Glass News

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News from the Association

One-day conference in November

The Association for the History of Glass will be holding a one-day conference on 20 November 2002 in the Museum of London's recently opened London Archaeological Archive and Research Centre (LAARC). Based at their Eagle Wharf Road store and resource centre the LAARC is a fitting venue for discussion and debate about the archaeology and history of glass. The topic for the day will be broad, covering glass supply and use in London from *c.*1400 to 1900, and will focus upon recently excavated material in the archive.

The details of the programme are still being compiled but will include an examination of the research potential of the glass in the London Archive (see p.5) with a tour of the new HLF-funded facility (John Shepherd), a discussion of the context of some large 15th and early 16th-century imported groups of vessel glass from Bishopsgate and Plantation Place (MoLAS TBC), a discussion of late 16th and 17th-century glass production and use in the City of London (Hugh Wilmott), unusual 17th-century assemblages, possibly the property of privateers and sea captains's, from Narrow Street (PCA TBC), and recent work on the Hopton Street glasshouse (PCA TBC).

The programme will be finalised during July and August but if you would like to receive these details then please send an sae to
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Membership of the Association

We would like to remind all of you who subscribe to *Glass News* that, at no extra cost to yourselves, it is possible to convert your newsletter subscription into membership of the Association for the History of Glass. All you have to do is fill in the reply slip on the back page, or write to John Clark at the address on the slip with the same information. You will continue to subscribe to *Glass News* and to receive notification of any meetings we are organising, but in addition you will be able to elect members of the Board, which runs AHG, and to offer yourself for election. If you prefer not to become a member, but to remain as a subscriber to the newsletter, this is also possible; indeed, if you do not write to us we will assume this is what you want to do. Anyone who may be reading this who does not subscribe can also become members of the AHG. Once again, please write to John for details of how to do so.

We must point out that the AHG is both a registered charity and a company limited by guarantee. The latter means that in the unlikely event of liquidation, each member is liable to contribute up to £5 towards any debts. Our current capital is in excess of £10,000 and the Treasurer is careful to ensure our activities do not make losses so there is little chance of this part of our articles of association being invoked.

The AHG continues to go from strength to strength, and we plan to develop our activities further. We want to ensure that we continue to run two meetings each year as well as publishing two issues of *Glass News*. Also, remember that we shall be hosting the 16th Congress of l'Association Internationale pour l'Histoire du Verre in London in September 2003. In order to realise these ambitious plans we would like to have more people actively involved in planning and running our activities. We hope that you will decide to become a member of AHG and help our Association prosper.

If you would like more information about AHG or especially if you wish to offer any help to support our activities, please contact
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IN THIS ISSUE

AHG window glass meeting - November 2001

In November 2001 AHG ran a most successful meeting on 2000 years of window glass and glazing. It set out to explain the technology used to produce window glass at each period and the characteristics that allow its identification. The lectures included information on methods of glazing windows and their visual effect on buildings.

Below are summaries of some of the papers; we hope the rest will follow in future issues of *Glass News*.

Roman Window Glass - Jenny Price

Although the use of flat sheets of glass in window apertures was a Roman innovation, glass panes occur in a limited range of buildings, and it is likely that shutters, wooden or iron grilles or sheets of horn were always much more common. In Italy, glass windows appeared during the first half of the first century AD and they have been noted in Romano-British settlements before the rebellion of Boudica in AD 60/61.

Roman window glass was almost always naturally coloured bluish green or greenish, though a few panes were dark blue or other colours. They were made from the same basic soda-lime-silica mix as vessels. Most panes are square or rectangular, and there are two principal methods of production. In the first to third centuries, virtually all panes were made with one shiny, uneven surface and one dull, flat surface, so they let light in but were not transparent. In *Glass News* No 9 (January 2001), Mark Taylor and David Hill described their experiments to reproduce this kind of window glass by pouring hot glass on a flat surface, squashing it to a flat disc, and then forming a rectangular pane by reheating, pulling and stretching different areas in turn using metal rods, hooks and pincers. These panes have at least two thick rounded edges, and sometimes two with scored and nibbled (grosed) edges where they have been cut from a larger piece. Panes made from a blown gather of glass, elongated to form a cylinder and then opened and flattened, were in widespread use in the Roman world from the third century onwards. They had shiny surfaces and were thinner and more transparent than the matt/glossy panes. Both types usually survive as small fragments though complete and reconstructed examples measuring 255x235mm (10x9 inches) to 800x800mm (32x32inches) are known, and they were fitted into apertures in a variety of ways. Many were fixed with mortar, though some were fitted into wooden or metal frames, and fittings for opening frames have occasionally survived.

Some more unusual kinds of window glass were also made. A few large circular matt/glossy panes measuring c.450mm (c.18inches) in diameter, with flat edges and domed centres have been noted in northern Spain and Britain. Smaller circular blown 'crown-glass' panes are known in late Roman contexts in Britain and the western provinces, though they are much better known in Byzantine contexts in the eastern Mediterranean. In addition, there is evidence for the deliberate obscuring of one surface of some panes and for the use of shaped quarries, though it is not clear whether the last were elements of windows or features of interior decoration.

Buildings with window glass are found in urban, military and rural settlements. Cities throughout the Roman world used glass panes in bath houses for keeping heat in and for introducing natural light into the building. Glazed windows were virtually always present in the walls and roofs of the hot and warm rooms, and some monumental baths with elaborate glazing schemes used vast quantities of window glass. Glass windows are also found in other public buildings, and in high-status private residences in cities. In addition, the army used window glass on a large scale, for the baths in legionary and auxiliary forts, for the residential quarters of the officers, and for parts of other official buildings. In the country, window glass is most commonly associated with the high-status residential areas, rooms and corridors, within villas, and with the bath house, but it is rare in other types of buildings.

Little is known in detail about window glass production in the western provinces. Legions sometimes had their own glaziers, while cities and the owners of villas employed window glass specialists for particular projects. In every case, it is likely that the panes were made in workshops close to where they were to be fitted and that many were formed from broken vessel glass collected for recycling.

7th-10th Century Window Glass from the British Isles - Rosemary Cramp

In the post- Roman to pre-Norman period there are very few references to window glass and none which describe its colours. It was apparently valued, as today, for keeping out the weather and birds and letting in the light. In this period glazed windows must always have been a rarity, and the area for the glass insert is very small.

Discoveries of window glass of this period from the British Isles have increased dramatically in the last twenty years. Today 15 of those 18+ sites in Britain are ecclesiastical, and have yielded coloured as well as plain glass. Quantities such as 1,827 fragments from Jarrow and several hundreds from Brandon (mainly colourless), Wearmouth, Whithorn and Winchester, as well as substantial groups from Repton (c.30), Dacre (22) and Beverley, have provided reasonable samples on which to base general conclusions. Establishing the context and distribution of the glass on any site is crucially important since its presence can signal the status of buildings.

This glass is very different in appearance from Roman window-glass. It is thinner, ranging from 0.7 mm

to 4mm, but usually about 2mm, although a single quarry can vary in thickness. It is bubbly; usually cylinder blown with one matt and one glossy surface, although some may be crown; the grozing is fine; it is very durable and unweathered.

Much recent research, here and on continent, has been concerned with assessing whether there is any evidence for the manufacture of window glass from its raw ingredients as opposed to merely glass working. The basic raw materials necessary to make glass are of course well known, but over the last thirty years there has been considerable research into the fine differences in the composition of Anglo-Saxon glass. Harden postulated in 1961 that all Anglo-Saxon window glass was of the soda-lime type and analyses have confirmed the general truth of this, but additionally on nearly every site where analyses have been undertaken, there are not only differences in composition between window and vessel glasses, but a shading off in the composition of window glass from natron/soda to other alkali additives. It would seem then, that as raw glass made with natron became more difficult to obtain in north-west Europe, glass workshops attempted to adulterate, possibly with marine plant ash. This conclusion has been explored thoroughly on the Continent by Karl Wedepohl, and at Jarrow one group of glass which contained some potash has been interpreted as a replacement window. Some of the differences noted in the compositions of early medieval window glass may however have arisen from the reuse of Roman glass. A few fragments of Roman glass and tesserae have been found on English sites but so far not in the quantities known on continental sites; nor indeed the raw glass blocks or ingots for which there is trading evidence at a later date. However, a small amount of cullet and part of a block was found at Glastonbury, where there is the best evidence for glass-working hearths.

A high lead content has been observed in several glass analyses and this seems to be a feature of the later ninth century onwards. Lead could have been added to increase the brilliance to the glass, but, as with the comparisons of analyses of different colours, the degree of conscious control of additives is difficult to assess.

Most Anglo-Saxon window glass inclines more to the pale blueish/green tone than the dark greens of Roman window glass. The exception to this is Brandon, which has only timber buildings, where the largest group is pale olive green. It seems reasonable to suppose that 'colourless' glass was always the most common form.

Coloured Anglo-Saxon glass includes pale to deep shades of blues, turquoise blues or greens, green, yellow green, greenish amber, brownish amber, red, purplish red, deep olive and emerald green; and red and greyish-green streaked. Simple red is by far the rarest colour, and indeed Wearmouth and Jarrow are so far unique in possessing more than one fragment of this colour, but red streaked glass is found in most Anglo-Saxon assemblages and indeed is almost a hall-mark of post-Roman glass. Some quarries from Wearmouth/Jarrow, Repton and Whithorn have marked two colour streaking in greyish greens and blues.

Most of the British sites have produced quarries which are carefully shaped by pincers to geometric or curving shapes, the most varied being Wearmouth and Jarrow. But other sites, in particular Repton and Whithorn, have produced complete quarries with complex curves which must have been part of elaborate compositions.

In contrast with the tiny complex shapes of some of the glass, the leads which have survived seem curiously heavy and thick. Nevertheless the heavy emphasis of shape, by line rather than shading, is a distinctive element in much early Insular manuscript illustration, and this has been illustrated in the speculative composition of a figure in the glass from Jarrow.

It is obvious that there are still many fruitful fields of research in the study of Anglo-Saxon window glass, but with publication and analyses of further assemblages these should be forwarded, and it is to be hoped that the future may even provide a reliable method of dating glass. It is now possible however to envisage in window glass comparable artistic developments with those in Anglo-Saxon metal-work and manuscripts, and one can only hope that in future excavations the geographic imbalance in the site distribution of window glass will be redressed.

A full bibliography has been removed from this text but further information on most of the topics covered can be found in one or more of the papers in J Price (ed) 2000, Glass in Britain and Ireland, AD 350-1100, *BM Occ Pap 127, London.*

Glass from Walraversijde 1465, a rural fishing community on the Belgian Coast - Danielle Caluwe

The Walraversijde Museum Project opened to the public in June 2000 and includes a site museum, the reconstruction of four houses and an excavation site. This reconstruction of part of the village is the result of 8 years of large-scale archaeological investigation by the Institute for the Archaeological Heritage of the Flemish Community. They set out to rediscover the medieval village of Walraversijde which disappeared during the Siege of Ostend (1601-1604). More than thirty buildings were recorded and a great variety of archaeological, botanical and zoological material has been excavated and is now under examination. A huge variety of finds were retrieved, including 687 glass sherds, of which 372 were hollow glass fragments from 196 drinking vessels, 7 beads, and 308 window glass sherds.

The window glass finds from Raversijde consist of 124 green, 26 colourless, 148 heavily weathered undefinable sherds, and 10 fragments with various colours such as blue, yellow and brownish red. A very fragmented sherd of glass with a heavily weathered metallic layer on the back is under investigation in order to identify the metal.

The 21 lead cames all have an I-profile, and their spatial distribution indicates the probable use of glass-in-lead windows in at least some houses, located in one area of the excavated site. Only one lead fragment was found in the vicinity of the chapel, although the majority of the painted window glass sherds were found there. The recycling of lead as weights for fishing nets may explain both the scarcity of the lead cames and the abundance of fishing net weights in the excavated area.

Three fragments were identified as crown glass. Two are round sherds of thick green glass and one is a thin round sherd of colourless glass with a rim. Their spatial distribution indicates the possible use of crown glass in at least one secular building in the second half of the 15th century.

The majority of the 26 painted glass fragments were found in the vicinity of the chapel. The presence of painted glass panels in the Raversijde Chapel is attested by a 16th-century historical source. The finds are very fragmentary but some details, such as a hand, a face and geometrical patterns, can be deciphered. The finds also indicate the possibility of two other buildings with at least one painted window panel. The combination of the distribution map data and the dendrochronological dating of the barrel wells indicates the use of painted window glass in at least one building from the mid 15th century, or possibly even slightly earlier. Painted glass fragments found in the nearby fishing village of Heist are under study and may set the Raversijde fragments in a broader regional context.

The remaining 160 plain glass fragments were found in clusters in the vicinity of certain buildings. Four of these locations can be dated stratigraphically, and through dendrochronological analysis of the barrel pits, to the second half and end of the 15th century. The remaining 148 heavily weathered glass fragments are concentrated in a late-medieval layer near the surface, which may suggest a 16th-century date.

Samples were taken from all types of window glass and the preliminary results indicate a potash-lime-silica composition; further quantification can give more details and if possible, the provenance. A proposal for conservation treatment and an iconographic study, possibly combined in a restoration project of the painted panels, is under consideration.

The interdisciplinary approach, the long term period and the open, large-scale character of the excavation, in combination with the excellent stratigraphic data have provided a lot of information. The combination of these preliminary conclusions on glass, with the studies on other materials such as ceramics, will result in a better understanding of the material culture of Raversijde during the late Middle Ages.

Other Contributions

Hentie Louw talked about 17th and 18th century windows. In the first half of the 17th century the English window glass industry provided for local demands, though some glass was still imported from France; the glass was thin and broke readily. The new coal-fired furnaces, such as those in Newcastle, produced for a larger market and provided supplies to the east coast and London. There was a considerable increase in the amounts of window glass made, and it gradually moved down the social scale as it became more affordable. Crown glass was re-invented in the late 17th century and sizes up to 50 inch diameter were made. It had a more brilliant sheen but showed some refraction because of the flow lines in it. Large sheets of glass were difficult to obtain so windows were designed with multiple panes. By the end of the 17th century plate glass was being made by both the cast and cylinder processes. The thick sheets were ground and polished and were initially used mainly for mirrors and coach windows. Plate glass became a status symbol for high quality buildings. More details about window glass at this period is available in Hentie Louw's paper 'Window-glass making in Britain *c.*1660-c.1860 and its architectural impact', published in *Construction History* (1991), 7, 47-68.

Chris Salmond then talked about developments in window glass production after 1800; how gradually the skills of the glassblower were lost as machines took over. At the beginning of the period broad sheet and crown glass were the norm, the latter being used for quality window glass; normal sheet size was 24x16 inches. Improved cylinder sheet was introduced in 1834, and sizes jumped to 49x30 inches. It was this glass – a million square feet of it – that was used to glaze the original Crystal Palace. The sizes of window sashes increased, and when window tax was abolished in the mid 19th century demand for window glass increased again. The later 19th century saw the introduction of machine rolled, patterned glass, and the early 20th century the introduction of drawn cylinder and then drawn sheet glass. The final major development was the introduction of float glass in 1959 – and with it came the large, water-clear, distortion-free windows that had long been the aim of glass-makers.

Further details of the different types of window glass can be found on Chris Salmond's website http://www.londoncrownglass.co.uk

Glass in the Eastern Mediterranean – Leuven 2002

How did Roman glass travel and where to? What elements of society were involved in the production, transportation and use of glass? What were different types of Roman glass vessel used for? These were some of the questions posed at a workshop on 'Glass in the Eastern Mediterranean', which was held in Leuven, on the 8th and 9th of February. The workshop was organised by Jeroen Poblome of Roman Crafts and Trades (ROCT) and sponsored by the Fund for Scientific Research, Flanders. The first day focussed on the typo-chronological evolution of glass tableware in the Eastern Mediterranean. The range of glassware recovered from specific sites, including Agora, Pella, Cos, Fayum, Ephesos and Petra, was discussed and overviews were also given on chronological and regional patterns in glassware types. Many of the sites provided opportunities to investigate chronological patterns and the different uses of glassware. Daniel Keller (Durham) focused on one building at Petra, where glassware was sealed beneath destruction debris of a known date. Different forms of fine quality glassware comprising a matching set were found in the dining room, poorer quality ware was found across the house and a mixture of both types in large quantities were found in the kitchen. Also at Petra, the types of glassware and pottery found in one period suggested that glassware types were selected to compliment the local fineware pottery also used as tableware.

The second day focussed on the archaeometry and organisation of production of glass tableware in the Eastern Mediterranean. Topics included lead glazes, archaeological evidence for glass working, early Islamic glass, and production organisation and trade mechanisms. The potential of archaeometry as a tool for investigating the production of Roman glass was demonstrated by Ian Freestone (British Museum). A model was presented for Roman glass production in which a small number of primary glass-working factories, producing vast quantities of glass in tank furnaces, used their own type of sand as one of the raw materials. Glass from different primary sources was found to have a distinct chemical fingerprint, particularly because of the use of different sands, and could be differentiated. However the chunk glass produced at each factory site was transported to a large number of glass workshops, and therefore the products of all of these workshops have the same composition. Jenny Price (Durham) outlined some of the outstanding questions in the study of Roman glass, referred to at the beginning of this article, and identified one of the first tasks as establishing the normal range of forms for different regions, in order to compare and contrast them. A second of these useful workshops is in the process of being organised.

Sarah Paynter

The London Archaeological Archive re-opens for business

Many readers might recall, back in 1996, that the Museum of London had to close access to its extensive archaeological archive. Reductions in the Museum's funding and increasing pressure from an ever-growing volume of developer-funded work completely overwhelmed the management and care programmes in place at the time. It has taken a while to sort it all out but, on 7 February this year, the Museum reopened access with the archive now forming the foundation of the London Archaeological Archive and Research Centre (LAARC).

The London Archaeological Archive is made up of over 5000 individual site archives of watching brief, evaluations and excavations carried out over the last one hundred years. It contains the archives of the post-war campaigns of fieldwork in the City of Ivor Noel Hume (Guildhall Museum) and Professor Grimes (Roman and Mediaeval Excavation Council), and the Dept. of Environment work in and around Whitehall. There are the archives of the late 60's and early 70's units and, of course, the vast collections of the work of the Museum's own departments of Urban Archaeology (DUA) and Greater London Archaeology (DGLA). Added to this material is the work of over thirty archaeological units of the PPG16 era of the last decade.

The list and range of sites contained in the archive is diverse – from prehistoric settlements to East End Victorian housing, from multi-period large landscape excavations to the detailed analysis of individual finds. Added to this, the volume of material awaiting further analysis is vast. The archive contains over 120,000 boxes of general material (pottery, animal bone etc), over 250,000 individually accessioned items (including glass) – all awaiting study, in neat order, on 10km of shelving. The potential for research of this material would normally, by any standard, be great but, considering the location of London and its role as a principle consume, manufacturer and exporter of all types of material throughout its 2000 year history, this collection is of international significance.

The glass contained within the collection is as diverse as the site types and periods. There is manufacturing and working waste from numerous Roman sites and from many documented sites from the early 17th century onwards, vessel glass associated with the Roman City as well as outlying settlements, some material from Lundenwic and and ever growing medieval assemblage which includes a vaste range of imported material used, one suspects, in the homes of merchants and ambassadors. Added to this are the large and varied post-medieval assemblages from City sites as well as surrounding small towns and a large collection of stratified 19th century material.

All of this glass, and the finds and records associated with them, are available for study. For further information about access, please contact the *Glass News* editor, John Shepherd who, as Manager of the Archive, is conveniently placed for anyone with an interest in glass studies (see address details on page 1).

Barometer World – Reconstruction of medieval/17th century kiln

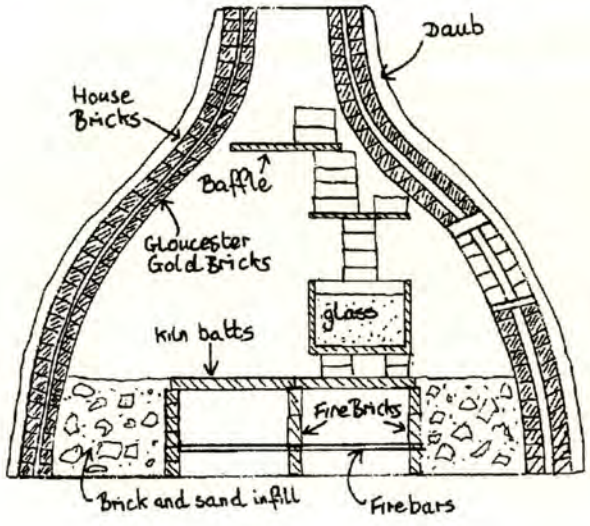
Working with barometers for a number of years I became intrigued with how barometer makers produced their instruments in years gone by. Our research filled us with enthusiasm, so much so that we decided to recreate the process for making the glass tubes for mercury barometers – in a 17th century-style wood burning kiln.

In April, and again at the end of October 2001, we successfully fired up our authentic style kiln here at Barometer World in Merton, Devon. The project started at the end of 2000 with some re-enactor friends from the 'Melford Hys Companie', particularly an ex-potter, who has built many wood-fired pottery kilns and had previously built a glass kiln at Kentwell.

Barometers were invented in 1643 and glass tubing, obviously in use by then, became common in the late 17th and 18th century for both thermometers and barometers. Today, nearly all of this type of glass is machine-made and we believe that Plowden & Thomson are probably the only surviving company making glass tubing by hand in this country. In our restoration department we have requirements for very heavy walled barometer tubing, which is unavailable commercially. The project seemed to be an ideal opportunity to test out a wood-fired kiln.

Construction of the kiln – The construction of the kiln was of a circular diameter, with two concentric walls of bricks. The inner wall was made with Gloucester Gold bricks, a domestic brick with reasonably good refractory quality and outer wall was made of ordinary red house bricks. The walls were infilled with vermiculite that regrettably seemed to disappear over the number of days of firing. After about 24 hours the exterior of the kiln was so hot that it ignited timber resting against it on occasions. The outer surface was covered in *c.* one inch (25mm) of daub, a clay/sand/lime/chopped straw mixture. Unfortunately, the company supplying this was not willing to mix horse or cow dung in it to make a more fibrous mixture!. The internal bricks, as well as the firebox walls and tops, were bonded together with a weak mixture of fire clay and sand. The first fireboxes had 3/4 inch (18mm) diameter steel reinforcing bars to support the timber. At the end of the second day of firing these were beginning to be burnt through and on a subsequent trial firing for twenty-four hours most of them had burnt completely through. For the October firing they were rebuilt with stainless steel tubes over the top of the 3/4 inch (18mm) bars, which then did not oxidise and were perfectly good throughout the melting operation. Above the ceramic crucible holding the glass, a lid was balanced on top of firebricks, resting on the crucible sides. Above that there was another brick with a round kiln bat close to the top of the kiln so as to restrict the gases coming out of the chimney. This increased the temperature and with the fireboxes at alternate sides the vortex created was quite noticeable.

From the drawing one can see a cross-sectional picture of a traditional kiln with two fireboxes. After three days of firing some of the red house bricks, which were (inadvertently used) in the bases of the fireboxes, showed signs of melting and distorting and the internal fire box walls were re-built. On top of these walls were placed inch-thick kiln shelves on which to rest the crucibles.



Firing of the kiln – For the first firing in April we loaded two ceramic crucibles with approximately 40kg of glass in each. With such small quantities of glass being used over a short period during the day, this proved to be too large an amount of glass. For the second firing only one crucible was used but placed nearer the opening and with a larger gathering hole so that more weight of glass could be gathered each time. Firing started at 6.30 on Thursday morning and continued until the glass was finished during early Saturday afternoon. It was fired exclusively on wood, logs as well as scantlings (off-cuts of sawn timber). The use of a modem pyrometer to measure the heat within the kiln was a useful data source. An alarm was also useful to keep one awake during the early hours of the mornings! From the initial firing early in the morning, on both occasions, it took approximately 5 hours to reach 1100°c. A constant temperature of 1160°c but the fuel supply had to be halted on occasions when it was approaching 1200°c and more. A few times, 1220°c was registered. Once the temperature was above 1100°c it was surprisingly easy to control by the volume of wood introduced into the fireboxes. The firing in October utilised one load of logs, approximately 4 foot (*c.*1200mm) long, and measuring 2 inches (50mm) - 5inches (125mm) in diameter, and nine bundles of pine scantlings, at a cost of £155.The use of the fine wood and the logs enabled more accurate control of the temperature. To raise the temperature more fine wood would be placed on and to maintain the tempera-

ture one or two logs would be placed in position. Wind direction made considerable differences to the amount of ash/charcoal build-up but at most times, when the furnace was up to temperature, the ashes were self-depleting. On measuring a cord (4ft x 4ft x 8ft – ie 1200 x 1200 x 2400mm) of wood, we estimated that we had used half a cord in eight hours for the two fireboxes, making the economy of the kiln exceptionally good. A few logs were left over at the end of the two days of firing.

On opening the gathering hole, as we expected, considerable loss of heat occurred. After about two to three hours of glass collecting the temperature dropped to such a level that it was necessary to close up the hole and to raise the temperature for 30 minutes. In all, we managed to gather out all the 40kg of glass.

The quality of the glass – At the first firing in April, the glass was very fine, free of bubbles and the glass was clear. At the second firing in October, firing for the same length of time, though at a slightly lower temperature for fear of damaging the kiln, the glass had some very fine bubbles in it. However, as we were gathering larger quantities it may be that we were simply gathering the poorer quality glass from the top of the crucible more often than the good quality glass from the middle.

The main objective of this exercise of course was to produce glass tubing by the traditional pulling method and this proved to be successful. It would appear that glass tubing could be easily drawn for diameters of approximately 12mm and below. The thicker glass tubing we were trying to create, from 14mm to 18mm with a very heavy wall and approximate internal bore of 6mm, is harder to accomplish under such primitive conditions. From existing barometers it is evident that early barometers had narrower tubing of about 12mm and less, whereas it is not until the Victorian period, particularly mid to late Victorian, that large very thick wall diameter tubing was used – it was common with the heavy stick barometers of the period. We have at times handled glass tubing 1 inch (25mm) diameter with a bore of 6mm - 8mm. This is an exception but it is not uncommon to come across 16mm glass tubing with a very heavy wall used for Victorian stick barometers. The glass we used was recycled lead glass cullet from Dartington Crystal and whilst soda glass would be preferred, we believe that lead glass was used in the manufacture of early barometers. Some of this glass, therefore, will be made into barometers for demonstration purposes and a small amount of glass tubing will be retained for the restoration of early barometers.

All in all this was a very enjoyable and successful experiment and demonstration. In April a number of glass tubes were produced: many bent and varied shapes but several good quality tubes were made. In total, we hand drew 90 feet (*c.*27m) of thermometer tubing, which, despite being of irregular shape and inferior quality, was a feat that was well appreciated by the onlookers. The demonstration further enhances my admiration for the skills of the early barometer makers, who would have had to locate glass tubing or had it made specially. This obviously would have been expensive in the early days until manufacture was more commonplace. If members are interested in seeing photographs of this occasion we have a number of pictures on our 'news' section of our web site – www.barometerworld.co.uk. Further information or knowledge of early tubing, method of manufacture, etc, would be most welcome. In our quest for new information we have been able to speak to a number of people who actually saw the Whitefriars tower for making thermometer tubing. The thickness of tubing that we are trying to produce presents a different set of problems to this but we hope to develop our work further. Now that we have mastered the basics of glass tubing production, our next trial will be in a studio where we wish to create a bigger quantity by using regular glass furnaces with glory holes.

Philip Collins FRMetS, Barometer World & Museum

Book review

F Dell. Aqua and R Silva (eds) *La Vetrata in Occidente dal IV all'XI Secolo. Atti delle gionarte di studi, Lucca, Villa Bottini 23-24-25 Settembre 1999*. Il colore nel Medioevo. Arte Simbolo Technica. Coillana di studi sul colore 3. Lucca Istituto Storico Lucchese-Scuola Normale Superiore di Pisa-Corpus Vitrearum Medii Aevi Italia, 2001. pp287, around 65 colour plates.

This volume represents the proceedings of a conference held in Lucca in 1999 on early medieval window glass. It was unusual in that it combined a close focus on the subject matter while including a wide range of approaches, and was very successful in promoting interaction between the wide range of specialists present. The twenty papers here addressed archaeological, art-historical, and scientific aspects of the subject, and range from history of windows in the Roman period through to Romanesque, but focusing on early coloured windows and glass painting, particularly in ecclesiastical buildings between the 7th and 11th centuries.

For those like me who are linguistically challenged, the four languages (Italian, English, French and German) in which the papers are written means that this is not always an easy read, but it is worth persevering. There are good accounts of the archaeology of window glass from all over Europe. To have all of this material in one place is a real advantage. Some of the chapters, for example, the summary of window glass before the 8th century, synthesise a very wide range of published material, while others, for example on Paderborn and Rouen, summarise a literature about specific sites or regions. For those with a specific interest in british window glass from this period, there is a thorough and extremely well-referenced review by Rosemary Cramp.

Francesca dell'Acqua and Romano Silva are to be congratulated on organising such a meeting and bringing the proceedings to press in good time. The book is very well produced and well illustrated. It is highly recommended to those with an interest in this area and at current exchange rates, it is a bargain.

Ian Freestone

New finds
New research
New publications
New ideas

REMEMBER

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Comments expressed in the newsletter are not necessarily the views of the AHG.

postscript

This year's AFAV meeting will be on 8-9th November at Cellier de Clairvaux, 27 Boulevard de la Tremouille, 21000 Dijon. Details available from the organiser Benedicte Grosjean, Musée Archeologique, 5 rue Docteur Maret, F-21000 Dijon.

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