Journal of Archaeological Science 40 (2013) 3822–3833

Contents lists available at SciVerse ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

Iron technology of the ancient megalithic communities in the Vidarbha region of India

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ARTICLE INFO

Article history:
Received 17 July 2012
Received in revised form
21 May 2013
Accepted 25 May 2013

Keywords:
India
Megalithic period
Iron technology
Microstructure

ABSTRACT

The megalithic period in India is notable for the emergence and development of iron metallurgy and the appearance of new burials known as megaliths. A number of iron objects from megalithic sites in the Vidarbha region of India, dating to the first half of the 1st millennium BC, have been examined for their microstructures and carbon distributions. The artifact assemblage consists mainly of edged or pointed tools and weapons, along with some domestic implements. Results show that the technology applied in their manufacture is characterized by the use of low carbon iron of bloomery origin and the application of surface carburization as the primary means of steelmaking. The functional parts of the objects examined were made mostly of steel with their mechanical properties finely adjusted through a combination of quenching and tempering. Of particular importance are certain fan-shaped plates which we believe were produced and circulated as intermediaries to meet a wide range of consumer needs. It appears that the Vidarbha megalithic communities shared a fully developed and well-standardized iron technology of substantial flexibility. While exceptions to this general trend were found in some unfinished or used objects, these do not suggest the presence of an inferior technological status. This paper raises questions as to the origin of such a developed technology, and will discuss the probable spreading of several key technical ideas which bear striking similarities to those noted in the early iron traditions of Korea.

1. Introduction

Iron is one of the most important archaeological materials that may provide rich information on the role played by an ancient society in the generation and dispersal of technological ideas and practices. Iron objects are produced through a series of engineering processes including the smelting of raw materials from ores, the control of carbon concentrations through steelmaking, and the use of different thermal and mechanical treatments applied during fabrication. Numerous techniques can be used to achieve these individual processes depending on the technological and sociopolitical climate of the region. The combination of these processes, techniques and environmental factors may contribute to the establishment of a general iron tradition, which in turn will reflect the temporal and regional characteristics of a given community.

Despite the importance of iron artifacts as a potential means for exploring the history of an ancient civilization, not much is known about the megalithic communities of India in terms of their regional technological status as related to the production of iron, let alone the role India might have played in the creation and diffusion of such technology. According to Possehl and Gullapalli (1999) the megalithic communities of India constitute one of the four principal archaeological groups that produced evidence for the early use of iron in the subcontinent. The evidence from these groups placed the early production of iron at the transition period from the second to first millennium BC and called for revision of the theory viewing the origin of Indian iron as the result of a foreign influence. Moreover Tewari (2003), based on new findings from excavations in Uttar Pradesh, dated the emergence of iron in India to the early second millennium BC, proposing India as an independent center for early iron production.

To gain a better understanding of ancient Indian metallurgy, as well as to establish a database for future comparative studies, our team launched a collaborative research project to investigate a number of bronze and iron objects retrieved from megalithic sites in the Vidarbha region of the Maharashtra state, situated in the

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http://dx.doi.org/10.1016/j.jas.2013.05.029

center of India (Fig. 1). The results of this undertaking have been summarized in two separate articles. In this paper, the iron technology of the megalithic Vidarbha communities is discussed and characterized in terms of smelting, steelmaking and thermo-mechanical treatments. In a companion paper, our assessment of the bronze objects under review is reported and related to the metallurgical traditions of the Vidarbha region (Park and Shinde, 2013).

Figs. 2 and 3 depict the iron objects examined. These artifacts were selected from the megalithic collection at the Deccan College in Pune, India. They were recovered from five different megalithic sites in the district of Nagpur: Borgaon (Mittra, 1983), Khairwada (Mittra, 1984), Bhagimohari (Nagaraja Rao, 1985), Mahurjhari (Deshpande, 1974, 1975; Thapar, 1981) and Raipur (Tripathi, 1987; Deglurkar and Lad, 1992). These sites were primarily excavated as part of 'The project on megaliths in Vidarbha', conducted by both the Department of Archaeology at Deccan College under S. B. Deo and the Department of Archaeology and Museums for the Government of Maharashtra under A. P. Jamkhedkar. Most of the objects examined came from stone circle enclosed burials while others originated from habitation areas. In a discussion on the Iron Age in the Maharashtra state, Thakuria (2010: 67–73) placed the chronology of these sites to the first half of the first millennium BC. This period is in fair agreement with the radiocarbon age of the site at Bhagimohari as reported in the data set compiled by Possehl and Gullapalli (1999).

The megalithic period in India, which began approximately in the early part of the first millennium BC, extended well into the historic era. It is also virtually synonymous with the local Iron Age (Gullapalli, 2009; Possehl and Gullapalli, 1999) since iron metallurgy emerged and spread throughout the region during that time. Most of the megalithic burial sites uncovered were found to be close to habitation areas. However, baring a few cases in the Vidarbha region, these burials have not yet been carefully examined in relation to their habitation sites. Different types of megalithic burials have been reported in different parts of the country. For example, in the north, particularly the Kashmir region, several menhir types have been reported. The main concentration of megalithic burial sites, however, is found in south India and the Vidarbha region of central India. In Vidarbha megalithic burials are mostly of stone circle types whereas in the south a variety of cist, stone circle, menhir, umbrella (*topical*), and chambered burial types (Krishnaswami, 1949) have been reported. Inside the burials mostly fragmentary human skeletal remains have been found. However, several intact skeletons have been unearthed with their placement being strictly in a north-south direction. Numerous goods including animals, ornaments, metal tools, iron and bronze pots, and earthen pots of varying styles and sizes have also been uncovered from inside these burial pits. Such burial traditions suggest that the megalithic people of India believed in the notion of life after death and the need for earthly possessions to be carefully placed alongside to assist in this transition.

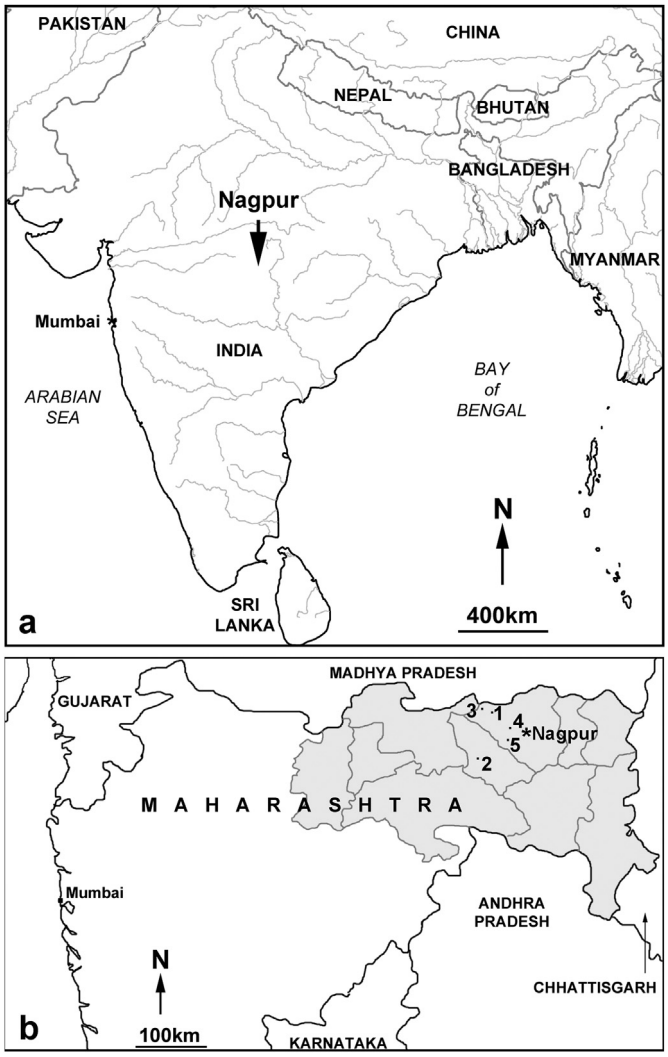

Fig. 1. Map of India. (a) The Indian subcontinent with the city of Nagpur indicated by the arrow; (b) the state of Maharashtra with the city of Nagpur marked by the asterisk within the shaded region of Vidarbha. Spots 1–5 denote the sites at Borgaon, Khairwada, Bhagimohari, Mahurjhari and Raipur, respectively, from which the iron objects under review were recovered.

2. Comments on artifacts

Of the forty-eight iron objects examined, thirty-six are finished products (Fig. 2) with their respective function implied by their appearance. The remaining twelve objects (Fig. 3), clearly distinguishable from the others, are tapered plates that become wider at either end. The ends, both of which resemble a fanned blade, differ significantly in size. Such a shape suggests no specific functional purpose when visually compared to the preceding objects. In addition, these fan-shaped artifacts were recovered from a majority of the megalithic sites excavated in Nagpur, frequently in larger quantities than any other items, suggesting that they may have played an important role in the local iron industry.

Figs. 2 and 3 provide images of the objects examined, which are currently on display in the Megalithic Room of the Deccan College Museum. The assembly in Fig. 2 consists of seven axes (objects #1, 7, 15, 18, 29, 30, 35), ten adzes (#2, 8, 9, 14, 16, 22, 23, 26, 27, 28), two hoes (#3, 21), four daggers (#4, 17, 25, 36), two sickles (#5, 12), two knives (#6, 13), two spearheads (#10, 11), a farm implement (#19), a pan with handles (#20), a socketed chisel (#24), an arrowhead (#31) and three ladles (#32, 33, 34). The items were recovered through controlled excavations at five megalithic sites (see Fig. 1) in the Nagpur district of the Maharashtra state. As noted in Fig. 2, objects #1–6 were excavated from Borgaon; #7–12 from Khairwada; #13–17 from Bhagimohari; #18–25 and #35–36 from Mahurjhari; and #26–34 from Raipur. In addition, as presented in Fig. 3, objects #1–4 were excavated from Khairwada; #5 from Bhagimohari; #6 from Mahurjhari; and #7–12 from Raipur. The bar near each object corresponds to 2 cm in Fig. 2 and 1 cm in Fig. 3. Brief information about their usage and recovery sites is given in Tables 1 and 2. The artifact numbers are consistent between Fig. 2 and Table 1 and also between Fig. 3 and Table 2. The arrows in each