

SYMPOSIUM REPORT

Materials and Technologies in the Age of Transition: The Byzantine, Sasanian and Islamic Near East

Organisers: Moujan Matin and Alain George
Wolfson College, University of Oxford

On 10th and 11th July 2019 a symposium 'Materials and Technologies in the Age of Transition: the Byzantine, Sasanian and Islamic Near East' was convened at Wolfson College, University of Oxford. The symposium included eighteen speakers and chair panels from the UK, France, Greece, Denmark, and Germany who specialise in different artistic media from the Middle East, East Mediterranean, and North Africa. This one-and-a-half day symposium was divided into six main sessions: *Day 1*: i) Glass, ii) Ceramics, iii) Metallurgy; iv) Mining and Stonework; *Day 2*: v) Textiles, and vi) Manuscripts, with each session focusing on the development of materials during the transition from late antiquity to Islam. Each session featured lectures by two invited speakers and a discussion panel facilitated by the panel chair. The symposium received excellent participation with approximately 70 attendees, 12 presentations and engaging and productive discussions.

The symposium was the first of its kind, bringing together experts from different disciplines of archaeology, archaeological sciences, and history to discuss the subject. The event provided a rare opportunity to address the development of materials and technologies from various perspectives considering the major effects of the Byzantine-Islamic transition and proposed various frameworks for collaboration across fields that rarely interact.

The first day focused on inorganic materials. In the Glass panel, chaired by Beatrice Leal, St John Simpson talked about a distinctive Sasanian glass industry with primary evidence of production from fieldwork in Iraq as well as the southern Caucasus. Nadine Schibille discussed glass compositions during the eighth to tenth century CE with a focus on well-dated samples of early Islamic glass weights from Egypt.



Discussion following the Glass panel (from left to right: Nadine Schibille, St John Simpson, Bea Leal) © Nyree Manoukian

In the Ceramics session, chaired by Oliver Watson, Moujan Matin discussed major technological revolutions in the development of glazed ceramics and the technological interactions between glass and glaze making during the Byzantine and early Islamic periods; and Seth Priestman spoke about the economic and cultural implications of the developments in early Islamic ceramics and their trade across the Persian Gulf and Indian Ocean.



Moujan Matin discussing Byzantine ceramic glazes © Nyree Manoukian



Seth Priestman giving his presentation on the commodification of ceramics © Nyree Manoukian

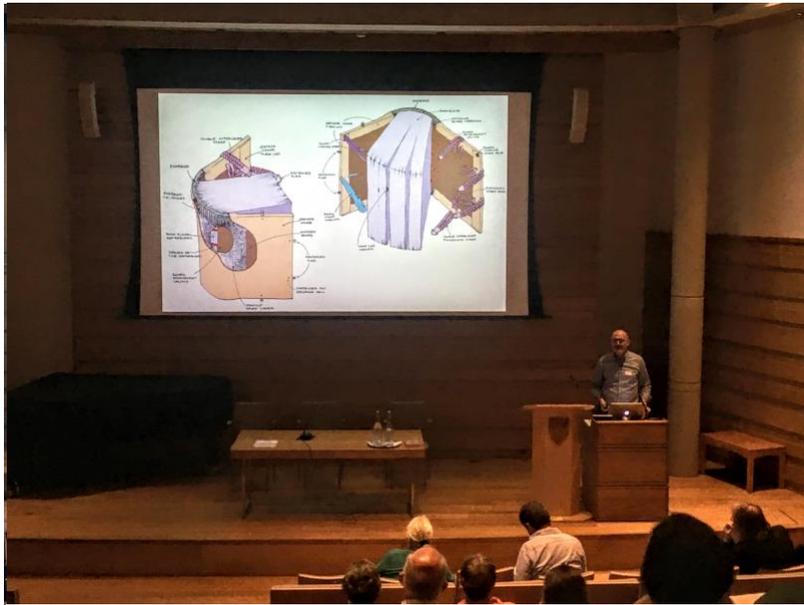
In the Metallurgy panel, chaired by James Allan, and the Mining and Stonework panel, chaired by Jeremy Johns, various aspects of the production and provenance of crucible

steel, copper alloys, and silver dirham coins were discussed respectively by Brian Gilmour, Matthew Ponting and Stephen Merkel. The last lecture of the day was given by Elise Morero, who focused on rock crystal carving techniques and supply sources of raw rock crystals in early Islam.



James Allan (left) and Brian Gilmour (right) beginning the Metallurgy panel © Nyree Manoukian

The second day was themed around organic materials, with the two panels focusing on Textiles and Manuscripts. The Textile panel, chaired by Jonathan Shepard, featured lectures by Anna Muthesius and Hero Granger-Taylor on silks and the evolution of loom technology. In the Manuscripts panel, chaired by Alain George, Matthew Collins presented recent advances in the use of DNA for the study of manuscript parchments; and Georgios Boudalis discussed the technology of the codex in late antiquity in relation to other industries, such as clothing.



Discussion following the Textiles panel (from left to right: Jonathan Shepard, Hero Granger-Taylor, Anna Muthesius) © Nyree Manoukian



The Manuscripts session; Alain George (left) and Matthew Collins (right) © Moujan Matin

The symposium concluded with remarks by Alain George. The event was audio-recorded and all the recordings of presentations as well as the full discussions will be available on the Khalili Research Centre website.

SHOT funding enabled us to invite speakers from across Europe (Nadine Schibille (France), Georgios Boudalis (Greece), Matthew Collins (Denmark), and Hero Granger-

Taylor) who otherwise would not have been able to travel to the UK and present their work. The support also allowed us to lower registration fees, particularly to encourage attendance by advanced students and early career researchers. The symposium attracted a diverse range of attendees from various fields including Islamic art, Byzantine Studies, archaeological science and Near Eastern and European archaeology as well as scholars and students from the Middle East, Turkey, Japan and China. The discussions between historians of art and materials specialists initiated during sessions and in the more informal setting of breaks and the meals on day 1 are likely to continue, and the event will have raised awareness of new possibilities on both sides. We thus hope to have planted the seeds of future collaborations that will benefit our respective fields. The symposium contributed to the expansion of the SHOT's intellectual terrain by addressing itself to a region largely neglected in the History of Technology the Near East and Eastern Mediterranean. The event may be the first in a series of events on 'Materials and Technologies in Ages of Transition'. It is hoped that the next workshop will focus on the Mongol transition in the Near East and China.



**WOLFSON
COLLEGE**
UNIVERSITY OF OXFORD



Materials and Technologies in the Age of Transition

The Byzantine, Sasanian and Islamic Near East

WOLFSON COLLEGE, UNIVERSITY OF OXFORD, 10-11 JULY 2019

Organisers: Moujan Matin and Alain George



Supported by:



Oxford Centre for History of Science,
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The Khalili Research
Centre for the Art
and Material Culture
of the Middle East



The British Institute of Persian Studies
مؤسسهٔ ایرانشناسی بریتانیا



WOLFSON COLLEGE
RESEARCH CLUSTERS



DAY 1 (10 July 2019)

REGISTRATION & REFRESHMENTS (9.00-9.30)

GLASS (9.30-11.00)

Sasanian Glass

St John Simpson (British Museum)

Mechanisms Underlying Early Islamic Glass Productions

Nadine Schibille (CNRS Orleans)

Chair: Beatrice Leal (University of Oxford)

TEA/COFFEE (11.00-11.30)

CERAMICS (11.30-13.00)

Late Antique Glazed Wares: Ceramic Glazing Traditions and Cultural Interactions

Moujan Matin (University of Oxford)

The Commodification of Ceramics During the Early Islamic Period

Seth Priestman (British Museum)

Chair: Oliver Watson (University of Oxford)

LUNCH (13.00 -15.00)

METALLURGY (15.00-16.30)

What Do We Know About Crucible Steel in the Late Antique Era: Evidence and Origins?

Brian Gilmour (University of Oxford)

Copper-based Metal Technologies at the End of Antiquity: Continuity and Change

Matthew Ponting (University of Liverpool)

Chair: James Allan (University of Oxford)

TEA/COFFEE (16.30-18.00)

MINING AND STONWORK

(17.00-18.30)

Metallurgy and Provenance of Early Islamic Silver: Current Results and Future Questions

Stephen Merkel (University of Oxford)

The Impact of Raw Material Supply on the Development of the Early Islamic Relief Carved Rock Crystal Industry (9-11th c.)

Elise Morero (University of Oxford)

Chair: Jeremy Johns (University of Oxford)

DAY 2 (11 July 2019)

REFRESHMENTS (9.00-9.30)

TEXTILES (9.30-11.00)

Early Byzantine, Sasanian and Near Eastern Silks: Design and Technical Cross-Currents as Symbols of Cultural Exchange

Anna Muthesius (University of Cambridge)

Sasanian Silk Textiles in Samite Weave-Their Origins and Afterlife

Hero Granger-Taylor (Independent scholar)

Chair: Jonathan Shepard (University of Oxford)

TEA/COFFEE (11.00-11.30)

MANUSCRIPTS (11.30-13.00)

Books and Bees: Material Culture from the Standpoint of the Natural History

Matthew Collins (University of Cambridge and University of Copenhagen)

The Technology of the Codex in Late Antiquity and its Sources

Georgios Boudalis (Museum of Byzantine Culture, Thessaloniki)

Chair: Alain George (University of Oxford)

GLASS

Sasanian glass

St John Simpson (The British Museum)

Sasanian glass was first defined as a category separate to Late Roman, Byzantine and Islamic glass in the late 1950s and has been the subject of much research over the subsequent decades. It has excited ideas of trade along the Silk Road and been the subject of frenzied collecting in the Far East as a result. Others have seen it as the direct forerunner of the early Islamic glass industry. The truth is more complicated and understanding this relies on the evidence of archaeological excavations and scientific analyses. This paper reviews what is now known about Sasanian glass – what it was and what it wasn't – and illustrates some of the latest directions of research on the subject.

Mechanisms underlying early Islamic glass productions

Nadine Schibille (IRAMAT-CEB, CNRS, Orleans)

The last two decades have witnessed a massive expansion in the analytical study of early Islamic glass assemblages from archaeological contexts stretching from the Iberian Peninsula to the eastern Mediterranean, Mesopotamia and along the Silk Roads to Afghanistan. The available data increasingly allow the identification of chronological and geographical patterns in the production, distribution and consumption of glass. Using the compositional data of early Islamic glass weights from Egypt in comparison to other Islamic glass assemblages from eighth-century Khirbet al-Minya and ninth-century Samarra, as well as pre-Islamic samples from Ctesiphon, the competing dynamics responsible for the changes in the production and trade of glass during the eighth to tenth century CE will be elucidated. Not much seems to have changed in terms of the primary production of glass in Egypt during the Umayyad and early Abbasid caliphates. It is only in the aftermath of the fragmentation of the Abbasid caliphate in the late ninth century that the manufacture of glass in Egypt experienced fundamental transformations. The compositional analysis of archaeological glass can thus shed light on the technological, cultural and economic processes that led to an Islamic glassmaking tradition.

Chair: Beatrice Leal (University of Oxford)

CERAMICS

Late Antique glazed wares: ceramic glazing traditions and cultural interactions

Moujan Matin (University of Oxford)

The technology of glazed wares underwent important transformations during the Late Antiquity. The methods of manufacture, the range of colours, and the composition of ceramic glazes in the Early Byzantine and Sasanian periods were significantly developed and expanded during the early Islamic period in the Near East and the Levant, leading to a technological revolution in the manufacture of ceramics. This paper investigates the development of ceramic glazing traditions as an anchor to understand the social, cultural and economic dynamics across the Eastern Mediterranean, the Near East, and Eastern Iran during the eighth to tenth century CE. The paper combines the results of the chemical and microstructural characterization of ceramics from Egypt, Jordan, Syria, Iraq, and Iran with experimental replication of archaeological ceramics to trace the spread of ceramic technologies.

The commodification of ceramics during the early Islamic period

Seth Priestman (Middle East Department, The British Museum)

Much of the research on Islamic ceramics has focused on aspects of stylistic development and technological innovation. I wish to advance the suggestion that these factors – important as they may be – are largely the result of and response to changes in the economic conception of the ceramic medium. This is particularly clearly demonstrated by the shift away from the use of ceramics as containers and general objects of utility, towards the commodification of the medium and the largescale exchange of tablewares as a product in their own right. Such a process may not be uniform across the Islamic world, but clearly pertains at least to the heartlands of the Abbasid Caliphate in central and southern Iraq and southwest Iran and the wider maritime sphere of the Persian Gulf and Indian Ocean with which this zone was directly connected.

Chair: Oliver Watson (University of Oxford)

METALLURGY

What do we know about crucible steel in the Late Antique era: evidence and origins?

Brian Gilmour (University of Oxford)

Crucible steel has become well known in recent centuries, mainly for the watered steel swords that survive in various museums and other collections but the origins, spread and even the nature of this very specialised branch of early steelmaking is poorly understood. This is largely through the scattered, patchy and obscure nature of the earlier written evidence – much of comes from secondary sources which are barely known and little studied. Until recently there has also been a lack of systematic (where there is any) archaeological evidence. Most of the earlier written evidence comes from the time of Ya'cub al-Kindi or later although some earlier history can be traced back as far as the early 1st millennium CE. From recent evidence it has become clear that this was a highly developed and widespread industry in the Near East and Caucasian region in the pre-Islamic era. The aim of this paper is to examine the beginnings of this industry and how/where it developed.

Copper-based metal technologies at the end of Antiquity: continuity and change

Matthew Ponting (University of Liverpool)

In 1979, Paul Craddock published a paper entitled 'The copper alloys of the Medieval Islamic World – inheritors of the Classical tradition'. This paper used the results of a significant number of Islamic artefacts from the British Museum collections to suggest that much of the metalworking technology evident in these objects had been inherited from Roman metal smiths. During the ensuing 40 years considerably more analyses have been undertaken and archaeological investigation has added new evidence for metalworking, therefore the picture is now, perhaps inevitably, somewhat more nuanced. The current paper aims to present some new data and to offer further interpretations.

Chair: James Allan (University of Oxford)

MINING AND STONWORK

Metallurgy and Provenance of Early Islamic Silver: Current Results and Future Questions

Stephen Merkel (University of Oxford and Bergbau-Museum, Bochum)

Under the Abbasids, minting particularly, in Iraq and Iran, reached considerable scales in the decades around the turn of the 9th century AD. Despite the immense scale of dirham output during this period, Abbasid dirhams are poorly characterised in terms of their lead isotope values. The dearth of the data is particularly apparent for the mints of Madinat al-Salaam and al-Muhammadiyah, the two most productive Abbasid mints in the late 8th - early 9th century AD. In order to explore the source of silver used in the early Abbasid coinage, 25 dirhams from the Fitzwilliam Museum were analysed by laser ablation multi-collector inductively coupled plasma mass spectrometry (LA-MC-ICP-MS), and these data, augmented by a small collection of published and unpublished analyses, were used to build a picture of the state of silver mining and supply for the major Abbasid mints. The primary results of the study show that the earliest Syrian-Iraqi dirhams may have been supplied by traditional Sasanian sources, however, in the 770s it is clear that there were separate sources of silver for the Iraqi and Iranian dirhams. The dirhams minted in Mesopotamia appear to have sources anchored in Eastern and Central Anatolia while the silver for Iranian dirhams originates from Iran, likely demonstrating a continuity of Sasanian silver sources. The acquisition of silver for Iraqi mints from the mines potentially in the Taurus Mountains has both economic and political implications for Arab-Byzantine relations.

The Impact of Raw Material Supply on the Development of the Early Islamic Relief Carved Rock Crystal Industry (9-11th c.)

Elise Morero (University of Oxford)

Rock crystal is a hard (Mohs 7) and brittle material, difficult to be carved. Therefore, for the creation of a relief decoration, the use of good quality raw crystals is essential. The technology necessary for executing relief carved pieces appeared during the Roman period. The increasing number of hard-stones, accessible throughout the Empire, participated to the stimulation of the craftsmanship and technical developments.

The industry reached its apogee in the Islamic World, between the 9-11th c. The emergence of this production, composed of large and high skill pieces, seems largely connected to the exploitation of new raw rock crystal sources in Madagascar, able to supply the workshops in big flawless blocks.

The study of relief carved pieces produced from the Roman to the Early Islamic period reveals a continuation in the main technology employed. The emergence and development of the industry (but also its decline) are partly determined by the possibility for the centres of production to be supplied in raw crystals of good quality, available in quantity.

Chair: Jeremy Johns (University of Oxford)

TEXTILES

Early Byzantine, Sasanian and Near Eastern Silks: Design and Technical Cross-Currents as Symbols of Cultural Exchange

Anna Muthesius (University of Cambridge)

This paper will explore the role of cultural exchange in the evolution of loom technology across Mediterranean and Near Eastern cultures, during 'Age of Transition' from Late Antiquity to 'Early Medieval' times. The paper will compare the role of silk as economic asset, political entity and 'cultural agent' across Byzantine, Sasanian and early Islamic cultures, in relation to a number of cross-influences in design and weaving technique, which can be observed on surviving silks.

In order to do this, the paper will outline the documentary evidence for the types of looms, and weaving workshops in operation across cultures, and it will highlight both traditional and innovative technical and design elements discernible on the silks.

Also, the paper will conclude that the evolution of weave and loom technology in the Mediterranean and Near East has to be seen as part of a much wider global development, and indeed this is borne out by developments in the period beyond the 'Age of Transition' outside the scope of this paper.

Sasanian Silk Textiles in Samite Weave – Their Origins and Afterlife

Hero Granger-Taylor (Independent Scholar)

Although few, if any, silk textiles in samite weave have so far been found within Iran, a certain number preserved outside – in Egypt, in western church treasuries and at Tibetan sites near the Silk Road – can now with some certainty be identified as of Sasanian manufacture or made within the Sasanian tradition. Carbon 14 dating has also allowed these to be chronologically ordered.

The earliest designs, of the 5th century CE, are small scale with horizontal rows of small composite motifs, often bizarre in character. By the time of Khusro II (591–628), designs had evolved and become considerably larger, with the famous pearled roundel type first appearing in around 600 CE. The principal motifs, almost always birds or other animals, were also more realistically represented. A comparison can be made between these silks and the silver gilt plates of the period.

Examples of samite discovered over recent decades at sites on the Tibetan plateau include a small number probably made within Iran before the fall of the Sasanians in 651. Most however are later, dating up to the mid-9th century. These are more brightly coloured, with gradually larger and more complex designs, the majority nevertheless firmly within the Sasanian design tradition.

Chair: Jonathan Shepard (University of Oxford)

MANUSCRIPTS

Books and Bees: Material Culture from the Standpoint of the Natural History

Matthew Collins (University of Cambridge and University of Copenhagen)

Digitisation campaigns are making more and more manuscripts available as high-quality digital renders. However, the digital revolution, like earlier facsimiles, distances us from these objects. The so-called “Material Turn” in the Humanities is, therefore, encouraging scholars to consider the entangled agency of objects and their readers. I will argue that a future direction will be the exploration of the biological record that can be recovered from manuscripts. The need in the early modern period to classify and ever-expanding Nature, often reflected in collections of singular items, ultimately became our modern museums. Today Natural History Museums are repositioning themselves as molecular libraries of lost biological diversity but few have so far seen libraries and archives in the same way. In the case of manuscripts, the diversity of the biological record is more limited, to domesticated animals and plants but collections of written texts began more than a millennia before the C 17th Cabinets of Curiosities and unlike the anomalous selections of early modern natural philosophers, aimed at comprehensive collection. Consequently Archives and Libraries are the accidental but remarkably rich and extremely well-documented museums of domestication. How do these material cultures reflect or respond to transition?

The Technology of the Codex in Late Antiquity and its Sources

Georgios Boudalis (Museum of Byzantine Culture, Thessaloniki)

The aim of the talk is to present the codex as an archaeological object and examine it from a material culture point of view. The focus will be on two complementary lines of investigation. On one hand there will be an examination of each of the main components of the codex – i.e. the sewing of the gatherings, the attachment of the boards to the bookblock, the sewing of the endbands, the decoration of the cover and the making of the fastenings – in order to see how these relate to everyday artifacts such as socks, shoes and sandals in late antiquity, the period when the codex was established as the standard book format. On the other hand it will be investigated how the multigathering codex relates on technical grounds to simpler and earlier book formats like the wooden tablet codices and the single-gathering codices. This comparison is made in order to stress that rather than an invention the multigathering codex should be understood as an innovation, that is, as the result of a long process of adaptation and evolution of features and techniques already in use in Roman antiquity.

Chair: Alain George (University of Oxford)