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Steel Making Hunter-Gatherers in Ancient Arctic Europe

Doctoral dissertation in History of Technology

Department of Social Sciences, Technologies and Arts

Luleå University of Technology, 2023

49 pages plus four peer reviewed papers (Appendices A–D)

and tables of sites included in the analyses, of analysed material
and of radiocarbon dates (Appendices E–G)

ISSN: 1402-1544

ISBN 978-91-8048-369-8; 978-91-8048-370-4

Reviewed by Marianne Skandfer 

Steel Making Hunter-Gatherers in Ancient Arctic Europe is Carina Bennerhag's PhD thesis, the culmination of many years of research related to two interdisciplinary projects at Luleå University of Technology: *Ironworking in a Hunting Environment* and *Iron in the North*. Their starting point is the results from a large rescue-archaeological project conducted by the Norrbotten County Museum, with Bennerhag serving as the excavation project manager. During her PhD project, these results have been supplemented by comprehensive additional investigations and data.

Bennerhag has examined evidence for metal production between *c.* 300 BCE and 400 CE (Pre-Roman Iron Age–Roman Iron Age), geographically

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confined to the northernmost parts of Finland, Sweden, and Norway. The thesis comprises an introduction and four papers, all co-authored, with Bennerhag as the first author of three. Two papers have been published in international peer-reviewed journals and the remaining two were submitted in 2023. It includes tables of sites analyzed, materials examined, and radiocarbon dates. All components are in English, making them accessible to an international (non-Scandinavian) audience. The list of 42 sites with observed traces of iron handling results from the author's studies of published and unpublished ('grey') literature in archives, examinations of databases, and visits to museums with archaeological material in Finland, Sweden, and Norway. The list of analyzed finds is based on Bennerhag's documentation of selected items: 237 objects including a variety of archaeological finds, most notably slags – production waste from different types of processing, technical ceramics, and prehistoric iron deposits. Of the 82 radiocarbon dates, several were obtained as part of the PhD project. In total, 43 are marked as results of 'this study', although the majority are from rescue archaeology projects at the Norrbotten County Museum. This underscores the close interconnection between developmental archaeology and research in this project. Notably, 20 of the 42 sites included in the study remain undated (Bennerhag 2023:10).

Steel Making Hunter-Gatherers in Ancient Arctic Europe aims to investigate the potential wider geographic distribution of ancient iron production technology processes observed in the Norrbotten material by including all evidence of early iron production and use in northern Finland, Sweden, and Norway. It also seeks 'to achieve a more profound understanding of the probable social/organizational conditions for the implementation and further integration/adaptation of iron and steel production within/among ancient Arctic hunter-gatherer societies' (Bennerhag 2023:4). The overarching goal is to enhance our understanding of prehistoric northern hunter-gatherers through a focus on iron production.

Paper I, *Hunter-Gatherer Metallurgy in the Early Iron Age of Northern Fennoscandia*, published in *Antiquity* (2021) and co-authored with Lena Grandin, Eva Hjärthner-Holdar, Ole Stilborg, and Kristina Söderholm, presents excavations of two multi-phased hunter-gatherer dwelling and iron processing sites – Sangis and Vivungi – in Norrbotten county, northernmost Sweden. Through interdisciplinary cooperation combining archaeological site and find documentation, metallurgical analyses, and radiocarbon dating, the paper identifies several stages of metal processing, different techniques, variations in raw material selection, and the ability to produce different qualities of iron, including high-carbon steel, all dated between c. 200 BCE and 100 CE. Clear evidence of iron smelting, primary bloom smithing, as well as secondary object smithing is found at the Sangis site,

whereas the latter process has not been identified at Vivungi. The results firmly establish ancient iron processing in the northernmost part of Europe.

Paper III, *Ancient Arctic European Hunter-Gatherer Steelmakers in the Limelight* (unpublished), co-authored with Kristina Söderholm, builds upon the first paper. This well-structured and informative method-oriented publication presents metallurgical analyses of materials from 42 sites in northern Norway (n=10), Sweden (n=28), and Finland (n=6). The results demonstrate that metal production and smithing were known and practiced among northern Fennoscandian hunter-gatherers in the final centuries before the BCE/CE transition. The authors argue that larger landscapes and their resources – tasksapes – should be considered as integrated parts of early metal processing in the north and discuss how this novel technology must have been scheduled to fit with other, typically seasonal, activities conducted within northern hunter-gatherer societies. However, the discussion only considers the two well-documented production sites in Norrbotten, and little attention is given to the variations in iron technology presence identified between sites and different parts of northern Fennoscandia.

While the material- and method-oriented papers present novel and solid results regarding early metal technology in northern Fennoscandia and offer inspiring insights into a very fruitful interdisciplinary study, the two other papers and parts of the introductory section, which are concerned with the research environment and process, are more challenging to read. The PhD project is situated within a context of European historical, archaeological, and technology-historical research on iron production, which, according to Bennerhag and her co-authors, has primarily been directed towards the beneficiaries of metal in farming societies and later for nation-building. It is claimed that existing research is still structured around nineteenth-century social-evolutionary frameworks including linking lifestyle with technological capacities. This has severely hampered understandings of the introduction of new technology, specifically iron technology, in 'peripheral' parts of the world, and the possibility of metal processing within prehistoric hunter-gatherer context has been actively excluded (Bennerhag et al. 2023). The critique includes a categorization of essentially all existing research up to today as representing evolutionism and diffusionism. Some of it appears too generalizing and at times unreasonable, for instance, in criticizing previous research for contributing little to the understanding of the recent results from Sangis and Vivungi, and for being too caught up in general evolutionary explanations to realize the potential of the new data (Bennerhag et al. 2023:273–274). Söderholm and Bennerhag (n.d.) describe the marginalization of research results as a direct outcome of the northern origin of the data, but also suggest a tension between an apparent lack of academic interest and local (Sámi) expectations for new insights into their own dis-

tant past. They reflect on how they experienced that national, regional, and local expectations of historical narratives influenced the research process, but the ways these expectations were expressed remains somewhat unclear.

These parts of the PhD thesis can be criticized for the same issues that Bennerhag and her co-authors criticize previous research for: broad generalizations and a specific narrative with little room for alternative interpretations. Reading the thesis, I was struck by how my impression of the northern region's status in relation to areas further south differed from her/their descriptions, both in terms of national history narratives, cultural heritage management systems, and archaeological excavation and research efforts between Norway, Sweden, and Finland. Further, although topography and vegetation differ substantially across the vast region, descriptions seem to adhere to a Norrbotten landscape template. Donna Haraway's critical concept of 'situated knowledge' struck me as useful in my reading. Haraway introduced it in her 1988 article *Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective*, to emphasize that there is no such thing as passive study objects or neutral viewpoints. Haraway insists that as researchers and parts of research environments, everything we do is influenced by our context, and all parts of the knowledge production process itself influences our research. It became clear to me that, although claiming to be about the larger 'Arctic' Fennoscandia, the research history and description of the empirical situation are almost solely based on the situation in northern Sweden. Bennerhag inadvertently engages with the concept of situated knowledge on the final page of her introduction. Here, she suggests that researchers analyzing patterns of ancient activities within a landscape may benefit from having personal knowledge and experience of the European Arctic's unique landscape and climate (Bennerhag 2023:25). This assertion seems to be a self-reference, and the point could have been further developed, perhaps in conjunction with the experience of producing new historical knowledge within a local context. The authors' situatedness is evident in their use of several key concepts, including 'periphery'. Although a major point is that the northern region has been unjustly treated as a periphery in archaeological and historic research, and of limited relevance to the question of metal technology introduction, the study region and study sites are presented as peripheral and remote also in these papers. The center-periphery structure seems to embrace various spatial categories and is treated as a timeless constant, such as between 'south' as 'national', and 'north'/'Arctic' as both different and fundamentally local, but also in the relations between model concepts of inland and coast (Bennerhag et al. 2023).

The interpretation of how iron technology was assimilated by northern hunter-gatherer societies during the final centuries BCE is grounded

in the methodological concept of *chaîne opératoire*, which delineates the technology of executing a task as a sequence of bodily movements that incorporate reflective knowledge and practical skills (Hodder 2012:53). Another key interpretive concept is *taskscape*, developed by Tim Ingold to describe the mutual interlocking of practical operations carried out by skilled agents within a physical and social environment (Ingold 2000:194–200). The ambition is to synthesize these two concepts and, with the help of the archaeological record, gain insight into how various activities were performed and scheduled in the specific landscape of northern hunter-gatherers and early iron producers (Bennerhag 2023:25). The contribution found in Paper III (Bennerhag et al. n.d.) is a commendable start, moving beyond the notion of 'the entire/full *chaîne opératoire*' as strictly about the metal production sequence to shed light on the array of typically seasonal activities that had to be planned around iron production tasks (Bennerhag et al. 2021:1523, n.d.:24). Highlighting investments in activities that paid off several months or even years later is a particularly insightful approach, as it challenges the long-standing misconception of hunter-gatherers as being fundamentally opportunistic.

In summary, the thesis presents incontrovertible evidence of iron and steel production/technology in northern Fennoscandia during the final centuries BCE, the full production sequences having been identified through high-quality archaeological investigations supported by targeted metallurgical analyses and direct radiocarbon dating. The results represent a significant achievement of interdisciplinary collaboration between archaeology, metallurgy, and technical history. Originating from public developmental archaeological investigations, the project exemplifies how rescue archaeology can evolve into pioneering research. However, the pervasive critique of existing research for overlooking or disregarding northern evidence of early iron processing could have been more nuanced, in my opinion. As I see it, many of the limitations in previous research in this field, as in so many others, can likely be attributed to constrained research resources. Additionally, advancements in and the relatively lower costs of radiocarbon dating over the last few decades – now allowing direct dating to become a standard procedure in archaeological investigations – have provided a new dataset that revolutionizes our ability to identify culture-historical connections for sites without typologically datable objects and for chronologically mixed sites.

The investigation of the thesis' aims, to understand the geographic distribution of ancient iron production technology processes observed in the Norrbotten material and to explore the implementation and integration of iron processing in ancient northern hunter-gatherer societies on a wider geographical scale (Bennerhag 2023:4), is only just beginning. The implications

of the results warrant further exploration along several avenues: What historical trajectory was this implementation part of? Starting from the local setting, which affordances characterize sites where complete production sequences are identified, and could differences in local landscapes/task-scapes have influenced the adoption of iron technology in the larger northern Fennoscandian region? (I suspect access to large amounts of firewood is key). I concur with Bennerhag et al. (2023:273) that previous research has overly focused on quantity rather than quality. This thesis demonstrates how meticulous site documentation, improved dating methods, and the application of metallurgical techniques can yield groundbreaking new knowledge from a (still) relatively sparse archaeological record.

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