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Iron production and the Kingdom of Kush: an introduction to UCL Qatar's research in Sudan

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The remains of extensive iron industries form prominent features at key locations within the Meroitic landscape, demonstrating the significance of iron production within the history of this period of the Kingdom of Kush. The scale of Meroitic iron production combined with early insights into technological approaches led to the iron industries being of particular interest to archaeometallurgists, while preliminary radiocarbon dates secured a prominent place for Meroe within debates concerning the origins of iron in Africa. However, when considering the extent of production, the potential time period involved and its wider significance within a Pan-African debate, it can be said that our knowledge to date of this fundamental Meroitic industry is notably superficial. This paper introduces UCL Qatar's research in Sudan, which, amongst other things, aims to generate new data that will answer some of the many questions concerning Meroitic iron production. It is hoped that our results will eventually allow the industries and people involved to be placed within the Meroitic context, thus revealing their contribution to the rise, dominance and fall of the Kingdom of Kush.

Introduction: why iron?

A central theme in the study of technology is the embedded nature of technical practices within broader social and cultural contexts. It is widely recognised that every stage of any technological process, or *chaîne opératoire*, represents the choices made by artisans, influenced by numerous variables including the availability of resources, preferences of the consumers, and the knowledge systems held within the community.[1] As such, technological practices reflect the artisans' position within society and the way in which they perceive the world around them, as well as the societies themselves. For the archaeologist, the identification and detailed understanding of a contextualised technology provides an invaluable and unique window into past society, complementing the focus on elite and consumer evidence that dominates much of traditional archaeology.

Perhaps more than any other ancient technology, iron production generated a significant quantity and diversity of remains that survive in the archaeological record. These remains can be subjected to a range of macroscopic, microscopic and chemical analyses, the results of which allow for the reconstruction of various fundamental aspects of the original technological sequences including operational parameters, ingredients and technological styles.[2] This information provides an insight into various aspects of past technological systems, and, when placed within a broader historical and cultural context, may in turn offer an insight into the past social, political, economic, environmental and ritual landscapes within which iron production was embedded.

With the adoption of iron production by society, a specialised and particularly resource and labour-thirsty technology joined the local craft scene, producing a valuable material with properties "far in advance" of anything that had gone before.[3] Despite the technical skill, effort and materials required to produce iron, this production was viable and in some cases became of paramount importance to society, because it provided a material that could be worked to produce tough, durable objects as well as ornamental and prestige items suitable for local consumption and for external trade.[4] From rings, pins, bracelets and bells, to hoes and axes, to spears and arrowheads, the malleability of heated iron meant that a smelted bloom could be easily forged and shaped into desired objects with good tensile strength. Thus, the practical significance of iron lay in the vast array of objects that could be produced, as well as the superior mechanical properties of these objects.

It is reasonable to suggest that the early use of this new and rare material would have been generally confined to high-status goods produced by a prestige technology.[5] Initially the effects of this metal on

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[1] For example Akinjogbin 2004, 61; Collett 1993, 508-511; Dobres & Hoffman 1994, 211; Rowlands & Warnier 1993, 522-543.

[2] For example Fluzin 2004; Tylecote 1992.

[3] Craddock 1995, 234.

[4] Delmonte 1985, 238; Gale 1969, 2-5.

[5] Pleiner 2000, 23-30.

day-to-day activities may well have been limited. Certainly, the evidence of iron objects found so far in Meroitic burials suggests that this seems to have been the case, and at first iron seems to have been confined to small objects of adornments or personal items for the highest ranks of society (see below). Gradually however iron became more common, perhaps as the number of artisans with the knowledge of how to produce iron grew, or more exotic items entered the economies of the upper echelons of society, or the value of iron objects to wider social endeavours became more evident. As production increased, the wider significance of iron to society began in earnest.[6] Across the world, once iron became more commonly produced, agriculture, warfare and even ritual or religious systems were gradually transformed. Did Meroitic iron production also have such a multi-faceted impact on the life and times of the Kingdom of Kush?

The recognition of the importance of iron in world history has been growing since the pioneering work of researchers such as Cleere,[7] Pleiner[8] and Tylecote.[9] Archaeometallurgy has rapidly developed and excavations are taking place in all continents as academics strive to understand how, when and why our ancestors made iron, and how, in turn, technology relates to broader social contexts. The application of the discipline, combining scientific analysis with the theory and techniques of archaeology,[10] has the potential to reveal many parameters of past metallurgical technologies. These include the nature of the raw materials used, the fuel types, the refractory nature of ceramics utilised during iron production, smelting parameters, and the quality and quantity of the material produced (although limitations apply).[11] Interest in the sub-discipline has led to new approaches (for example the use of experimental archaeology) and new scientific techniques (including the application of luminescence dating to provide a more precise chronological framework), which allow for a greater level of understanding of the archaeometallurgical record. As more archaeometallurgical investigations are carried out, a greater appreciation of the extent of technological complexity is being developed, and the dates of early iron production are being pushed further back in time. In addition, ethnographic observations across the world indicate that at least in later times, at the local level artisans played the role of innovators and motivated producers.[12] This stands in contrast to the traditional notion of metallurgy as a dispassionate, utilitarian entity. The UCL Qatar research in Sudan aims to move beyond the mere transposition of interpretive models to use systematic scientific investigation alongside specific local and cultural aspects to reveal insights into both the metallurgy and the metallurgists of Meroe (fig. 1).

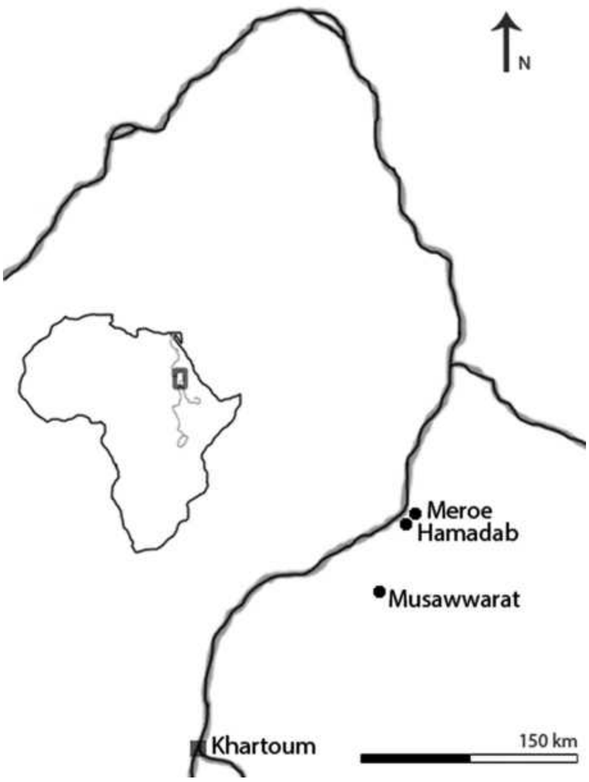

Fig. 1: Map showing key sites mentioned in the text

The archaeometallurgy of iron

In order to understand and interpret the archaeometallurgical remains of iron production and to appreciate them within an embedded *chaîne opératoire*, it is necessary to understand the stages involved in the production process: that of reducing iron oxides (e.g. Fe_3O_4, Fe_2O_3) into iron metal (Fe) by subjecting the material to specific temperatures and reducing conditions that allow the economically viable production of metal. Iron production in Africa made use of the 'bloomery process', which produced iron in a solid state directly through the reduction of iron ore to a workable iron bloom, with a significant

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[6] Pleiner 2000, 30-35.

[7] For example Cleere 1970; 1972.

[8] For example Pleiner 1978; 2000.

[9] For example Tylecote 1962; 1965.

[10] Cleere 1970.

[11] See Craddock 1995, 13.

[12] For example Barndon 1996; Celis 1987; Childs & Dewey 1996; Schmidt 1997; Tripathi 2001, 148-166.

amount of iron oxide required to form slag. During this process, the waste from the ore (including the gangue materials as well as a significant amount of iron oxide), some of the technical ceramics, any fluxes added, as well as fuel ash melt to form liquid slag.[13] This liquid slag envelops and protects the solid particles of metallic iron that form during the smelt and progressively coalesce in the form of a bloom.

Due to the preservation of some of these facets of the smelting process within the iron slag, each themselves representing the skills, choices and resources available to those involved in the iron industries, detailed investigations of iron slag can reveal much about the original smelting charge and the processes it underwent.[14] However , a major factor to consider when approaching the analysis of slag is the representative nature of a particular (and possibly quite small) slag sample. Throughout a smelt, which can last from a few hours to a few days, ingredients, temperatures, redox conditions and many other factors evolve and change. Therefore, an arbitrary piece of slag picked up on a smelting site cannot be representative of the entire original smelting operation, let alone the smelting technologies of many smelters over even a short period of time.[15] The issue of representativity is one of particular concern to this new research (see below).

The main ingredient required for a successful smelt is an economically viable ore; that is one that is reasonably high grade (considering the significant amounts of iron lost into the slag during the process) and present as easily reducible oxides and/or hydroxides. The collected ore, which has either been mined or collected at ground level, is sometimes beneficiated (usually by density or colour) so that the richer ore minerals are separated from the rest. The ore can also be roasted to enable iron hydroxides or carbonates to become more easily reducible iron oxides and to generally ensure even and successful reducibility during the smelting process. In the archaeological record, mining sites can provide invaluable information concerning the types of ores being mined and the techniques used for this stage of the *chaîne opératoire*.[16] Therefore, an additional goal of the UCL Qatar research is to expand on the work of Dr. Abdelrahman Ali, Director General of NCAM, to further understand the ore sources exploited during the Meroitic period. Currently Dr. Brigitte Cech is conducting this research, as well as research into the stone quarries of Meroe, under a three-year Qatar National Research Fund (QNRF) grant.

The other essential material requirement for the production of iron is fuel, which plays a number of vital roles during the smelting process. The controlled combustion of fuel provides energy to enable high temperatures to be reached and maintained, a sufficiently reducing environment rich in carbon monoxide, and often the alloying component to produce steel rather than soft iron.[17] Further factors relevant for fuel selection include its limited contamination by other elements, and its ability to support the batch column within the furnace. While fuel types such as animal dung, grasses and logs may not meet all of these requirements, charcoal provides the perfect fuel for smelting, being (in the best instances) highly calorific, strongly reducing and relatively clean.[18] Comparing palaeoecological and modern data, vegetation changes in the landscape can be mapped over millennia and the environmental impacts of such a fuel-thirsty technology as iron production can be documented. Of course, one of the greatest potentials of charcoal found within the archaeometallurgical record is for radiocarbon dating and for the construction of chronological frameworks for the archaeometallurgical remains themselves. Thus, wood species identification and extensive radiocarbon dating form key components of the UCL Qatar research, alongside a luminescence-dating program to ensure the validity of the dating sequences produced.

For a successful smelt, an enclosed environment usually in the form of a furnace superstructure of some style is required. This structure retains heat energy, maintains a reducing atmosphere, and enables control over the whole process by containing and funnelling the gas flow, charcoal, ore, and molten slag. The furnace must be able to maintain structural stability throughout the process for the smelt to proceed successfully, withstanding temperatures in excess of 1200 °C for long periods of time. To allow the smelt to progress, during the bloomery process the slag is allowed to flow either down into a pit in the case of pit furnaces, or out of the side of the furnace structure in slag-tapping furnaces as seems to have been the case at Meroe. However, even within the slag tapping furnaces, a certain proportion of slag will solidify inside the furnace itself, and this is evident in the Meroitic context. In addition to a furnace structure, other technical ceramics (i.e. those produced specifically to withstand the extreme

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[13] Crew 2000; Serneels & Crew 1998; Tylecote 1987, 47-52.

[14] Fluzin 2004; Serneels 1993; Rehren et al. 2007.

[15] Humphris et al. 2009.

[16] Childs & Herbert 2005, 282-283; Schmidt 1997, 53-59.

[17] Rehren 1997.

[18] Craddock 1995, 189; Joosten 2004, 11-12.

nature of the smelting process)[19] include the tuyères, or pipes through which the air entered the furnace structure, in the Meroitic case apparently blown in from ceramic pot bellows. The ways in which clay used to make the furnaces, furnace lining and tuyères was manipulated to enable it to survive the smelting process, or to contribute to the necessary slag formation, can reveal much about the technical knowledge and skills of the iron producers as well as the ceramic producers of the time. Thus a detailed understanding of these ceramics through laboratory analysis, and a comparison of this material with non-technical ceramic, is a particularly interesting aspect of this research.

Non-material requirements were equally crucial to ensure a successful smelting operation. A large and coordinated labour force (both those with the technical skill to smelt iron and non-skilled workers); negotiated access to resources; and sometimes ritual/ symbolic acts and ingredients such as medicines to ensure the success of the smelt were necessary.[20] Needless to say, accessing information about such non-material requirements is particularly challenging but where possible, especially rewarding.

Iron in Sudan: early discussions

One of the earliest mentions of the residues of iron production at Meroe can be found in the accounts of the 1909-1910 excavations at the Royal City. Garstang et al. describe how the Lion Temple was found on top of one of numerous dumps of iron production and other industrial waste.[21] They note, "the great quantity of such slag strewn about is evidence of very extensive workings continued through several centuries."[22] They describe that the iron slag, mixed with faience and other objects, could be found as a one meter deep deposit between the enclosure wall and the temple wall itself. Soon after, Sayce published his report on the excavations at Meroe, including the notorious description based on the extent of archaeometallurgical remains at the site: "Meroë, in fact, must have been the Birmingham of ancient Africa; the smoke of its iron-smelting furnaces must have been continually going up to heaven, and the whole of northern Africa might have been supplied by it with implements of iron."[23]

In 1945, before the advent of radiocarbon dating and during a period of time when colonial thought portrayed Africa as a backwater where any technological achievement must have been introduced from outside the continent, Wainwright published his paper on *Iron in the Napatan and Meroitic Ages*. Here he focuses his attention on explaining the appearance of iron as a result of external influences and technological diffusion from the civilized heartland of Asia Minor: "In the sixth century B.C. the Ionians and the Carians came as mercenaries to Nubia, and iron begins to be found there [...] In the third century B.C. mercenaries went to the coasts of Abyssinia and Somaliland [...] and so introduced the natives of those parts to the value of iron [...] Three hundred years after that [...] 'Greeks' were trading up and down the Red Sea and actually importing ready-made iron there."[24]

A concerted effort to try to make sense of the Meroitic iron production industries did not, however, begin until the 1960s. Arkell notes that Meroe was a particularly favourable location for iron production due to its iron ore and wood resources.[25] He postulates that overgrazing and destruction of vegetation could have been a significant problem around key Meroitic locations later during the period,[26] and that this could have led to the importation of wood charcoal for iron smelting. He also suggests that the Kushite King Taharqa may have deliberately initiated an iron industry at Meroe after recognising the superior efficiency of the iron weapons of the Assyrians.[27] Trigger however disputes this claim, calling it "the first of many myths about iron-working in the Sudan."[28] While Arkell suggests that the increasing frequency of iron objects found in Meroitic graves from 600 B.C. is indicative of local production, Trigger prefers to see these earlier iron objects as the result of trade with Egypt. He goes further to suggest that the objects themselves were probably originally traded from further afield, due to stylistic affinities with iron objects being produced at the time in the Near East and Greece.[29]

Writing in 1967, Shinnie describes the large slag mounds and the speculation surrounding Meroitic iron production within the history of ferrous metallurgy in the African continent in general. Alongside a summary of a small number of Meroitic iron objects, he concludes, based on limited radiocarbon dates

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[19] Martinón-Torres & Rehren 2014.

[20] For example Childs & Killick 1993; Rowlands & Warnier 1993; Schmidt 1997, 231-261.

[21] Garstang et al. 1911.

[22] Garstang et al. 1911, 21.

[23] Sayce 1912, 55.

[24] Wainwright1945, 18.

[25] Arkell 1961, 147.

[26] Arkell 1961, 167f.

[27] Arkell 1961, 130.

[28] Trigger 1969, 39.

[29] Trigger 1969, 42.

available at the time, that iron technologies may well have diffused south and west from Meroe, but that there may well have been other centres of diffusion elsewhere on the north-west African coast. He suggests that along with iron production technologies, Meroe may also have provided inspiration and information about the formation and running of a complex state, and suggests that much development in Sub-Saharan Africa, including agriculture, warfare and formation of states, could be owed to Meroe.[30] One year later, Stuiver and van der Merwe considered the introduction of iron into Africa, concluding that although often mentioned as a potential route of diffusion, Meroitic iron technology was in fact younger than that found further west and south[31] and so is probably not the source from which this knowledge diffused into the rest of the continent.

Trigger, whose 1969 paper attempts to unravel the concept of iron technology spreading from Meroe into Sub-Saharan Africa, not only describes the lack of eastern cultural traits or technological similarities in west Africa,[32] but also discredits the notion that iron-working technologies were taught to the Meroites by Greek craftsmen.[33] He notes the problem that very little is known about the details of the organisation of the socio-political context of Meroitic iron production, mentioning that there is no evidence to suggest iron production was controlled by the state.[34] Further distraction came in a book by Amborn claiming that the slag mounds of Meroe in fact related to faience production and gold smelting, not iron production;[35] this view, however, never caught on.

Despite years of speculations about the iron industries at Meroe and their potential local, regional and international significance, it was not until the 1970s that archaeometallurgical data began to be produced, providing a firm evidence base on which to develop a real appreciation of the Meroitic technology.

Archaeometallurgy in Sudan

From 1969 to 1976, Tylecote and Shinnie excavated a number of furnaces at Meroe and various publications describe these furnaces as well as analyses of a small collection of metallurgical debris and ores. Tylecote suggests that the Meroitic iron producers exploited the abundant good quality iron ore sources within the surrounding hillsides, discarding poor quality ore and roasting the usable ore before smelting. Smelting underwent an evolution in technological approach from "more primitive" small bowl furnaces, to the "sophisticated technique" of the later slag-tapping furnaces.[36] However, Shinnie and Kense discard this assumption, suggesting instead the smelting furnaces at Meroe "seem to be of a single basic type", and the earlier more basic style noted by Tylecote probably represented smithing hearths.[37]

The later smelting approach involved two brick built furnace structures situated at opposite ends of a workshop/work-space. The furnace structures potentially stood about 1 metre high. They were lined with a sand-clay mix and powered by ceramic pot bellows that supplied air through up to six tapered tuyères situated up to 40 cm above the furnace bottom, sloping downwards to enter the furnace. A significant amount of slag formed inside the furnace bottom, but molten slag was also tapped from the furnace. The bloom was removed once the smelt was complete, with parts of the furnace lining being removed at the same time. The bloom was then worked in smaller smithing hearths powered by bellows and tuyères. Square tuyères were also found, although the significance of the shape of these was not particularly commented upon.[38] Shinnie and Tylecote suggest the furnace style was inspired by Egyptian iron smelting, and that this in turn was probably introduced originally into Egypt by the Romans.[39] In terms of organisation of production, because the furnaces excavated were found in one production location, it was assumed that smelting was confined to specific areas, and was probably "in the hands of craft specialists."[40] In terms of dating, the furnaces themselves seem to date to the first few centuries of the Christian era, although metallurgical debris was found in layers dating as far back as the sixth century B.C. Although this initial phase of archaeometallurgy in Sudan shed significantly more light on Meroitic smelting, the constraints of the sampling strategy limited the broader applicability of the conclusions of the study.

In the early 1990s, a new collaborative venture called the *Meroe Joint Excavations* was formed between The Institute of Sudan Archaeology and Egyptology at Humboldt University of Berlin, the

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[30] Shinnie 1967, 160-169.

[31] Stuiver & van der Merwe 1968, 54.

[32] Trigger 1969, 25f.

[33] Trigger 1969, 43-44.

[34] Trigger 1969, 46-47.

[35] Amborn 1976, 165.

[36] Tylecote 1970, 67-69.

[37] Shinnie & Kense 1982, 21.

[38] Tylecote 1970; 1982; Shinnie & Anderson 2004; Shinnie & Kense 1982.

[39] Shinnie 1985, 30-35.

[40] Shinnie & Kense 1982, 27.

Roemer-Pelizaeus-Museum in Hildesheim, and the University of Khartoum Department of Archaeology, with funding provided by the Volkswagen Foundation.[41] Archaeometallurgical research into the iron technologies and their role within the Meroitic period was a key research focus for this new project, and led to the invitation of the Deutsches Bergbau-Museum in Bochum to join the project as a technical partner. During the pre-campaign of 1992 roughly a quarter of slag mound NW1 at Meroe was excavated, close to where Shinnie and Tylecote had previously identified furnace remains. This slag mound was identified by the team as being less disturbed by erosion than other slag mounds, and was, in size and shape, fairly typical of the other mounds at the site. Tylecote's earlier furnace find close by meant there was significant potential to reveal much about the iron industries by linking new data with existing information.[42] An excavation unit 17 m by 13 m was excavated to a maximum depth at the highest point of the mound of about 1.40 m. The archaeology revealed that the 'slag mound' in fact contained a mixture of metallurgical debris and domestic material (including animal bones, pottery and grinding stones), suggesting that the smelters must have resided close to the areas where they practiced their craft.[43] Samples of metallurgical debris were taken for analysis at the Deutsches Bergbau-Museum in Bochum.[44] This first season of research also confirmed the presence of iron production remains at other locations, such as the site of Hamadab.

Due to the collapse of the Meroe Joint Excavation project as a result of political issues, the team was unable to complete the archaeometallurgical excavations at Meroe and only very limited laboratory analysis of some of the slag samples collected during the 1992 season were completed.[45] Nevertheless, the results of the fieldwork and analysis suggest that between 5,000 and 10,000 tons of iron slag (divided into equal amounts of smelting and smithing slag), and the same quantity of furnace debris is located at Meroe.[46] Like Tylecote before him, Rehren identifies a number of different types of slag including slag tapped from the furnace, slag that had solidified inside the furnace, and slag adhering to furnace lining. He notes that excavation within the slag heaps produces a complicated impression of layering of slag, ash, red material (ore or ceramic), tuyère and furnace fragments, and suggests that this layering represents waste dumping episodes.[47] Possible ore samples collected from the surface, although alumina-rich, would have been suitable for smelting at Meroe. The iron slag was found to be fayalitic in nature with very limited wüstite present, indicative of an efficient smelting technology.[48] This supported previous conclusions that took into account the variability of iron blooms produced during a bloomery smelting process, and it was concluded that the iron being produced at Meroe could have contained an elevated carbon content due to the particularly reducing nature of the smelts.[49] In terms of the reconstruction of smelting operations, Rehren agrees with Tylecote's previous outlines of this process (described above), but goes further to calculate that about 5 to 10 tons of iron metal per year for 500 years could have been produced at Meroe. Of course, it was clear that such an estimate could only be provisional until more comprehensive and wide-ranging archaeometallurgical investigations were undertaken.

Complementing the archaeological and analytical studies concerning Meroitic iron production outlined above was the first comprehensive effort to perform scientific analysis on Meroitic iron objects from the Humboldt-University's earlier excavations at the Meroitic site of Musawwarat es Sufra.[50] As well as noting the presence of non-ferrous artefacts including those made of bronze and silver, this provides a description of mostly utilitarian items including nails, chisels and hooks. It became clear that the Meroites were producing and working with carbon-rich (steel) blooms, and that the slag inclusions, which appear almost wüstite-free and dominated by titanium spinels in a glassy matrix, are very similar to the slag excavated at Meroe itself. However, due to the growing number of iron production sites being found along the Nile it was not possible to say whether the iron objects found at Musawwarat were produced at Meroe as opposed to another Meroitic location.[51]

More recently, M. F. Abdelrahman undertook a typological review and discussion of Napatan, Meroitic and Post-Meroitic iron objects. He notes that only seven Napatan period sites have yielded ferrous artefacts, while the number of Meroitic and post-Meroitic sites where iron objects have been

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[41] Wenig 1994, 16; Rehren 2001, 102.

[42] Eigner 1996, 24.

[43] Eigner 1996, 26.

[44] Wenig 1994, 17; Eigner 1996, 24, 26.

[45] Rehren 1995; 2001.

[46] Rehren 2001, 103.

[47] Rehren 2001, 104.

[48] Rehren 2001, 104f.

[49] Rehren 2001, 106.

[50] Rehren et al. 1995; Rehren 1996.

[51] Rehren 1996, 25f.

found is dramatically more.[52] He goes on to say that in his view, some of the 48 Napatan-dated iron objects were probably produced at Meroe or at least at a Meroitic site. Meroitic and Post-Meroitic objects are similar in number, with weaponry constituting the greatest percentage of the overall object functions,[53] and he goes on to discuss the weight of iron in relation to estimations provided previously. However, it would seem that such discussion and arguments based on these preliminary estimates[54] should be treated with caution.

Thus, it is clear that despite previous efforts to enhance our understanding of Meroitic iron production and build on earlier observations and theories, to date the archaeometallurgical understandings of the Meroitic context remains frustratingly stunted. The work of Tylecote was pioneering at the time, but Rehren's attempts in the early 1990s were necessarily limited and remained superficial. It is from this point that UCL Qatar's new research takes up the mantle and will again attempt to explore the nature and significance of the Meroitic iron industries. Before moving to a discussion about the new research and some initial interpretations, it is worth summarising more recent thoughts concerning Meroitic iron production that begin to consider the symbolic nature of the industries.

Symbolism in Meroitic iron production

In 2007, Haaland and Haaland explored the relationship between iron production and the temples of Apedemak, the Meroitic god of warfare and creation. Drawing on the symbolic and ritual nature of iron production on the African continent and beyond,[55] they consider whether the location of the Apedemak Temple on a slag mound at Meroe Royal City demonstrates a symbolic link between royalty, iron and this god. However, from the outset they state: "To our knowledge, it is the only Apedemak temple located on a slag mound,"[56] This would seem to suggest that if indeed there is a symbolic relationship being represented by the positioning of the temple, it is either particularly local or secretive, or developed later during the Meroitic period, after other Apedemak temples were constructed. Haaland and Haaland note the fact that Apedemak is depicted in various instances symbolising both power and warfare, as well as in some cases the fertility of the land.[57] From this they suggest that the relationship between the Kushite kings and queens and Apedemak was fundamental in the legitimisation of the power of the ruling families. They conclude that the centralised production of iron was performed by a caste-like social group, and that the reason we see iron production spreading further away from the Royal City towards the end of the Meroitic period is a reflection of the decreasing power and influence of the Kingdom itself.[58]

Although there are only a limited number of temples dedicated to Apedemak in the Island of Meroe region[59] and only one of these is situated in direct relationship to iron production, and despite the fact that the role of iron production as a key driving force on the military might of the kingdom is not necessarily demonstrated by the finds of iron object types in Sudan, Haaland continues this argument in a more recent paper, while further incorporating influences from the Indian Ocean and ideas concerning the position of Meroe within various World-Systems and trade networks.[60] She endorses the idea that the location of the Apedemak temple on the iron slag heap at Meroe suggests that iron was one of the most significant sources of power for the ruler, especially during the later times of the Meroitic period when conflict was perhaps at its greatest.[61] She suggests that the fact that Apedemak is depicted within hybrid images with Indian associations illustrates the long-distance movement of both trade goods and people during the Meroitic period.[62]

Research aims and methodology

General avenues of enquiry

The remains of iron production at Meroe and elsewhere along the Nile are immense and their significance have been recognised for over a century. Clearly, they cannot possibly be studied within a typical short-term project. Therefore, UCL Qatar has developed a long-term programme of systematic

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[52] Abdelrahman 2011, 396.

[53] Abdelrahman 2011, 397.

[54] For example see Haaland & Haaland 2007, 381.

[55] For example see Childs & Killick 1993; Collett 1993; DeMaret 1985.

[56] Haaland & Haaland 2007, 375.

[57] Haaland & Haaland 2007, 384-388; see also Török 1997, 500-503.

[58] See also Mapunda 1997, 113f.

[59] Haaland & Haaland 2007, 385; see Török 1997, 506f. for a list of locations throughout the kingdom associated with the temple cult of Apedemak.

[60] Haaland 2013, 149.

[61] Haaland 2013, 151.

[62] Haaland 2013, 153.

excavation, sampling and analysis of Meroitic iron smelting remains as part of its wider research strategy focussing on the archaeology of raw material procurement and production in the Arab world. The objective of our research is to investigate iron smelting and smithing at selected Meroitic locations and then combine the archaeometallurgical results with broader archaeological understandings to generate a solid contextualisation of the data. Therefore, the archaeometallurgical results will refer to and complement current knowledge concerning Meroitic life, creating an enriched view of the role and impact of the resource and labour-thirsty iron production technologies. Technological characteristics will be reconstructed from the analysis of samples of ore, slag, tuyères and furnace walls, and mass balance calculations will allow for a quantification of ore and charcoal used, and the amount of iron produced.[63] In parallel, a detailed chronological framework will be constructed using luminescence and radiocarbon dating. Identification of charcoal will provide information concerning wood selection and supply. Combining all of the data produced during fieldwork and laboratory analysis will eventually allow for in-depth considerations of issues of access to natural resources, organisation of production, landscape management and human impact on the environment over time.

Broad research questions include the chronological development of iron production during the Kingdom of Kush: was there small-scale, local production at Meroe during earlier times which subsequently developed into the vast industries of later periods, and if so, was it based on an independently invented African technology, or do we see external influences? How do the techniques and ingredients of iron smelting change over time, perhaps reflecting the changes in supply or selection of resources or changing market demands? How does Meroitic iron production relate to the broader Meroitic context: did the production and products of iron act as stimuli for other aspects of Meroitic society, or were the industries a more passive element of the kingdom? Was there a significant environmental impact from the technologies as has been suggested, or was the fuel supply managed to avoid this? How much iron was produced during the Meroitic period and did rates of production change over time, and what proportion of this production was for local and for external markets?

Field methods

Although durable and present in large quantities, the information value of iron slag is tempered by several factors – both in initial production and subsequent deposition. For instance, iron slag has the potential to be particularly variable in nature. Iron smelts can last many hours, during which time temperature and redox conditions, as well as the ingredients added to the smelt, the incorporation of technical ceramics, the type of fuel and fuel to ore ratio used, the air supply rate, or the addition of any fluxes or 'special' ingredients, may change constantly. Consequently, the iron slag produced as the iron ore reduces to iron metal can be heterogeneous in chemical and microscopic nature, and systematically vary in composition.[64] At Meroitic locations, we are faced with tons of small, arbitrary fragments of iron slag present in heterogeneous slag heaps containing limited amounts of domestic refuse.[65] The first stage of the fieldwork therefore involves excavating within a number of slag heaps at each smelting site using an assortment of trench sizes and locations. A key aim of these excavations is to provide an understanding of the nature of each slag heap and thus the processes that went into the formation of the heap and its relationship to the associated archaeological remains of the broader sites.

In an attempt to quantify the slag content of each heap, and to collect representative slag samples from the excavations, slag removed from each trench is quantified and sampled. For this, all of the material from each trench is first mixed thoroughly. The material is then halved, halved and halved again, leaving a sample representing1/8th of the original content. Following the earlier work done in 1992, this 1/8th is then sorted by hand into four identified slag types and other categories including furnace lining, furnace bricks, tuyères, ore samples, domestic pottery, smithing beads, fragments too small to sort, possible flux material and other material. These categories are then individually weighed and this information is used to quantify the remains within the area of the slag heap within which that particular trench was excavated, and numerous samples are taken from each category for analysis. Multiple trenches have revealed the heterogeneous nature of the slag heaps themselves, thus a number of trenches per slag heap is desirable. Samples are then also taken from within every identified context from every trench.

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[63] Rehren et al. 2007, and references therein.

[64] Humphris et al. 2009.

[65] Rehren 2001.

Alongside the slag heap excavation and sampling, geophysics is used to determine the depth and other features of the slag-rich layers in each heap in order to prepare appropriate excavation strategies, and to allow for general understandings of quantifications before excavation. A further aim is to locate ancient furnace workshops. Ground penetrating radar performed by Burkart Ullrich of Eastern Atlas GmbH & Co. in 2013 at Hamadab was unable to pinpoint furnace locations. Future research strategies in collaboration with Dr. Chris Carey of the University of Brighton will trial resistivity and gradiometry.

Charcoal found within the slag heaps, and most importantly found embedded within fragments of iron slag (which can then be related directly to that piece of iron slag), is thoroughly sampled and sent for archaeobotanical wood species identification by Dr. Barbara Eichhorn (Institut für Archäologische Wissenschaften, Johann Wolfgang Goethe-Universität, Frankfurt) to allow for an understanding of fuel use. Charcoal collected by other teams working on non-ferrous production and domestic Meroitic contexts is also sent to Dr. Eichhorn for analysis to generate comparative data. Samples of charcoal confirmed as unlikely to be affected by the 'old wood' phenomenon is sent for AMS dating by Dana Drake Rosenstein at the University of Arizona's AMS laboratory. Complementing the development of the AMS chronological sequence, a luminescence programme has also been implemented in the field by Drake Rosenstein. Dosimeters (used for calibration) are placed within sections of the slag heaps where they remain for one year before being collected under controlled conditions alongside samples for luminescence dating at the University of Washington Luminescence Laboratory.

Laboratory methods

The slag samples taken in the field are shipped to UCL Qatar where they are documented photographically and entered into a database. One specimen from each sample is cut to produce a cross-section of approximately 1 cm² and then set in resin and polished down to a grain size of 0.25 µm following established procedures to produce a mirror-like finish.

Optical microscopy with plane polarised light (PPL) and cross-polarised light (XPL) is used to study the internal microstructure of the sample. This gives an indication of different phases present and thus of the type of processes which created the specific slag composition and appearance. Through careful examination of samples at up to x500 magnification, detailed descriptions can be made of crystal structure and arrangements, allowing the smelting techniques to be categorised for example in terms of homogeneity and cooling rates, and the presence of residual minerals or metals. Features typical or unusual to each sample are recorded, and samples of interest selected for SEM-EDS investigation, which allows a greater magnification and specific chemical compositions of various phases of the samples to be analysed. Certain samples are selected for bulk chemical analysis using X-ray fluorescence (XRF) and these samples are either prepared as powder pellets or glass beads.

Initial results and interpretations

This project is in its infancy. Over 500 kg of samples from the site of Hamadab and the iron production remains to the east of the railway outside Meroe Royal City have so far been shipped to UCL Qatar, and laboratory analysis and interpretation, and then contextualising the results, will take some time. However, below we present some initial results using one particular trench excavated at Hamadab as a particular focus. We also present some more general interpretations. It is hoped that this preliminary offering will demonstrate the potential of this long-term investigation.

Hamadab and Trench 2012-09

The research began in 2012 in collaboration with Dr. Pawel Wolf at the Meroitic site of Hamadab, three kilometres south of Meroe Royal City. Trench 2012-09 was excavated within slag mound H 100-200, which had been documented by Dr. Wolf lying approximately 20 m to the east of the east town wall, almost directly behind the location of the temple.[66] The trench was one metre wide and approximately four metres long, and excavated from the summit of the mound in an easterly direction to the edge of the mound. Separated at the top by a balk fifty centimetres wide, an adjacent trench (2012-08) was excavated along the same line running west down the western side of the slag mound. Both trenches were dug to a depth of c. 1 m at the highest point of the mound.

Of the approximately 3 m³ volume excavated from trench 2012-09, about half was metallurgical waste, as can be seen in figure 2, col. fig. 18. Nearly

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[66] see Wolf & Nowotnick 2005; Wolf et al. 2008.

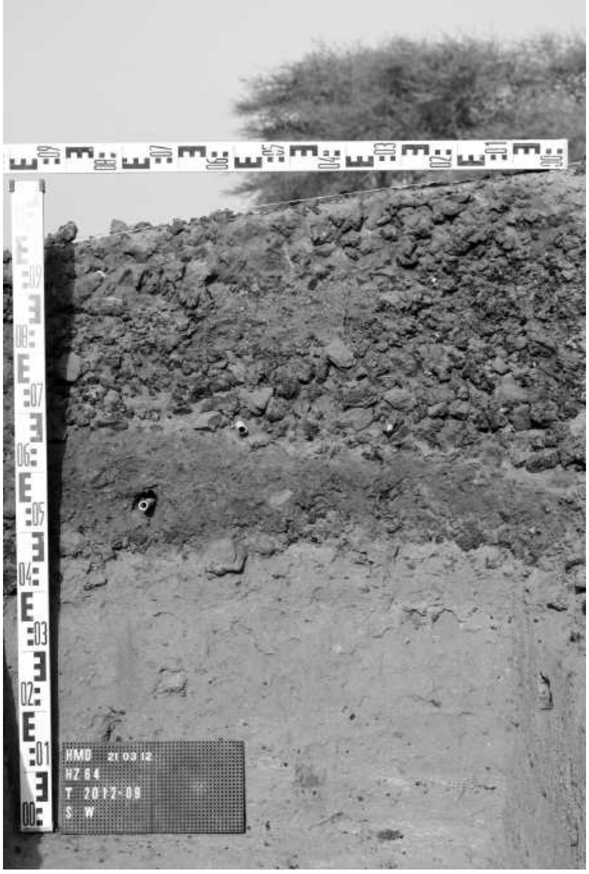

Fig. 2: The shallow nature of the metallurgical deposits within trench 2012-09 (the two white tubes seen in the middle of the image are the locations of dosimeters)

twice as much furnace slag (clearly formed within the furnace structure, further loosely defined as type 1: porous and light, and type 2: dense and heavy) was present compared to tapped slag (slag removed from the furnace during smelting, further loosely defined as type 3: small complete slag drops and flows, and type 4: large flows with a clear top and bottom surface). Interestingly, while this slag type ratio was found to be the case in the metallurgical debris excavated from trenches 2012-08 and 2012-09 (excavated in the same slag mound), the opposite was found to be the case in two other trenches excavated in other slag mounds at the site. Does this indicate that different workshops were operating at Hamadab, perhaps following different technological styles or operating under different smelting parameters, and if so, does this suggest specialisation, competition, innovation, access to different resources, production for different markets? Or does this represent change in techniques over time?

Laboratory analysis of slag has only just begun, and has confirmed its fayalitic nature with limited wüstite present, as was identified by previous research. Figure 3 serves to illustrate the variable nature of Meroitic iron slag, with three of these slag samples being taken from one context but displaying quite different phase formations. It is for this reason that such a large-scale detailed investigation of numerous slag fragments from many slag heaps at a variety of Meroitic sites is required before we can begin to really understand the iron industries.

General insights

Considering more general impressions of the work so far, it is clear that the Meroitic slag mounds themselves are heterogeneous in nature and their compositions are particularly complex (fig. 4). This means that a single trench in one slag heap is insufficient to represent the composition of the slag mound. Furthermore it seems that large trenches (as was trialled at Hamadab during the research [trench 2012-10] and as excavated by the Joint Meroe Excavations in 1992), do not allow for an understanding of the intricate nuances of deposition evident in the slag heaps themselves. However, understanding such nuances is essential for the formation of the slag heap to be understood.

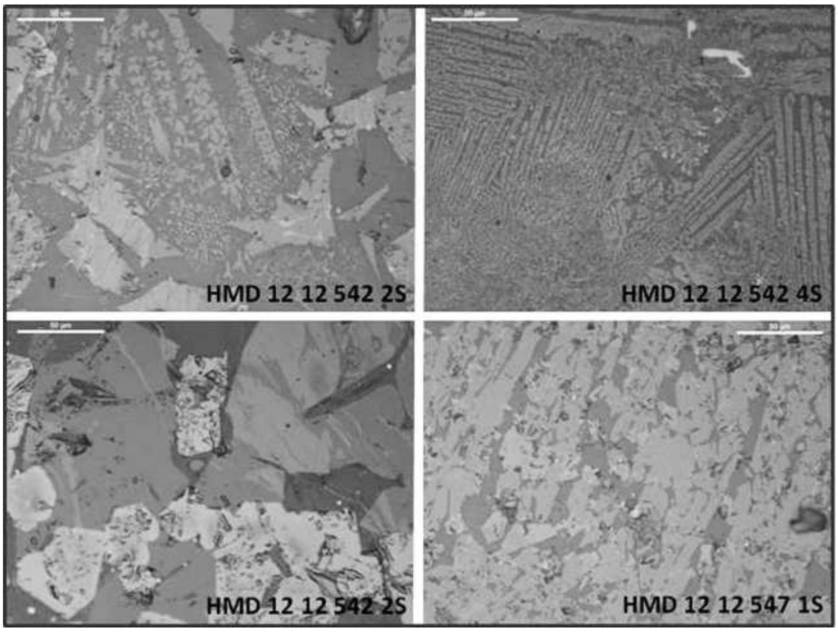

Fig. 3: Photomicrographs of four slag samples taken from trench 2012-09. All samples at same scale and same magnification

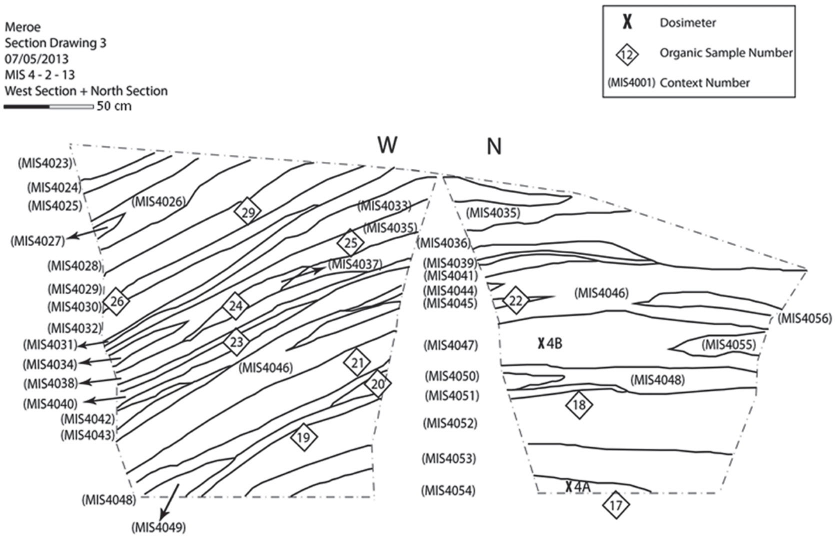

Fig. 4: Section drawing of trench MIS4-2-13 within the large slag heap to the east of the railway outside the Royal City, demonstrating the complexity of the composition of the slag heaps

Another important observation made at Hamadab is that the slag mounds at this site were not solid slag, but actually in some cases relatively shallow layers of iron slag sat on other deposits (fig. 2 and 4, col. fig. 18). Such an observation potentially has quite serious implications for previous estimates of the quantity of iron slag produced at Meroe, and thus the quantity of iron produced. Occasionally it was found that under the archaeometallurgical deposits were accumulations of sand, and under this sand lay architectural remains that appear not to be associated with the iron production remains (fig. 5, col. fig. 19); this raises further questions regarding the chronology of iron production relative to these settlements and the choice of space in terms of where industrial waste was deposited.

So far, 101 charcoal samples were sent for wood species identification from the excavations at Hamadab. Of these, 72 were from the trenches excavated within the iron slag heaps at Hamadab. The remainder were taken from domestic contexts excavated within the city of Hamadab by Dr. Pawel Wolf and his team. The domestic contexts included household cooking areas, a pottery kiln, a sample excavated from a street, and one sample from the wood used during the construction of the Royal Baths at Meroe City (excavated by Dr. Simone Wolf and her team of the German Archaeological Institute). Of the 72 samples from iron production contexts at Hamadab, 50 were embedded within iron slag, and the remaining 22 were selected during the excavations of the slag heaps. 67 of these 72 charcoal samples were classified by Dr. Eichhorn as *Acacia Nilotica*. Of the remaining 5 samples, 3 were Acacia type and one sample, which was taken from the sieve was classified as *Leptadenia Pyrotechnica*. The final sample was unidentifiable due to its small size. In stark contrast, of the 29 samples analysed from the domestic, non-iron production contexts, only 2 were identified as *Acacia Nilotica*. 21 of the samples were defined as *Acacia* type. Of the remaining 6 samples, 1 was classified as *Ziziphus* species, 2 as *Syzygium*, 1 as *Capparaceae*, 1 as palm charcoal and 1 was unidentifiable.

The domestic charcoal samples that were identified as definitely not of *Acacia* type come from two different houses, the pottery kiln and the street. The palm charcoal was identified from the sample taken from the Meroe Royal Baths. Therefore, it would seem

Fig. 5: Architectural remains in trench 2012-12

that at this early stage in our research we can tentatively suggest that the iron producers were specifically selecting *Acacia Nilotica* wood charcoal to power their furnaces, with more than 90% of the charcoal analysed from the iron smelting contexts being identified as *Acacia Nilotica*. This species is known for its highly calorific properties and structural stability. Furthermore, it can be suggested that within other contexts, for example cooking or pottery production, such species selection was less important.

Dr. Eichhorn has just completed analysis of a further 244 samples of charcoal excavated from slag heaps to the east of the Royal City. Of these, one sample contained no identifiable charcoal; 3 samples were '*Acacia* type'; 17 were probably *Acacia Nilotica*; and the rest, 223 (again more than 90%), was definitively identified as *Acacia Nilotica*. Again, these results suggest that the iron producers were specifically selecting *Acacia Nilotica* wood charcoal to power their furnaces. It is to be hoped that the corpus of wood species data from Meroitic contexts will gradually expand, incorporating comparative data from other Meroitic locations and from domestic contexts, which will allow this understanding to develop over time.

The final results that can be briefly discussed are the AMS dates generated from the charcoal samples analysed from Hamadab. The dates will be discussed in detail in future publications with Dr. Wolf, where we will combine all of the results generated by this study at Hamadab to produce an interpretation of the role and position of the technologies and the technologists within the life of the town. However, it is worth mentioning that three charcoal samples from each trench excavated as part of this study in iron slag heaps at Hamadab (five trenches in total), taken from the bottom, middle and upper levels of the metallurgical debris, were dated using AMS methods. They place iron production at Hamadab in 2 sigma ranges of between an average lower range of AD 311 and an average upper range of AD 530. Hence, the iron production at Hamadab seems to date to the Post Meroitic Period.

Summary

The aim of this paper was to introduce the new UCL Qatar research into Meroitic iron production rather than to offer results and interpretations, mainly because the project is in its infancy and therefore results are currently limited. Long-term, the local region as well as the broad geographical expanse within which Meroe was a key player in trade and contact networks will be considered as an "integrated cultural entity,"[67] with local and external influences identified. However, even presenting the very preliminary snapshot provided here hopefully demonstrates the archaeometallurgical potential of this study, i.e. to produce a comprehensive understanding of the techniques, choices and materials used and produced during the period at different sites, and use this information to understand the role and impact of iron production during the Meroitic period.

In the future, while the large-scale laboratory analysis of samples continues, geophysics is being used to identify furnace workshops, and excavations within and around the slag heaps at a variety of Meroitic locations will continue in collaboration with other teams to allow the potential of this research to be fulfilled.

Acknowledgements

None of this research would have happened without the initial invitation by the three partners in the Meroe Joint Excavations project, Steffen Wenig (Berlin), Khidir Ahmed (Khartoum) and Arne Eggebrecht (Hildesheim) to the Deutsches Bergbau-Museum in Bochum to collaborate with them in 1992. The museum's director, Rainer Slotta, decided to send a budding archaeometallurgist who had recently joined the museum's staff, and who was eager to escape the cold German winter for some work in the sun. Twenty years later, UCL's decision to establish a campus in Doha provided an opportunity to pick up the work again. We would like to thank Dr. Abdelrahman Ali Mohamed Rahma, Director General of the National Corporation for Antiquities and Museums, for granting permission for this new research to be conducted in Sudan. We also owe our continuing thanks to Dr. Pawel Wolf of the DAI and his team for their ongoing academic and logistical support in the field. Dr. Barbara Eichhorn and especially Dana Drake Rosenstein are also to be thanked for their outstanding work. Finally, we would like to thank Thomas Scheibner, whose professionalism and patience had a huge impact on the success of the first two field seasons of UCL Qatar in Sudan, and the local workforce whose hard work made the projects possible. Paul Belford and the editors of this Festschrift are thanked for their comments on drafts of this paper.

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[67] Mapunda 1997, 120.

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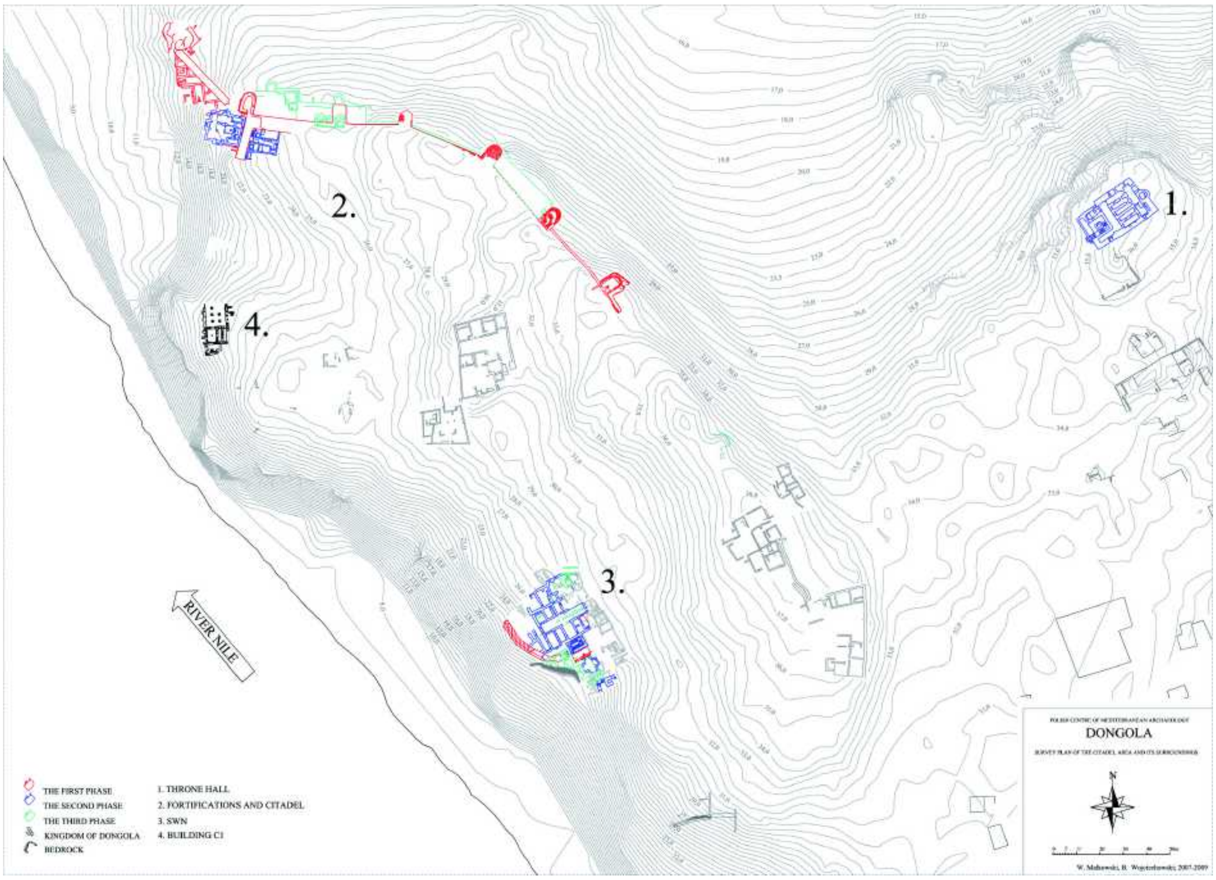


Col. fig. 17: Central part of Dongola: Citadel, Churches and the Throne Hall (plan: M. Małkowski, PCMA Archives)

Col. fig. 18: The shallow nature of the metallurgical deposits within trench 2012-09 (the two white tubes seen in the middle of the image are the locations of dosimeters)

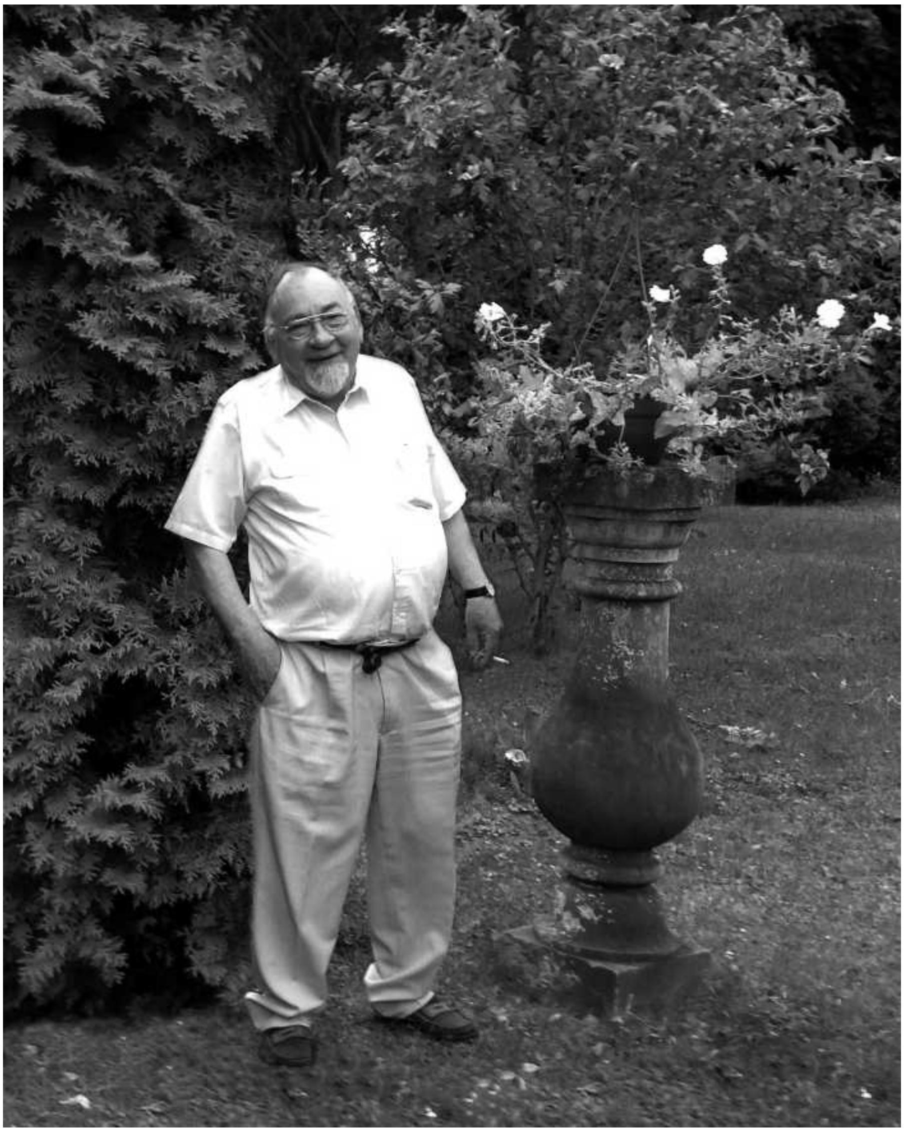
Col. fig.19: Architectural remains in trench 2012-12

Ein Forscherleben zwischen den Welten

Zum 80. Geburtstag von Steffen Wenig

Herausgegeben von

Angelika Lohwasser & Pawel Wolf



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(Foto: Claudia Näser)

Frontispiz: Der Jubilar im Garten seines Hauses in Berlin-Karow
(Foto: Jane Humphris, Bildbearbeitung: Frank Joachim)

DANK

Dass diese Festschrift zustande gekommen ist, verdanken wir vielen Mitwirkenden. An erster Stelle stehen die Autorinnen und Autoren, die mit ihren vielseitigen und fundierten Artikeln das eigentliche Geschenkpaket geschnürt haben. Julia Petereit hat die redaktionelle Arbeit übernommen – Korrekturen gemacht, Literatureinträge kontrolliert und vieles mehr. Sollte doch noch ein Fehler zu finden sein, ist das der Fülle der Beiträge und der gegen Ende deutlich knappen Zeit geschuldet! Frank Joachim hat das Layout hergestellt und unermüdlich auf Bitten um Veränderungen reagiert. Die Sudanarchäologische Gesellschaft zu Berlin e.V. stellt ihre Mitgliederzeitschrift „Der antike Sudan“ für die Aufnahme dieses Sonderheftes zur Verfügung und ehrt damit den Gründungsvater von Verein und Zeitschrift. Darüber hinaus hat sie den Druck zwischenfinanziert und damit die Herstellung erleichtert. Der Lehrbereich Ägyptologie und Archäologie Nordostafrikas der Humboldt-Universität zu Berlin übernimmt in bewährter Weise den Vertrieb, um die Erkenntnisse auch an die wissenschaftliche Gemeinschaft weiterzugeben. Instituts-, Grabungs- und Familienangehörigen haben mit Rat und Tat, vor allem aber Geduld und moralischer Unterstützung zum Gelingen beigetragen!

Ihnen allen und weiteren ungenannten Helfern gebührt unser aufrichtiger Dank!

Inhaltsverzeichnis

GRUSSWORT

Ein Forscherleben zwischen den Welten – Steffen Wenigs wissenschaftliche Reise begann in Ägypten und führte ihn über den Sudan nach Eritrea und schließlich bis auf das Hochland von Äthiopien. So breit wie sein Interesse und seine Expertise vor allem in der Kunst und Architektur dieser doch teils sehr unterschiedlichen Kulturregionen ist auch die Schar von Schülern, Mitarbeitern und Kollegen, die ihn mit einem Beitrag in dieser Festschrift würdigen möchten. Die in diesem Band vereinten Autorinnen und Autoren haben alle in der einen oder anderen Weise mit Steffen Wenig zusammen gearbeitet – sei es an der Universität oder im Feld, in Projektpartnerschaften oder nicht zuletzt den beiden von ihm gegründeten und lange geführten Vereinen, die sich der Erhaltung und Vermittlung des archäologischen Erbes im Sudan und in Äthiopien widmen. So ist es ein sehr bunter Strauß geworden, den wir hier überreichen können!

Nachdem Steffen Wenig schon in den frühen 50er Jahren – noch als Volontär am Berliner Akademie-Verlag – als Gasthörer Vorlesungen über Ägyptologie an der Humboldt-Universität hörte, studierte er 1950–1959 Ägyptologie bei Fritz Hintze und Afrikanistik bei Ernst Dammann. Später erweiterte er seine Kenntnisse auch in Klassischer Archäologie bei Ludger Alscher. Es war sicher von prägender Bedeutung für seine Laufbahn, dass er schon als Student 1958 an der Butana-Expedition der Humboldt-Universität unter der Leitung von Fritz Hintze im Sudan teilnehmen durfte. Doch unmittelbar nach seinem Studium nahm er zunächst eine Tätigkeit als wissenschaftlicher Mitarbeiter am Ägyptischen Museum in Berlin auf, wo er unter anderem zur Kunst der Amarna-Zeit forschte, und 1967 zum Kustos bzw. 1971 zum stellvertretenden Direktor ernannt wurde. Ihm verdankt das Ägyptische Museum seinen ersten Katalog der Nachkriegszeit. Darüber hinaus war Steffen Wenig maßgeblich an der Entwicklung des „Corpus Antiquitatum Aegyptiacarum" beteiligt. Während der Museumszeit gehörten auch die Nubica zu seinem Aufgabengebiet und in der zweiten Hälfte der 60er Jahre führten ihn die von Fritz Hintze geleiteten Ausgrabungen der Humboldt-Universität in Musawwarat es Sufra erneut in den Sudan. So wurden – mit seiner Dissertation 1964 und seiner Habilitation 1979 – Meroitistik und Sudanarchäologie zu seinen wissenschaftlichen Schwerpunkten. Es ist somit wohl nur folgerichtig, dass Steffen Wenig 1978 an den Bereich Ägyptologie und Sudanarchäologie/Meroitistik der Humboldt-Universität zu Berlin wechselte, wo er 1981 zum Hochschuldozenten für Meroitistik und 1984 zum außerordentlichen Professor berufen wurde. Neben seiner Lehrtätigkeit entstanden hier hervorragende Werke wie der Katalog zu einer der ersten großen Ausstellungen altsudanesischer Kunst „Africa in Antiquity. The Arts of Ancient Nubia and the Sudan“ am Brooklyn Museum in New York. Dem Institut blieb er treu, übernahm in den schwierigen Jahren nach der Wende die Leitung der nun als „Institut für Sudanarchäologie und Ägyptologie“ und dann als „Richard Lepsius Institut“, sowie schließlich als „Seminar für Archäologie und Kulturgeschichte Nordostafrikas“ bezeichneten Lehreinheit bis zu seiner Emeritierung im Jahre 1999.

Die Wende in der damaligen DDR machte es möglich, nun auch wichtige archäologische Projekte im Sudan zu verwirklichen. Zunächst waren es 1992 die „Meroe Joint Excavations“ in der antiken Hauptstadt Meroe, ein Co-Projekt der Humboldt-Universität mit dem Römer-Pelizaeus-Museum Hildesheim und der University of Khartoum. 1994 gelang es Steffen Wenig, die Ausgrabungen der Humboldt-Universität in Musawwarat es Sufra wiederzubeleben (s. Titelbild). Im folgenden Jahrzehnt erlebte die „Große Anlage“ von Musawwarat nicht nur intensive Feldforschungen, es wurden unter seiner Ägide auch erstmals umfangreiche Maßnahmen für ihren Erhalt unternommen. Der Erhalt des Erbes der Kulturen war und ist ihm ebenso wichtig wie der wissenschaftliche Erkenntnisgewinn. So setzte sich Steffen Wenig als Gründungsvater der Sudanarchäologischen Gesellschaft zu Berlin e.V. eminent für die Sicherung und Konservierung der Bauten in Musawwarat ein (s. Rückumschlag innen). Ebenso am Herzen liegt ihm, dass die Forschungen zur altsudanesischen Kultur auch veröffentlicht werden. Er übernahm die Herausgabe der Reihe Meroitica von Fritz Hintze und gründete die jährlich erscheinende Fachzeitschrift "Der antike Sudan. Mitteilungen der Sudanarchäologischen Gesellschaft zu Berlin e.V."

Es war eigentlich ein Zufall, der Steffen Wenig im Jahre 1994 nach Eritrea führte. Doch die noch fast gänzlich unerforschte Kultur des nördlichen Horns von Afrika fesselte ihn so sehr, dass er schon im darauf folgenden Jahr einen archäologischen Survey auf dem Hochplateau von Qohaito in Akele Guzay organisierte. Der erneute Ausbruch der kriegerischen Auseinandersetzungen zwischen Eritrea und Äthiopien und die darauffolgenden unsicheren politischen Umstände im Lande ließen leider nur zwei Kampagnen zu (1995-1996). Dies tat Steffen Wenigs wissenschaftlichem Interesse am abessinischen Hochland jedoch keinen Abbruch, sondern führte ihn weiter nach Äthiopien (s. Rückumschlag außen). Bezeugt nicht nur durch seine einschlägige Lehrtätigkeit, die Edition und Herausgabe von Sammelwerken und die Organisation mehrerer Konferenzen zu Ehren von Enno Littmann, dem Begründer der modernen Äthiopienforschung, sondern auch durch Initiativen wie die Initiierung der Ausgrabungen am äthio-sabäischen Almaqah-Tempel im tigräischen Wuqro durch das Deutsche Archäologische Institut im Jahre 2008. Unser Jubilar, Enthusiast und Aktionist im positiven Sinne kann es bis heute nicht lassen: gemeinsam mit Paul Yule begann er 2013 eine Ausgrabung in Mifsas Bahri, einem neuen aksumitischen Fundplatz nahe der heutigen Hauptstadt von Tigray. Und auch hier engagiert er sich wieder für den Erhalt und die Förderung des Kulturerbes: Er ist aktiver Mitbegründer der Berliner „Gesellschaft zur Förderung der Museen in Äthiopien“, deren erstes großes Ziel bald erreicht sein wird – der Neubau und die Ausstattung eines archäologischen Museums in der Stadt Wuqro (s. Rückumschlag innen).

Mit der Überreichung der Festschrift zum 80. Geburtstag am 15. Juli 2014 wollen wir Ihnen Glück wünschen – aber auch Dank aussprechen an Sie als Lehrer, mitunter strengem Vorgesetzten, aber immer wohlmeinenden Kollegen!

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