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Iron Age in India

Some More Thoughts

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Iron Age in India: Some More Thoughts (English)

Abhayan G.S., Rajesh S.V., and Preeta Nayar (Editors)

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Preface

The Iron Age research in Indian Peninsula is of great value in order to better understand the development of urban centres, complex social formations and resultant long-distance trade in South Asia. Iron Age-Early Historic cultural horizon is one of the vigorously researched areas in India. Even though several research activities on various aspects of the Iron Age are happening at the regional levels, there is a lack of integration in research outputs. This edited book is an attempt to piece together some thoughts of current scholars engaged in the Iron Age research in India. We hope that this humble attempt makes some additions to the existing knowledge and will help to retrospect the progress and fine-tune our objectives for future research.

This work is a conception of the ideas and their deliberations resulting from a webinar titled 'Iron Age in South Asia' conducted for four days from 1st to 4th March 2021 by the Department of Archaeology, University of Kerala.

The papers engage a variety of aspects of the Iron Age. Akinori Uesugi discusses stone beads of the Iron Age in Peninsular India through a comprehensive approach of examining different aspects of beads such as raw materials, morphology, and manufacturing technology. Ambily C.S. gives a comprehensive view of the Iron Age archaeology of the Pamba basin through the results from extensive explorations and excavations. Arjun R. discusses the adaptation of the Iron Age population in a monsoonal climate of the Western Karnataka. Arun Kumar K.S. et al. show the results of intensive surveys in recording the Iron Age burial sites in two taluks of Kollam district. S.B. Darsana explores beliefs of the Iron Age-Early Historic people through the Sangam literature. Himanshu Shekhar integrates ethnographic data on burial practices of the Jharkhand region with the Iron Age remains. Jenee Peter et al. present the results of salvage operations in the Bison Valley region of the Idukki district in Kerala. Namita Sugandhi and Shobha V. elaborate on the Iron Age period at Tekkalakota in Karnataka based on the outcome of their recent excavation. Praveen Kumar K. presents the results of intensive surveys in the Arkavathi Valley in Karnataka, emphasising the landscape and cultural remains of the Iron Age period. K. Rajan records first-hand information on Iron Age burial sites of the eastern bordering regions of the Palakkad district. Smriti Haricharan gives a picture of the Iron Age-Early Historic landscape of the Eastern Tamil Nadu with added information on recent explorations. S. Udayakumar compares ethnographic iron smithing practices in Gujarat and Karnataka.

We are thankful to all the authors for sharing their valuable thoughts in the form of papers and also for patiently and positively responding to the revisions and suggestions. We place our gratitude to the University of Kerala for the financial support and other facilities for materialising this work.

Abhayan G.S., Rajesh S.V., and Preeta Nayar

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A Comparative Approach to Understand the Current Ethno-techniques of Ironsmiths of South and Western India: Case Study of Karnataka and Gujarat

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Abstract: In the Indian Subcontinent, the tradition of using iron is well established, as indicated by the large number of metal objects unearthed from different cultures. Archaeological investigations, especially at Atranjikhera, have amply shown that iron, in its technological and economic aspects, has come into use some time by the end of the second millennium BCE. The current research aims to understand the iron technology from two different regions (Karnataka) and (Gujarat) through the lens of current ethno-technological approaches to gain fresh insights, especially given that ironworking traditions are vanishing into the sunset. This research explores several aspects concerning iron technology along with micro-level observation of past and present practices. Comparative analyses of the construction of furnaces, building structure of the workshop location, tools such as chisel, axe, blade and so on as well as the socio-cultural aspects concerning the family involvement, mobility, migration, current status in society and decline of iron technology in the study area were undertaken. This comparative study is a helpful tool to gain more insights into the anthropology and ethnoarchaeology of ironworking, including aspects such as the migration of ethnic practices.

Keywords:
Iron technology
Ethnography
Furnace
Forging
Ironsmith

Introduction

Archaeometallurgy is the study of metalworking structures, tools, waste products and finished metal artefacts from the Bronze Age to the recent past. The earliest archaeological evidence of iron production is derived chiefly from the evidence on waste materials such as slag, broken pieces of the furnace, broken part of tuyeres, crucibles, moulds and charcoal. They can be helpful to identify and interpret metalworking structures in the field during the post-excavation phases of a project. The technologies used in the past can be reconstructed from the information obtained from excavations. Scientific techniques are often used in archaeometallurgical studies to provide additional information (Bayley et al. 2001).

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Technology can be defined as "a materially grounded arena for dynamic social interaction involved in the planning, production, use, repair and discard of material culture" (Dobres 1995: 27). A systematic set of practices, including not only knowledge and technical skill, but also organization, used to effect material changes in the environment. Such definition does privilege the contextual and contested nature of technologies, emphasizing the fact that as a set of practices, they are inherently tied to the perception, actions and decisions of individuals. Such an approach also necessitates a reorientation of archaeological methodology to understand technological practices as socially and culturally mediated so that the information they contain is fully exploited (Gullapalli 2005: 19).

The beginning of the Iron Age in India was at first dated to the 5th century BCE, ascribing the diffusion of this metal to the contact with the Greek-Persian world (Wheeler 1959: 132). Subsequent excavations and research have enriched our knowledge of the Indian proto-history, showing that ironworking precedes some centuries. However, an agreement on when and where iron technology was utilized for the first time is lacking. Bridget and Raymond Allchin (1982: 345-46) divided the Iron Age into three stages: in the first stage (1300 - 1000 BCE), iron occurs in Rajasthan (Ahar and Noh) and in Karnataka (Hallur); in the upper Ganges valley, it appears in a second stage (1000 - 800 BCE); and in the middle Ganges valley it appears only in a third one (800 - 500 BCE). Conversely, Roy (1983: 181) observed that iron objects were found during the same period in the Ganges valley, that is, before the introduction of the Northern Black Polished Ware (NBPW) and Painted Grey Ware (PGW). Chakrabarti (1977; 1992) indicated Madhya Pradesh (Nagda and Eran sites) as the earlier region where iron smelting occurred (1100 BCE).

Why We Need Comparative Analysis in Archaeology?

To understand the particular technology such as a stone tool, copper/bronze, iron, etc. of two different regions, comparative analysis plays a vital role.

The importance of comparison in archaeology in order to understand the material evidence, one must know and understand an object before. Similarly, the comparison is also essential to understand variations over time and space. Comparative analysis helps to identify regularities in human behaviour and to identify distinctive features of human societies (Smith and Peregrine 2012).

Archaeologists, during the 1970s, began to rely on comparative ethnology to understand the archaeological record (Ember and Ember 2001). Although a large number of material indicators of human behaviour have been identified (Blanton and Fargher 2008; Ember 2003; Ember and Ember 1995; McNett 1979; Peregrine 2004), comparative ethnology has yet to develop into a crucial archaeological tool. As McNett (1979:40) succinctly puts it, "One is rather at a loss to explain why this method has not been used more for archaeological purposes."

Process of Iron Technology

In the subject of iron technology, there are two processes which are the primary process and secondary process. In this research paper author will use comparative analysis to understand the secondary process of iron technology of two different regions.

Primary process of iron technology **(Smelting process):** Smelting is a process or a combination of processes to produce molten metal. The smelting of iron in the blast furnace is an example of reducing smelting in which coke serves both as fuel and as a source of reducing agent. In the presence of an excess of carbon monoxide, iron oxide can be completely reduced at about 900°C, but the melting point of the metal is 1535°C.

Secondary process of iron technology **(Iron smithing/ Forging process):** Forging is defined as a metalworking process in which the useful shape of the workpiece is obtained in a solid state by compressive forces applied through the use of dies and tools. The forging process is accomplished by hammering or pressing the metal. It is one of the oldest known metalworking processes, with its origin about some thousands of years back. Traditionally, forging was performed by a smith using a hammer and anvil. Using a hammer and anvil is a crude form of forging. The smithy or forge has evolved over centuries to become a facility with engineered processes, production equipment, tooling, raw materials and products to meet the demands of modern industry (Rathi et al. 2014).

Study Area of the Research

The research focuses on two ironworking centres in Western India (Nizampura) and South India (Tingallur).

Nizampura: (Latitude: 22°19'47.21" N, Longitude: 73°10'38.88" E) Nizampura is a fully developed prime locality in Vadodara, and it is 10 km away from the M.S. University of Baroda, Vadodara, Gujarat (Fig. 1).

Tingallur: (Latitude: 13°04'14.09" N, Longitude: 77°34'08.46" E) Tingallur is a fully urban developed prime location in Bangalore, and it is 15 km away from National Institute of Advanced Studies (NIAS), Bangalore (Fig. 1).

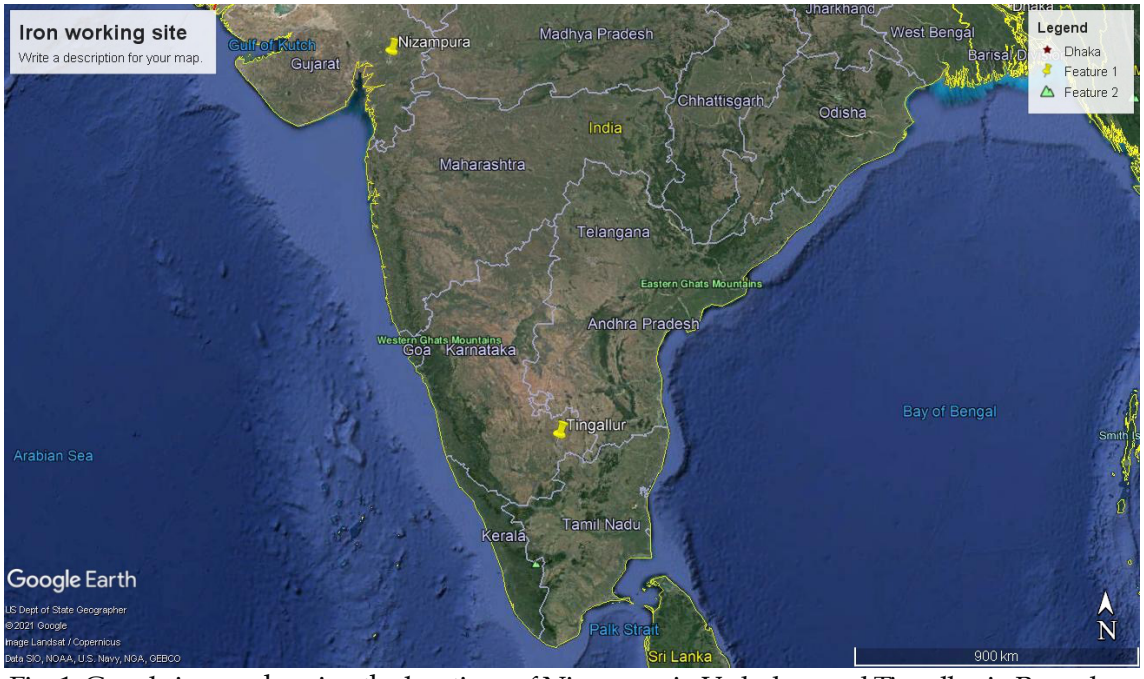

Fig. 1: Google image showing the locations of Nizampur in Vadodara and Tingallur in Bangalore

Aim of the Research

This research aims to identify the technological difference and similarities between ironworking in Western India (Gujarat) and South India (Karnataka). The investigations intend to understand the structure of the workshop area, the structure of the furnace, community, source of labour, anvil and the making of tools. The research has taken a reference to changes in ironworking of two different regions in an urban context.

Ironsmiths in Western India

***Gadulia Lohars*:** The Gadulia Lohars are a historically nomadic community originating from Chittorgarh, Rajasthan and now settled in various states of India, including Delhi, Gujarat, Haryana, Madhya Pradesh, Maharashtra and Punjab. They are primarily known for small-scale manufacturing and selling of iron tools, utensils and other implements on their carts (known as *gadias*), through which they earn their livelihood. Their current economic status is not good, and they are in a constant struggle for political rights since they have been on a constant move from place to place for many years.

Rajput Lohars: Rajput Lohars are from Chittorgarh, Rajasthan and now settled in various states of India, including Delhi, Gujarat, Haryana, Madhya Pradesh, Maharashtra and Punjab. Rajput Lohars believe that their forefathers were blacksmiths, who made weapons for the Rajput rulers in Rajasthan in the 16th century CE, when their ruler, Maharana Pratap was being persecuted by the Mughal rulers.

Ironsmiths in Nizampura, Vadodara

In this research, the author has taken a study of Rajput Lohars, who were migrated from Rajasthan to Gujarat. Ironworking is the most important and basic unity of the Rajput Lohar. A rural Rajput Lohar has seasonal work like smithing and agriculture, but in the case of urban Rajput Lohar, they have only smithing work for the whole year. Rajput Lohars have no knowledge of the smelting process. They buy raw materials of iron from the steel and iron market and produce the iron implements, or sometimes they get raw materials from people who give an order.

Current settlement of Rajput Lohars: The habitation area and the ironsmith workshop space are joined together in the Rajput Lohar settlement. The workshop area of the Rajput Lohar is always located outside and just in front of the entrance of their house. The location of the workshop of Rajput Lohar is always shifted according to the work convenience of the ironsmith. The Rajput Lohar workshop is a simple and less planned workshop space due to their frequent migration from one place to another (Fig. 2).
Bellows: Rajput Lohars use a motorized air blower to supply combustion air for charcoal fuel and increase the higher temperature to heat the iron to be worked. They do not use leather bellows.

Anvil: Anvil is the normal forging table of the smith and the platform to shape the required iron object. The anvil is mounted on a wooden stand, usually a tree stump, but

Fig. 2: Workshop space of Rajput Lohars at Nizampura

sometimes on a squared timber block. They are set into the ground and supported laterally with rocks or stakes to prevent the stump from moving. Though they are found in different types, size and shape, most of the ironworkers of West India use rectangular-shaped anvils (Fig. 3).

Furnace: There are five types of furnaces used by the ironsmiths, viz. Shaft furnace, Multiple-Hearth furnace, Single-Hearth furnace, Bath smelting furnace and Bowl furnace. A Bowl and circular furnace with a depth of 1 ft was observed in this case study. The furnace of Western India is mostly circular in shape and wall plastered with fine clay. The bowl furnace is connected to the blower, which will supply the air to upsurge the temperature (Fig. 4).

***Technique and production*:** Forging or smithing is the technique used by Rajput Lohars. The working pattern of Rajput Lohars is to heat the piece of the iron rod until it becomes red hot, then the iron rod is beaten with a hammer to bring it to the desired shape. Rajput Lohars work in a team as a family while making the implements. They make implements like knife, chisel, ploughshare and axe. Sometimes they engage in the welding work and repair work also (Fig. 5).

Ironsmiths in Tingallur, Bangalore

The author has conducted a study on the ironworking of Tingallur, which is located in the Bangalore Urban location. The ironsmiths of Tingallur were migrated from Andhra Pradesh, Tamil Nadu and Telangana States and belong to Viswakarama or kamalar

Fig. 3: Anvil of used by Rajput Lohars at Nizampura

Fig. 4: Furnace of Rajput Lohars at Nizampura

Fig. 5: Production of iron implements by Rajput Lohars at Nizampura

community. Kamalar community from Tingallur are engaged in full-time ironworking for the whole year, and they do not participate in any other occupation such as agriculture. The kamalar from Tingallur have no knowledge about the iron smelting process. They buy raw materials from the steel and iron market and make implements, or sometimes they collect old iron rods from the person who offers the job. Here author would like to give a detailed description of ironsmiths at Tingallur, specifically on the aspects of their settlement or workshop place, the structure of furnace, anvil, bellows/air blowers and production of iron objects.

Settlement of Tingallur Kamalar: The settlement of Tingallur kamalar is away from their workshop location due to lack of space and urban development. The working time of Tingallur kamalar starts from morning 9.30 am to evening 5 pm. The workshop area is well planned, and the workshop place is well plastered with red soil. The arrangement of the tools for the smith is in a proper and systematic way (Fig. 6).

Bellows: Tingallur kamalar use a hand-turned air blower which is made up of steel and they have no information regarding the leather bellow (Fig. 6).

***Anvil and workplace platform*:** The anvil is mounted on a wooden stand, usually a tree stump but sometimes on a squared timber block. These were set into the ground and supported laterally with rocks or stakes to prevent the stump from moving. The ironworkers of South India use rectangular anvils with curved corners. A working platform is placed to remove the rust from the heated iron object while working on hot iron (Fig. 7).

***Furnace and furnace wall*:** The bowl furnace and circular furnace with a depth of 1 to 2 ft is used here. The bowl furnace is connected to the air blower, which supplies air to raise the required temperature. There is a furnace wall for which there are two reasons to build it. The first reason is to protect the person behind the furnace who is working on the air blower and the second reason is to avoid accidents. The furnace wall is built of brick, and red soil and brick count may be 9 to 12. On top of the furnace wall, their *Kuladheivam* (family god) is fixed, which is made up of clay (Fig. 8).

***Technique and production*:** Forging or smithing is the technique used by *Tingallur kamalar*. Their pattern of work is similar to the Rajput Lohars. They make implements like knife, chisel, ploughshare and axe. Sometimes they also do welding work and repair work (Fig. 9).

Comparative Analysis of Ironworkers from Western India and South India

The following aspects have been considered to understand the similarity and dissimilarity of the current ironworking in two study areas.

1. Furnace
2. Anvil
3. Working platform
4. Tools

Fig. 6: Workshop of Tingallur Kamalar showing furnace wall and hand-turned air blower

Fig. 7: Anvil and working platform of Tingallur kamalar

5. Bellower/ Air blower
6. Structure of workshop
7. Settlement of workers

The comparative analysis is presented in Tables 1 to 6.

Observations

The present study is an attempt to understand the same iron technology which is being used in two different regions. Through this study, the author has envisaged how the contemporary ironsmiths of two different regions are practising iron technology which

Fig. 8: Furnace and furnace wall of Tingallur kamalar

Fig. 9: Tools made by Tingallur kamalar

Table 1: Similarity and dissimilarity of the furnace in the study area

Western India	**South India**
Furnace wall is absent	Furnace wall is present
Furnace is circular in shape	Furnace is circular in shape
Furnace is not well prepared	Furnace is well plastered with fine red soil
Working platform is absent	Working platform is present
Terracotta image is absent in furnace	Terracotta image is present on top of the furnace
The depth of the furnace is 1 ft	The depth of the furnace is 2 ft

Table 2: Similarity and dissimilarity of the anvil in the study area

Western India	South India
Anvil is made up of cast iron	Anvil is made up of cast iron
Anvil is circular in shape	Anvil is rectangular in shape with curved corners
Anvil is fixed with the wooden platform permanently	Anvil is fixed with the wooden platform permanently

Table 3: Similarity and dissimilarity of the working platform in the study area

Western India	South India
Working platform is absent	Working platform is present, and it is a recent development in iron smithery

Table 4: Similarity and dissimilarity of the techniques and production in the study area

Western India	South India
Forging technique has passed through generation to generation	Forging technique has passed through generation to generation
The objects are mostly small chisel, knife, handled knife and sometimes repairing work too.	The objects are mostly materials for construction work such as a big chisel, knife, handled knife, and sometimes repairing work too.
Do not practice sword making	Do not practice sword making
They use a motorized air blower with help of electricity.	They use a hand-turned air blower.

Table 5: Similarity and dissimilarity of the Structure of workshop in the study area

Western India	South India
They do not construct a properly planned workshop structure because they change the location of the working area from time to time, and also, they do travel a lot. The location of the workshop is always away from the roadside. The workshops are in open space, and they do not construct the roof because they always set the workshop in front of their settlement. Also, they are much comfortable working in an open area.	The workshop is well planned. It is well plastered with red soil. The structure and location of the workshop are away from the roadside. The workshop is enclosed, and there is a proper roof which they change once a year.

Table 6: Similarity and dissimilarity of the Settlement pattern in the study area

Western India	South India
The settlement and workshop locations are joined together, and the workshop is structured in front of their settlement. The ironsmith travels a lot to get work.	The settlement is away from the workshop location. The ironsmith never travels to get work.

they learnt from their ancestors who were using the same for manufacturing of swords and such weapons. This study gives an understanding of the development and adaptation of the ironsmiths of these two different regions. The Indian iron technology is going into the sunset, and it is high time to record and sample their work for future research. It is the responsibility of academicians to make an awareness among the public and ironsmiths themselves through various activities such as discussions on the past iron technology to the current ironsmith community and engage them to have educational workshops in schools and colleges.

REFERENCES

Allchin, R. and B. Allchin (1982) *The Rise in India and Pakistan*. Cambridge: Cambridge University Press.

Bayley, J., D. Dungworth, and S. Paynter (2001) *Centre for Archaeology Guidelines: Archaeometallurgy*. London: English Heritage.

Blanton, Richard E. and Lane F. Fargher (2008) *Collective Action in the Formation of Pre–Modern States*. New York: Springer.

Chakrabarti, D.K. (1977) Distribution of Iron Ores and the Archaeological Evidence of Early Iron in India, *Journal of the Economic and Social History of the Orient* 20(2): 166–184.

Chakrabarti, D.K. (1992) *The Early use of Iron in India*. Delhi: Oxford University Press.

Dobres, M.A. (1995) Gender and Prehistoric Technology: on the Social Agency of Technical Strategies, *World Archaeology* 27(1): 25-49.

Ember, Carol R. (2003) *Cross-Cultural Research and its Relevance for Archaeological Inference*, Paper presented at the Santa Fe Institute, Working Group on Language and Prehistory, Santa Fe, NM.

Ember, Carol R. and Melvin Ember (2001) *Cross-Cultural Research Methods*. CA: Alta Mira, Walnut Creek.

Ember, Melvin and Carol R. Ember (1995) Worldwide Cross-Cultural Studies and their Relevance for Archaeology. *Journal of Archaeological Research* 3: 87–111

Gullapalli, P. (2005) *Smelting and Smithing: The Organization of Iron Production in Early Historic Southern Rajasthan*. Ph.D. Dissertation. Philadelphia: University of Pennsylvania.

McNett, Charles W. (1979) The Cross-Cultural Method in Archaeology, *Advances in Archaeological Method and Theory* 2: 39–76.

Peregrine, Peter N. (2004) Cross-Cultural Approaches in Archaeology: Comparative Ethnology, Comparative Archaeology, and Archaeoethnology, *Journal of Archaeological Research* 12: 281–309.

Rathi, M.G. and N.A. Jakhade (2014) An Overview of Forging Processes with their Defects, *International Journal of Scientific and Research Publications* 4(6): 1-7.

Roy, T.N. (1983) *The Ganges Civilization*. New Delhi: Ramanand Vidya Bhawan.

Sanderson, Stephen K. (1990) *Social Evolutionism*. Oxford: Blackwell.

Smith, Michael and Peter Peregrine (2012) Approaches to Comparative Analysis in Archaeology, in *Comparative Archaeology of Complex Societies* (Michael E. Smith Ed.), pp. 4-20. Cambridge: Cambridge University Press.

Wheeler, M. (1958) *Still Digging: Adventures in Archaeology*. London: Pan Book Limited.

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