HMSNEWS
Historical Metallurgy Society

51 Summer Autumn 2002

Forthcoming Events

HMS Annual Conference 13-15 September
based at Seaford for the Weald. Particulars appeared in HMS 50 and in separate leaflet. Organiser Tim Smith, 15 Hazelwood Road Partridge Green, Horsham RH13 8EX Tel (0) 1403 710148.

The **Find Research Group** meeting has been changed to Saturday 19th and Sunday 20th October at the National Museums of Scotland, Edinburgh on Fairs and Markets. Further particulars from Jenny Shiels or Jackie Moran, Medival Dept. National Museums of Scotland, Chambers Street, Edinburgh EH 1JF. Tel 0131 247 4082 Fax: 0131 247 4060. e-mail: j.shiels@nms.ac.uk.

HMS Annual General Meeting 2003 will be held on Saturday 10th May at the Royal Armouries, Leeds. The associated Spring meeting will address research framworks in archaeometallury which the Archaeology Committee of HMS are currently preparing. There will also be an opportunity to visit behind the scenes in the conservation and scientific sections at the Royal Armouries.

HMS Annual Conference 2003 (12-14 September) will be held on **Exmoor**. The focus of the conference will be on metal production landscapes and field visits will include non-ferrous mining and smelting from the late Iron Age to the 19th century. In particular, it is hoped that participants will be shown newly emerging evidence for a significant Roman iron production industry in the area. Further details will be posted in the next newsletter.

Developing technological and material culture in America precolonial and colonial. Symposium to mark the 51st International Congress of Americanist. 14th to 18th of July 2003, Santiago, Chile. This meeting will be co-ordinated by Adrian Angel Pifferetti of the National Technological University of Argmtma and the Dr. Dora Krasnopolsky-Grinberg of the Autonomus National University of Mexico. Conference languages will be in Spanish and English. Contact apiffere@agatha.unr.edu.ar

Report on Spring Meeting.

Return to Coalbrookdale.

I remember the early days at Coalbrookdale when it was little more than an idea to save the ruins of the furnaces, in the mind of **Reg Morton**; when the days of a World Heritage Site for the Valley was far in the future. We would all gather round the **Bedlam furnaces** while Reg Morton held forth on their history and **Keith Gale** explained the intricacies of iron production. They were days to conjure with when Michael Hallett, Douglas Hague, Leo Biek, Kenneth Barraclough, Ronnie Tyiecote, Richard Doncaster and Michael Darby would be of the party and we should all be kept in order by Charles Blick. Happily Michael is still with us and gave the introduction to the proceedings on the Saturday. Our commemoration mugs also mark his birthday which was on Sunday.

There is no doubt that since the early years the emphasis at Coalbrookdale has moved from the industrial to the popular. There are more museums and less accent on the smelting furnaces and blowing engines though it is all still there for the enthusiast metallurgist to discover.

The **Coalport China Museum** and the **Museum of Iron** are major attractions are in their own right and the **Blists's Hill "Victorian Town"** has been much augmented in recent years. The great achievement is that it has been done without degenerating into a Disneyland. It is more a re-creation of the past, and it is well done - the delight is in the detail. In the Victorian shops and working places, moments kept coming back to me from my childhood — little half forgotten things that lingered on into the 1930s; a small handbell on the counter of the restaurant on the first floor of the 'public house' used to call for service — there was a time when no counter was complete without one. The enormous hooves and hairy fetlocks of the carthorses, the fact that shire horses were there at all bringing the streets to life, together with a little group of people on bicycles and two children on penny-farthing cycles, or as my grandfather always referred to them as the high or tall cycles. The costumes were beautifully authentic, there were no artificial fabrics that so often mar re-creations. One did not so much watch the past as become a part of it. Sailors in thick wool uniforms (probably marines as they were armed with swords and water bottles, ready to rush into action in some far flung imperial desert) lent an air of reality as they ordered their tea in the cafe.

Inside the little shops, packed with merchandise, those in charge talked with real knowledge about the stock, the milliners, bakers, butchers, and grocers, and the chemists, selling toilet rolls made by Thomas Crapper! Small dark workshops, lit by gas mantles, showed the making of copper weighing scoops; the manufacture of candles; and plaster casts. What better or pleasanter way for children to learn about social history.

Paul Belford, archaeologist to the Ironbridge Gorge Museum Trust, showed us the Darby furnace and the Coalbrookdale area.

The first lecture session included two talks on the Iron Bridge, one by Shelley White on the comprehensive archaeological survey of the bridge and its abutments, that was commissioned by English Heritage in 1999. The whole bridge being subjected to detailed hand measured and photographic survey which brought to light a number of new discoveries pertaining to the bridge's original construction and casting techniques.

Andrea Parsons spoke of the Coalport bridge some two miles south of the first iron bridge. At first built in wood it was given a fully iron superstructure in 1818. It was built as a Speculative venture by local business men, both design and construction reflecting a low capital provincial exercise without any of the pretensions of its famous forerunner.

Bill Blake of English Heritage described the CAD modelling of the Iron Bridge and explained how the project integrated data from historians, archaeologists, and engineers. The high parity 3D work has set new standards for the documentation of a monument with a world heritage site.

The afternoon sessions on the Saturday took us further afield when **Tom Swailes** (Manchester centre for Civil and Construction Engineering, UMIST) presented a paper on the structural details of a selection of different types of iron framed buildings in Scotland. A Flax Spinning Mill, The Grandholrne Works, in Aberdeen, 1793 with alterations in the 1820s; a conservatory at Fairfield House; A Linen Weaving Factory at Arbroath (1851); The Old Fruit Market, City Halls, Glasgow, built in 1852 and for which the Great Exhibition of 1851 could well have provided inspiration for this building by Robertson and Lister. Gardner's Furniture Warehouse, Jamaica Street, Glasgow (1856) and a Cotton Mill, Anchor Mills, Paisley (1886).

Tom Swailes went on to outline how and what to record in such buildings, combining close-up measured survey work and photography. Touching also on the knowledge and skill needed for interpreting such sites as well as an understanding of the industrial processes and power systems they once contained.

Jonathan Clarke of English Heritage opened up a subject singularly unknown to most of us — Iron buildings in India. He spoke of Watson's Hotel, Esplanade, Bombay (1867–71) and the Civil Secretariat Building in Simla (1896–7), designed by Henry Irwin. These two remarkable fully-framed buildings erected by British engineers, owed much to our own iron-framed mills and breweries, erected for speed and economy, yet contrived by the sophisticated finish and details to integrate with Indian architecture — the cast iron pillars reminiscent of the slender stone columns in the airy halls of Indian architecture.

On Sunday HMS members had the opportunity to watch a live demonstration of Iron rolling at Blist's Hill. The machinery used was rescued from the former Atlas Iron Works at Bolton. Iron billets were reduced to half inch section in a series of heats. It is always impressive to see the red hot iron lengthening in the dim shadows of a rolling mill and for members who had not seen such a demonstration before it was a particularly interesting experience.

The final lecture was on the Iron Bridge by **David de Haan** and it was full of interest. He described how such a careful record has now been made of every part of the structure that in the future the image of the bridge can be brought up on a commuter screen, giving the history of every part — where repairs have been made and how they were made. Many facts unsuspected have been brought to light. One might have supposed that all five arches on each side were exactly the same castings, but this is by no means the case. The bridge may be cast but it was hand made, and as it fitted together parts were made individually to fit the spot required. Abraham Derby III was young and brash and said rashly that if it ran over price he would fund the difference himself. When the making was some three-quarters the way through and the price already some double

the estimate, he began to get worried and to make efforts to lighten the sections to save money.

Although in 1999 the bridge had been up for 200 years and there were masses of illustrations and designs , no one knew for sure how it had been erected. The true breakthrough came after Mr de Haan had lectured to an audience from Finland. In discussions afterwards mention was made to him of a small watercolour, no more than ten inches across in Finland, purporting to show the bridge during erection. At first it looked an unlikely record to produce exact and valuable facts. However although it seemed only to show some three half arches and some poles thrown across the river, when it was studied in detail it turned out to be gold of the highest order.

During the time it was erected there were no abutments. The five cast iron arches on each side of the river are joined in the centre by a Crown bearer, a separate casting of 15ft long. The arches do not form a true semi-circle, if they did they would go much further down in the river.

It took some three months to erect and no scaffolding was used. The decision was made to erect an experimental half size bridge, using Royal Engineers for the work. Since the Coalbrookdale Company had no suitable floor large enough to cast the half arches, the castings were made by a Huddersfield foundry, Downs and Sons. Each half arch weighed just over 1 ton each and were brought down the river on completion. Eight people were used and it was calculated that probably about thirty would have been needed to make the original bridge.

Four poles placed in the river, all leaning slightly inwards were used with block and tackle to raise each half arch into position, when they were joined into the Crown bearer to bring them together by workers sitting on the arches.

Gradually the other parts were riveted in, no two cast junctions were identical but were individually made and hand cut — after all this was the *first* iron bridge. If there were those who were sceptical about the wisdom of an iron bridge they were silenced when a very large flood, some years after its completion, swept away most of the bridges over the River Severn but the iron bridge remained fast — the Darbys were made.

ARCHAEOMETALLURGY

New datasheets available

The Archaeology Committee of HMS has now produced a further 3 sheets:

No. 9 *Excavation and sampling strategies/or metal-working sites*; **No. 15** *The care and curation of metallurgical samples*; **No. 16** *Metal-working evidence and the management of archaeological sites*. These can be downloaded from the Society's web page: **http://hist-met.org** or obtained by sending a stamped addressed envelope to David Starley at the Royal Armouries, Armouries Drive, Leeds LS10 1LT. (A first/second class stamp class stamp should suffice for these 3 sheets but anyone requiring a full set of the sheets should send an A4 envelope with stamps to cover a weight of l00g).

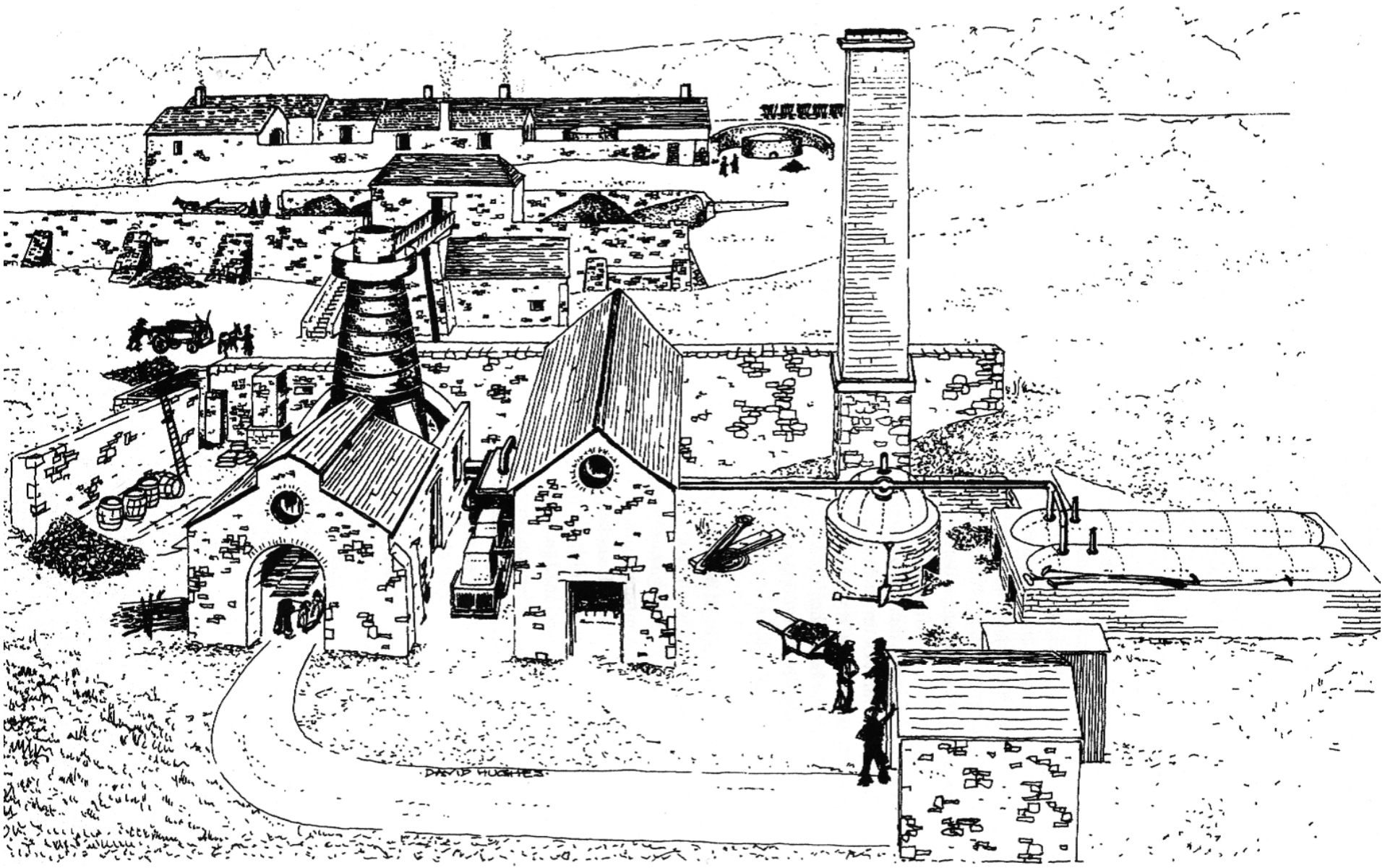
For those who are unaware of **English Heritage's Centre for Archaeology Guidelines**, the issue covering **Archaeometallurgy** is highly recommended. This was based on the text of the HMS datasheets, but has been expanded and illustrated. It is available free of charge from English Heritage Customer Services, National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon, Wiltshire SN2 2GZ. Tel. 01793 414575.

The Mushets' Darkhill Ironworks

A two part report has been written by **Keith Webb** in support of an application to English Heritage to schedule the site of Darkhill Ironworks at Gorsty Knoll, Coleford, Gloucestershire. This Forest of Dean works was founded by David Mushet in 1818/9, but is perhaps best known as the plant at which his son, Robert Mushet conducted his pioneering work on the production of alloy steels. The site was excavated between 1977 and 1979 as part of a Manpower Services job creation scheme, but unfortunately no satisfactory published report resulted from this excavation. The new report aims to draw together information from a variety of sources, into a unified whole.

ILLUSTRATION ON NEXT PAGE

Darkhill Ironworks as envisaged in 1845


DAVID HUGHES

At Darkhill, structural remains survive on three terraces built into the natural hillslope. The upper terrace next to the tramway originally housed the ironworking shops and a brickworks. Later, a forge and foundry were built on top of the remains of the brick drying sheds and it was here that Robert Mushet carried out his experimental work into self-hardening steels. Next down the slope is the middle terrace on which the charge for the blast furnace was stored. Below this, the lower terrace is the site of the blast furnace, the surviving part of which probably dates to the final stages of production. Its final lining, never fired, may have been added immediately prior to attempts to sell the works in 1847.

Keith Webb's report concludes with his view that the Darkhill Iron Works is of both national and international importance and should be given statutory protection. A book by Keith Webb; *Robert Mushet and the Darkhill Ironworks* is published by Black Dwarf Publications, 47-49 High St. Lydney, Gloucestershire.

Medieval Lead Hearths

Bill Bevan of the Peak District National Park Authority Archaeology Service has excavated two lead working sites in the Upper Derwent Valley on behalf of the National Trust. At the first site, in Howden Clough, South Yorkshire, a natural platform-like landslip was used during the early 13th century for lead-melting activities. A simple stone hearth was used, either to produce useable objects from lead pigs or to recycle broken/unwanted objects. The archaeological remains suggest that the site was used for a single lead working event, rather than returned to repeatedly. Parts of two pottery vessels, lead waste and burnt gritstones were discovered within deposits consisting of charcoal fragments, ash and sands. The excavation has been published in the Transactions of the Hunter Archaeological Society, Vol. 20, 1999.

The second site, in Linch Clough, Derbyshire, is still undergoing post-excavation analysis and is yet to be published. At this site, a hearth was built in a 3.5m diameter shallow scoop and was used for smelting lead in the mid-15th century. Structural remains and the slags suggest it was an enclosed hearth with a forced blast, using charcoal for fuel. A narrow channel, partly stone lined and covered, was seemingly used to supply air under the hearth rather than to tap the molten lead. Very little galena was found, but it is presently unclear whether it was used for smelting ore or re-smelting slags. A small, partly scorched, pit lay downslope but no connecting channel was identified.

Silver inlay on Minoan dagger

For those who may have missed the article in *Opto and Laser Euro* "Europe's leading magazine for optoelectronics, photonics, laser technology and fibre optics", the magazine ran a story on the use of laser-induced breakdown spectroscopy (LIBS) by the Foundation for Research and Technology Hellas (FORTH) in Crete. The technique, which is designed to analyse archaeological objects without sampling revealed traces of silver on a dagger-handle found on the island of Pseira. The researcher, Demetrios Anglos suggested that the technology for silver-on-bronze decorative coating was available during the late-Minoan period (around 1600 BC). The dagger rivet was reported to be the first of its kind to be found on Pseira, although similar objects have been found in Mycaenean shaft graves on the Greek mainland. For those interested in the technical details of the instrument, an Nd:YAG laser operating at the fundamental 1064nm wavelength was set to emit 15ns pulses of 3–5mJ per pulse. The LIBS instrument was also reported to have been used to analyse ancient manuscripts, although milder pulse energies of l–2mJ per pulse and energy densities of around 5-20J/cm^2 are used to minimise any damage to these sensitive documents.

16th & 17th Century smelting of silver-lead ores in Devon

Although there is considerable documentary evidence for the smelting of silver-lead ores in Combe Martin, North Devon during the 16th/17th centuries, neither archaeological evidence of the water-powered smelt-mill, built on the authority of Henry VIII, or any silver-lead smelting debris have previously been discovered. Trevor Dunkerley had already spent three years searching the hill slopes for this evidence, but then followed a suggestion from Gill Juleff to look in the valley bottom. Excavation of a small test pit in his own garden, which is in the centre of the old village, finally produced evidence in the form of 16/17th century smelting debris.

Two further 2x1m test pits have now been excavated, one in the author's garden, and the other in the garden of a neighbour. Both have revealed

silver-lead smelting debris, which has been dated from, early 16th century to the mid 17th century. Further excavation is now planned at what is thought to be the location of the smelt-mill. Analysis of the debris will be undertaken by Sarah Paynter at English Heritage's Centre for Archaeology.

Early Bronze Age metal finds in "archer's" grave. Excavations by Wessex Archaeology have revealed what is claimed to be the richest Early Bronze Age burial in Britain, at a location near Amesbury, Wiltshire and dating to about 2,300 BC. Metal finds comprised three copper knives and a pair of gold ear-rings. Further finds, including arrowheads, archer's wristguards and a tool kit for butchering animals, were of stone.

Reconstruction iron smelting — Cistercian style

The **Ancient Metallurgy Research Group**, Department of Archaeological Sciences, Bradford University is undertaking a series of iron smelting experiments at the English Heritage site of Rievaulx Abbey, North Yorkshire, as part of Science Year and the National Archaeology Days. Gerry McDonnell and his team have been undertaking research on the iron industry of Rievaulx, which has an exceptional iron smelting -landscape, revealing technological changes from bloomery, high bloomery and blast furnace technology The reconstructed clay-built furnace base dimensions are based on the excavation of a 14th Century furnace 5 miles to the north in Bilsdale. Australian goethite ore was kindly supplied by the Corns plant at Redcar, Teeside and willow charcoal from the Yorkshire Charcoal Company. Details of the experiments can be found at:

www.brad.ac.uk/acad/archsci/depart/resgrp/amrg/Rievaulx02/Rievaulx.htm

Further smeltings are planned for September 2002, after which the decay of the furnace will be monitored as part of the experiment, including geophysical surveys at regular intervals.

Embrittlement in silver artefacts

Russell Wanhill at the **National Aerospace Laboratory in the Netherlands** has been undertaking research into the embrittlement of archaeological silver alloys and coins. The following is brief synopsis of a longer abstract for the report Archaeological silver embrittlement: A metallurgical enquiry (NLR-TP-2002-224).

A copy of this work is with the Editor of HMSNews and members wishing to see it may apply to the address at the end of the News, page 8.

Corrosion may form a brittle surface layer, but can also penetrate the metal along grain boundaries, segregation bands and interdendritic regions in cast objects. Also through slip lines and deformation twin boundaries in cold-worked objects. The mechanisms of corrosion-induced embrittlement include; galvanic attack from long-term low temperature segregation of copper to grain boundaries, galvanic attack owing to the presence of the remains of high temperature segregation of copper, and preferential stress and strain-assisted corrosion along slip lines and deformation twin boundaries. Microstructurally-induced embrittlement is characterised by grain boundary fracture, which is most likely due to impurity elements, particularly lead, segregating to grain boundaries and reducing their cohesive strength. The severity of both kinds of embrittlement is increased by the synergistic action of corrosion-induced and microstructurally-induced embrittlement and a larger grain size.

The report suggests diagnostic techniques and remedial measures. The diagnostic techniques include visual inspection. X-ray radiography, optical and SEM metallography (the latter combined with EDX or WDX chemical analysis), microhardness testing and SEM fractography. The most definitive technique, with the broadest diagnostic scope, is SEM metallography. The remedial measures that could or should be taken during restoration and conservation are less certain with each case considered on its own merits.

Metallography reveals accidental quenching of ferrous chain mechanism in Roman well

Excavation of two Roman wells by the **Museum of London** in 2000 recovered components of a chain mechanism for lifting water. Three of the iron parts have been examined by **Roger Wilkes** at English Heritage's **Centre for Archaeology** to determine the types of iron used.

The microstructures displayed the heterogeneity typical of bloomery iron/steel and contained numerous slag inclusions. Some areas were, as might be expected, ferritic, i.e. pure iron without

carbon. Surprisingly, most areas were of martensite, i.e. quenched steel. However, the micro-hardness values were low for martensite (184 to 445 HV) suggesting that the quenched metal was a relatively low carbon steel.

The choice of alloy and its apparent heat treatment was initially puzzling. The components of this chain mechanism would have been under tension during use and, logically, unhardened, iron would have been more suitable than the quenched steel that appeared to have been used. Subsequent to the investigation, it was learned that this well had actually been burned down. It is now assumed that the iron components may have been heated by the fire before falling into the water below, where they were quenched. Channel 4 TV's Time Team programme are funding work for a replica of the lifting mechanism found in the adjacent well on this site.

New publication on historic and ancient mining

The first volume of the Atlas Historique des Zones Minieres d'Europe has just appeared, and the second volume is forthcoming shortly. Both are funded by the European framework "European Cooperation in the field of Scientific and Technical Research" (COST) and its programme "Paysages Anciens et Structures Rurales" (Ancient Landscapes and Rural Structures) (PASTA) (COST G2). Contents of the new volume deal with ancient and historic mines in Spain, France, Italy, Greece and the United Kingdom. The British contributions, focussing on mining landscapes in Roman Britain, have been compiled by **Irene Schrüfer-Kolb and David Mattingly**, School of Archaeology and Ancient History, University of Leicester. Their contributions review the archaeological evidence for gold, copper, lead/silver and iron ore mining in the province, many of the sites of which have been the focus of fresh investigations in recent years. The dossiers integrate the results of this ongoing research and introduce all major sites, with a particular emphasis on the impact they had on settlement patterns and landscape development. Following the COST PASTA tradition, this volume will again make extensive use of illustrative material. It will also contain a useful multi-lingual glossary of technical and mineralogical mining terms, as an appendix to the individual chapters.

The earliest antimony in Britain (update)

In HMSNews 43, Winter l999 we reported on the discovery by the **Museum of London Archaeological Services** of a fragment of a late sixteenth century ingot of antimony, in **Southwark**, London. In the resultant discussion Thilo Rehren queried whether the ingot could actually be antimony sulphide, used for refining silver-gold alloys. The analyst involved, **David Dungworth**, at the **Centre for Archaeology, English Heritage** reports that he has now checked this with a quantitative analysis of a polished section. The findings show that although it does have a little sulphur (3%) the ingot is essentially metallic antimony

Any contributions to next issue by 1st November to:

David Starley, Royal Armouries, Armouries Drive, Leeds LS10 1LT. UK. Tel. (0113) 220 1919, Fax (0113) 220 1917, email david.starley@armouries.org.uk

Conference reports

The Beginnings of the Use of Metals & Alloys (BUMA V), Kyongju, Korea

Report by **Alan Williams**

In April 22 the conference "The Beginnings of the Use of Metals & Alloys (BUMA V)" opened at Kyongju, Korea. The Keynote lectures were given by Prof. Robert Maddin, on the beginning of the use of iron, and Prof. Tsun Ko, on the progress of Historical Metallurgy in China. In many ways, the latter was the most significant revelation.

While Archaeometallurgy has been established for a long time in China, most of its results have been published only in Chinese journals and it is only through infrequent lectures in Europe that western audiences have become aware of the findings. The details of an extensive (and apparently well-funded) programme of archaeometallurgy in China, and especially at the Institute of Historical Metallurgy & Materials, Beijing University of Science & Technology, were given by several delegates from the Institute. Prof. Sun Shuyun (the current Head of this Institute) summarised recent work there since BUMA IV, which includes, inter alia, the analyses of 300 copper alloy artefacts from East Asia, 28 early Shang bronzes, 200 Zhou bronzes, some white

cast iron from the 8th c. BC, 130 iron & steel objects from the Warring States period, and numerous steel objects from Han princely tombs. The evidence for Han steelmaking by fining seems, for the first time to this reviewer, to be fairly clear-cut. (One is still left to wonder why in the Song period swords were apparently imported from Japan). Other lectures included Shuyun Sun and Zhiguo He on gold amalgam found in a 1st c. BC tomb. In addition Wei Qian and Ge Chen discussed bloomery iron artefacts from 10th c. BC tombs, and Wei Qian and Shuyun Sun the analyses of 70 arsenical bronzes. These delegates all lectured on the results of their work (with admirable clarity) in English.

Mention should be made here of a collection of papers from this Institute now translated into English, and accessible for the first time. The beginnings of metallurgy in China (ed. K.M. Linduff, Han Rubin & Sun Shuyun, New York, list price $120 ISBN 0 7734 7853 1, available from The Edwin Mellen Press, P.O. Box 450, Lewiston, NY 14092-0450, USA

Systematic studies are under way in metal-winning and metal-using cultures all over the Far East and Central Asia. Katheiyri Linduff's paper on the Eurasian metallurgical tradition formed an interesting counterpart to that of Ludmila Konkova on Siberian metallurgy. Paul Craddock spoke on cast iron in the Tang and Song periods. Gert Bachmann spoke on the parting of gold and silver. Albrecht Jockenhövel delivered a well-illustrated treatment of high bloomeries in Westphalia.

Far fewer Americans were present than in previous years, an exception being Daniel Eyion who's elegant hatchet job on radio-carbon dating, based on his study on an iron hand-rail from the top of the column of Marcus Aurelius in Rome. The rail could only have been dated from either the 2nd c. AD or the 16th, when the pope had the statue of the emperor replaced with one of a saint. Nevertheless the radiocarbon dates determined were 1405–1450 AD and 660–980 AD.

Papers given on topics related to Arms and armour included Saito on the manufacture of Japanese muskets in the 16th c. (which closely followed the European originals) and by this reviewer on Japanese armour and its metallurgy. Reconstruction experiments described included a small Tatara furnace for steelmaking (Nagata) an Austrian copper-smelting furnace from 2nd m. BC (Bachmann) and Chinese bronze swords with harder cast-on edges (Lian).

A conference visit was made to the impressive Kyongju National Museum which contains an enormous array of metal objects from the Silla (7th c. AD onwards) tombs excavated over the last 30 years, ranging from gold crowns and jewellery to swords and armour, bells, bronze saddle-fittings and some very early stirrups. Korea's powerful neighbours have tended to leave rather little of its culture surviving intact, so that a disproportionate number of surviving artefacts are those which have only been unearthed since the end of the Korean War in 1953. The organisers of the Conference also provided opportunities to enjoy Korean hospitality and sample Korean cuisine (definitely an acquired taste).

I am extremely grateful to the Historical Metallurgy Society for helping me to make a visit to this conference and present a paper there, a list of all the papers given, with abstracts, is available on the BUMA V website
http://147.46.231.108/BUMA-V/main.htm

Durham Charcoal Pits.

In connection with the current research into medieval iron working and charcoal making. **Tom Gledhill**, **Ros Nichol** and a **WEA** evening class attempted to make charcoal in a pit similar to the surviving medieval remains found in Weardale and Teesdale. The experiment was intended to show.

1) whether the proposed method of stacking, covering and lighting the pit would work in practice.

2) whether the charcoal making site resembles the known archaeological remains after use.

3) the significance of charcoal and other plant remains found at charcoal making sites, and the extent to which they are representative of the wood and the other materials used in the burn.

The experiment took place on June 1st–5th at Killhope Lead Mining Museum. The charcoal bum took five days and produced 8kg of charcoal. More burns are planned for 2003.

Dr Tom Gledhill
1 Hylton Terrace, Bishop Auckland, Co. Durham, DL13 2BB

The Hon. Editor Amina Chatwin, The Coach House, Parabola Close, Cheltenham GL50 3 AN. Tel 01242 525086 welcomes contributions for HMSNews by, the end of February, June 11th, and November 5th. If possible on Apple Mack or ascii.

Membership Secretary, Mrs Lesley Cowell "Little Gables" 17a Thorncote, Northill, Beds, SG18 9AQ. Direct e-mail address is: lesley@mcowell.flyer.co.uk.