

# HMS NEWS

Historical Metallurgy Society  
73 Autumn 2009

## Letter from the Chairman

It is now some 16 months since I last wrote "letter from the Chairman"- and it has been a very busy period for the Society. In that last letter, I described the changes that were being made to the committee structure of HMS. Those changes are now well bedded-in and the Society has moved forward rapidly, particularly in the way it handles the archives and collections for which it is responsible.

The last year has also been a productive one in terms of the activities organised by the society, with the "Research In Progress 08" meeting in Cardiff in November, the "Urban Archaeometallurgy" meeting at UCL in February, "Fe09" at Coalbrookdale in June and, as I write this, the next meeting (which combines "Research in Progress 09" with a celebration of Gerry McDonnell's time in Bradford University) is only a few days away. This has been an exciting year for the academic profile of the Society. The major conferences have, however, imposed a slightly unusual timetable on the Society, with the AGM being held to coincide with "Fe09" and the Annual Conference effectively subsumed by "Fe09" too. In the coming year, the 2010 Annual Conference, an exciting meeting focused on experimental archaeometallurgy at West Dean, is also somewhat of a departure from tradition. Because of this, we hope to redress the balance with the 2010 Spring Meeting (including the AGM), to be held in Cumbria in May, which will be organised along the lines of our traditional annual conference with plenty of field excursions. More details of this will be circulated soon.

The year has also been a good one for the Society's publications, with some excellent issues of Historical Metallurgy, together with the launch of "Metals And Metalworking: A Research Framework For Archaeometallurgy". Following the completion of this important volume, the Archaeology Committee is now turning its attention to a major overhaul of the "Archaeology Datasheets".

Another aspect of the recent work of the Society has been the preparation of responses to two significant government consultations: those on the National Heritage Science Strategy and on the draft planning policy document PPS15 (Planning Policy Statement 15), a key element of the on-going revision of heritage protection. I see the involvement of HMS in these consultations as a healthy sign of the maturity and self-confidence of the Society today, whilst also reflecting similar priorities to those inherent in the original foundation of HMS.

All this activity, however, relies on the energy of those who give their time so generously to the Society. The more we undertake, the more we need to share the workload between,

and benefit from the experience of, a larger number of people. We would welcome anyone who would like to contribute to the life of HMS through participation in its committees. At present, I would particularly encourage anyone who feels strongly about the preservation of knowledge concerning the recent metals industries to become involved with the developing "History and Recent Metals Committee", which will be coordinating the Society's activities in this area. I would also welcome anyone who feels they could play a role in developing the Society's meetings programme; a broader representation of the membership of the Society on the "Membership, Programme and Promotions Committee" would be of enormous benefit to all. We are now finding that much committee business is being conducted electronically, so contributing to a Society committee does not even necessarily mean attending meetings! Any offers of help will be gratefully received; just let me know. The next 12 months are going to be even more exciting than the last!

Tim Young, [Tim.Young@geoarch.co.uk](mailto:Tim.Young@geoarch.co.uk)

## Wealden Iron Research Group

Volume 29 (Second series) of the Group's annual Bulletin of research is dominated this year by an edition, with introduction, of the correspondence between John Legas and Samuel Remnant during the late 1740s. They were appointed trustees of the estate of William Harrison, the ironmonger and gunfounder, with whom Legas was partner. The correspondence, which includes letters from some of Legas's associates, deals with the management of the partnership's ironworks in Sussex and Surrey. It includes references to the casting, transport and proving of cannon, and the production of round shot. The use made of the collection of Land Tax to provide short-term liquidity is referred to in several letters. A brief mention of a dispute over another partnership in which Harrison was involved throws light on his wider activities in connection with iron supply in north-east England. Contemporary with the better-known Fuller letters, which were published by the Sussex Record Society in an edition by David Crossley and Richard Saville, in 1991, the Legas-Remnant letters are complementary in that they reveal a more mercantile perspective on the ordnance trade.

The discovery of six new bloomery sites is the subject of short notes, in addition to an article on recent fieldwork in the Kentish low Weald. Another article outlines the discovery of bloomery slag in the site of the 13th century Newark Priory at Ripley, in Surrey.

Jeremy Hodkinson.

The next edition of the HMS Newsletter will be published in March 2010. Contributions are welcome and should be emailed to [r.doonan@sheffield.ac.uk](mailto:r.doonan@sheffield.ac.uk) by 21st February 2010.

# A Celebration of Irons! Their Production and Use

Conference Review: *The Finds Research Group AD700–1700*  
Lincoln, Saturday 24th October 2009.

The Finds Research Group AD700–1700 put on an excellent one-day conference at Lincoln's 'The Collection' devoted entirely to iron. Conference presentations were in The Collection's plush lecture theatre with displays of iron, slag and publications in an adjoining space.

Gerry McDonnell began with a thought provoking example of how iron might have a significant impact on aspects of history beyond technology. The sea voyages made by the Vikings from the 9th century onwards and the expansion of the medieval cod-fishing industry have long been noted as important historical phenomena but Gerry pointed out that both were dependent on the production of good quality iron that could survive in the cold waters of the Atlantic. In discussing the underlying concepts in the production and use of iron, he stressed that many typologies for furnaces were problematic because so little of the superstructure survives. Gerry took the opportunity to bemoan the fact that most archaeological excavations led to different types of iron-working evidence being split up and distributed to different specialists. A clear picture of metalworking from archaeological evidence was only possible if all forms of evidence were studied together. The smelters' refined product comprised simple bars of iron and Gerry made a plea for archaeologists to pay more attention to this crucial material. Unfortunately these bars often looked simply like large nails which have lost their heads and so are not always identified properly. Gerry suggested that archaeologists and archaeometallurgists were too keen on the idea of recycling metal; maybe recycling was the exception rather than the rule. In reporting recent research into an examination of the wear on iron knives he showed that fewer knives used in the Roman period were re-sharpened (and they were presumably less used) than those of later periods. Gerry reported on Tony Swiss's examination of the iron tyres from the Ferry Fryston chariot burial. An analysis of one of the tyres revealed that the slag inclusions contained widely varying proportions of iron oxide, iron silicate and glassy matrix. This was interpreted as evidence that the iron was produced by welding together different sorts of iron (from different geographical sources). There was, unfortunately, no data on the chemical composition of the slag inclusions, and in particular of the glassy matrix.

One of the most interesting aspects of Gerry's presentation was his theory that the much early iron smelting has been misunderstood. For perhaps a century or more, it has been widely accepted that early iron was produced by a *direct process*, that is, the iron ore was reduced to metallic iron at a temperature below its melting point to form a bloom. This contrasts with the *indirect process* in which iron ore is reduced to metallic iron (strictly speaking an iron-carbon alloy) above its melting temperature. The product of the *indirect process* is brittle cast iron which needs to be refined to yield a malleable form of iron. Most historians and archaeologists of metallurgy have accepted the paradigm that the only process in use in Britain until the end of the 15th century was the *direct process*. Gerry, however, argues that a sort of *indirect process* was regularly carried out well before the 15th century and is sceptical about the bloomery process as a model for early iron manufacture.

Hector Cole gave a fascinating talk which reflected on the lessons he had learnt during the manufacture of pattern-welded swords. His approach was craft-based and he was working all the way from bloom to finished sword — a mammoth undertaking!



*Hector Cole at work*

The bloom was consolidated to remove slag and produce thick short bars which were then drawn down into long thin bars similar to the many examples of trade iron. He then welded together alternate strips of low carbon steel and phosphoric iron. This mass was then drawn down again and twisted (no more than three-and-a-half twists per inch or the metal would tear). The twisted bar was then squared down and two steel strips welded on to form the cutting edges. The processes of manufacture were made clear through the part-made examples that Hector had made and which were passed around the audience during his talk. These were both instructive and beautiful. Hector stressed that the manufacture of a pattern-welded sword represented a considerable amount of time and that the loss of iron as hammerscale during the process was also considerable.



*Hector persevering in the rain*

Hector also reported that some of the hammerscale appeared to retain some of the pattern from the surface of the pattern-welded bar/sword.

Hector continued with a report on his experiences with manufacturing pattern-welded spears; while pattern welding might give greater strength with flexibility to a sword it is not immediately apparent what functional benefit pattern welding would give to a spear. He suggested that perhaps the main purpose of pattern welding was to give status to an object and its owner.

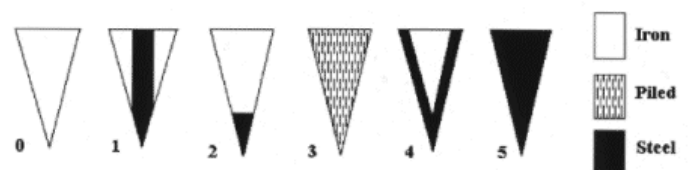
Sarah Paynter provided a thorough review of bloomery (i.e. *direct*) iron smelting which included a careful description of the process, residues and related structures. The clear description of the residues was supplemented and complemented by the range of different types of slag that Sarah had brought and displayed. Sarah argued powerfully that historic iron manufacture was spread widely across England and that small outcrops of rather rich ores (such as bog ores) would have been available in most areas, including those not famed for their ironworking (such as the Thames valley). Sarah argued that, while furnace superstructure is rarely well preserved, some of the general form of the furnace and the way in which it was used could be deduced from the form of the associated smelting slag. Tap slag is commonly found in large quantities on Roman and medieval smelting sites and indicates that furnaces would have been provided with an opening close to the base which would periodically allow slag to flow out of the furnace. Some medieval iron smelting sites, however, produce little or no tap slag but do have large plano-convex lumps of slags. These so-called furnace bottoms represent slag which has collected in a pit at the base of the smelting furnace proper. Initially such pits would be filled with wood or other organic material which during the smelting process would gradually burn out and be replaced by slag. While such a slag-pit furnace might need less management during the smelting process, its use was of course limited by the fact that once the pit was full of slag the furnace could no longer be used. Sarah also provided a clear account of other issues relevant to the archaeological investigation of ironworking, such as common types of residue (including smithing slags and hammerscale), types of iron alloys (plain iron, steel and phosphoric iron), and the archaeology of workshops. Sarah ended with a slide showing the enormous quantities of charcoal used during experimental iron smelting and smithing. One of Peter Crew's smelts had used 28kg of charcoal and 7.6kg of ore to produce a 1.7kg bloom. This bloom was then smithed (using a further 10kg of charcoal) into a 0.9kg bar — given the amount of charcoal used in its production iron was a valuable metal.

Peter King gave a paper on iron production in the two centuries after the introduction of the blast furnace. Peter explored the sorts of ores used in this period (haematite, limonite, siderite, magnetite, etc) some of which were associated with particular production areas (such as the Forest of Dean or Cumbria). This had led to the identification of particular iron alloys with particular regions. The siderite ores of much of Britain tended to contain phosphorus which then found its way into the smelted metal but this meant that the smelted bar iron was cold short, i.e. brittle at room temperature. Peter described the various furnaces and hearths used in the manufacture of pig and bar iron which were part of blast furnace iron smelting from 1490 onwards. He pointed out that the introduction of the blast furnace occurred rather slowly: during the first fifty years. Peter also stressed that some *direct* (bloom) iron smelting manufacture continued in Britain until the 18th century. This was in part because, although blast furnaces allowed the production of large quantities of iron, most demand was for malleable iron. It was possible that some bloomery iron was produced under suitable conditions for the bloom to be carburised. From the early 17th century onwards, however, steel could be produced in large quantities through the use of specialised cementation furnaces. Such cementation was only successful if the bar iron was virtually free of phosphorus and so cementation steel initially used Forest of Dean iron and later Swedish iron.

David Starley picked up on such issues and asked whether it was possible to distinguish between malleable iron produced by the *direct* and *indirect* processes. David had examined the microstructure and composition of late medieval iron and concluded that both processes produced iron that was heterogeneous with few, if any, systematic differences. However the chemical composition of slag inclusions offers some hope for distinguishing processes. Whilst David's research had so far not shown clear results that could be linked to the direct or indirect processes, recent research in France seems to have succeeded in this respect.

Eleanor Blakelock presented results of her on-going PhD research into the metallurgy of Anglo-Saxon iron knives. Eleanor gave an elegant introduction to the complexities of knife typology, blacksmithing techniques and the metallographic techniques used to investigate these artefacts. While acknowledging the useful role that can be played by the use of X-radiography in identifying some aspects of the manufacture of iron, Eleanor stressed that this was no substitute for the metallographic examination of artefacts. An impassioned plea for more metallographic examination of iron artefacts was made not simply because of the valuable information that it can provide about blacksmithing but because of the nature of archaeological iron. It is clear that even under the best storage conditions some archaeological iron continues to corrode after excavation and in extreme cases all metal can be lost within a few decades.

Anglo-Saxon iron knives have been studied from and settlements. Eleanor showed how most of the knives from middle Anglo-Saxon urban settlements were type 2 knives (see figure) while those from early Anglo-Saxon cemeteries showed a much wider range of fabrication techniques. Eleanor proposed possible theories: either differences between urban and rural smithing, changes between early and middle Anglo-Saxon smithing traditions, or were knives specifically made for the grave? Examination of iron knives from two rural middle Anglo-Saxon settlements (Burdale and Wharam Percy) found that there are broad similarities between knives from urban and rural settlements. Nevertheless, there seems to be more use of phosphoric iron at rural settlements whilst urban settlements showed more use of heat treatments.



David Starley gave a second presentation at the end of the day in which he examined the metallography of Anglo-Saxon weapons. This period is well known among metallographers for the high quality of both the iron itself and the ways in which it was smithed, including welding steel cutting edges on to iron objects as well as the quenching and tempering of steel to achieve optimum physical conditions. David's examination of spearheads from Anglo-Saxon burials, however, shows that very few of these made use of the high quality metal and smithing technology that was clearly available. David suggested that the weapons in burials may not have been a straight-forward reflection of the weapons that were used in life. It is possible that some iron artefacts were made specifically for burial and that these could have been symbolic weapons in which their form rather than their substance was seen as important.

David Dungworth

## BUMA VII

*Conference Review: Bangalore, 13-17th September 2009*

Hosted in East Asia since its Beijing inauguration in 1981, for 2009 the *Beginnings of the Use of Metals and Alloys* made its first visit to South Asia. From the 13<sup>th</sup> to 17<sup>th</sup> September, 110 delegates from 17 countries descended upon the Karnatakan capital city of Bangalore, home of the National Institute of Advanced Studies (NIAS). The BUMA VII organisers, Professor S. Ranganathan and Dr S. Srinivasan, combined efficiency and, more importantly, outstanding hospitality in their execution of an excellent conference, ably supported by the students and staff of NIAS. Not only were the participants treated to 57 oral presentations over 12 themed panels and a well-attended poster session, but we were repeatedly regaled with performances of South Indian dance and music, both exhilarating and moving. On the gastronomic front, the flow of local and regional delicacies continued unabated throughout the meeting, and was complemented by the notable produce of Karnataka's upcoming vintners.

In the BUMA spirit of international collaboration, Professor Kathryn Linduff (U Pittsburgh) opened the conference by borrowing a Chinese colleague's glasses, before delivering a review of the prehistoric metallurgical evidence in Western China, Mongolia, and Southern Siberia, and offering her latest thinking on the nuances of potential transmissions of metallurgical knowledge between prehistoric social groups in this intriguing region. Professor Jianjun Mei (USTB) and colleagues added to this debate with further data from Xinjiang Province, and the rest of the 18 strong Chinese delegation provided numerous fascinating case studies from around China. Xiuzhen Janice Li's (UCL) GIS-based technological analysis of the 40,000 bronze artefacts interred with the Terracotta Warriors is providing remarkable insights in to the organisation of metallurgical production at the Qin dynasty imperial capital of Xian. Moving away from the Central Plains, research being conducted by Kunlong Chen (USTB) *et al.* on Shang metallurgy in Shaanxi Province is revealing significant local variation in alloy compositions and founding techniques, potentially opening a window on the nature of Shang imperial influence on its periphery. From the Chinese frontier, Yali Yun (USTB) at the Warring States copper smelting and casting site of Hejiashan in Yunnan Province and Dr Quansheng Huang (U Guangxi) at the Song Dynasty iron smelting sites of Long'an in Guangxi Province are both investigating potential technological relationships with neighbouring regions outside of China. In the interests of rewarding international discourse, I found it extremely promising that Chinese archaeometallurgists are increasingly 'looking South' to consider trans-regional social interactions, complementing recent perspectives 'looking North' from Southeast Asianists Ciarla, Hamilton, Higham, Pigott, and White.

Being in South Asia, there were of course a large number of papers on the region's remarkable technological achievements with crucible steel, with noteworthy contributions from Dr S. Jaikishan (SLNSA Oriental Degree College) reporting a survey of dozens of crucible-rich sites around Telangana, and Dr N. V. Ravikumar (IIT, Madras) and colleagues presenting the Iron Age Karnatakan steel production site of Banahalli, and Dr Gill Juleff (U Exeter) on c. 300-1250 CE Sri Lankan production at Hattota Amune. The latest results of a multiple analytical tech-

nique approach to the composition and fabrication of the enigmatic Delhi Iron Pillar were delivered by Dr U. Kamachi Mudali, Dr Baldev Raj and colleagues from the Indira Gandhi Centre for Atomic Research. Dr Brian Gilmour (U Oxford) presented a recently re-discovered 9<sup>th</sup> century CE manuscript by the Iraqi scholar Ya'cūb al-Kindī on crucible steel recipes and, from the consumer perspective, Dr Alan Williams' (Wallace Collection) metallographic analyses of inscribed medieval swords has led him to suggest that that Viking traders may have been trading steel ingots up the Volga from the Black Sea to Sweden to produce top quality swords for the European market. The other base metals were well covered with contributions from Susan La Niece and Paul Craddock (British Museum), David Bourgarit (C2RMF), and Arun Kumar Biswas (Kolkata) on zinc, and Prabhakar Upadhyay (Banaras Hindu University) who is reappraising the potential for ancient South Asian tin producers. Precious metals were covered by Alessandra Giumia-Mair (AGM Archeoanalisi) with a study of a Hunnic gold assemblage from Hungary, and A.E. Geçkinli (Istanbul Technical University) presenting research on Sardis' famous gold source, the Pactolus River. There were also very promising bronze-based programmes of archaeometallurgical research from Brett Hoffman (U Wisconsin-Madison) at Harappa, Pakistan, Erez Ben-Yosef (U Cal San Diego) at Feinan, Jordan, and Brice Vincent (Paris III, Sorbonne Nouvelle) from the collections of the Phnom Penh National Museum in Cambodia. It should also be recorded that in his ongoing attempt to reconstruct Egyptian Old Kingdom copper-base founding techniques, Professor Christopher Davey (La Trobe) publicly promised to pick up his hot experimental crucibles with only clay pads to protect his hands - we await the images with macabre anticipation. If Professor Maddin had the honour of being the senior delegate, the junior role went to Joana Pereira, 6 month old daughter of Maria João Furtado (Instituto Tecnológico e Nuclear de Portugal) who presented a technological analysis of late Imperial Chinese brass coins.

Dr Xander Veldhuijzen presented the latest evidence from Tell Hammeh, Jordan, with an iron smelting furnace excavated this summer and dated to 930 CalBC - making it both the earliest and first ferrous primary production installation in the Near East. However, my personal highlight of BUMA VII had to be Dr Nils Anfinset's (U Bergen) presentation of traditional copper sulphide mining, smelting, and icon casting in Nepal. Not only has Dr Anfinset recorded a highly detailed and near complete *chaîne opératoire* of a socially and technically highly complex metallurgical tradition, he has also provided one of the vanishingly rare non-ferrous ethnoarchaeological case studies. Dr Anfinset intends to return to the field and it will be fascinating to discover whether the Nepalese technological tradition has any significant time depth or if it is a relatively modern economic response.

During the closing session we witnessed the BUMA chairmanship pass after 28 years of service from co-founders Professor Robert Maddin (U Penn) and Professor Tsun Ko (USTB, who unfortunately was unable to join us) to Professor Mei Jianjun and Professor Thilo Rehren. As many of the delegates departed for a tour of nearby Mysore, the exhaustive efforts of Professor Ranganathan and Dr Srinivasan were realised in full and BUMA VII can be considered a huge success. BUMA VIII is scheduled for 2013 in Japan under the direction of Professor Kazuhiro Nagata (Inst. of Tech., Tokyo).

T. O. Pryce

# Finding the Familiar

## Dealing with artefacts of the Modern Age

Workshop Report: Sheffield, 9th May 2009

The United Kingdom-based Finds Research Group (FRG) held a workshop entitled “Finding the Familiar: Dealing with artefacts of the Modern Age.” The workshop was intended to provide British researchers with an introduction to the material culture of the more recent past, particularly those of the 19th and early 20th centuries. While artefacts of the last couple of centuries have not traditionally been a focus for analysis in the United Kingdom, the growing quantities of material culture being excavated and kept – particularly from urban sites – as a result of developer-funded archaeology are increasingly forcing British archaeologists to pay closer attention to the period. The workshop was organized by Claire Coulter of ARCUS, and was attended by people from a broad spectrum of archaeological and historical interests, including field archaeologists, buildings archaeologists, collectors, post-excavation managers, and museum professionals. The wide range of attendees was encouraging and highlighted the interest in modern archaeological research.

The first part of the day consisted of a number of short, thought-provoking presentations. The first presentation was given by Dr. Alasdair Brooks of Leicester University. Alasdair used a case study on 18th- and 19th-century pottery recovered from Huntingdon, Cambridgeshire to highlight the fact that there is a large gap in the knowledge of material culture of this date in British archaeology compared to Australia and North America, something which he noted was ironic given that much of this material culture was actually manufactured in the United Kingdom.

This gap in knowledge was again highlighted by Linzi Harvey, of ARCUS, and Marit Gaimster, of Pre-Construct Archaeology. Both spoke from the point of view of commercial post-excavation and highlighted the fact that there are many types of more modern artefacts that British researchers sometimes struggle to recognize. Due to the lack of British-focused archaeological publications for this type of artifact, we often have to look toward the internet for the websites of amateur enthusiasts. Marit backed up this point by discussing case studies from recent excavations of modern sites in London. As sites of a later date are being excavated more often due to redevelopment of industrial areas, there is a need to better understand the artifacts for the interpretation of the sites.

Lance Mytton provided an informative talk on the history of British bottle manufacture from a collector’s perspective. Eddie Birch of the Historical Metallurgical Society introduced the workshop to the United Kingdom’s National Slag Collection, and made it known that the collection has recently undergone some redevelopment. The collection holds samples from over 200 sites; these are available by appointment for those wishing to undertake metallurgical analysis of industrial residues. Joan Unwin, archivist for the Company of Cutlers in Hallamshire, discussed the use of bone in Sheffield’s once-thriving cutlery industry. Oliver Jessop, also of ARCUS, used a talk on paper archives to highlight the problem of archive storage and curation in commercial archaeology. Pauline Webb of the Science and Industry Museum, Manchester, spoke from the point of view of museums that specialize in material from the modern period and their importance in understanding a local past.

The final session of the day featured a discussion chaired by Sarah May of English Heritage, in which those present discussed the possibilities of setting up a British research group for the material culture of the modern period. During this talk, it became clear that a research group encompassing all aspects of modern archaeology – buildings, finds, and technology – was needed due to the increasing number of excavations and surveys focussing on the more recent past. It was suggested that a list be made up of groups and individuals with relevant specialisms, so that they can be contacted as a point of reference, and the development of an online forum for this purpose was proposed. It was largely agreed that, in the first instance, the new group should be developed under the auspices of the already-established FRG to prevent disciplinary fragmentation and to help sustain membership of and interest in the group. A small core working group has been created to look at the practicalities of developing such a research group in conjunction with the FRG.

For more information on the new research group (which still lacks a name), please contact Claire Coulter, Julie Cassidy <JuCassidy@northamptonshire.gov.uk> or Alasdair Brooks <amb72@le.ac.uk>

Julie Cassidy

## Rehabilitating Artefact Studies

Ten years ago when Gill Chitty reported to EH on the state of artefact studies she noted that “*A shortage of trained specialist professionals and a serious loss to research scholarship is being anticipated*”, five years later Colin Haselgrove writing for the Iron Age research seminar stated that “*the supply of future specialists is a major problem*” since “*Material culture no longer figures strongly in undergraduate teaching and there are few MA courses in artefact studies.*”. It must then come as good news for the community that after more than two decades of landscape-based studies dominating archaeological research agendas there seems to be increasing evidence for the academic community rehabilitating artefact studies. Whilst some institutions, notably London and Sheffield have always maintained a commitment to material culture studies, there are many more departments now convening research groups and providing post-graduate courses in this area. Recently Leicester University has teamed up with Exeter and Glasgow to launch the Tracing Networks project which investigates Craft Traditions in the Ancient Mediterranean and Beyond. Newcastle University has also opened The Centre for Interdisciplinary Artefact Studies which aims to develop existing programmes and the construction of specialised new offerings, in high demand low-supply fields, such as ceramic petrology. Although such initiatives must be considered positive it remains to be seen how commercial archaeology will fare in this area in light of the drastic loss of skilled staff over the last year as many units have closed because of the halt in construction projects. The drastic downturn in commercial work has resulted in ARCUS (The University of Sheffield’s Unit) closing, a unit which has been instrumental in developing methods for the evaluation and excavation of the historic metal industries.

Roger Doonan

# “Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC”

A conference in honour of James D. Muhly

*Conference Review: Archaeological Research Unit, University of Cyprus  
Nicosia, 10th-11th October 2009.*



*Prof Muhly with an ingot of Cypriot copper presented to him at the conference.*

Last month saw a weekend conference to celebrate the Prof James Muhly honorary doctorate by the University of Cyprus. Prof Muhly's role in the understanding of ancient metallurgy in the Aegean and Eastern Mediterranean has been immense and the conference proved to be an appropriate acknowledgment of his contribution to this field. In his acceptance speech Prof Muhly drew the audiences attention to his scholarly hero, Eratosthenes. We were told that Eratosthenes excelled in no particular area, although the librarian of Alexandria and despite having calculated the perimeter of the earth to within 1%, he was considered second best at many things and often scorned by later writers. However, Prof Muhly emphasised that for him, the great thing about Eratosthenes was that he had a wide command of many subjects, something we lack in today's world of specialisation. The introduction of such a scholarly figure soon proved to have been perfectly judged as many of the best papers presented were the ones where speakers had attempted to develop ideas well beyond Archaeometallurgy.

The Saturday morning commenced with a very spritely Bob Maddin reflecting on his and Prof Muhly's time together on various projects. The theme which emerged was that of two enthusiastic scholars who travelled throughout the Mediterranean in their investigation of early metals and whilst they defined new research programmes they seemed to have consumed a pleasing amount of good food and wine! The first formal paper presented was by Geologist George Constantinou who provided a very useful geological context for the subsequent papers. This was followed by Bernie Knapp who reviewed the variety of archaeological and archaeometallurgical evidence and identified the key issues which remain to be resolved in LBA studies of the region. The first site specific paper was given by Maria Belgiorno who presented the evidence from Pyrgos/Mavrorachi. This remarkable site has beautifully preserved evidence for a range of industries including copper production. However, a clear model for production did not emerge from the presentation and the contentious claim made that copper was smelted using olive oil as a fuel. This aspect is sure to

stimulate much heated debate in the future. Papers from Alison South and Gerald Cadogan et al. maintained a Cypriot theme and discussed the nearby sites of Maroni-Vournes and Kalavassos. What is clear about the evidence from these sites is that copper smelting does not seem to have been carried out at a particularly intense scale. It certainly contrasts sharply with the smelting workshop at Politiko excavated by Lina Kassianidou. It is possible that different scales of production were practiced across Cyprus with Cadogan et al. suggesting that metallurgy at Maroni-Vournes seems to have been performed with a complete disregard for economic rationality.

Noel Gale presented his latest thoughts on the lead isotope analyses of copper Oxhide ingots. In defending the ability of LIA to discriminate different copper deposits he highlighted the curious situation where artefacts seem to derive from a range of Cypriot deposits yet ox-hide ingots from post 1400BC contexts seem to come almost exclusively from one mine, Apliki in the Northern Troodos. Conference organiser, Lina Kassianidou, continued the session with a detailed discussion of the early metalworking evidence from Enkomi. The results suggested that in the earlier phases metallurgy was centred on refining and casting. The afternoon session was concluded with talks by Phil Betancourt who examined the metal-based relations between Crete and Cyprus and Nota Dimopoulou who examined the extensive evidence for bronze smithing at Poros, the harbour town to Knossos.

Sunday morning began with Fulvia Lo Schiavo presenting her all but published volume on Oxhide ingots and demonstrating the utility of an ingot database that will be available online. Anthony Harding began the discussions beyond the Mediterranean with a review of the Cypriot artefacts which have been discovered in NW Europe. Whilst many of these artefacts have often been ignored he was keen to indicate that many do appear to be the result of extensive exchange networks. Aslihan Yener updated the conference on excavations at Tell Atchana and situated these preliminary results within a trans-regional context. It was clear that this project will provide significant insights in the years ahead into resource perception and exploitation across the region. Edgar Pusch presented evidence for industrial scale melting batteries from Pi-ramesse, Egypt which form part of a high temperature workshop complex which extends over approximately 30,000sqm. The conference was concluded by two excellent papers which further moved the subject of debate through time and space with Vince Piggott discussing transmission models for metallurgy in SE Asia (another interest of Prof Muhly in light of tin metallurgy) and finally Xander Veldhuijzen who discussed the coming of Iron based on recent work at Tell Hammeh in Jordan which has provided actual production evidence dating to 930CalBC.

The conference was remarkable for the wide ranging implications of the papers and the efforts which the speakers had expended in ensuring a rewarding experience for all. At such an event it would have been easy for most scholars to have presented solid but unremarkable papers. The opposite was true, the combination of work in progress coupled with daring interpretations gave the conference a dynamic atmosphere. It was no doubt a recognition amongst the delegates that Prof James Muhly is a special kind of scholar and rightfully deserving of such efforts. Whilst the subject of the conference was “Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC” it could not be considered relevant only for the specialist. The far reaching implications of Archaeometallurgy for Mediterranean archaeology were something that I feel Eratosthenes would have been proud.

## In the news

### Rare Forge

**A 19th Century wheelwright and blacksmith's workshop which won a BBC restoration show has secured planning permission.** Chedham's Yard, which won Restoration Village in 2006, is due to become a visitor and education centre in 2010 at the site in Wellesbourne, Warwickshire. Work will cost more than £1m, with 75% of the money coming from the Heritage Lottery Fund.

The forge closed in 1965 and remarkably has been owned and run by seven generations of the Chedham family. The site is due to open in the half-term holiday in October 2010 and is expected to be fully open in the spring of 2011. The yard is an "outstanding example of traditional working methods and tools", according to the parish council, which owns the site. The existing three buildings will have "minimal restoration" and another small building will be built.

See <http://www.chedhamsyard.org.uk> for more details

### Metal detecting

**Some stunning metal detector finds have made the headlines in the last few months.** The first, a significant Anglo-Saxon hoard from Staffordshire comprised almost 1800 artefacts including a cheek flap from a helmet, dozens of pommels and hilt decorations from swords, and a cryptic inscription from the Bible on a strip of gold. Whilst the number and range of objects was stunning the sheer quantity of precious metal amazed museum staff, some 5kg of Gold was accompanied by 2.5kg of Silver. The role of metal detecting has been acknowledged by experts who have stated that this particular hoard is likely to "rewrite the history of Anglo-Saxon Britain". The finding of the Staffordshire hoard is one in the line of many for metal detectorists, since 1988 well over two-thirds of all Anglo-Saxon, medieval and post-medieval metal artefacts seen by the British Museum through treasure trove procedures have been from metal detector finds. In regards to this hoard the treasure valuation committee has recently met and after some deliberation valued the hoard at £3.3M.

The second hoard to make the headlines was found near Sterling in Scotland. The discovery was made by a novice detectorist on his first outing! This find was made up of four gold torcs. Two of the set are ribbon torcs, twisted carefully from sheet gold with flattened ends and most likely Scottish or Irish in origin. Fragments of one torc appear to be from a French-style annular torc, which would have been an enclosed circle with a hinge and catch. However the piece which has caused the most excitement is a looped terminal torc with decorative ends, made from eight golden wires which have been looped together and decorated with thin threads and chains. Preliminary assessment of the hoard suggests that it dates to between 300 and 100 BC. The find was reported to the Museum of Scotland and the museum's principal Iron Age and Roman curator, Dr Fraser Hunter, was one of the first on the scene. An excavation of the area surrounding the location where the cache was found discovered remnants of a wooden roundhouse, suggesting the possibility that the artefacts may well have been associated

with an undisturbed archaeological context. It is likely that they were either buried for safekeeping, or part of a votive offering. Like the Staffordshire hoard the importance of this find has been emphasised by museum experts, 'This will revolutionise the way Scotland's ancient inhabitants are viewed - it shows they were much less isolated than previously believed.', said Dr Fraser Hunter. He added that the craftsmanship of one of the looped terminal torcs showed it was made by a smith who had learned his craft in the Mediterranean but had combined it with local style. The hoard is yet to be formally valued but is expected to be priced at around £1M.

Common to both these hoards are the rich rewards given to detectorists, the importance attached to the finds by experts and the attention given by the media to the 'reward' itself. Some archaeologists fear that we may be on the cusp of a metal detecting 'craze' which could increase illegal detecting and night hawking. Already in the run-up to Christmas, some High Street retailers, such as Maplin, have even placed enticing displays of coins, brooches and other finds next to their detectors. Whilst this might be good for business it has irked some archaeologists. One Sheffield-based archaeologist who was recently made redundant said "I've worked for a pittance for years and now I find myself unemployed. Seeing metal-detectorists clean-up like this makes you want to join them but something about it feels wrong. Being a keen football fan I pay for my hobby to be policed yet they pay nothing and reap big rewards". The distribution of funds does seem to be skewed in favour of the finders with no responsibility for dealing with the aftermath of the discoveries. After the discovery of a rare hoard of prehistoric bronze axeheads in Cornwall, the finders and landowner received £8,500 under the Treasure Act. But money for writing up the excavation, and for analysis and display of the hoard, is still being sought. Jane Marley says there is a need for "a grant fund for the conservation, analysis and publication of treasure finds".

In light of the current interest in metal detecting it is particularly timely that the BBC have screened an episode of Inside Out which profiles the life of Night hawkers. It is good to see the BBC addressing these significant yet often unacknowledged problems with our national heritage. Some detectorists are becoming more strategic and determined to locate significant deposits. There are reports of University Archaeology departments admitting students keen on honing their archaeological skills to improve their detecting and some departments have already developed protocols for archaeology students who 'happen' to be metal detectorists. In addition to the prospect of a metal-detecting craze and the ever-present issue of night-hawks, there are now even private companies who are offering metal detecting "vacations" to overseas guests. Whilst such activities are undertaken within the remit of the law they are unlikely to result in the reporting of all finds and there is a real sense of a limited resource being over-exploited. The relationship between archaeology and metal detectorists has been characterised by tension and often a reticence to speak out amongst archaeologists for fear of litigation by the detecting community. The recent headline making cases and the growing concern amongst the archaeological community might suggest a review of the practice is timely. Many in the archaeological community feel that if metal detecting has come of age and wishes to be considered a serious hobby they it must be seen to account for itself financially as well as ethically.

Roger Doonan

## Obituary

### Michael Davies-Shiel



Mike Davies-Shiel, a long-time member of the Historical Metallurgy Society and well-regarded researcher of the industrial history of the Lake District, died on 15 July 2009 at the age of 80.

He was born on the Wirral and annual holidays in Wales, followed by wartime evacuation to mid-Wales, engendered in him a life-long love of mountains. He graduated in Geology from Birmingham University before National Service in the Army Education Corps. In 1953 he was appointed Geography Master at Windermere Grammar School for Boys, and after its closure joined the new Lakes Comprehensive School at Troutbeck Bridge. He remained there until early retirement in 1986, following a disabling stroke but gradually made a substantial recovery.

I was a pupil at Windermere Grammar School when he arrived, and quickly discovered that this bright young teacher shared my budding interest in the geology and mineralogy of the Lake District. I shall ever be grateful to Mike for his enthusiastic support and encouragement which set me on the path to my chosen career as a metallurgist.

Mike was an intrepid field-walker and, in the course of his investigations, visited almost every part of Cumbria, noticing with the keen eye of a trained geologist traces of many industries. An early discovery, of which he was very proud, was the famous Neolithic axe factory high on the Langdale Pikes. His find was doubted initially by the experts until he took them up the precipitous scree slopes to see the chippings for themselves. His collection of stone axes and tools has now been donated to Kendal Museum.

He brought two essential talents to industrial archaeology: the patience to winnow out information from old records, and the ability to relate this to what he could see on the ground. The two areas which predominated were iron smelting and water-powered mills, but he also mapped almost every known industrial site in Cumbria for the Sites and Monuments Record.

Mike's published work is comparatively small: four books co-authored with Dr John Marshall, one book of his own, a chapter in another and eight research papers, including two in *Historical Metallurgy*. At his death he was working on two further publications, one on iron smelters and iron processing, the other updating John Somervell's *Water-Power Mills of South Westmorland*.

However he preferred to present his research findings at conferences and public lectures rather than in book form. There were hundreds of these talks, all presented without notes and copiously illustrated from his vast collection of colour slides. Peter Crew remembers with great affection the occasion of the 1985 HMS Cumbria conference at Lancaster: 'Mike and I had the last two ten-minute slots on the Saturday evening and the audience were getting restless and thirsty. Mike had a full carousel of 80 slides and I chided him that it was far too much for 10 minutes. Mike grinned and said "Just you wait". Not only did he manage the slides exactly on time but his commentary, on the last firing of the Backbarrow furnace, was brilliant and very amusing; Mike was a true professional in his favourite field of lecturing.'

Another anecdote from Colin Phillips testifies to the lasting contribution that Michael has made to the study of historical metallurgy. Many of the slag samples held by HMS in the early days and much of the collection belonging to the late Dr Reg Morton, were identified and collected originally by Michael. With the donation of Dr Morton's collection to HMS's National Slag Collection, now housed at Ironbridge, Michael's contribution to the study of historic industry will endure as students and experts utilise this nationally important resource.

Sam Murphy

### HMS spring meeting,

National Museum of Scotland, Edinburgh,  
Saturday 20th March 2010.

The meeting will be on the subject of early Scottish metallurgy (up to c. AD1000).

Offers of papers (along with an abstract) should be sent to Fraser Hunter, National Museum of Scotland, Chamber Street, Edinburgh, EH1 1JF. Email: fjh@nms.ac.uk

While submissions to the Newsletter are welcome at any time, if you want to have something in a specific issue of the newsletter then it needs to be with the editor by the following deadlines.

**1st March, 1st July 1st November**  
Contributions can be sent in any format (hand-written, typed, email, floppy disk, CD-ROM, etc).

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