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RESEARCH PAPER

Iron Age Material Culture in South Asia – Analysis and Context of Recently Discovered Slag Sites in Northwest Kashmir (Baramulla District) in India

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This paper deals with presence or absence of Iron Age material culture and explores the development of Iron Age in northwest Kashmir (Baramulla District). It has been noted from the previous surveys that a chronological gap existed (c. 1000 BCE – 100 CE), which roughly equates to the Iron Age in Kashmir (Yatoo 2005; Yatoo 2012). Furthermore, considering that there is very little evidence of Iron Age material culture from the few excavated (or explored) sites in Kashmir, there is a debate about the very presence of Iron Age in Kashmir. The little information we have about Iron Age material culture from key sites in Kashmir (such as a few sherds of NBPW, some iron artefacts and slag at one site), has been largely dismissed as imports and lacked serious attention by scholars. It was therefore difficult to build any comparisons in the material culture for the present study. Instead the Iron Age material culture in other parts of South Asia, such as the Indian plains and northern regions of Pakistan, are discussed, as these regions have documented evidence of iron and its associated material culture but very few have archaeometallurgical evidence. Furthermore, Kashmir historically had communication links with these regions in South Asia since the early third millennium BCE until the 10th century CE, so we might expect some contact during the period of early iron production and use.

Therefore, one key issue for archaeology in northwest Kashmir in this paper is to understand the link between the newly discovered slag and tuyeres with the key sites in Kashmir and in South Asia; and a further key issue is to determine whether or not there was a distinct Iron Age in north west Kashmir (or whole of Kashmir), or whether the few recovered iron artefacts from key sites of Kashmir are indeed all imports.

Introduction

The question of indigenous origins versus foreign introduction of iron artefacts and iron working has generated much debate (Agrawal 1982; Agrawal and Kharakwal 2003; Chakrabarti 1976). Early scholars argued in favour of diffusion, claiming that iron technologies and artefacts were introduced from contemporary cultures outside India (Gordon 1950: 67–69; Wheeler 1959 cited in Allchin and Allchin 1993a). However, more recently other scholars have argued in favour of indigenous production and development of iron and believe it was a local industry (Agrawal and Kharakwal 2003; Chakrabarti 1992; Tewari 2003). These scholars arguing for indigenous development of iron technologies have been able to show that the northern Indian states, including Kashmir, and the Central Himalayan regions, are rich in iron ores (including ores of magnetite, haematite, and limonite) and these regions also have archaeometallurgical evidence as well.

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Furthermore, the radiocarbon dates of the Iron Age material culture and the relative stratigraphic position of iron artefacts or slag or crucibles in the archaeological sites of north and central India do support the indigenous evidence of iron smelting and manufacture of iron artefacts from around circa 1000 BCE (Tewari 2003). Sites in north and central India providing this information are Atranjikhera, Raja Nala-ka-tila, Malhar, and so forth in Uttar Pradesh (Gaur 1983: 16; Tewari 2003: 540), Kausambi near Allahabad (Ghosh 1993: 20; Darian 2001: 55), and Jakhera in the Ganga Valley (Sahi 1994: 90). Similarly, the presence of iron and its associated material culture from the two sites in Kashmir takes the form of iron artefacts at Gufkral (1550–1300 uncal. BCE) and iron slag at Dragtiyung (no date, considered to be Neolithic on the basis of surface material). This has been argued as indicating the antiquity of iron artefacts in Kashmir, far earlier than 1000 BCE, and probably local smelting as well (Chakrabarti 1992: 132; Shali 2001: 109; Sharma 1992: 67).

Material culture of Iron Age sites in South Asia

The Iron Age in India is associated with three important diagnostic pottery types: painted gray ware or PGW (c. 800 - 350 BCE); northern black polished ware or NBPW (c.

600 - 100 BCE); and black and red ware (c. 900 BCE - 100 CE) (Gaur 1983; Lal 1954: 13, 16; 1992: 425; Singh 1979: 315; Wheeler 1962: 34–35). However, there is a difference of opinion on dating of black and red ware among scholars: Chakrabarti believes that it pre-dates PGW (1992: 61); whereas Habib (1997: 20) argues that it post-dates PGW in peninsular India.

Towards the Upper Gangetic Valley at Hastinapur, Atranjikhera and Noh, iron artefacts are associated with diagnostic pottery types such as PGW and NBPW (Chakrabarti 1992; Gaur 1983; Lal 1954; Singh 1979: 315). Towards eastern India at Chirand and Mahisdal, iron is associated with black and red ware and NBPW (Allchin and Allchin 1993b: 210–212). In the central Indian sites of Nagda, Eran and Navdatoli, iron artefacts are associated with the diagnostic pottery types of black and red ware and NBPW (Chakrabarti 1977). Finally, the context of iron towards the north (Gufkral in Kashmir where it is associated with menhirs) and in south India (in Mysore and Kerala where it is associated with Megalithic burials and sometimes with black and red ware pottery) is with the Megalithic period (Agrawal and Kharakwal 2003: 235–237; Sharma 1992). Moreover, towards north and north west in Pakistan, iron artefacts or Iron Age material culture is first mentioned in the context of protohistoric graves (called Gandharan graves), corresponding to period VII of the Ghalegay sequence (c. 500 BCE) (Stacul 1970; 1979a; 1995; 2001).

Early evidence of iron working in South Asia

Apart from diagnostic pottery types, the actual evidence of archaeometallurgy is very small from sites in north, or central India; and there is very little evidence from north or north western Pakistan where iron artefacts are reported. Sites such as Raja Nala-ka-tila (c. 1400 cal. BCE), Malhar (c. 1800 cal. BCE) and Atranjikhera (1265–1000 cal. BCE) in Uttar Pradesh, and Noh (885–580 cal. BCE) in Rajasthan, are some of the few sites with archaeometallurgical evidence (Agrawal and Kharakwal 2003; Chakrabarti 1992; Gaur 1983; Possehl 1989; Tewari 2003). Erdosy's (1988: 90) work in Allahabad district in the Gangetic region tracing urbanisation during c. 1000 BCE to 300 CE mentioned slag at a few sites and with a very limited number of iron artefacts. Erdosy (1988) suggested that archaeometallurgical information cannot be extracted from meagre evidence, and it is therefore difficult to prove whether the iron artefacts from Allahabad are a product of local smelting or not.

To trace the origins of iron working in India, Tewari (2003) excavated a series of Iron Age sites such as Malhar, Raja Nala-ka-tila, Baba Wali Pahari, and Dadupur in north and central India. These excavations provided evidence for smelting such as tuyeres, heaps of slag and finished iron artefacts (Tewari 2003: 542). On the basis of this new evidence Tewari suggested three sets of dates during which iron working was being practiced at these northern India sites: c. 1200–900 cal. BCE; c. 1400–1200 cal. BCE; and c. 1800–1500 cal. BCE (Tewari 2003: 543). Prior to this, the earliest date for iron artefacts came from the Megalithic phase at Gufkral site in Kashmir with a date rage of 1550–1300 uncal. BCE (Sharma 1992: 67). Allchin and Allchin (1993b: 345) and Gaur (1997: 20; 1983: 15) proposed c. 1200–1000 cal. BCE date for iron working in the mid Ganga Valley, and Chakrabarti (1977: 183) also suggested a similar date of c. 1270 cal. BCE for iron working there.

Evidence along the north western regions of Pakistan

Towards the north western region of Pakistan scholars such as Wheeler (1962), Marshall (1975), Dani (1967), Dani and Durrani (1964), Stacul (1969), Antonini (1963), McDonnell and Coningham (2007), have brought to light evidence of iron from Dir (Timargarha and Balambat), Swat (Aligrama, Butkara II, Loebanr I, Katelai, and Bir-kot-ghundai), Vale of Peshawar (Charsadda), and the Taxila Valley (Bhir mound). Under Dani's periodisation scheme iron was identified in Period III, providing a date range of c. 800 to 500 BCE (Dani 1967: 9). Stacul (1969; 1987) however, provided a different chronological sequence (the Ghalegay sequence), and in this system iron was noted in Period IV (c. 1730–1600 BCE), (although Stacul cited this as an intrusion), but more consistently from Period VII (c. 500 BCE) onwards. Stacul furthermore, noted similarities between gray ware from period VII at Swat in grave sites with material from Hasanlu IIIA (c. 500–400 BCE), an Iron Age period site in western Iran, suggesting that the Swat iron artefacts may have come from Iranian sources (Stacul 1977: 251; 1981: 90; 1987: 97). At the Bala Hisar of Charsadda, Wheeler argued for the diffusion of iron technology from Persia, thus placing the introduction of iron artefacts in the c. 6th century BCE. However, recent excavations at Charsadda by the Bradford-Peshawar team (McDonnell and Coningham 2007: 155), brought to light 25 iron artefacts and a few iron slag pieces, and these were assigned to c. 1200–900 BCE. Marshall (1975: 533–547) also reported many iron artefacts from the Bhir mound at Taxila and proposed a date of c. 3rd century BCE. Among all these sites only Bala Hisar of Charsadda provided archaeometallurgical evidence (a few pieces of slag), and a similar date to Tewari's (c. 1200–900 cal. BCE, see above), for iron working at Uttar Pradesh in India; the authors suggested possible iron working at Bala Hisar (McDonnell and Coningham 2007: 155).

Evidence along Central Himalayas

Along the Central Himalayan regions such as Uttaranchal (now Uttrakhand), a large number of protohistoric graves similar to the Gandharan graves of Swat have been explored (Agrawal et al. 1995). Agrawal et al. believed Central Himalayan graves were typologically similar to Swat graves, and both produced iron artefacts and a distinct gray ware. However, Agrawal et al. suggested that the Central Himalayan graves were older than those in Swat by obtaining new dates from the site of Bageshwar ranging between c. 2666–2562 cal. BCE (Agrawal et al. 1995: 251). Apart from these protohistoric graves, sites with PGW pottery have also been reported in the Purola and Thapli areas of the same region (Khanduri et al. 1998). Moreover,

Figure 1: Location map of Baramulla District showing it in South Asia (Map: Mumtaz Yatoo).

recent explorations in the region have brought to light slag and crucible sites in the Kumaun and Almora districts in the Central Himalayan region (Agrawal and Kharakwal 1998; Singh 2008). The slag from Uleni site at Dawarahat in Almora District has been analysed and dated to the early 1st millennium BCE (c. 1022–826 BCE) (Agrawal and Kharakwal 1998: 252, 263; Singh 2008: 245). Agrawal and Kharakwal (1998: 252) further located iron ore and pre-industrial smelting at many other places in the same region. The authors suggested that the people of the Ganga Valley most likely procured either iron ore (which is locally available), or processed iron in the shape of artefacts from the Central Himalaya region. They believed the Central Himalayan region played an important part in the diffusion of iron metallurgy in the Ganga Valley, primarily because they argued that the Ganga Valley itself is a foredeep filled with alluvium and without any mineral outcrops (Agrawal and Kharakwal 2003: 252–253).

Evidence from Kashmir

The only references to iron artefacts in Kashmir itself come from Burzahom, Gufkral and Semthan (Indian Archaeology 1981: 70; Saar 1992: 43; Sharma 1992: 67-68). From Burzahom two artefacts (a nail and an arrowhead) were reported from the early historic phase (c. 1st century - 5th century CE) (Saar 1992). From Gufkral three un-identified iron artefacts, plus two needles and one nail, were reported from the Megalithic phase with a date range of c. 1550–1300 uncal. BCE (Sharma 1992: 67). From Semthan an arrowhead and a few slag pieces were found along with NBPW pottery dating to c. 700–500 BCE (Indian Archaeology 1981). Furthermore, the chance discovery of a few sherds of NBPW somewhere along the Jhelum Valley route in Baramulla tehsil (**Fig. 1**) by the Archaeological Survey of India was also reported (Mitra 1984: 15–17).

Besides iron artefacts and associated pottery, the only evidence of archaeometallurgy (iron slag) comes from Dragtiyung near Prang on the Srinagar-Leh national highway where (explorations revealed) iron slag was found spread over the surface of the site alongside the Neolithic material culture (Shali 2001: 109). Beyond this, nothing is known of Iron Age material culture or archaeometallurgical evidence in Kashmir, which has resulted in a great deal of speculation about diffusion (from both South Asia and from west (such as Iran) or its indigenous developments in metallurgy. While there are a very few references to iron artefacts and associated material culture from Burzahom, Gufkral, and Semthan in Kashmir, the only similarity with Iron Age material culture elsewhere in South Asia appears to be in NBPW, found at Semthan and somewhere in Baramulla. Although similarities in material culture pre-dating c. 1000 BCE (Neolithic) and post-dating c. 1st century BCE (Kushan) are documented, and also observed in the current research with north and north western regions of Pakistan such as Swat, Peshawar and Taxila, there does seem to be a 'gap' between the Neolithic and the early historic.

Evidence of ore deposits in Kashmir and its surrounding regions

Agrawal and Kharakwal (2003: 215), Chakrabarti (1992; 37; 1976: 117), Possehl and Gullapalli (1999: 154–58), and Singh (2008: 241), mention six early iron-using centres in India and Pakistan: Baluchistan; the Gandhara Grave Complex in north west Pakistan; Upper Gangetic Valley; eastern India; central India; and the Megalithic north and south. Chakrabarti (1976; 1977) studied geological publications (such as Ball (1881); Chowdhury (1955); Dunn (1942); Hunday and Banerjee (1967); Krishnan (1951, 54); and Roy (1959) to trace the source of ores that would have been used for the production of iron in India and Pakistan. He identified ore bearing deposits in all the six regions noted above, arguing that this justified local production and not diffusion from west Asia (Chakrabarti 1992; 1976). Among these ore bearing deposits, Kashmir is specifically noted as having magnetite (72.4 % iron), haematite (70 % iron), limonite (hydrated iron oxide) and other sedimentary ores (Agrawal 2003: 246–247; Chakrabarti 1992: 34). Lawrence (1895: 62–63), during his tenure as settlement commissioner of Kashmir, discovered extensive workings of iron ore. Referring to comments by an anonymous Englishman who visited Kashmir in 1892, Lawrence mentioned that Kashmir iron ore is inexhaustible and superior to iron ore of Indian plains, and described it as mild steel. Mallet (1890 *cf.* Chakrabarti 1992: 132) and Qazi (2005: 80–81) mentioned the place names of ore bearing deposits in Kashmir such as Khrewa (outskirts of Srinagar), Uri (Baramulla District), Sopore (Baramulla District), Handwara and Lolab (Kupwara District, 50 kms from Baramulla District). It is the Sopore area in Baramulla District where three slag sites with tuyeres among the total nine sites in the current research were reported.

Chakrabarti (1992), Singh (2008), and Tewari (2003) all argued that it is the availability and knowledge of resources and evidence of smelting which determines local

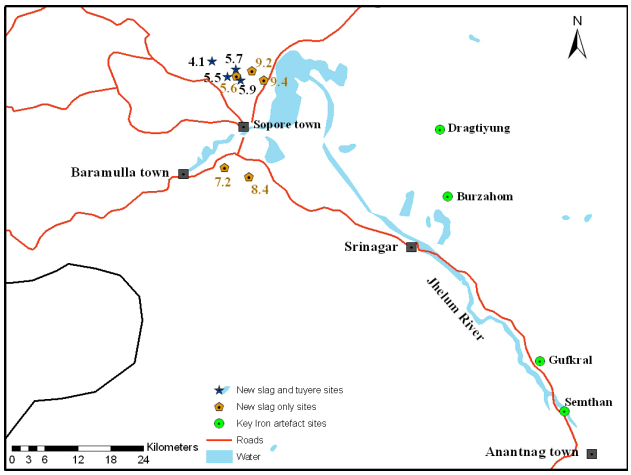

Figure 2: New slag only sites and slag and tuyere sites in context with the key iron artefact and slag sites reported in Kashmir (Map: Mumtaz Yatoo).

Figure 3: Taken from south western end of Site 5.5 with exposed sections bearing slag and tuyere fragments (Picture: Mumtaz Yatoo).

production and distribution of iron artefacts in a region rather than the mere presence of artefacts within sites. Chakrabarti (1992: 173–174; 1976: 121), while describing smelting of iron in India, highlighted the lack of direct archaeometallurgical material from the sites were iron has been found, such as slag, tuyeres, furnaces or crucibles. He had suggested unless manufactured articles of iron and iron residue, such as slag are found in the same region, a relationship between production and smelting methods cannot be drawn. Agrawal and Kharakwal (2003), citing the example of Uleni site, believe pre-industrial smelting had been practiced there with its users probably traced to the same place and pushing back the dates for this period to 1022 - 826 cal. BCE in the region (Agrawal and Kharakwal 2003).

The above discussion suggests that although Baramulla in particular, and Kashmir in general, were rich in ore, the current lack of direct archaeometallurgical evidence (such as slag, tuyeres, crucibles or furnaces), justifies an argument for local production means - that it is likely iron was introduced in the form of artefacts among the key sites. To justify an argument for its local production, some form of link needs to be established with ore sources and archaeometallurgical evidence to support its local production in Kashmir and possibly identify the key areas for its consumption there.

The present evidence and its interpretations

In the present survey nine sites (4.1, 5.5, 5.6, 5.7, 5.9, 7.2, 8.4, 9.2 and 9.4) provided evidence of slag (**Fig. 2**). Of these nine sites, four sites (4.1, 5.5, 5.7 and 5.9) provided slag and tuyere deposits with no other recognisable material culture (**Fig. 3**). The main diagnostic pottery types of the Iron Age in South Asia such as PGW, NBPW and Black-and-red ware were not recognised or recovered from any of these sites.

Material culture from the newly recorded sites in Baramulla District was discussed in relation to similar material culture from Kashmir and South Asian sites (Yatoo 2012). From few of these sites iron artefacts have been reported such as Burzahom, Gufkral and Semthan in Kashmir and from sites in Swat, and Charsadda and Taxila in Pakistan. Building on this information I will now consider whether the new slag sites reported in Baramulla District are somehow linked with those sites where iron have been recovered in Kashmir or South Asia. I will therefore consider the evidence from the sites in Baramulla District in order to think about whether this supports local iron working or not. It was noted above that iron ore was easily available in Kashmir, and this was argued as a key pre-requisite for local development of metallurgy (Chakrabarti 1992: 132).

From Swat in Pakistan, iron artefacts were found associated with protohistoric graves dating to c. 800 to 500 BCE with no archaeometallurgical or other Iron Age material evidence. At the Bala Hissar of Charsadda in Pakistan, iron artefacts were reported and dated to c. 1200–900 BCE but with two pieces of slag and no other evidence and at Sarai Khola again in Pakistan iron was found in period III deposits (1st millennium BCE) (Allchin 1995: 127). None of these sites provide any conclusive archaeometallurgical evidence for iron working in Pakistan. This raises an important question: we have the evidence of consumption of iron at these sites but where was it being smelted and how was it being distributed?

At Burzahom iron artefacts were reported between c. 1st century – 5th century CE with no archaeometallurgical evidence or other Iron Age material evidence e.g. related pottery types; at Gufkral iron artefacts were reported from the Megalithic phase 1550–1300 uncal. BCE (earliest date for iron in the whole region) again with no archaeometallurgical or other Iron Age material evidence; and at Semthan iron artefacts were reported from c. 700–500 BCE only with few sherds of NBPW.

The only archaeometallurgical evidence such as slag in Kashmir was reported from Dragtiyung (Neolithic site on the basis of surface material culture), c. 60 kms towards north east of Gufkral and now at nine sites in Baramulla District, c. 100 kms towards north of Gufkral. Furthermore at these nine new sites four have tuyeres associated with

Figure 4: Tuyeres from sites 5.5 and 5.7 (Picture: Mumtaz Yatoo).

Figure 5: Showing the slag and tuyere lying on the surface of the site 4.1 (Photo: Mumtaz Yatoo).

slag in Baramulla District (**Fig. 4** and **5**). Does this suggest that iron was being smelted at Dragtiyung and the nine new places in Baramulla District and later possibly distributed and consumed by sites like Gufkral, Semthan and other sites through trade or interactions, similar to those in practice since the Neolithic times in the region.

Law's (2008) work in the greater Indus region of Pakistan and India (c. > 3300 BCE to c. 1300 BCE) examining inter-regional interaction and identification of resources, suggested that Kashmir was an important resource centre during the early Harappan or Kot-Dijian phase (c. 2800 to 2600 BCE), as well as the later Harappan periods (2450 to 2200 BCE and 2200 to 1900 BCE). He identified sources of galena lead in Baramulla District (Buniyar village) used by the Harappans (Law 2008: 637–638, 777). In support of this model of resource procurement from Kashmir, Law also noted the presence of alabaster (Law 2008: 528–529), steatite and agate (371–372, 441–442) and chalk (141) in the Kashmir region. Building on Possehl (1999, *cf.* law 2008) and Stacul (1992, 1994, 1987), Law discussed Kashmir as part of a 'Northern Neolithic' with trade links with the Indus Valley people in South Asia, such as the presence of Kot Dijian pottery (pot with horned figure painted on its shoulders (c. 2800 to 2600 BCE) from phase II at Burzahom, and agate and steatite beads at Burzahom (Law 2008: 86).

The new interpretations of the material culture supports the idea that Baramulla District was in a strategic position on the ancient communication routes and had contacts through various chronological periods in all directions (Yatoo 2012), are now also reflected in Law's (2008) work. The evidence of galena lead at Harappan sites in Indus Valley traced to Baramulla District suggest that knowledge of iron ores at Baramulla was also a likely possibility; harvested or exchanged either in raw or smelted form. Moreover, iron artefacts from the known sites in Kashmir or surrounding regions of South Asia might be linked to Baramulla District as well. The archaeometallurgical evidence which is missing in this whole region has now been found at the four slag and tuyere sites and the five slag sites in Baramulla District. Furthermore, the presence of tuyeres at four slag sites does support smelting of metal as tuyeres are directly linked to smelting (Chakrabarti 1992: 135–140). It is important to remember that it is the surface material from the new sites in Baramulla District that is being analysed which means that dating is an area of great concern, and means that these suggestions remain conjectural until clear dating evidence associated with the slag and tuyeres can be obtained; probably through targeted excavation for scientific dating samples.

A similar case study

A similar research question in a neighbouring region was addressed by Matthews and Fazeli (2004) when they questioned the mechanisms behind the acquisition of Iranian copper, its metallurgical process, and consumption by the Late Chalcolithic communities of Mesopotamia. They explored this question by addressing the sequential stages of processing and manufacturing involved in copper metallurgy. Their interpretations were based on identifying certain stages of metallurgy such as: the source of copper ores; the smelting process; casting of metal; the transport of either ingots or artefacts from the Iranian highlands to Mesopotamia; and finally the consumption of copper artefacts at sites (Matthews and Fazeli 2004: 67–70).

In Baramulla District it is possible to distinguish some, though not all, of these stages in relation to iron production and distribution. We have information that suggests the presence of iron ore sources in the Baramulla District, and we now have archaeometallurgical evidence here for

smelting or casting technology at nine new sites located in the current research in the form of slag and tuyeres. However, we do not have information about the consumption of metal at the new sites in Baramulla District yet, but the presence of iron artefacts at other sites in Kashmir and South Asia could indicate distribution and consumption. Excavation in order to provide dating samples alongside slag and related material culture, followed by scientific analysis of this material may go some way to addressing these issues. Further, there are some reservations about the chemical composition of the slag belonging to iron; unless we have confirmation that the slag residue is actually iron based, we can only suggest that it may be iron working debris.

Further discussion in light of new material culture in Baramulla District

If we analyse the material culture in Baramulla District, we have evidence of Upper Palaeolithic people along the mountains. Then we have evidence of the Neolithic people living on the *karewas*. Further we have slag and crucible sites four of which lie in the vicinity of the new Neolithic sites and are devoid of any other material culture except a few undiagnostic pottery sherds. We also have evidence from the early historic to the later historic periods (Kushan, pre-Karkota, Karkota and Utpala phases), in Baramulla District. Therefore, one key issue is to understand the link between these apparent Neolithic sites and slag; and whether or not there was a distinct Iron Age in Baramulla District.

There is also the absence of a Chalcolithic phase along the central Himalayan and northern Himalayan regions as well as in Kashmir (Agrawal and Kharakwal 2003: 235). The extensive works of Agrawal and Kharakwal (2003: 237) in these regions has led to the conclusion that the Neolithic culture is directly succeeded by a 'Megalithic' phase that represents the Iron Age. At both Burzahom and Gufkral, the Neolithic is succeeded by Megalithic material culture with iron found only from the Gufkral Megalithic phase, and Baramulla District is analogous to both Gufkral and Burzahom in terms of its material culture. Moreover at the site Dragtiyung which lies c. 50 kms north east of Baramulla District, iron slag is found in association with the Neolithic material over the surface of the site (Shali 2001).

Moreover, the presence of two distinct types of material cultures: stone bowls and saddle querns reported at the early historic sites in Baramulla District, suggest that they might be part of the Iron Age material culture in Baramulla District. While Stacul (1979; 2001) unambiguously related saddle querns to iron metallurgy, there is no study on stone bowls yet. Stone bowls were found at nine new early historic sites, of which two also contain slag, and saddle querns were recorded at four new sites and interestingly one contained both a saddle quern and slag in Baramulla District. Stone bowls have been reported at Gufkral around c. 1000 BCE when the iron artefacts were reported there. The saddle querns are reported at Aligrama, Swat during periods VI and VII (6^{th} to 4^{th} century BCE). Stacul (1979: 341; 2001: 244) stated that period VII of Swat is represented by iron metallurgy with the introduction of saddle querns and new pottery types. The absence of saddle querns from key early historic sites in Kashmir is perplexing though, and it is therefore not yet clear whether these saddle querns reported in Baramulla District have anything to do with Iron Age material culture or they might be material from two distinct cultures at Baramulla District.

Summary and conclusion

The present evidence of slag at nine new sites (four among them containing tuyeres) in Baramulla District have provided for the first time archaeometallurgical evidence from the district, possibly indicating smelting of metal, probably iron. Furthermore, the sources of iron ore from Baramulla District suggest that there were mineral resources locally available and therefore the potential for people to exploit them.

On the present evidence, it can be suggested that Baramulla District may have the potential to allow us to explore the missing 'Iron Age' and learn much more about iron working in this region. Metallographic study of slag will help us identify what was being smelted. Furthermore we need to obtain some dates and clear stratigraphic associations of other material culture with the slag. At Uleni in Almora district, Kumaun a similar problem was addressed by dating slag through radiocarbon dating (Agrawal and Kharakwal 2003), and Tewari (2003) excavated the four Iron Age sites in Uttar Pradesh from 1996–2002 (dating c. 1800 to c. 1000 BCE), which revealed slag and crucibles in stratified sections, and enabled sampling for radiometric dating. A similar procedure could be followed at selected sites in Baramulla District.

Based on the present survey by author it may not be conclusively determined whether or not there was an 'Iron Age' in Baramulla District (and thus Kashmir), but this survey and analysis of the sites and their material culture has permitted the framing of key research questions and provided some fundamental ground work in order to build on this question in future.

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