of the potential dolomitic

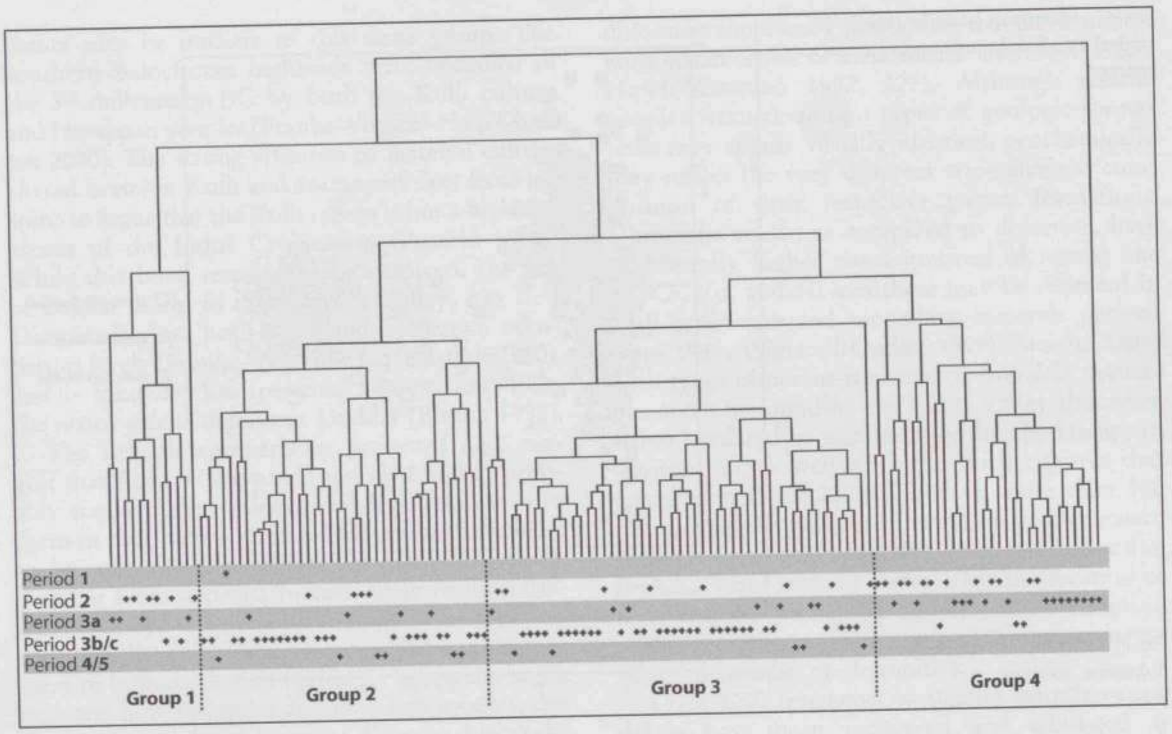

Fig. 8. Cluster diagram of steatite fragments from Harappa.

sources have been eliminated. It is evident from this plot that the Harappan fragments most resemble steatite from deposits in Hazara District and Khyber Agency of Northern Pakistan. However, while many of the archaeological samples closely match those deposits, the bulk of them still cluster outside of those source areas. This suggests that while the Harappan steatite fragments most likely originated from sources in this northern zone, the exact deposit(s) from which the bulk of them derive from has not yet been sampled. The steatite-bearing dolomitic formations of northern Pakistan are related to those occurring in the Udhampur District, Jammu, India and so these would seem to be the most probable candidates for the sources of the Harappan fragments. It is important to note that the nearest occurrences of both steatite (Indian Bureau of Mines 1992) and galena (discussed above) are found in this region starting 325 km northeast of Harappa. Steatite samples from Jammu have recently been acquired and will be included in future analyses.

Although when displayed in plots of discriminant functions the Harappan steatite fragments appear to be closely related, cluster analysis was performed on the archaeological samples in order to better assess their geochemical homogeneity (or perhaps lack of) and to examine if diachronic changes in source exploitation was apparent. Multiple clustering strategies (Baxter 1994) were employed and compared. All strategies resulted in a remarkably similar pattern that suggested at least four discreet groups existed within Harappan sample set. The samples within each of these four groups are chemically similar to the degree that they probably represent individual source areas (perhaps even single steatite deposits). In figure 8 the cluster observations of one strategy [complete linkage, Pearson's distance] is displayed with a series of bars beneath it indicating the period of origin that each sample on the classification tree derives from. From the Early Harappan phases through Period 3A nearly two-thirds (65%) of steatite at Harappa came from sources represented by groups 1 and 4. However, beginning in Period 3B (c. 2450 BC) a significant shift in source utilization apparently takes place, with as 90% of the raw steatite samples analysed from that and the subsequent period (3C) derive from sources represented by groups 2 and 3.

There could be several explanations for this change in source emphasis including error due to the much smaller sample size for Period 3B and 3C. It is also possible that sources/groups 1 and 4 began to produce less useable steatite by the later periods and emphasis in acquisition shifted towards sources/groups 2 and 3. Interestingly however, it is samples from groups 1 and 4 that are most chemically analogous to the Khyber and Hazara sources. These sources would have been most accessible to residents of the several Early Harappan (Kot Dijian Period) sites in the vicinity, most notably Sarai Khola (Halim 1971). If Kot Dijian occupation did occur as late as 2400 BC in this area (Khan 1988) and then ceased after that time, it could help to explain the dramatic drop in the presence of steatite from sources in northern Pakistan seen at Harappa around the Period 3A/3B transition.

SUMMARY

As the urban period commenced (around 2600 BC), there was a marked increase in the diversity of raw rock and mineral varieties utilized at Harappa. For common materials like grindingstone and chert there was a shift from closer sources during the early periods towards more distant higher quality sources during the urban phase. For lead ore we see a single source area north of Harappa (most probably galena deposits in the Jammu region) used throughout the early periods. While this northern source area continued to be accessed during the urban phase, galena from new sources to the southwest (Balochistan) and east (Himachal Pradesh) also began to appear at this time. Finally, raw steatite appears to have been acquired from deposits closely resembling those found in source formations north of Harappa rather than in Balochistan or Rajasthan.

CONCLUSION

Diachronic variations are clearly evident in the rock and mineral assemblage of Harappa. An increase in the lithic varieties present at the site and many observable changes in source area utilization appear to accompany urban development. Such variations might be interpreted in a number of ways. The appearance of more diverse and exotic stone during Period 3 may indicate that the various ethnic and ruling elite groups residing at Harappa began seeking news materials to differentiate themselves as their city became more cosmopolitan and their civilization more socio-politically stratified. The galena data demonstrates links to the east (Himachal Pradesh) and southwest (southern Balochistan) and seems to suggest that new or intensified inter-regional interaction networks to those regions also appeared at this time. The move towards more distant sources of higher quality utilitarian materials during the urban phase might signal not only intensified interaction with far-away source areas, but also a new ability and/or willingness to expend wealth for higher-quality but harder to acquire materials. With regard to bulky, heavy utilitarian commodities like grindingstone, this may also suggest the development of improved transportation technologies and infrastructure. Finally, the shift in emphasis away from steatite sources in northern Pakistan that seems to have taken place around the Phase 3A to 3B transition may indicate either the depletion of some of those sources or, perhaps, less access to that source area due to changing socio-political and economic networks.

Significant synchronic variations at the intra-site level are much less evident at the current stage of analysis. Relatively few differences have been identified in the lithic material types present on different mounds at Harappa (vesuvianite-grossular is a notable exception). A more detailed study at the intra-site level is in progress and *may* eventually reveal that different assemblage and source access patterns do exist between the discreet habitation areas of the site. Until then, it appears that although different groups may have controlled the acquisition of grindingstone, chert, or steatite, these materials seemed to have been made available to all residents of Harappa regardless of which section of the city they lived in.

Source provenance investigations continue on other materials in Harappa's raw rock and mineral assemblage. New and even more detailed insights into the trade and interaction networks of the settlement's ancient residents over time are expected soon. However, while Harappa is one of the most important and best excavated of all Indus Civilization sites, it alone can not provide us with a complete picture of inter-regional interaction and exchange in late prehistoric South Asia. Rock and mineral artefacts from the three other excavated Indus cities (Mohenjo-Daro, Rakhigarhi, and Dholavira) must eventually be analysed and incorporated into such reconstructions. Lithic materials from the numerous excavated sites of smaller size (particularly those that may be located near resource extraction areas or along exchange routes) must also be considered. Only such a comprehensive examination will allow us to achieve the fullest and most accurate possible understanding of internal trade and interaction during the development and existence of the Indus Civilization.

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