Glass News

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A newly identified type of 'trick glass' from Germany; late 16th/early 17th century. Photo © Ingeborg Krueger. See pp. 17–18 for a report on these.

Welcome to *Glass News* 45! We start by thanking Colin Brain, Mark Taylor and David Hill for their organisation of a superb AHG Study Day held at The Glassmakers' workshop at Quarley in November. An account of this, and of the AIHV Congress held in Istanbul in September, can be found on pp. 5–7.

The November AGM saw some changes to the Board. Martine Newby Haspeslagh takes over from Colin Brain as President. Martine is well known to us all as an active member of the Board since 2000, and organiser of the 2018 AHG/BM conference 'Glass of the Caesars@30'. We thank Colin for all his dedicated hard work on behalf of the AHG; he first joined the Board in 2004, and became President in 2014. He has jointly organised a number of meetings reflecting his interest in early modern glass and glass making, and has been a regular contributor to *Glass News*. Denise Allen has stood down as Secretary, and we thank her for her commitment in performing this role superbly since 2011. Colin and Denise remain on the Board. Sally Cottam is the new Secretary, having been a member of the Board since 2012 and joint organiser of AHG study days. Angela Wardle, previously Treasurer, has retired from the Board. We would like to thank her for her dedicated contributions to the AHG since joining the Board in 2007. We warmly welcome James Peake to the Board, currently an auctioneer and valuer with Chiswick Auctions, who completed a PhD in 2013 on the compositional analysis of early Anglo-Saxon glass beads. His research interests currently focus on post-medieval glass and include *façon de Venise* glass, early Dutch and German engraved glass, as well as English glass from the 18th and 19th centuries.

The AHG is organising a Study Day on 'Coloured Glass' at the British Museum in May. Other interesting meetings include 'Gold Glass' in Oxford in April, and various conferences later in the year (see pp. 2–4 for details).

This issue of Glass News contains a varied selection of glass topics. Ingeborg Krueger has written a summary of a new type of 'trick glass' identified in Germany, with the possibility that somebody might recognise an example in Britain that is puzzling them (p. 17). A query about a Roman glass fragment which seeks a parallel has been sent by Rose Broadley (p. 18). The Glassmakers have written about the frustrating case of the replica Roman cup that appeared as a 'genuine' Roman artefact from an excavation in Italy (pp. 15–17). Grants are awarded every year by the AHG for glass-related projects, and this issue contains four accounts of those interesting activities: on glass inlays from Egypt, beads from Pakistan, medieval glass from the Volga Bulgaria, and window glass from Lincoln Cathedral (pp. 8–14).

The editors would like to thank this issue's contributors for their material; please continue to send anything you think would be of interest, particularly new glass finds, however small. We are always very pleased to receive long or short pieces about glass research or discoveries.

Subscriptions and memberships for 2019–2020 are due in **April**, and a form is enclosed to send with cheques to John Clark. **New members who joined at the Study Day in November, and any new members who have joined since then, are reminded that their subscription is valid for next year, until March 2020 – and they do not need to renew it now.**

While every effort is made to check the content of the articles and reviews, Glass News does not accept responsibility for errors.

AHG SPRING STUDY DAY

AHG Study Day: Coloured Glass

Wednesday 15th May 2019
The British Museum, London

The Association for the History of Glass, in collaboration with the British Museum Department of Scientific Research and the Early Glass Technology Research Network, is holding a Study Day on coloured glass at the British Museum. The focus will be coloured glass from the Bronze Age to the Present Day. There will be 8–10 papers and confirmed speakers include Paul Nicholson, Sally Cottam, Martine Newby Haspeslagh and Ana Franjic. There are still some spaces available for papers.

It is free to attend this meeting, but you must register in advance. To register or offer a paper please email Daniela Rosenow (daniela.rosenow@dainst.de). Space at the venue is very limited, so please register as soon as possible.

For further information please contact Daniela Rosenow at daniela.rosenow@dainst.de.

AHG GRANTS

Grants are available from the Association for the History of Glass, for educational or research activities consistent with the Association's charitable aims. These could include, for example, attendance at a conference to present a lecture or poster, a study visit, fieldwork, or publication of scholarly works. There are no restrictions on who may apply or on the topics of applications, which will be judged on merit. Multiple applications in different years will be considered with individual awards up to £500. A list of grants that have previously been awarded can be found on the AHG website.

An application form may be downloaded from the website, or can be obtained from the Honorary Secretary, Sally Cottam, at ahgstudydays@gmail.com, or writing to her at:
The Association for the History of Glass Ltd, c/o The Society of Antiquaries of London, Burlington House, Piccadilly, LONDON W1J 0BE.

CONFERENCES

Gold Glass
Memorial Day for Daniel T. Howells

Saturday 27th April 2019
Ioannou Centre for Classical and Byzantine Studies, Oxford

A conference, co-hosted by Drs Susan Walker (Oxford University) and Ine Jacobs (Ioannou Centre), in commemoration of the life and work of the late Dr Daniel Howells. Speakers, many of whom knew or worked with Dr Howells, will present papers on the art of ancient gold glass, its historical contexts and influence on later art. Sessions will be chaired by, amongst others, Mr Chris Entwhistle (British Museum) and Prof. Liz James (Sussex University) who brought Dr Howells' work to publication. The conference is made with the generous assistance and support of the Ashmolean Museum and Oxford University.

Draft Programme: Opening remarks: Prof. Liz James, Professor of Art History.
1. Dr Giulia Cesarin "Gold-band glass: from Hellenistic to Roman luxury glass production."
2. Drs Yasoko Fujii and Hidetoshi Namiki "A Study of Continuity: gold leaf techniques on gold glass. From Hellenistic '*Kirikane'* to Late Roman 'Scratching'."
3. Mr Will Lewis "A Constantinian prince's guide to religion and culture in the mid-fourth century."
4. Dr Susan Walker "Craft, consumers and the value of gold-glass in late antique Rome."
5. Dr Lucy Grig "'Cultures of Conviviality': thinking about the role of the gold glasses in feasting and conviviality."
6. Dr Eileen Rubery "Gold glass and the cults of female saints in Rome: whatever happened to the Virgin Mary?"

A sandwich lunch and refreshments are included in the ticket price.
Tickets £15. Available from Eventbrite:
https://www.eventbrite.co.uk/e/gold-glass-memorial-day-for-daniel-t-howells-tickets-49383275707

The 8th International Festival of Glass Stourbridge Glass Quarter

23rd–26th August 2019

Since its inception in 2004 the Festival's aim has been to celebrate and showcase the skill and innovation of the glass industry and makers, both historic and contemporary, local and international. We are currently planning the 8th International Festival of Glass. The theme will be PLACEMAKING.

Please do check for updates on the website: https://www.rmlt.org.uk/Pages/Site/international-festival-of-glass, sign up for our newsletter or follow us on Facebook or Twitter.

Society of Glass Technology Annual Conference

From Sand to Splendour

1st–4th September 2019
Murray Edwards College, Cambridge

Once again we plan within the SGT Annual Conference to hold a Seminar devoted to the History and Heritage aspects of glass.

In ancient times, the transformation of mundane sand into the splendour of brilliant glass was a subject of awe. Glassmakers guarded carefully the secrets of their craft, and formed guilds to ensure confidentiality to protect their livelihoods. Notoriously, in 14th-century Venice, a glassmaker judged to have betrayed his fellows risked losing an ear or a hand!

Today we delight in sharing information, insights and inspiration surrounding the history of glass making and the splendour of the heritage we have received from previous generations. So when we meet in Cambridge next September the topics could range from the most ancient to the contemporary, from the insights of science to the splendour of glass art, from the archeometric studies of glass sites to the conservation and display of our rich glass heritage – really the programme could be as limitless as glass itself!

As ever, our objective is to bring together enthusiasts from all branches of glass studies, to meet in friendship to share our passions, our perplexities, and our problem-solving successes. We cordially invite you to join us at Murray Edwards College to share in our discussions, and if you'd like to make a presentation or offer a poster we'd love to hear from you.

If you are interested in attending and would like to submit a poster or presentation, please email <abstracts@sgt.org>. There's a convenient template you could use – please click AbstractTemplate to download it in .doc format.

https://cambridge2019.sgt.org/

Recent Advances in Glass and Ceramics Conservation

ICOM-CC, Icon and the British Museum

5th–7th September 2019
BP Lecture Theatre, Clore Centre for Education,
British Museum, London

The Glass and Ceramics Working Group of the International Council of Museums Conservation Committee (ICOM-CC), the Institute of Conservation (Icon) UK's Ceramics and Glass Group and the British Museum, are pleased to announce the call for papers for the first-ever joint meeting between these parties.

This conference marks the 5th Interim Meeting of ICOM-CC Glass and Ceramics, and the 34th year of dedicated events from Icon's Ceramics and Glass Group. Held at the British Museum, the joint conference promises to gather an impressive group of professionals specialising in the field of ceramics and glass conservation at a prestigious location in the heart of London.

Conference goals:

- Present relevant case studies in the conservation of glass and ceramics
- Disseminate research results
- Promote the application of new materials and technologies for conservation practice, as well as tools for analysis and documentation
- Identify further research and provide networking for future collaboration and activity

All aspects of the conservation, study, and research of glass- and ceramics-based cultural heritage are welcome, and papers may explore a wide variety of topics.

The three-day conference will include thematic sessions for paper presentations, as well as a small poster session. We will also feature a dedicated student session. Students currently enrolled (or enrolled at the time of this announcement) in a conservation training program are invited to submit abstracts for this session. If selected,

their contribution will be published in the proceedings as abstracts.

The British Museum has also one of the oldest and largest conservation departments in the world. Since 2014, the department has been based in the British Museum's new state-of-the-art World Conservation and Exhibition Centre (WCEC). As part of the conference, delegates will have the opportunity to visit the conservation studios and see the ongoing conservation work.

A conference website will be coming soon, linked both to the ICOM-CC Glass and Ceramics Working Group page and the Icon Ceramics and Glass Group page:

http://www.icomcc.org

Registration opens in May 2019.

Glass Objects in the Courtly Context; Production, Usage and Impact in the Early Modern Period (1500–1800)

21st–23rd November 2019
Heidecksburg Palace, Rudolstadt,
Thuringia (Germany)

Even though glass played an important role in the courtly context of early modern Europe, it has not yet received much scholarly attention beyond specialised publications with a focus on particular genres or qualities. Objects of glass could be found in daily life as well as in ceremonies, in alchemy and medicine, in astronomy, as part of scholarship and collections at court, as an element of architecture and of interior design. Above all, it was a popular material for optical instruments or tableware.

The conference wishes to draw attention to the manifold usages of glass in the courtly context, to its sensual impact and aesthetic perception. It will also focus on places of origins, production centres and modes of acquisition of the glass objects to be investigated. It aims to shed light on the conscious and unconscious use of all sorts of glass. Who cleaned glass windows if they were cleaned at all? Who took care of glass objects? Was there a keeper of glassware at court? Were objects made of green glass considered a mere commodity? What happened to broken shards? What kind of games were executed with glass vessels? What was the percentage of glass bought at local markets compared to that acquired at fares or commissioned for a particular project? How could objects made of glass be safely transported? What was the role of glass items in courtly ceremonies? Were glass objects ever part of dowries?

The conference addresses an interdisciplinary scholarly audience from all fields of cultural historical research (history, art history, history of music, cultural anthropology). We particularly welcome presentations arising from museum-based research, i.e. on restoration and conservation.

The conference is organised and convened by the research project 'Glas. Material, Funktion und Bedeutung zwischen 1600 und 1800 in Thüringen' funded by the German Ministry of Education and Research (BMBF) in cooperation with the interdisciplinary research group Rudolstädter Arbeitskreis zur Residenzkultur e.V.

Contact: Annette C. Cremer (Giessen/Cambridge) at: acc85@cam.ac.uk or annette.cremer@geschichte.uni-giessen.de.

OBITUARIES

John P. Smith

John sadly passed away on Sunday February 24th, just as this edition of *Glass News* was going to press — a longer appreciation of the man and his career will appear in the next issue.

John was a dealer with a passion for glass and worked for both Apsreys and Mallett and Sons (Antiques) Ltd in London as director of glass. After retiring he worked as an independent glass scholar and continued to publish and lecture on a wide range of glass interests. He was also the Chairman of the Glass Circle for over 15 years, a Fellow of The Corning Museum of Glass, and Trustee of the British Glass Foundation.

FACEBOOK AND TWITTER

To keep up-to-date on news and current research on the history of glass visit:
facebook.com/TheAssociationForTheHistoryOfGlass
Click 'Like' and please share.

Follow us on Twitter: @Ass_Hist_Glass

MEETING REVIEWS

The 21st AIHV Congress in Istanbul

3rd–7th September 2018

Delegates from 27 countries gathered in Istanbul for the 21st Congress of the International Association for the History of Glass (AIHV). This was the first time Turkey had hosted the Congress, and Istanbul proved an ideal location to explore the glass of the eastern Mediterranean, with late Roman and Byzantine themes taking centre stage. The Congress was based at Istanbul University, a short stroll from the magnificent mosques and palaces of the old city and perfectly placed to take a quick wander around the labyrinthine Grand Bazaar during breaks (and hopefully finding our way out again in time for the next session).

Colourful lamps of the Grand Bazaar © S. Cottam

We were welcomed very warmly by the Turkish organising committee, with a patriotic opening ceremony in the grand marble halls of the 16th-century central campus. The arrival of the Congress was clearly a source of pride to the university and we even featured on the evening's television news bulletins.

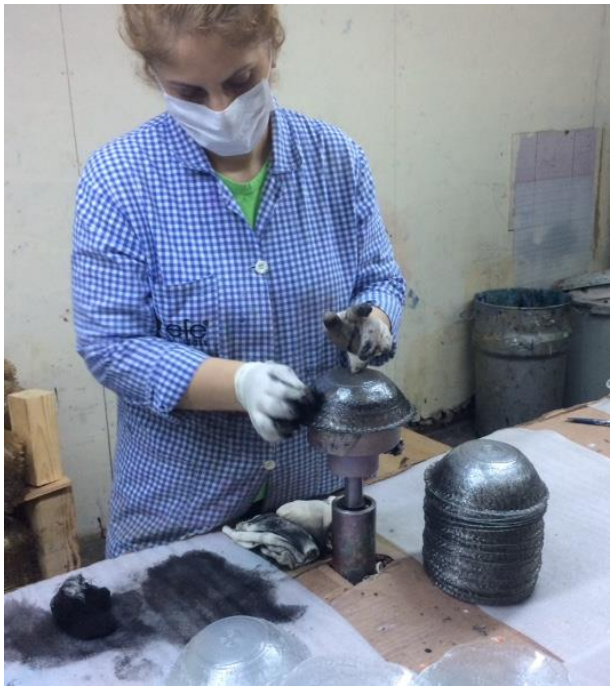
The Congress attracted many familiar faces and it was good to meet up with old friends and colleagues. It was also refreshing to see so many new contributors to glass studies, with young Turkish researchers joining more established names in presenting glass finds from across Anatolia. The question as to whether the Hittites made glass was addressed by Julian Henderson and his colleagues (the answer 'probably not'). There were extensive reviews of multi-period assemblages from Labraunda by Omür Çakmakli and Olba by Emel Erten and Yücel Senyurt, whilst Marianne Stern took a trip seasons at the early churches of Anamur.

Polycandelon lamps in Hagia Sophia © S. Cottam

Science-based papers were as popular as ever, but there seemed to be an increased awareness in many of the presentations at this Congress for the need to relate analytical results with vessel form and chronology. This dual approach was illustrated by the presentation by Luciana Mandruzzato on the glass found in the 3rd-century AD wreck known as 'Julia Felix' off the coast of Grado in the northern Adriatic Sea. In this latest update we were told about the work being undertaken to identify and analyse around 1,200 colourless and blue/green fragments found in a wooden barrel in the ship's cargo. The assemblage is believed to represent the movement of glass for recycling, but there were intriguing suggestions that the cargo was not heading for the town of Aquileia, known as a centre of glass manufacture, as might have been assumed, but may have been departing.

There were many other enlightening presentations, too many to mention individually, but I particularly enjoyed Martin Grünewald's review of 4th to 5th-century AD glass from excavations in the coal-mining region of the Rhineland, Yael Gorin-Rosen's summary of the ever-increasing number of glass furnaces being discovered in Israel, as well as the group of presentations on the little-known (to me at least) glass assemblages from the northern Black Sea region.

A full list of the contributors and presentation titles can be found using the following link: http://aihv21.istanbul.edu.tr/en/haberler/, and scrolling to 'programme'. Using the same link, it is also possible to view photographs taken during the afternoon outing to Efe Glass, sponsors of the Congress, where we watched as skilled glass blowers and finishers produced a colourful selection of bowls, which were also presented as gifts to each of the delegates.



Colouring and polishing bowls at Efe Glass © S. Cottam

Whilst in Istanbul we learnt of the death at the age of 99 of Clasina Isings. Professor Isings, whose name is synonymous with Roman glass vessels, was warmly remembered by her friend and colleague Marianne Stern who delivered an appreciation of her life and achievements to the Congress.

There were a number of changes made to the membership of the Board of the AIHV. Sylvia Fünfschilling has stood down as President and the role has been passed to Anastassios Antonaras and Maria-Grazia Diani is the new General Secretary. As is traditional, the Vice-President's role was passed to the head of the organising committee of the next Congress, and as such it is Márcia Vilarigues who will be in charge of preparations for the 22nd Congress to be held in Lisbon from the **13th to the 17th of September 2021.**

Sally Cottam

Hot from the Furnace Mouth

AHG Study Day
The Glassmakers, Project Workshops, Quarley
Friday 2nd November 2018

Twenty of us enjoyed a sunny day with Mark Taylor and David Hill, 'The (Roman/Georgian) Glassmakers', at their workshop near Andover. We split into two groups, alternately watching The Glassmakers' demonstration of hot glassworking techniques, and discussing various aspects of experimental glassworking with Colin Brain. For many members including a number of students, this was their first chance to see Mark and David demonstrate their well-practised formation of reproduction historic glasses. For the 'old hands' who had been present for the Roman Furnace Project of 2005 and 2006 (see Taylor and Hill 2008; Paynter 2008) there is always more to learn and new questions to be answered.

An 'Ennion cup' being taken out of a four-piece mould, during the blowing process © R. Tyson

The demonstration of glassblowing included a range of techniques. The most complex re-creation was of the mould-blown Roman 'Ennion cup' (featuring the Greek inscription 'Ennion made me'). This was blown into a four-piece mould, which David explained was surprisingly difficult to hold securely to withstand the pressure of glass being blown into it. It showed how some techniques can be mastered by experimentation – the moulded decoration is reproduced to a very impressive standard, but The Glassmakers explained their frustration that they have not yet worked out a more successful way to eliminate the seam marks left between the mould pieces. Other experimental pieces we saw included a mould that had not been coated in carbon on the internal surface, resulting in the glass being stuck inside it. We watched a square-sectioned bottle being shaped by flattening each side on the flat surface of the stone marver – showing how this results in rounded corners, whereas a mould-blown square-bottle has much sharper corners. Other Roman techniques for adding applied trails, handles, folded feet and for thickening rims were also demonstrated.

Moving to later periods, The Glassmakers showed examples of 17th-century air-twist stems, which took several stages to make, and explained how they had worked out how to re-create these complex stems in various different patterns through experimentation, as no written instructions survive, and previous theoretical suggestions proved not to work. The written record should anyhow be treated with caution, and is not always based on first-hand experience. The medieval monastic

writer Theophilus warned about the blowpipe: 'take it immediately out of your mouth … lest by chance you should suck the flame into your mouth when you draw in a breath' (*De Divers Arts*, Book II, Chapter 6: Hawthorne and Smith 1979, 54); however, Mark demonstrated that sucking the blowpipe after blowing results in experiencing only a little warm air in the mouth.

Colin Brain shared some thoughts about how practical glassworking has influenced research into glass history, and how the various data produced can be brought together to compare with what is excavated or on museum shelves. We discussed the Roman Furnace Project, whose immersive experience has had a huge influence on glass studies. It provided evidence for how glass might be made, how to manage a successful furnace, what temperatures can be achieved, how much wood is required, how tools were used, and the resulting waste products etc. Nevertheless, we should also be aware that while this proved to be a successful way to make glass, it is not necessarily how it was done. The principle of Occam's Razor was discussed – and whether the simplest solution is the most likely. Collecting data from experimentation can build up models to predict what's possible, and we looked at a spreadsheet created by Mark that predicts melting and working temperatures of glass and their coefficient of expansion based on batch composition and glass analysis results. This can be useful for glass historians: by putting in glass analysis results the model can predict what temperature the glass was melted and worked at. Other aspects of experimental work include using glass in historical contexts – for example, the display of vessels in the Hampton Court Chocolate Kitchen, and its use by re-enactors. The thorny dilemma of 'fakes' was mentioned, and this is further discussed in Mark and David's article on pp. 15–17.

Viewing strains in unannealed glass through a cross polarising filter, against a light box © R. Tyson

We had an opportunity to use Mark and David's cross polarising filter that detects strains in unannealed glass when viewed against a light box. The strains were surprisingly visible, and the method can distinguish between finished, annealed glasses, and those that have been discarded without annealing, as waste.

We visited the site of the 'Roman' glass furnaces built for the 2005 and 2006 projects, which are being monitored for the archaeological evidence that they leave (see photos on their website: http://www.theglassmakers.co.uk/weathering.htm). The main furnaces were still recognisable, but the annealing furnace, having not been fired to such a high temperature, was reduced to a bump in the grass. Two members brought fragments from Roman glass assemblages they were working on, to provide some light lunchtime identification entertainment.

We left reminded of how valuable Mark and David's work has been and continues to be, and contemplating what future developments there might be in experimental work in Britain. Thank you to Mark, David and Colin for a most informative and enjoyable day.

For anyone who would like to see The Glassmakers glassblowing, this will be possible during the Summer Exhibition at the Project Workshops, Quarley in mid May, and at the International Festival of Glass at the Ruskin Centre, Stourbridge in late August. They will be participating in furnace projects at Villa Borg, Germany in June, and Velzeke, Belgium in September (see http://www.theglassmakers.co.uk for details).

Rachel Tyson

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AHG GRANT REPORTS

The Tebtynis Workshop: A Glimpse at Glassworking in Ptolemaic Times

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This short report is intended to offer an overview of the communication 'Glass inlays between tradition and innovation: a closer look at the Tebtynis workshop', co-authored by Cinzia Bettineschi, Ivana Angelini, Gianmario Molin and Paola Zanovello. The communication summarised the main results of the first author's PhD project and was presented at the AIHV 2018 Conference in Istanbul thanks to the generous support of the AHG, who financed the travel expenses.

The research focused on the archaeological, technological and archaeometric study of the inlay workshop of Tebtynis (Egypt) and its materials. Tebtynis is an ancient village located in the south of the Fayum oasis. Its lifespan extends from the Middle Kingdom (approx. 18th century BC) to the Arab period (approx. 11th century AD), but the climax is reached during the Graeco-Roman era (Gallazzi 2001). The topography of the site is articulated around the Ptolemaic temple of the crocodile god Soknebtynis and comprises various blocks, such as the well-known *insula dei papiri* (Vogliano 1937). Tebtynis hosted a templar workshop for producing sacred furniture inlaid with glass (see Nenna 2015 and cited bibliography). There are other similar structures in Egypt between the 5th and the 1st century AD, but the one in Tebtynis is the best preserved, as it is the only one with the combined presence of finished and semi-finished products, wastes, tools, the kiln and an intact archaeological stratigraphy, at least when it was first excavated by the Italian Archaeological Mission in Egypt directed by Carlo Anti in 1931 (Bettineschi, Angelini and Molin in press). Lacking any published data, the location of the structure remained unknown for over 70 years.

Recently, the discovery and study of the archives of Carlo Anti offered the opportunity to localise and contextualise the findings unearthed within the so-called structure 17 in the first courtyard of the temple (Deotto et al. 2017; Bettineschi et al. 2018). The communication at the AIHV first examined the typology and the function of the kiln and the tools and subsequently focused on the finished, semi-finished and waste products related to glassworking, which are now preserved at the Museo Egizio (ME) di Torino, Italy.

The Tebtynis collection at the ME counts more than 800 fragments of vitreous materials, almost entirely in glass. The pieces can be divided according to the technological complexity in monochrome, stratified and complex mosaic glasses (Fig. 1). After a first screening of all the materials in stereoscopic microscopy, 70 objects comprising 144 different glasses were chosen for in-depth archaeometric investigations. In particular, the materials were selected to represent all the typological, functional and chromatic classes discovered in the workshop; they included: colourless, white, blue, green, yellow, yellowish-orange, red and brown glass both transparent and opaque.

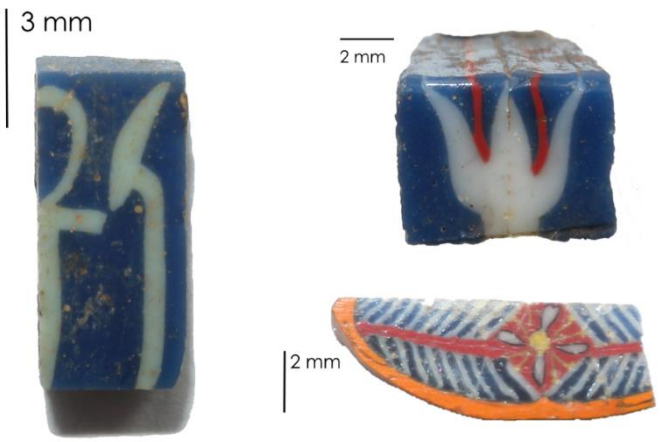

Figure 1: A selection of the mosaic glass inlays discovered in Tebtynis preserved at the Museo Egizio, Torino. Left, slice with ankh-was hieroglyphic text (inv. S. 18554/08); top right: lotus flower bar (inv. S. 18554/01); bottom right: slice with a mix of floral and geometric decorations (inv. S. 18554/05).

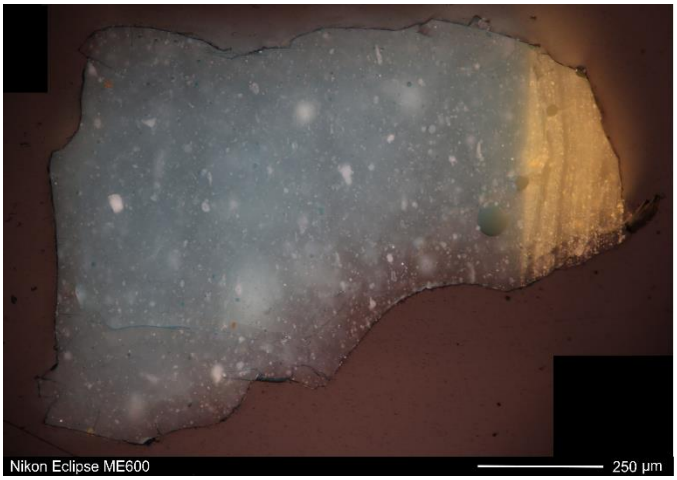

Figure 2: Optical image of sample Ty-S-ARG-403, with layers of opaque yellow and opaque light blue glass. Magnification 200x. © Cinzia Bettineschi

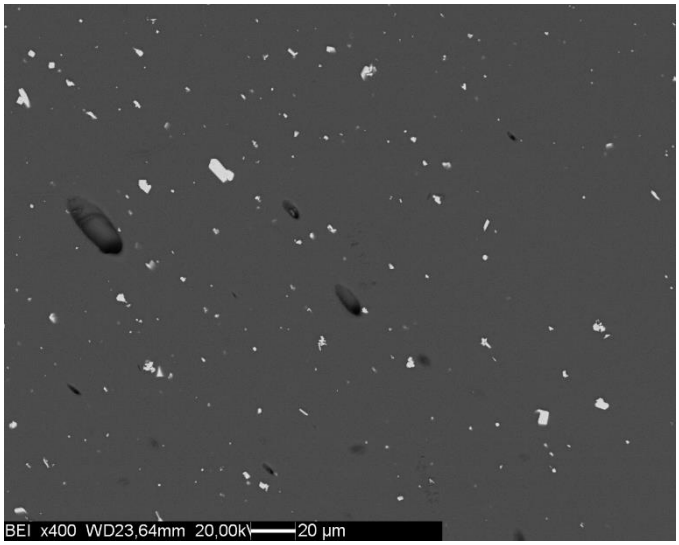

Figure 3: SEM micrograph in backscattered electrons (BSE) of the dark blue sample Ty-M-BAu. The texture is characterised by the presence of finely dispersed, euhedral crystals of Ca-antimoniates acting as opacifiers. © Cinzia Bettineschi

A set of complementary analytical techniques were used to obtain a complete overview of the texture, the mineralogy and the elemental composition of the investigated samples. After a preliminary screening in stereoscopic (SM) and confocal laser scanning microscopy (CLSM), the objects were micro-sampled and the prepared chips were systematically analysed by optical (OM) and electronic microscopy (SEM-EDS), and by electron microprobe (EPMA) for quantitative chemical data (Figs 2–3). When necessary, micro-Raman analysis was also performed for the investigation of the colourants and opacifiers, the newly formed phases and the undissolved relics of the batch material.

For reasons of space, it is not possible to go into the details of the chemico-mineralogical interpretation in this short report. The complete results will be discussed in dedicated publications, which are now in preparation.

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Some Preliminary Observations of the Glass Beads from the Early Historic Site of Barikot, Swat (Pakistan)

Mubariz Ahmed Rabbani

ISMEO Italian Archaeological Mission in Pakistan
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This PhD research involves the systematic documentation, classification and study of the beads of the Early Historic site of Barikot in the Swat Valley of North-West Pakistan (Iori et al. 2015) currently excavated by the ISMEO Italian Archaeological Mission in Pakistan directed by Dr Luca M. Olivieri. Barikot (ancient Bazira of Alexander's historians) is most famously known to have been conquered by Alexander the Great in 327 BC (Tucci 1964 and Olivieri 2014). Apart from studying the non-vitreous bead material, this fieldwork involved documenting and classifying the beads made up of glass and vitreous material of the late Iron Age from the 7th century BC until the 3rd century AD covering the Achaemenid, Mauryan, Greco-Bactrian, Indo-Greek, Scythian, Parthian, Kushan and Kushano-Sasanian cultural periods which characterise the site. The beads were classified based on their typology and base materials. The typological study will shed light on the provenance, production and use of the Barikot glass beads. Eventually, it will be possible to see how the glass beads developed over time both on a local as well as on a regional level.

Preparing to take high-resolution photographs in the Swat Museum © Mubariz Ahmed Rabbani

A variety of different shapes, sizes and colours has been recorded across the chronological sequence with a significant amount of glass material deriving from the 6th – mid 4th BC which includes most notably the Persian Achaemenid cultural phase. The Achaemenid Empire covered the entire Near East, from Asia Minor to Egypt and from Central Asia to the eastern-most boundaries of the Indus Valley with Royal Road networks established to efficiently connect different parts of the Empire with one another (Van De Mieroop 2015). An atmosphere of willingness to adopt new ideas, styles and customs prevailed in the Achaemenid lands (Frankopan 2016). These factors must have encouraged the formation of new identities, increased international commerce, diversity and skill growth. It may have stimulated cultural diffusion particularly of the glass bead ornaments into Uḍḍiyāna (Swat Valley) indicating the preference, value and significance attached to glass at that time in the eastern-most territories of the Achaemenid Empire.

With the expertise of my co-supervisor Professor Massimo Vidale and Professor Ivana Angelini from the University of Padova (Italy), the glass material was identified. Among the most interesting pieces are the gold sandwich glass beads where gold foil is fused between two layers of glass. Known to have been introduced between the 3rd – 2nd century BC in Greece, gold glass beads were produced to address the needs of the elites and aristocracy. They were also common in the Roman world. Apart from their practical use, sandwich techniques ensured a better preservation of the decoration (Cesarin 2018). Thus far there have been limited studies on their technological aspects, the location of their workshops and chronology (Cesarin 2018). In contrast, the beads of Barikot derive from a controlled stratigraphic environment, provided with more than 30 radiocarbon dates giving a reliable dating system. Were the gold glass beads products of long-distance trade from the Greek and Roman worlds? Were they imported from a presently unknown location in South Asia? Hence, this study can contribute in pinpointing the origin of glass, its movements in South Asia and beyond.

In conclusion, the large amount of information recorded is presently being organised. Currently, it is difficult to say whether glass beads were traded down to Barikot in a finished form and if they were intended for local consumption by the households. However, excavations are ongoing, hence there is a strong possibility of finding evidence related to on-site glass bead production. Eventually it will be possible to reconstruct different adornment and identity patterns through the currently ongoing study of the forms of beads depicted on Gandharan carved stone sculptures, asking whether jewellery parures on Gandharan statuary included glass specimens. Therefore, this research represents studying a culturally complex and internationally linked fertile region of the world.

I would like to express my deepest gratitude to the Association for the History of Glass for supporting me in my travels to the Swat Valley of the Khyber Pakhtunkhwa province of Pakistan as part of my PhD research. I am immensely grateful to my supervisors, Dr Luca M. Olivieri, Professor Massimo Vidale, Professor Roger Matthews and Dr Duncan Garrow for giving me the opportunity to work with them on this important and exciting research project.

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Chemical Analysis of Medieval Glass from Volga Bulgaria

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The work presented was undertaken for an AHG grant awarded in 2018. It was intended to collect glass samples excavated in several sites in the Republic of Tatarstan (Russian Federation), belonging to the cultural horizon of the medieval Volga Bulgaria.

The Volga Bulgaria was a federation of sedentary tribes inhabiting the region around the confluences of the Volga and the Kama rivers, in modern Tatarstan. The Volga Bulgaria participated actively in the trade networks that linked Eastern and Baltic Europe with the Near East, the Caucasus, the Transcaucasia, Central Asia and Persia. In the 10th century, the Volga Bulgaria adopted Islam as their official religion, which seems to have increased the trade contacts with the Islamic lands to the south, including glass. In the 13th century, the Mongols of the Golden Horde overran the Volga Bulgaria, but commercial contacts continued being very active during the Mongol domination.

Glass from this period has already been subject to some analysis (see References), but some crucial questions remain to be clarified. Was there any technological change in the glass being consumed/produced in the Volga Bulgaria after the adoption of Islam as the official religion of the state? Is there evidence for the import of raw glass, as well as of finished products, or is there evidence for local primary production? What was the role of the Volga Bulgaria in redistributing glass products from the Islamic lands to the south towards Eastern and Baltic Europe? The local production of finished objects in the Volga Bulgaria has already been demonstrated, with the discovery of several industrial and commercial facilities directly related to the manufacture of glass, but the transmission and adoption of glass-related technological knowledge remains unclear.

Figure 1: Glass items from the site of Bolgar, including locally-produced beads and imported vessels. © David Govantes-Edwards

Once the guidelines of technological transmission and interaction are clearer, we shall be able to compare them with those attested in other 'peripheral' Islamic societies ('peripheral' in strictly geographical, not hierarchical, terms with regard to the Islamic heartlands of the Near and Middle East), the most obvious example being perhaps al-Andalus, where the project members are already working in the context of the *Al-Andalus Glass Project*, which I co-direct with Dr Chloë Duckworth (Newcastle University).

In order to begin addressing these questions, a plan to analyse between 40 and 50 samples by Electron Microprobe and LA-ICP-MS has been devised. The samples include different typologies (beads, vessels, stills, etc.) and chronologies (10th–14th centuries, spanning from the earliest adoption of Islam to the Golden Horde period), from a variety of sites: Bolgar (UNESCO World Heritage Site) (capital of the Volga Bulgaria immediately before the Golden Horde period and an important commercial hub afterwards), Suvar (earliest capital of the Volga Bulgaria) and Bilär

Figure 2: Central area of Bolgar, with the remains of the 14th-century mosque in the foreground and 18th-century Russian church in the background. © David Govantes-Edwards

(another important commercial hub). The samples include both local productions and imports (identified on the basis of typology) from Syria, Egypt, the Byzantine Empire, Persia and Central Asia.

The samples were collected during a visit to the sites of Bolgar and Suvar in August 2018, and their preparation for analysis is already ongoing. The visit to these sites also included the inspection of the ongoing excavations and several locations, such as the Great Bazaar of Bolgar, where glass-making facilities have been excavated in the past. These visits were greatly illuminating, as they put into perspective the results of the archaeological excavation of the sites, and the central location in which glass-making activities were performed.

The project is being carried out in cooperation with Dr Svetlana Valiunina (Kazan State University), with the help of Dr Vladimir Koval (Russian Academy of Sciences) and Dr Airat Sitdikov (Tatarstan Academy of Sciences).

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Preliminary Data of Archaeovitreological Analysis on Medieval Stained Glasses from Lincoln Cathedral by PXRF and SEM-EDS

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On this occasion I would like to thank The Association for the History of Glass for providing me the financial support to present the preliminary data of my PhD research. The results were presented at the 21st International Congress of the Association Internationale pour l'Histoire du Verre in Istanbul, Turkey with Melina Smirniou, Tom Küpper and Philippa Hoskin as co-authors.

Lincoln Cathedral was founded in AD 1073. It had to be rebuilt after a disastrous earthquake in AD 1185. The reconstruction started under bishop Hugh of Avalon (AD 1186–1200). The Eastern Transept and the Saint Hugh's Choir were built by AD 1210 by Geoffrey de Noyers and Richard the Mason in the English Gothic style. Most of the Cathedral was finished by AD 1215–1255 by Master Alexander. The north rose (Dean's Eye) window (Fig. 1) was completed by AD 1220–1255. Throughout the centuries, additional features have been added to the original layout of the Cathedral (Morgan et al. 2012; Hendrix 2011).

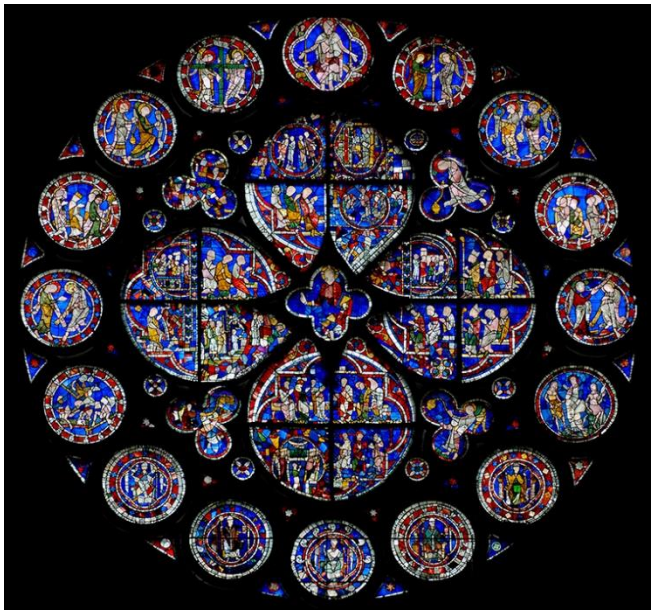

Figure 1: Dean's Eye rose window. Image: © Gordon Plumb

The Dean's Eye window (Fig. 1) is made of 77 panels: 37 figurative and 40 decorative. From the 16th century onwards the window has been continuously repaired. It is assumed that all the windows remained in situ until the mid 18th century. The medieval decorative system was neglected and the window is a result of the rearrangements representing an amalgamation of glasses from diverse periods. The last restoration and conservation treatment that included replacement of glass fragments, cleaning and reinforcement of the whole stone framework was carried out from 1990 to 2002 (Morgan et al. 2012; Hendrix 2011).

The aim was to preliminary determine, by means of SEM-EDS and PXRF, the glass composition and if the data supports their dating to the first half of the 13th century. Additionally, we focused on the morphology of the glasses: the presence of bubbles, the presence of paint layers (grisailles), the degree of weathering and corrosion of glass and production technique (fueilleté or plaqué) (Kunicki-Goldfinger et al. 2014; Silvestri et al. 2011; Schalm et al. 2007; Pradell et al. 2016). Nineteen glass fragments were selected for this study: one dark amber flashed over white, three yellow, two skin colour, one colourless and three purple, four red and five blue glasses (Fig. 2) from various panels of the Dean's Rose window. The fragments have been stored at the Lincoln Cathedral Glazing Department since the last restoration treatment.

Figure 2: Samples embedded in resin blocks. Image: ©Ivona Posedi

The chemical analyses proved that the glasses have four different compositions. The majority of them are typical 13th-century K-Ca-Si glasses (wood plant-ash glasses) (Pradell et al. 2016). The HLLA (high-lime low-alkali)

glass seems to have a 16th/17th-century composition, while the Pb-K-Si glasses (lead-potassium glasses) could be dated to the late 17th and early 18th century (Schalm et al. 2007; Dungworth 2017; Schalm et al. 2010). The Na-Ca-Si glasses (soda glasses) do not have detectable or have low concentrations of MgO, P_2O_5 and very low concentrations of K_2O dating them to the 19th/20th century (Dungworth 2017; García-Heras et al. 2005). The red soda glass was made in plaqué technique, and the red wood plant-ash glasses in fueilleté technique. The presence of fueilleté technique seems to be consistent with the dating of the glasses to the 13th century (Kunicki-Goldfinger et al. 2014). All the red glasses are coloured with copper. Manganese was used as a decolourant in the colourless glass. The glass matrix is homogeneous and the melt seems to be refined well as the occurrence of the air bubbles is rare (Silvestri et al. 2011). The presence of the paint layer was noted and it is vitrified without and interdiffusion zone (Fig. 3)(Silvestri et al. 2011). The wood plant-ash glasses are prone to leaching and can simultaneously have weathering deposits.

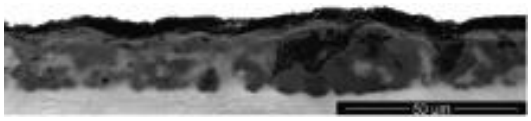

Figure 3: Secondary electron (SE) image of vitrified paint layer. Image: ©Ivona Posedi

The preliminary data of the Dean's Eye rose window from Lincoln Cathedral indicated that most of the analysed glasses seem to be original, dating to the 13th century. Historical data about restorations of the Dean's Eye are confirmed with the presence of HLLA, Pb-K-Si and Na-Ca-Si glasses.

This research was supported by a PhD Studentship (Ref. CoA-LC-16-2) from the University of Lincoln and Lincoln Cathedral.

REMINDER

Would you like to see the photos in this issue in colour?
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OTHER GLASS ARTICLES

‘Echoes in Eternity’: A Gladiator Tale

“What we do in life echoes in eternity” *(Maximus Decimus Meridius)*

Mark Taylor and David Hill: The Glassmakers

http://www.theglassmakers.co.uk/

Figure 1: Reproduction beaker made by The Glassmakers. Photo © Mark Taylor and David Hill

The 2006 Festchrift in Honour of Professor Jennifer Price organised by the Association for the History of Glass, *Glass of the Roman World*, published in 2015, includes an article which discusses some new finds of examples of so-called Roman ‘sports cups’ of the first century AD. These are mould-blown drinking vessels, usually depicting chariot racing and/or gladiatorial combat, and the authors compare an amber fragmentary cup from Fos Gulf, and the complete ‘brown-green’ vessel from Como, along with fragments of a similar cup found at Vindonissa in Switzerland (Fontaine and Foy 2015).

The Fos amber cup, now in the collection of M. Frederic Lehoussel, was found in underwater excavations of a harbour deposit, and shows gladiators in combat, including a *retiarius* who has dropped his trident. This detail, unique to this particular type of beaker, along with the positions of the other combatants, allows direct comparison with the Vindonissa fragments and others from Lattes, and all were undoubtedly blown in the same mould.

The apparently intact ‘brown-green’ beaker from Como (Fig. 2) appears to be another example of this same type, accorded the reference number C3 by Beat Rütti et al. (1988), featuring the *retiarius’* abandoned trident, the unusual multi-tiered base section, unique amongst circus beakers, and names for all eight gladiators depicted, broadly agreeing (though not entirely) with those seen in the Vindonissa fragments, and apparently representing the first complete example known from the same mould.

However, the authors noted several anomalous details and differences which suggested that the Como beaker was definitely not from the same mould as the others, remarking: ‘Do we have to continue to try to identify the original mould, thus creating sub-divisions of the existing moulds defined in the Swiss typology for every new variant discovered?’

A closer examination of the photographs of the Como beaker, which first appeared in an article originally delivered at a glass study day in Massa Martana (De Bellis 2001), shows that the vessel in question is, in fact, an example of our 1996 reconstruction of the Rütti C3 beaker by us, Mark Taylor and David Hill, and the view of the underside of the beaker given by De Bellis (Fig. 3a) clearly shows that the two signatures of Taylor and Hill on opposing sides of one of the base rings, along with the date of manufacture of the beaker, appear to have been deliberately removed by some rather clumsy abrasion, perhaps using a Dremel drill, before a false patination was applied to the whole vessel to counterfeit age. Mark frequently grinds the base ring of these vessel reproductions very slightly, whenever necessary, to ensure they stand perfectly upright (unlike any Roman examples!). This effect, visible on the photo as a slight

Figure 2: The ‘Como beaker’. Photo: De Bellis 2001

Figure 3: Photos of (a) the base of the Como beaker (photo: De Bellis 2001) and (b) our beaker (© Mark Taylor and David Hill), showing signatures.

flattening of the lowest ring, is also seen on the Como vessel. The cracked-off lip rims of all our reproductions are always smoothed and polished to a far higher standard than the Roman examples, a detail that the faker of the Como cup tries (but fails) to disguise by heavy modern patination.

So, this Como beaker is definitely no older than 1996, when I first made the mould for this vessel. At the time, my reconstruction of the missing elements of the design was achieved by repeating details such as heads, helmets and shields from elsewhere on the surviving fragments, and the missing names were added after reference to other gladiator beakers. In doing so, I inserted some gladiators' names that I was well aware were unlikely to be correct, since it proved impossible to supply over 75% of the missing parts of the frieze with complete accuracy. I reasoned that if another, better preserved beaker ever showed up (as it now has, the Fos cup, though still minus names, sadly!), we could easily amend the mould to render it more accurate as a reproduction. Furthermore, noting the unusual 'tiered' base to the beaker given in the Rütti et al. article, I naïvely copied what appeared precisely, but we now know that the Swiss reconstruction profile was extrapolated from just one unrepresentative fragment of the Vindonissa beaker (one that had been blown into a mould with a slightly mis-aligned base section), and the whole base shape is quite incorrect. No such tiered base seems to have existed on these beakers, as the Fos cup now confirms (despite the fact that, like some other known finds, it appears to have slumped and flattened slightly during annealing).

All of our 1996 'first series' beakers were derived from Rütti et al. 1988, which was the principal reference source available at the time, and the first attempt to categorise the entire series of vessels. Thousands of our reproduction beakers were sold in the 1990s and early 2000s, many to the European mainland, notably at Vindonissa and Augst museums.

The deliberate breaking and repair, artificial ageing, and particularly the crude removal of our signatures from this vessel prove that it was altered with deliberate intent to be passed off as a genuine Roman beaker, presumably for considerable financial gain, and it is to be hoped that there are no other such examples to be found in collections and museums. This is the only incidence of such a deliberate fraud that we are aware of, but we hope that it is the last! This vindicates our decision to sign and date every single circus beaker and other Roman style vessel we have ever made, since the removal of these engraved details is extremely difficult to achieve, and the attempt was performed very ineptly in this case, but the appearance of these clearly ground-away areas really should have alerted archaeologists to the fraud. That no-one noticed and questioned this removal of our signatures at any stage of its 'discovery' and fraudulent sale as an antiquity, or presentation in an article shows that much greater vigilance by archaeologists and glass specialists needs to exist.

Please do not blame us for re-creating Roman beakers in the first place! We discovered this particular fraud, and are discussing it here. We have always taken great care to ensure that our reproductions should not be presented as the real thing, and our glass vessels have been available for nearly a quarter of a century, but this is the first example of a deliberate intent to deceive and defraud that we know of. The quality of the metal of the glass itself should be a significant clue to ours being modern reproductions – our soda-lime glass is usually much better in quality than the often poorer material used by the Romans, with fewer bubbles and cord, and our base rings are almost always subtly levelled by grinding so that they stand up straight (very few original Roman vessels are ever as vertical as ours), and there are always those signatures engraved on the bases of vessels: Mark's name alone if it is entirely his work, as most of the free blown glass is, and both our signatures if I have created the mould he blew into.

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Stretchable Glasses. A Forgotten Type of Trick Glasses

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From (at least) the mid 16th century until (at least) the late 19th century a peculiar type of trick glasses seems to have been rather popular: goblets or beakers whose slightly conical or cylindrical wall had an artificial spiral crack that started at the rim and stopped a little above the base. Because of that crack it was possible to pull the glass apart slightly, it would then contract again and still hold liquids, thus demonstrating the surprising fact that glass can be elastic.

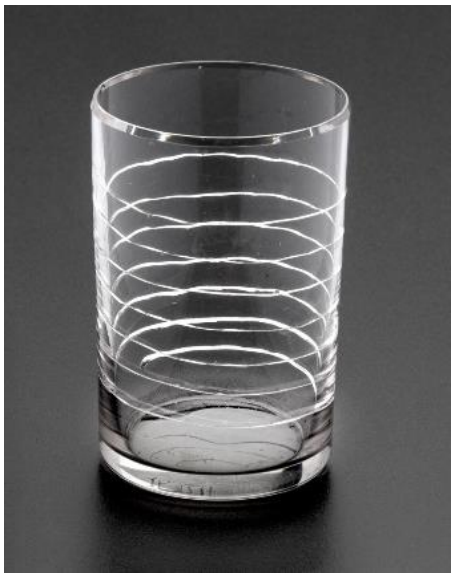

Figure 1: 'Stretchable' beaker, early 19th century. Prague, Museum of Applied Arts, inv. no. 10360. Photo © Gabriel Urbánek.

So far I know only a few intact beakers of this kind in museum collections (relatively recent specimens from the early 19th century) (Fig. 1) and some older fragmentary goblets from archaeological contexts in northern Germany (Fig. 2) and the Czech Republic (Fig. 3), but probably such spirally cut glasses were also made elsewhere.

Figure 2: Fragment of a 'stretchable' goblet, late 16th/ early 17th century. One of several similar examples found in Lüneburg, Am Ochsenmakt 1. Museum Lüneburg, inv. no. 34:1, Sch. 6. Photo © Ingeborg Krueger.

The earliest known mention of 'stretchable' glasses appears in Johannes Mathesius' sermon on glass making of 1562; at that time they seem to have been already quite familiar. In publications from the 17th, 18th and 19th centuries they are described either in connection with practical instructions on how to cut glass by thermal shock, in order to provide equipment for pharmacy or chemical experiments, or within collections of 'recipes' for various sorts of conjuring tricks.

Figure 3: Cup-fragments from a 'stretchable' goblet, 17th century. Found in Brno/Brünn, Mečová/Schwertgasse 2. Muzeum města Brna, inv. no. 429 059. Photo © Miloš Strnad.

I want to draw attention to those forgotten glasses because they may have been produced not exclusively in north-eastern Europe but also in England and other European countries. Fragments of spirally cut 'stretchable' glasses may have puzzled archaeologists and therefore remained unpublished. Hopefully images of more complete specimens will help to identify mysterious stripes from the walls of such goblets or beakers. My present state of knowledge is summarised in my article in *Der glasfreund* (2018); in addition Marian Schüch, studying conservation at the Staatliche Akademie der Bildenden Künste Stuttgart, has written a paper (2018) on his experiments with different methods to produce spiral cracks in glasses, and he has traced additional written sources.

Any further information regarding more fragments of this type of trick glasses from archaeological contexts or historical texts mentioning them will be very welcome!

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QUERIES

An Unparalleled Roman Glass Vessel Fragment from Kent

Photos © Rose Broadley

In 2017, Maidstone Area Archaeological Group excavated an unusual vessel glass fragment at East Farleigh Roman villa near Maidstone, Kent. The fragment is from a colourless beaker and features two bands of letters inscribed between wheel-cut horizontal bands (V/ASA). It was found near a building of uncertain function known as Building 6. The fragment is thought to date from the fourth century, but no close parallels have been identified so far from Britain or elsewhere, despite the assistance of Jenny Price and various attendees at the Glass of the Caesars anniversary conference last year. Is it unique? If you have seen something similar, details would be gratefully received (contact Rose Broadley at roseclark2@gmail.com).

Further information on the excavations can be found on the group's website: http://www.maag.btck.co.uk/ExcavationsatEastFarleigh.

RECENT FINDS

Thirteenth-century Glass from Crusader Castle of Montfort, Galilee

Recent excavations at Montfort Castle in modern north Galilee, principal castle of the Teutonic Order in the Holy Land, by the Society for the Study of the Crusades and the Latin East have uncovered a previously unknown large Gothic Hall, with remains of grisaille-style painted window glass. The castle was built in the 1220s, and destroyed and abandoned in 1271. A photo and summary can be found in the online magazine *Vidimus*: https://vidimus.org/blogs/news/gothic-hall-with-medieval-stained-glass-discovered-in-crusader-fortress/

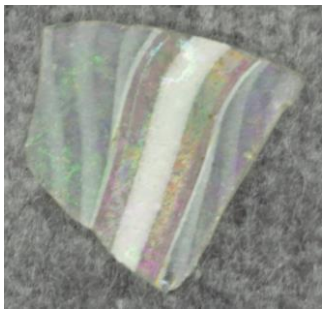
Excavations in 2016 of a tower and adjacent chamber uncovered numerous artefacts including a large quantity of glass vessel fragments. See: https://societyforthestudyofthecrusadesandthelatineast.wildapricot.org/Archaeological-and-Field-Research-Projects/6749584

Glass with White Cane Decoration from London

These two recent finds come from the Thames foreshore. They are assumed to be of mid 17th-century date. They could be of local manufacture, but equally one or both could be imported.

© *Colin Brain*

The first fragment is 35mm across and appears to be from the base of a wine-glass bowl. Under a lens it appears to be made in two layers, each approximately 2mm thick. The inner lining is decorated on its exterior with flattened white canes and the outer casing with a matching mirror-image pattern on its interior. The two layers fit together exactly, but sandwiched between them there appear to be thin patterned strips of gold foil. The canes have clear glass cores and judging by the black corrosion on their broken ends a lead-based opacifier has been used. Viewed under short and long-wave UV light the base glass appears to be a mixed alkali glass while the cane fluorescence appears consistent with the use of lead-soda glass as a base for the opacifier.



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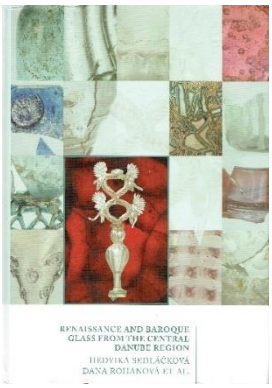
The second smaller fragment is 16mm across and about 1mm thick. It is decorated on one side with flattened white canes of similar construction to the first piece, except that these do not appears to have been opacified using a lead compound. The base glass is better quality than the first fragment and under UV appears to be primarily potash-based. It is perhaps part of the wall of a parallel-sided vessel, but if so the curvature suggest that this would be around 20cm diameter.

Colin Brain

BOOK REVIEWS

Renaissance and Baroque Glass from the Central Danube Region

Hedvika Sedláčková, Dana Rohanová et al.



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Written in English, this study brings together and makes accessible a huge wealth of archaeological, art historical and scientific research on the glass from the Central Danube region from the mid 16th to the 18th centuries. Much of this research has been previously published in individual excavation reports and articles written in a wide variety of European and Slavic languages. Some has been presented at international symposia and conferences, including the AIHV, while other material is presented here for the first time.

The book itself is divided into three main parts: the first discusses in a series of essays the glass from the region within its cultural and historical context. Written by Frederik Federmayer, Branislav Lesák, Dana Rohanová, Hedvika Sedláčková, Petra Šimončičová-Koóšová, Kinga Tarcsay and Dana Zapletalová these essays concentrate on the glass found at Brno (Czech Republic), Vienna (Austria) and Bratislava (Slovakia) at a time when Bratislava had huge political and social importance as the legislative centre of the Kingdom of Hungary. The vessels discussed include both imports from Venice and Germany, as well those of local production.

The second part takes the form of a catalogue, compiled by Hedvika Sedláčková, Branislav Lesák and Petra Šimončičová-Koóšová, of the glass vessels, which have

been found primarily from refuse pits. Arranged according to form, each section begins with a short summary, followed by a catalogue of the glasses, each of which is accompanied by a scaled drawing and often further enhanced with colour photographs. The first type, comprising 'plates, bowls and cups', is only represented by a few recorded examples, while Type II, 'serving vessels', is further divided into sub-groups of ewers and jugs, table bottles, pilgrim bottles, kuttrolfs, carafes and vases. Drinking vessels unsurprisingly form the largest group and so have been divided into Types III and IV for 'beakers', including tankards, and 'goblets' with a special study of those with relief stems blown in patterned two-part moulds. Types III and IV include vessels of both imported and domestic production that display a wide range of decorative techniques. The next two types comprise 'lids' and 'funny vessels and toys', while Type VII 'utility glass', includes five sub-groups: lens-shaped bottles, inkwells, lamps (although some appear more likely to be urinals), hygiene and laboratory glass (chamber pots and alembics), and small items. 'Storage bottles' with pear-shaped bodies, spherical bodies or those blown into four-sided moulds make up Type VIII and 'window glass' Type IX.

In the third part of the book Dana Rohanová has collated and summarised the chemical analyses for a large sample of fragments, which provide further information about the technological progress in the manufacture of glass at various locations over periods of time. The results of over 430 samples, mostly with colour photographs of the fragments from which they were taken, are arranged together in 39 tables. From this it was possible for the author to identify changes in production technology from the mid 16th and 17th century to the turn of the 17th and 18th century, including the introduction of refining agents after the second half of the 16th century and changes to the composition of the batch at the turn of 17th and 18th centuries when beech ash was no longer used. Analysis also showed that each large town had its own producers of glass.

Finally, there is a DVD that contains a PDF with all the drawings in the book arranged according to their archaeological context, so it is possible to see clearly the assemblages from the relevant refuse pits. Furthermore, there is a table of Types I–IX with illustrations showing the date ranges and variations of the forms recovered across the three main cities in which they were found at. Certainly, this latter part would have been a useful addition to the main body of the book. Notwithstanding this, whether used by archaeologists or scientists this book will remain a valuable resource for a long time not only for the study of glass from the region but for the history of European glass as a whole.

Last few copies available of Annales of 14th AIHV Congress, Venice and Milan 1998

The last 11 copies of the Annales of the 14th AIHV Congress in Venice and Milan in 1998 are available free of charge to anyone who would like a copy. They are A4 size, 20mm thick and paperback. If you would like one, email me in the first instance to reserve a copy and make arrangements for delivery (mail@justine-bayley.co.uk). Copies can either be collected from me in central London or you can pay for posting them to your home address. The volume weighs 1.38kg (cost to UK address is £2.95, Europe c. £7.50). A pdf version of this volume (and of other AIHV Annales) are also available free of charge from https://aihv.org/publications/.

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