

SURVEY OF IRON AND WOOTZ STEEL PRODUCTION SITES IN NORTHERN TELANGANA

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The mining of iron ores, smelting of iron and manufacturing of high carbon steel (wootz) in Northern Telangana has been reviewed. This area was very important in the production of wootz steel and was the origin of the famous “*teling*” swords wrought out of wootz steel. Several villages in Adilabad, Karimnagar, Nizamabad and Warangal districts in Northern Telangana, were actively involved in wootz steel manufacture for a long period in history. An extensive survey was conducted in 1100 villages, where information and evidences related to iron smelting and wootz processing were confirmed in more than 425 villages. The findings of the survey on iron and wootz production sites in Northern Telangana are presented in this communication. Several village names in the region surveyed have been etymologically identified (in Telugu language) with iron and iron related works. There are good numbers of villages not identified yet. The standing testimonies for the extensive nature of iron and wootz steel manufacture in this region are the huge heaps of slag remains, extending over hundreds of acres in several parts of this region.

Keywords: Iron and wootz steel, Northern Telangana; Survey; Telugu etymology

INTRODUCTION

Rich deposits of iron ores are available in several parts of the Indian subcontinent. This, combined with the advances made in practice of chemical sciences in the sub-continent from a fairly early period in Indian history¹, resulted in the development of a vibrant iron and steel industry. Convincing archaeological evidences has been earthed and these prove that the earliest recorded iron making activities are from the Indian subcontinent². The so-

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called antiquity of iron from Egypt is not established based on archaeological and scientific evidences. The antiquity of an iron object supposedly dated to 2700 BC³ has now shown to be not true based on actual metallurgical analysis of the iron object⁴. The antiquity of iron making in the Indian subcontinent is further established by the numerous archaeological finds of iron from several parts of the country and therefore it is not a rare occurrence⁵. Further, the Indian subcontinent is home to the discovery of carburization of iron, which resulted in the production of tough and stronger steels, using which the second urbanization of India (i.e. settlements along the Gangetic plains) took place in the period 800-300 BC⁶. The Indians, by about 300 BC, had further mastered the art of converting brittle high carbon steel into tough cutting materials by intelligent thermomechanical processing and this is attested by the high esteem with which Indian steel is mentioned by the Greeks, who came in to contact with the Indian sub-continent during the fourth century BC, with Alexander's invading forces⁷.

The iron and steel production in the Indian subcontinent continued through the historical period right up to the late medieval period. There are ample physical evidences that are living examples of the Indian blacksmith's mastery of iron and steel making, like the Delhi Iron Pillar⁸⁻¹⁰, the numerous beams in Orissa temples¹¹ and the large number of forge welded cannons located across the Indian subcontinent¹². The fame of Deccani wootz, in particular, reached its peak by the end of the 18th century and the foundations of modern metallurgy were laid when several European scientists, included Michael Faraday, tried to duplicate the wonder material of the Orient – wootz steel¹³.

One of the locations in India that was most noted for the production of wootz steel was Telangana, in particular the northern region. The present communication provides a survey of iron and wootz steel making sites of Northern Telangana. The importance of this region for wootz steel manufacture has been amply demonstrated by literature, which record that the best quality steel for making cutting blades came from this region¹⁴. The name of this steel, wootz, is a corruption of its name *ukku/uruku/ekku*, which is etymologically related to the meaning "melt" in several south Indian languages¹⁵. Wootz steel was very famous and a cherished material for a long period in history because it was used in making of tough swords that could retain their cutting edge in spite of repeated use¹⁶.

SURVEY

Iron smelting and manufacturing of wootz steel was practiced in several villages, of Adilabad, Karimnagar, Warangal and Nizamabad districts in Northern Telangana of Andhra Pradesh (see Fig. 1 for map of this region). The geographical and cultural characteristics of Telangana in the Deccan are unique and distinct. For example, iron mining, smelting and manufacturing of wootz steel was very brisk, in the medieval period, in this region. We can witness the remains of iron and wootz steel making in several villages of Northern Telangana. The physical evidences for wootz steel manufacture are presented in another communication in this volume¹⁷.



Fig. 1. Map of Northern Telangana

In ancient and medieval periods, this region was home to other crafts, like cotton spinning, cotton weaving, carpet industry, copper ware, bronze ware and silver filigree industries. For example, the silver filigree works of Karimnagar have been applauded because of their excellent artisanship. Particular mention might be made of the medieval bronze works of Pambatla in Warangal district and carpet industry of Warangal. As regards iron and steel manufacture, we find only scattered historical references to iron and wootz steel industrial activity in this region and this is based primarily on the travelogues of Persian and European visitors¹⁸. For example, the famous Venice traveller Marco Polo noted that “The iron at Hyderabad, at a very early period, obtained a wide renown, being in fact the material which, when made in to steel, afforded the source of supply for the manufacturer of Damascus blades, the raw material having been exported to Persia and the Punjab for that purpose”¹⁹. However, the iron and wootz making activities of this region has not been properly studied and catalogued, so far. This is a very important aspect because this region was the hub of iron and wootz steel industry since ancient times²⁰.

What was the reason for the widespread popularity of iron and steel making in this region? The iron ore deposits in this region are ‘cap type deposits’, meaning that they are available on the surface. Good quality iron ore is available from a depth of about three to six feet from the surface. Further, these deposits are spread over a large area extending over several kilometers. Further, iron ore is also available on the surface of hillocks in shape of small stones or big stone boulders. Havert, a European traveler of the 17th century, noted, “abundance of good quality of iron ore at Golkonda region on the surface level was one of the reasons for the presence of good number of mines and manufacturers.”²¹ The content of iron ore varies from 20% to 70%. The State Mineral Development Corporation has not yet conducted proper survey of the iron ore content of the surface deposits in this region. This is important to conduct since iron making and steel making was a major industrial activity of this region for a long time in history. Interestingly, the local iron industry disappeared suddenly because of the impact of industrial revolution in Europe. Further, the laws, enacted by the Imperial British India, that made the industry to die down have not yet been properly studied.

A large number of sites were surveyed in Northern Telangana over a period of one year and the iron and steel making sites were recorded. In addition, ample evidences (related to iron smelting, wootz steel making like slag remains, crucible remains and implements wrought out of wootz steel) were collected from this region. The major problem is that most of the sites have not been dated and this has to be performed, in the future, in order to fix the antiquity of the sites. Most of the iron production villages can be identified based on remains of iron workings and material related to iron manufacture.

The present survey reveals that a relatively large number of villages were involved in the production of iron and among them some of them were famous as wootz steel making centers. One of the important factors that helped identify the particular village as a iron making site was the presence of iron slag remains, in and around the village. A careful radiocarbon dating of selected slag samples will reveal fresh insights on the antiquity of iron and steel making of the Telangana region.

In the course of the survey some additional points were noted regarding the manner in which the iron slags were found distributed in the land. These observations are noted below:

- (a) The remains of the iron and wootz steel production activities (namely slag or iron smelting debris) are to be found either in the centre of the village, in the nearby fields or in abandoned habitation sites in nearby forest areas.
- (b) It is difficult to locate the sites in the villages in modern times because many houses have been constructed over the slag debris. However, one can notice remains of slag pieces in the old mud walls of the houses (Fig. 2) and in the mud walls of fortalices (Fig. 3). The fortalices were constructed in the early medieval period, as provincial administrative centres or government granaries. Heaps of slag can also be found on the roadside, like noted near Kadem in Adilabad district as seen in Fig. 4.
- (c) The sites which are now deep in the forests, however, do not reveal large scale disturbance. For example, in several forests of Adilabad district, iron production sites spread over hundreds of acres can be noted even this day, because of lack of agriculture. A large heap of slag in the Kalleda forest in Adilabad district is seen in Fig. 5.

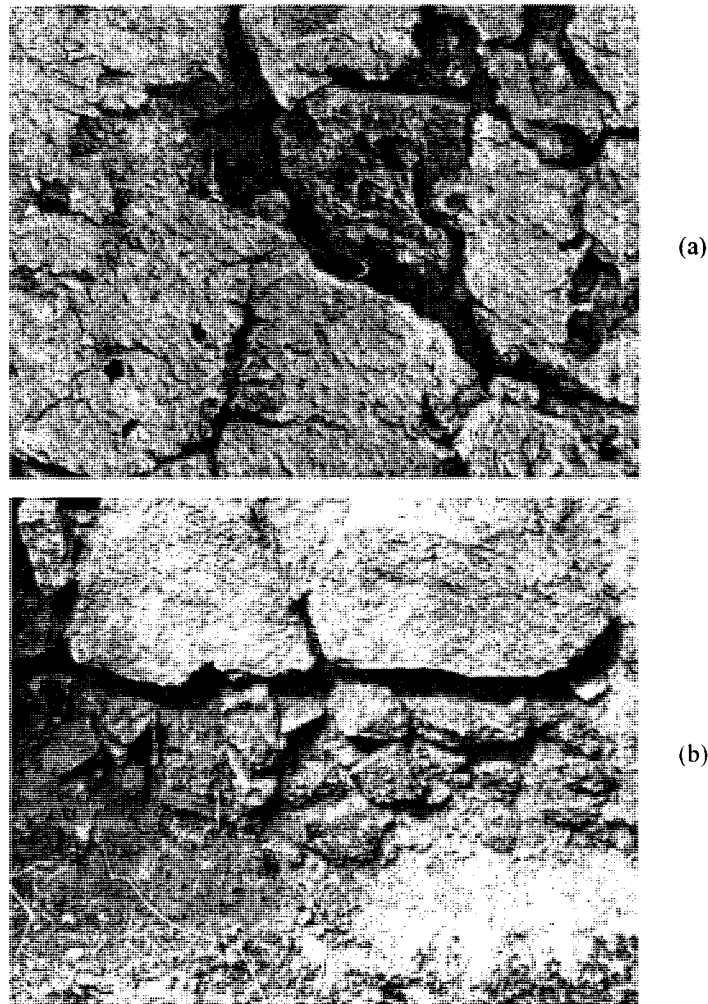


Fig. 2. Slag found on (a) house wall and (b) house foundations at several places in the northern Telangana region.

(d) Slag heaps which are in the middle of the fields are out of recognition due to cultivation. We find only some samples of slag here and there. These fields are locally called as '*cittepu celuklu*' or '*cittepu polalu*', meaning "slag lands" or "slag fields." A typical slag field near Kalleda village in Karimnagar district is seen in Fig. 6. In most of the villages, the slag fields belong to the smith families, and they have constructed houses in and around these sites. The slag fields in some villages are



Fig. 3. Slag pieces in mud walls of fortalice.



Fig. 4. Heap of slag found in Kalleda forest in Adilabad district.



Fig. 5. Heaps of slag found on the roadside, near Kadem in Adilabad district.



Fig. 6. A typical '*cittepu polalu*' meaning "slag field" near Kalleda village in Karimnagar district.

owned by the government. The government has constructed buildings in and around the site.

- (e) The locally available iron slag debris is being wisely used by the local population for repair of roads and filling ditches.

More than 1100 villages, in four districts, were surveyed. The extensive survey was conducted in 28 *mandals* out of 57 *mandals* in the four districts. Information and evidences related to iron smelting and wootz processing were recorded in more than 425 villages of the total number of villages visited. In particular, more than 325 villages were identified in Karimnagar district as iron making sites. In addition, remains of iron smelting furnaces were noted in the deep forests of Adilabad.

The villages identified in the four districts are provided below:

I. Karimnagar District

1. *Metpally Mandal*: Metpally, Metlachityapur, Raygunta, Athmakur, Vellulla, Veampet, Medipally, Bandalingapuram, Jaggasagar, Lingampally.
2. *Kathalapur Mandal*: Kathalapur, Muddapally, Sirikonda, Bhushanraopet, Posanipet, Bommana, Potharam.
3. *Sarangapoor Mandal*: Sarangapoor, Rachapally, Madapur, Laxmidevipalli, Pambatla, Konapur, Battupalli, Potharam, Kammunur.
4. *Medipally Mandal*: Medipally, Kammaripet, Bheemaram, Thakkalapalli, Lingampet, Venktraopetpeta, Kasaram, Kondapur, Tthomburaopet, Machapur, Dammannapet, Kalvakota, Govindaram, Mannegudem.
5. *Korutla Mandal*: Korutla, Venkatapur, Mohanraopet, Kallur, Madapur, Ilapur, Paidimadugu, Chinnametpally, Peddapur, Kammarikanipet.
6. *Gollapally Mandal*: Gollapalli, Kurnipata, Shekalla, Yeshwantharaopet, Velugumatla, Bonkur, Luthunor, Chandoli, Chilvakodur, Athmakour, Raypalli, Ibrahimnagar, Aggimalla, Gangapur.
7. *Kodimayal Mandal*: Kodimayal, Pudoor, Ramsagar, Thimmaipally, Shanivarpet, Konapur, Santhalapally, Surampet, Potharam, Kondapur, Potharam, Chappyal, Namilikonda.
8. *Choppadandi Mandal*: Choppadandi, Ragampet, Chityalapally, Mallapur, Desaipet, Arnakonda, Kolimikunta, Gumlapur, Bhoopalapatnam, Vedurugattu, Bhupalapatnam, Katnapalli.

9. *Julapally Mandal*: Julapally, Telkunta, Kummarikunta, Khachapur, Dhulikatta, Eligadu, Narsapur, Lakapeta.
10. *Velgatoor Mandal*: Velgatoor, Ambaripet, Kapparaopet, Kotilingala, Kondapur, Endapally, Pathagudur, Paidipelli, Jagdevepur, Charlapally, Velugumatla, Gullakot, Munjapalli, Suraram, Kondapur, Chaggam, Jagdevepet, Padkal, Rampur, Mukkaraopet.
11. *Dharmaram Mandal*: Medaram, Abbapur, Patthipaka, Katikanapalli, Mallapur, Gopalraopet, Sayampet, Bottla Vanaparathi, Khila Vanaparathi, Banjarupalli, Dongathurthi, Chityala, Kammarikanipet, Kanampalli.
12. *Dharmapuri Mandal*: Chinnapuram, Nagaram, Kamalapur, Neralla, Thimmapur, Rayapatnam, Sirikonda, Maddunur, Gopulapuram, Jaina, Buggaram, Sirivanchakota (Ranam Kota), Velgonda, Beersani, Munjampalli, Sthambampalli.
13. *Raikal Mandal*: Raikal, Davanpally, Gondaagudem, Vasthapur, Itkyala, Katakapur, Thatlavai, Uppumadugu, Paidimadugu, Ayodhya, Bhoopathipur, Chinthalur, Alooru, Veerapur, Allipur, Kishtampet, Kothapet.
14. *Mallapur Mandal*: Mallapur, Raghavapet, Narkuda, Obulapur, Chittapur, Raygunta, VV Raopet, Laxmipur, Satharam, Gundampalli, Advi Madapur, Sirpur, Valgonda, Gorrepalli, Damrajpalli, Sirrampur, Sangam, Narkuda, Muthyampet, Dharmaram.
15. *Jagtial Mandal*: Jagtial, Polasa, Tadoally, Thakkallapalli, Kalleda, Gorapally, Poligutta, Mothe, Parkalammampet, Porandla, Thatipalli, Chalgall, Morapalli, Peddagutta, Habsipur, Somanpalli, Gullapeta.
16. *Konaraopet Mandal*: Konaraopet, Marthanpet, Kolanur, Dharmaram, Kondapuram.
17. *Ibrahimpatnam Mandal*: Ibrahimpatnam, Godhur, Thimmapur, Ymapur, Vemulakurthi, Mularampur, Yerdandi, Komatikondapur, Varshakonda, Ammakkapet, Yerrapur, Medipalli, Bandalingapur, Fakeerkondapur, Dabba. Komatikondapur.
18. *Karimnagar Mandal*: Elgandal, Durshed, Irukulla, Raykurthi, Kothapalli, Nagunoor, Yelabotharam, Raykurthi, Pothangal, Baddipalli.

19. *Illenthakunta Mandal*: Illenthakunta, Peddalingapur, Galipalli, Dacharam, Neralla, Raypaka, Gundaram.
20. *Malyal Mandal*: Malyala, Tatipalli, Potharam, Maddutla, Balvanthapur.
21. *Pegadapally Mandal*: Pegadapally, Nancharla, Bathkepalli, Aravelli, Itharajpalli, Nandagiri, Yellapur, Devikonda, Laxmipur.
22. *Gangadhara Mandal*: Gangadhara, Mallapur, Garishakurthi, Nalakondapalli, Upparamalyala.
23. *Ramadugu Mandal*: Ramadugu, Shanagar, Koratpalli, Rudraram, Vedira, Gundi, Mothe, Gopalraopet, Chippakurthi.
24. *Peddapally Mandal*: Peddapally, Kanagarthi, Chikuraye, Peddabonkur, Chinna kalvala, Peddakalvala, Rangampalli, Mulasala, Maredukonda.
25. *Huzurabad Mandal*: Chalpur, Yerraballi, Jupaka, Sirpalli, Bornapalli, Kanukalagidda, Singapur.
26. *Jammikunta Mandal*: Korapalli, Maidipalli, Rachapalli, Sirceda.
27. *Veenavanka Mandal*: Challur, Korukallu.
28. *Bheemadevarapalli Mandal*: Terrabally, Mulkanur, Kothapalli, Mutharam.

II. Nizamabad District

1. *Kammaripally Mandal*: Kammaripally, Konasamudram, Basheerabad, Sunketa, Konapuram, Narsapuram, Dammannapet, Athmakur, Kothapalli, Ramannapet, Arugatla, Kampalli and Manala.
2. *Bheemgal Mandal*: Bheemgal Gudikal, Rautala, Sirikonda, Muchukur, Farapuram, Dindurty.
3. *Balkonda Mandal*: Balkonda, Chittapur, Sospet, Chakraye, Busapur, Mupkal, Nagampet.
4. *Morthad Mandal*: Morthad, Dharmora, Shatpalli, Batthapur, Thimmapur.
5. *Sirkonda Mandal*: Sirkonda, Thatpalli, Chimanpalli, Mylaram, Kondapur, Rakulapalli Navandi.
6. *Gandhari Mandal*: Pothangal, Narasapur, Thimmapur, Konapalli, Nagur.
7. *Bhanswada Mandal*: Konapur.
8. *Thadvai Mandal*: Chityal, Argonda.

III. Adilabad District

1. *Luxittipet Mandal*: Luxittipet, Yellaram, Gudem, Nambala, Ragampalle, Rebbanapally, Kommugudem.
2. *Jannaram Mandal*: Jannaram, Bommana, Indanpalli, Narsingapur, Kaval, Dongapalli.
3. *Kadem Mandal*: Kadem, Peddaballala, Kallda, Narlapur, Gangapuramu, Udampur, Islampur, Pandavapur, Goundgudem, Mallapur, Allampalli.
4. *Uttoor Mandal*: Uttoor, Nallgondagutta, Udumpuram, Beersaiprt.
5. *Khanapur Mandal*: Khanapur, Chittapur, Dasthurabad, Birnandi, Mandapalli, Thatiguda.
6. *Chennur Mandal*: Chennur, Sankaram.
7. *Bejjur Mandal*: Bejjur, Penchikalpet, Agarguda, Loha, Jandaguda.
8. *Dohagam Mandal*: Amaragonda, Jandagutta, Loha, Rampur, Vdugur.
9. *Manchiryal Mandal*: Rayepalli, Kondapur, Naspur.
10. *Dandepalli Mandal*: Lingapur, Gurrevu, Narsapur.
11. *Lohesra Mandal*: Lohesra

IV. Warangal district

The surveyed villages are Chityal, Thatikonda, Zafargadh (Velupukonda), Ganpur and Shapur.

IRON RELATED ETYMOLOGY OF VILLAGE NAMES

There are some interesting aspects noted during the survey. Several of the village names were closely related to iron and steel making. This is understood in the following discussion. By way of introduction, iron is called *kheri* and wootz steel as *faulad* in Urdu language, which is important to consider given the long association of Muslim trade of these objects from this region. Wootz steel is called *deśī woukku* and industrial steel is called as *keti* in the local Telugu language.

Several of the village names can be etymologically related in the regional language (Telugu) to terms associated with iron and steel manufacture.

Let us first understand some local Telugu words related to iron and steel. In Telugu, 'inumū' means iron while 'cityamu' means slag or scum of melted metal. 'Kammārī' is the black smith while 'kolimī' refers to furnace. Several villages can be identified to these words. For example, the villages named 'Dindūrthī', 'Inukūrthī' and 'Indūrthī' mean "iron village." *Kāmmāripetā*, *Kāmmāripally*, '*Kāmmārasālā*' and '*Kāmmārāla*' implies "village of blacksmiths." Further, '*Kolimkunta*', '*Kolimiyālā*' or '*Kodimayālā*' are names related to blacksmith's furnace. The name of the village '*Muḍḍāpalli*' is derived from '*muḍḍā*' meaning "bloom or lump of iron" while '*palli*' means village, thereby indicating that this village was a place where lumps of iron were made.

There are several villages named after slag, like for example '*Cityamu*' meaning "the remains of slag," '*Cityāla*', '*Cittapuram*', '*Cittemula*'. Interestingly, significant heaps of slags were noted in all these villages pointing out their importance in probably iron smelting. These slag are spread out in fields and these fields are called '*Cityapu Cealkalu*' meaning "fields of slag." Interestingly, the remains of the slag within the village limits are called as '*cittepu pentā*' or '*citepu kuppā*'. The effect of rampant modernization is also evident in several of these villages. In several villages of Karimnagar and Nizamabad districts, it was difficult to identify slag remains due to recent developments due to land irrigation activities under the Sri Ramsagar irrigation project. Most of the slags in the fields have been cleared, where these cleared slag heaps can be found. An interesting modern application for slag powder was noted. It is used for making '*Tabālā Kārni*' in which slag powder is mixed with boiled rice and applied in the centre of the leather drum (*tabālā*).

Village names can also etymologically be identified with iron manufacture. One example can be cited. '*Kattalapuram*' is derived from the associated Telugu word '*katti*' which means "sword" while '*puram*' means "village." This implies that this village was particularly noted for making swords.

There is need to analyze other village names in the entire Deccan iron and steel making region, in the light of the discussion above.

EPILOGUE

The Northern Telangana area was very important in the production of wootz steel. A large number of villages in Adilabad, Karimnagar, Nizamabad and Warangal districts of Northern Telangana were surveyed to understand their connection with iron and wootz steel manufacture. An extensive survey was conducted in 1100 villages, where from information and evidences related to iron smelting and wootz processing were confirmed in more than 425 villages. The findings of the survey on iron and wootz production sites in Northern Telangana were presented in this communication. A brief discussion has been provided to show how several village names in the region surveyed can be etymologically identified (in Telugu language) with iron and steel related activities.

The survey and study of the science and technology of wootz steel is not exhaustive. There is still much to do to explore the techniques by which iron and wootz steel were manufactured in this region. There are several households in the villages of this region that possess objects made of wootz steel, which are being unscrupulously purchased by middlemen and sold at a huge premium in the international market. In this manner, the local population are duped of the real value of their objects and the cultural heritage of the Indian subcontinent has also been robbed, in one sense, because there is no written records kept of the objects or their transactions. In addition, there are several large forge welded cannons lying in several forts of this region²² and these wonderful pieces of blacksmith skills is mute testimony to the excellent workmanship of the local artisans of this region. The unfortunate aspect of the matter is the lack of conservation and preservation of these archaeological objects either by the Archaeology Department or the District Administrations. Sadly, even the village administrations do not recognized their significance and it is important that these historical iron objects are properly preserved and conserved for posterity.

It is hoped that the record of the existing evidences will add value to the material culture of the people in the region. Further, the survey opens new avenues to historians, archaeologists and archaeo-metallurgists to explore the rich iron and steel making tradition of the Northern Telangana region. It is important to conduct proper archaeological excavations to bring out the wide extent of wootz steel manufacture of this region and to unearth proper wootz steel furnaces.

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