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SHARED PRACTICES AND IDENTITIES IN THE NORTHERN SETTLEMENT OF ACTUNCAN, BELIZE

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Overview

This research examines how urban families developed and shared neighborhood identities at the Maya city of Actuncan, Belize, ca. AD 800-900, a time when the city experienced rapid population growth as surrounding centers, including Xunantunich, declined. To investigate household relationships, this research considers the nature and location of activity patterns in and around three commoner households to infer shared practices and the shared identities that those activities both enabled and constrained. Examination centers on the notion of “practices of affiliation,” or beliefs and behaviors that contribute to the creation and expression of community or neighborhood identity. Multiple methods were employed, including subsurface testing, soil chemical residue analysis, and macro- and microartifact analysis, to produce overlapping datasets of the sample area. The data were examined spatially using geostatistics as well as with quantitative assessment. This research contributes to the understanding of urban processes of growth and decay in this region, and how they are linked to the behaviors of social factions in neighborhood communities.

Study Area

Actuncan is located in the upper Belize River Valley, in the district of Cayo, near the modern town of Succotz and the Guatemalan border (fig. 1). The settlement is roughly 2 km north of the well-known center of Xunantunich (Ashmore 2010; LeCount and Yaeger 2010; Leventhal

and Ashmore 2004). Actuncan rests upon a T-3 alluvial terrace west of the Mopan River, a tributary of the Belize River. The Mopan River flows all year and would have been beneficial to prehispanic residents of the region as an abundant and consistent supply of fresh water (Fedick 1988; Smith 1998). Additionally, this waterway allows direct access to the coast of the Caribbean providing an ideal transportation route for goods and/or people (Cap 2015). Actuncan sits above one of the first rapids on the fall line of the Mopan River as it flows out of the Peten.

Consisting of 14 ha of civic and domestic buildings, Actuncan is similar in size compared to neighboring centers and is a good example of a low-density urban center (Smith 2011). Ceramics indicate that the area was continually occupied from the Preclassic period into the Postclassic period. Although the site was occupied for around 2000 years, this research is primarily concerned with contexts from the Terminal Classic period. Prior to the Terminal Classic period, during the Late Classic period, Actuncan was a secondary center subordinate to neighboring Xunantunich (Mixer et al. 2014). During the Terminal Classic period, Actuncan appears to have gained independence and was ruled corporately by a governing council (Mixer 2016). In spite of the on-going “Maya collapse” Actuncan remained a vibrant population center.

Sampling Strategy

The aim of this research was to explore similarities and differences in the use of space within the sample area. Specifically, were architecturally-free areas used in similar ways to residential groups? Did residents conduct similar activities? Or were these groups locations for different types of practices? In order to explore these questions, I employed a variety of methods to draw on multiple independent lines of evidence. The sample space included the three residential groups and the open spaces between and surrounding surface visible architecture (fig. 1). This sampling strategy was determined with the aim of going beyond architecturally bounded space to explore open spaces between architecture in attempts to better understand the use of space in the context of one continuous landscape. Standard clam-shell style posthole

IN THIS ISSUE

<i>Shared Practices and Identities in the Northern Settlement of Actuncan, Belize (K. Fulton)</i>	1
<i>Identifying Anthropogenic Modification on Archaeological Ochre Materials (E. Velliky)</i>	4
Announcements	7
Archaeological Ceramics (C.C. Kolb)	8
Archaeometallurgy (T. Fenn)	16
Upcoming Conferences	24

diggers were used to systematically sample the space. Through posthole testing, I collected soil samples for chemical residue analysis as well as artifacts. Additionally, I collected off-site control samples for comparison.

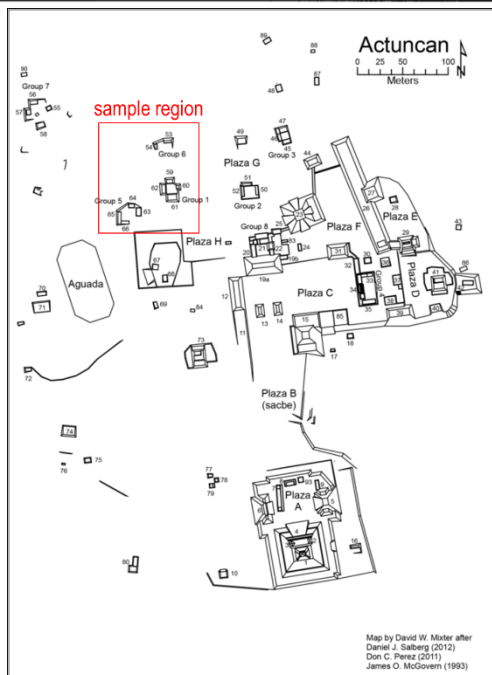
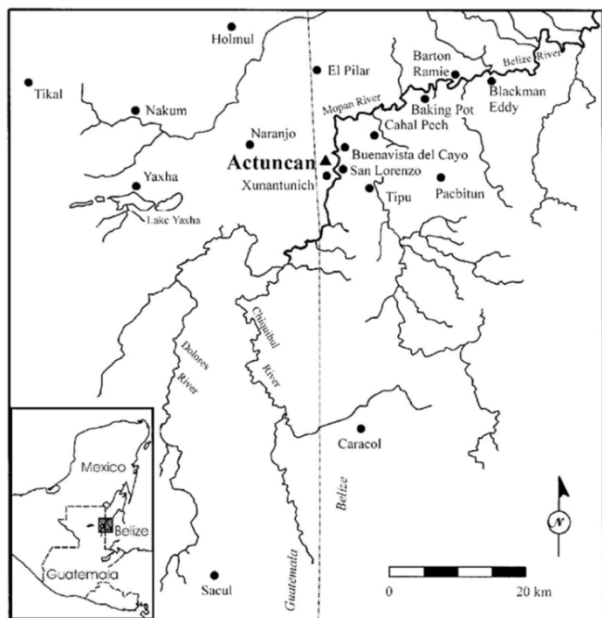


Figure 1. Maps showing the location of Actuncan (top) and a plan view of Actuncan with the sample region identified (bottom).

Methods and Results

Soil samples were collected in the field and stored in sterilized Whirl-Pak® bags to prevent contamination. Inductively coupled plasma-mass spectrometry (ICP-MS) using the Foss mild acid-extraction technique (0.60 M

HCl + 0.16 M HNO₃, trace metal grade) was used to characterize chemical concentrations (Lewis et al. 1993). The calibrated concentrations of 21 elements were determined: Al, Ba, Ca, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Na, Ni, P, Pb, Sr, Ti, U, V, Y, and Zn. The results were reported in parts per million (ppm) of the element.

Two categories of artifacts were considered in this study: macroartifacts and microartifacts. Macroartifacts were those artifacts collected from the 1/4-inch mesh in the field (and thus larger than 1/4-inch). Microartifact samples were collected in the field using a 2-L measured scoop and brought back to the field laboratory for processing. Each sample was divided into three size fractions using a set of three nested screens: 1. over 1/4-inch (Fraction 1), 2. between 1/4-inch and 1/8-inch (Fraction 2), and 3. between 1/8-inch and 1/16-inch (Fraction 3). All samples were divided by material class, counted, and weighed.

The artifact and chemical data were examined spatially using geostatistics as well as with quantitative assessment. The results discussed here focus on spatial patterning. The spatial distributions of a selection of elements and artifact classes were investigated using Kriging, an empirical model that interpolates unknown values based on known values. Spatial distribution maps are presented in Figure 2 and Figure 3.

Discussion and Conclusions

If activities and their locations were specialized, we would expect to see clear definitions of activity loci represented by areas with heavier concentrations of elements or artifacts (dark red in the spatial distribution maps). Alternatively, if activities were overlapping and generalized, we would expect to see a more homogeneous distribution. Many chemical and artifact distributions show areas with higher concentrations; however, not all of these areas are associated with visible architecture. Additionally, some distributions show relatively homogeneous distributions in the open spaces surrounding architecture. This suggests that not only the patio groups, but also the empty spaces between architecture are being heavily trafficked in a generalized way. Further, the areas with higher concentrations of elements or artifacts may represent areas where activities were likely more specialized.

Daub is more prevalent in the eastern portion of Group 6 than elsewhere, though it also appears to extend fairly far beyond the formal patio space of Group 1. Ceramic and lithic concentrations also appear off structure from Group 1. The daub surrounding Group 1 may represent temporary perishable structures for specialized activities

involving high quantities of ceramics and lithics. The high concentrations of P, often associated with food consumption and preparation, and Mn, related to organic refuse disposal, surrounding the patio suggest the specialized activities likely included food, possibly for ceremonial feasting (Parnell et al. 2002; Wells and Terry 2007; Wells et al. 2007). Additionally, the presence of elevated levels of Fe, linked with iron oxide (a mineral commonly used in ceremonial contexts including rituals using ochre and hematite) at Group 1 supports the existence of ritual activities.

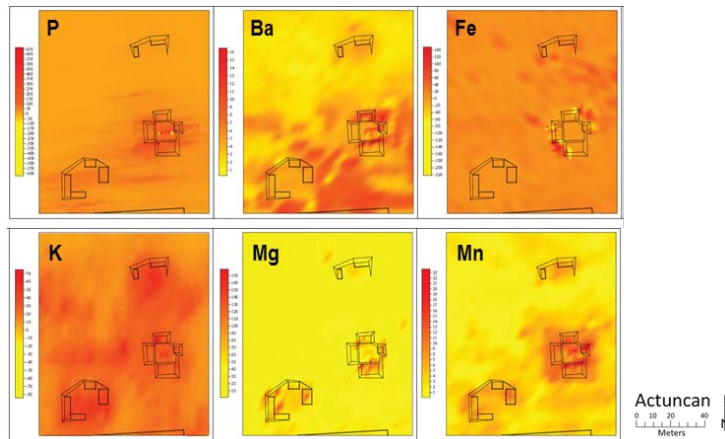


Figure 2. Kriged image maps showing spatial distributions of extractable P, Ba, Fe, K, Mg, and Mn.

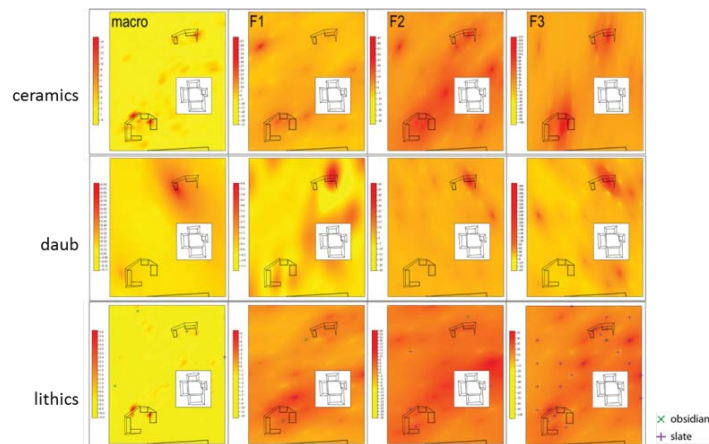


Figure 3. Kriged image maps showing spatial distributions of artifacts of (from left to right) macroartifacts, Fraction 1 microartifacts, Fraction 2 microartifacts, and Fraction 3 microartifacts for (from top to bottom) ceramics, daub, and lithics.

In conclusion, residential areas at Actuncan appear to have been very busy places. People did not confine themselves to the formal patio spaces but, rather, interacted with the entire landscape. Group 1 appears to have been a locus for more location-specific activities than the rest of the area and may have been an arena for ceremonial feasting involving other members of the

community. Other analyses that are beyond the scope of this report support this conclusion (Fulton 2015). Shared practices would have helped to enhance inter-household relationships and contribute to the creation and expression of shared social identity.

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**IDENTIFYING ANTHROPOGENIC
MODIFICATION ON ARCHAEOLOGICAL
OCHRE MATERIALS BY EARLY HOMININ
POPULATIONS**

*Elizabeth Velliky, PhD Student, Dept. of Archaeology, Univ. of Western Australia, Institut für Naturwissenschaftliche Archäologie, Eberhard Karls Universität Tübingen
Recipient of the SAS Student Research International Travel Award*

With the assistance of the Society for Archaeological Sciences Student Research International Travel Award, I was able to travel to Johannesburg to visit the University of the Witwatersrand, the archaeological site of Sibudu Cave, and the Iziko Museum in Cape Town. The purpose of this research trip was to gain experience in identifying anthropogenic modification on archaeological ochre materials, in order to address broader questions regarding symbolic and cultural behaviors in early hominin populations.

For my doctoral research, I am investigating the use of ochre and artifacts associated with ochre in the Swabian Jura region of Southwestern Germany. This area is known for producing some of the earliest known examples of symbolic artifacts, including animal figurines carved from ivory, personal ornamentation, and the oldest known musical instrument, a flute. The sites also contain various ochre materials and artifacts with traces of ochre pigment, which is unique for this region as there have been very little painted artifacts recovered from Germany in general. As of yet, there has not been a holistic analysis

conducted of the ochre materials and ochre artifacts at Hohle, nor of the Swabian Jura sites in total.

Though southern Germany and South Africa are quite geographically far, these are two of the most prominent research areas in regards to the early emergence of symbolic behavior in our hominin ancestors. Though Germany and other parts of continental Europe have boasted some of the oldest uncontested examples of symbolic behavior, in the forms of musical instruments (Conard, et al. 2009), personal ornamentation (Conard, 2011), and figurative art (Conard, 2003; 2009), South Africa contains similar specimens, sometimes twice the age, albeit a bit more elusive in identifying their definitive purpose (d’Errico and Henshilwood, 2011). What we can ascertain from the archaeological assemblage of Southern Africa is that there exists a very early pattern of complex cognitive behavior, which many researchers take to suggest behavioral modernity and the use and maintenance of symbols (d’Errico, et al. 2003). One of the materials most often used to support such theories is red ochre, as it has consistently appeared in archaeological contexts from 400,000 years ago (Barham, 2002) with evidence of intentional use from 160,000 years ago (Marean, et al. 2007). It is suggested that the deliberate grinding of ochre was conducted in order to create a red pigment, and the acquisition, creation, and use of this pigment would suggest advanced cognition, complex language, and the maintenance of social structures. It is for these reasons that the research of red ochre in ancient contexts receives such attention.

At the University of the Witwatersrand, Dr. Tammy Reynaud (née Hodgskiss) studies ochre use and modification during the Middle Stone Age period (MSA) in Africa. She conducted an extensive analysis of the ochre materials from Sibudu Cave, a prolific cave site in the KwaZulu-Natal region of South Africa, boasting extensive MSA deposits (Hodgskiss, 2013). She has also run experiments on ochre modification to identify these traces archaeologically (Hodgskiss, 2010), and to differentiate between anthropogenic and post-depositional traces on the pieces. Though Dr. Reynaud has published extensively on ochre use-traces and modification, this type of practical experience is best learned working directly with the researcher and materials. It is for this reason that I applied for the SAS Student International Research Travel Award to conduct a research trip to Wits with Dr. Reynaud to study different types of ochre modification and use-traces, and how to identify these on archaeological ochres.

I arrived in Johannesburg on February 22nd and began working with Dr. Reynaud the next day. On our first

working day, we established a list of priorities to cover during the coming week: identifying use-wear, differentiating between anthropogenic and post-depositional processes, identifying incisions as bone or stone tool marks, the different types of striations and when more than one type of modification is present, terminology, as well as experimenting with ochre pieces (fig.1).



Figure 1: Experimental ochre grinding and scoring.

We also discussed the utilization of heat treated ochre, ochre residues on lithics and hafting materials, the identification of binders mixed with ochre, and linking types of modification to subsequent use (e.g. rubbing for direct application, grinding for acquiring pigment). In addition to working with use-traces, we discussed how to construct a database for the ochre pieces and what types of categories to include and how to quantify these. Though seemingly trivial, the proper organization of this sort of data is crucial, as ochre pieces can have a number of use-traces with different concurrent features. The need to quantify this information is essential in conducting large-scale analyses of ochre use at a site over time.

Throughout the working week, we looked at the different collections of ochre materials housed at Wits. These included the Rose Cottage, Olieboomport, and Sibudu ochre materials. The sites boast a range of ochre materials, the Rose Cottage ochre was very dense, hematite-rich ochre with very few traces of anthropogenic modification, while the Sibudu ochres ranged from hematite-rich ochres to iron oxide pockets contained within shale materials. Using Dr. Reynaud's database, we

went through the Sibudu ochres and discussed the types of variation and how she reached these conclusions. This proved highly beneficial as working together with a microscope and looking at the use-wear in real-time, as well as discussing its visual presence, provided a much higher learning experience than simply reading an article (fig. 2). Additionally, we took some ochre pieces and had some fun, grinding the pieces on different stone materials, using lithics to score the pieces, and observing the range of color that seemingly dull ochre pieces can produce. Seeing fresh traces was very useful, as not only could I see what grinding looks like, but it also helped to differentiate between more "fresh" traces and older traces. Furthermore, I was able to tour Wits University, the Origins Museum, and meet many of the leading archaeologists in South African archaeological research.



Figure 2: Looking at use-traces under a microscope at the Evolutionary Studies Institute (ESI) at Wits.

After my week in Johannesburg, I flew to Durban and then drove to Ballito in KwaZulu-Natal to participate at the Sibudu excavation for one week. Sibudu is a rockshelter site with thick MSA deposits with an extensive lithic, faunal, botanic, and ochre collection. Work here has been conducted by the Universität Tübingen since 2011, and was taken over from Dr. Lyn Wadley at Wits by Dr. Nicholas Conard from Tübingen. I had the fortunate opportunity to participate on this excavation last season, where I briefly studied the ochre materials and compiled this section of the final report. This year I was only able to visit for one week, but it still provided an excellent opportunity to see the ochre finds and maintain my familiarity with the site contexts. As I had just come from Wits where most of the Sibudu collections are housed (prior to Dr. Conard's excavations) and had worked with the materials, it was of particular relevance to visit the site once again.

After my work at Sibudu, I flew from Durban to Cape Town to study the ochre collections at the Iziko Museum of South Africa. These museums house the archaeological assemblages of a number of famous Western Cape cave sites, such as Blombos Cave, Klein Kliphuis, Die Kelders, Forest Hall Cave, Nelson Bay Cave, De Hangen, Elandsbay Cave, Oakhurst, and Peers Cave. The purpose of this part of the trip was simple- to look at the different ochre assemblages and observe the variance in the types of modification. I spent the week in Cape Town going through the different collections, documenting and describing the different types of modification present (grinding, rubbing, scoring, smoothing), and then photographing these examples. Working with these collections also gave me insight as to how to house the ochre artifacts that I work with; namely, ochre artifacts should never be labeled (as many of the pieces I saw had a label directly on the surface of modification, as these surfaces tend to be flat). By observing these different practices, I gained a clear understanding of how I want to process, catalogue, and organize the ochre artifacts I will be researching for my PhD project. I was also able to see how grinding, scoring, rubbing, and smoothing appears on different types of ochre materials. For example, it is much more difficult to identify grinding striations on coarse-grained ochre pieces than on fine-grained ochre pieces. Through my work with Dr. Reynaud, I was also able to identify when traces were from post-depositional processes, such as polish from handling or scoring by a trowel, and when they were in fact intentionally modified. It was also a great personal experience to see many of the more famous worked ochre pieces, like the worked pieces from Klein Kliphuis, which boast excellent use-traces and forms of modification (fig. 3).

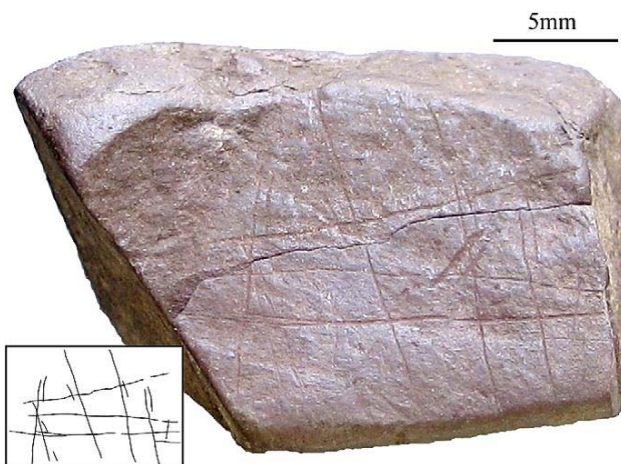


Figure 3: Klein Kliphuis ochre piece showing clear scoring marks (from Mackay and Welz, 2008:1525)

With the support of the SAS Student Research International Travel Award, I was able to conduct this research trip to the University of the Witwatersrand, Sibudu Cave, and Iziko Museum. The experience from these visits provided an excellent starting point upon which to base my doctoral research. From South Africa, I flew to Germany, where I will start my analyses of the ochre materials from Hohle Fels housed at the Universität Tübingen. Because of the experience that I gained from working with Dr. Reynaud, I am able to build a proper database to organize my finds, how to identify and categorize the different types of ochre modification, different tricks and techniques ranging from working with a microscope to experimental archaeology, and lastly, discussions about ochre in archaeological contexts and what observing these materials can contribute to the greater discussion on symbolic behaviors and cultural modernity.

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ANNOUNCEMENTS

R.E. Taylor Student Poster Award

Congratulations to James A. Davenport (University of New Mexico), winner of the 2016 R.E. Taylor Student Poster Award, for his poster submission "Inka Craft and Ritual Production: Compositional Analysis of Ceramic Pastes and Pigments from the Temple of the Sun, Pachacamac". Honorable mention goes to Mechell E. Frazier (Arizona State University) for her poster "Connectivity: Mapping Ritual Objects in the Prehispanic U.S. Southwest". Both posters were presented at this year's 81st Annual Meetings of the Society for American Archaeology, Orlando, Florida. You can view the posters (in PDF format) on the SAS website: <http://www.socarchsci.org/awards.html>. The abstracts for both posters are found below.

Make sure to check out the next issue of the *SAS Bulletin* for the announcement about the recipient of the R.E. Taylor Student poster award selected from submissions at this year's 41st ISA Symposium in Kalamata, Greece.

Inka Craft and Ritual Production: Compositional Analysis of Ceramic Pastes and Pigments from the Temple of the Sun, Pachacamac

James A. Davenport (University of New Mexico)

In Andean South America during the Late Horizon (AD 1400 - 1532), rituals and ceremonies, both inclusive and exclusive, were a major part of the Inka Empire's strategy for control of its subjects. These ceremonies involved the use of distinct Inka-style material culture, which has its

origins in Cuzco but spread throughout the Andes with the expansion of territory of the empire Tawantinsuyu. The Inka required local craft producers to replicate these imperial styles as a part of their mit'a labor obligation to the state, though occasionally these styles were sometimes imported to provincial locations from the capital or other Inka centers. Pachacamac, on the central coast of Peru, was a major ritual and pilgrimage center in this period. This poster examines the chemical composition of pastes and pigments of ceramics found at the Temple of the Sun, the principal Inka structure at Pachacamac, using Neutron Activation Analysis (NAA) and Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). This analysis is used in an attempt to understand the level of control and influence the Inka exerted over local craft producers, as well as the role that these ceramics played in the production of state-sponsored rituals and ceremonies.

Connectivity: Mapping Ritual Objects in the Prehispanic U.S. Southwest

Mechell E. Frazier (Arizona State University)

Many scholars have noted the connectivity between the Southwest and Mesoamerica, especially that of the Hohokam and cultural groups in North and West Mexico). In this case, connectivity is defined as a set of social processes and interactions, both direct and indirect, that link individuals and groups together. It involves multiple aspects of communication, observation, and exchange, all with varying costs. Archaeologists can investigate connectivity by studying changing social, economic, and geographic relationships of people and objects through time. Researchers can observe this relationship through the study of what Nelson (2006:345) calls "interaction markers", artifacts and architectural styles that incorporate a Mesoamerican element (e.g., copper bells, macaws, ballcourts). Typically these markers were used in ritual contexts and were highly valued—albeit for different reasons—in the socioeconomic realms of the Hohokam (475-1450 CE). This paper will question whether these markers are present in both the Phoenix and Tucson basins and in equal frequencies. Specifically, are the two basins equally connected with Mesoamerica? Or do their respective connections change over time? Such connectivity may reveal how people in different parts of the Hohokam region would have been incorporating aspects of Mesoamerican rituals. One may look at the question of connectivity in several ways; this paper evaluates connectivity using distance as a way to understand how objects could have moved through space, and to evaluate the frequencies of artifacts deposited in each basin, respectively.

ARCHAEOLOGICAL CERAMICS

Charles C. Kolb, Associate Editor

This issue contains four topics: 1) Book Reviews on Ceramics; and 2) Previous Professional Meeting; and 3) New Ceramics Journal; and Ceramic Note.

Book Reviews on Ceramics

Pottery, Peoples and Places: Study and Interpretation of Late Hellenistic Pottery, by Pia Guldager Bilde and Mark L. Lawall (eds.), Black Sea Studies 16, Aarhus, Denmark: Aarhus University Press / Aarhus Universitetsforlag A/S, 2014. 387 pp., 332 illustrations, 6 tables, 1043 endnotes. ISBN-10: 8779345328, ISBN-13: 978-8779345324, kr. 449.95 / \$72.00 US (hardcover). Pia Guldager Bilde, a specialist on the ancient history and archaeology of the region of the Black Sea and Crimea, was a graduate of the University of Copenhagen and Aarhus University (1990), a field archaeologist and director of the Danish National Research Foundation's Centre for Black Sea Studies. She also served on the staff of the University of Aarhus's Department of Classical Archaeology from 1993 until 2012, and was the director of the Museum of Antiquity. Pia (11 February 1961 - † 10 January 2013) passed away after finishing the bulk of the editorial work for the volume under review. On the University Staff page she wrote: "I am particularly interested in ancient cult/religion as a particular arena for meeting of cultures and construction of identity. I have made a general study of 'temple' architecture of the Black Sea region and several studies of Artemis and Parthenos and the relationship between the two goddesses. My main focus is on Dionysos and his role in negotiating identities of the Greek settlers not just in the early period but also - and in particular - in the Hellenistic period. My ongoing work with the Mouldmade bowls, the so-called 'Megarian bowls' combines several of my interests. These pieces of mass-production fabricated in most of the Hellenistic cities are precious evidence for trade relation and traveler's networks. But they are also completely overlooked testimonies of Dionysian imagery of the late Hellenistic period."

Mark Lawall is Associate Professor with the Department of Classics, University of Manitoba. He holds his degrees from the University of Michigan (Ph.D. and MA) and the College of William and Mary. His areas of specialization are amphora studies (Archaic through Hellenistic transport amphoras), and the archaeology of ancient economies, particularly of trade and markets; he has conducted amphora research at Athens, Corinth, Isthmia, Gordion, Ephesos, Klazomenai, Troy, the Kyrenia shipwreck, the Pabuc Burnu shipwreck, Stryme, Olbia,

Koptos, Lerna, and Rhodes. He is co-editor with John Lund of *Pottery in the Archaeological Record: Greece and Beyond*, Acts of the International Colloquium held at the Danish and Canadian Institutes in Athens, June 20-22, 2008, Gösta Enbom Monographs, Aarhus, Denmark: Aarhus University Press, 2011 (reviewed in *SAS Bulletin* 35(2):9-11, 2012). In addition, he has written more than a dozen refereed journal articles and 27 book chapters.

Pottery, Peoples and Places derives from a conference held in November 2008 at Sandbjerg, Denmark. The late Hellenistic period, spanning the 2nd and early 1st centuries BCE, was a time of great tumult and violence as a result of nearly incessant warfare. During this same time period there was a great expansion of "Hellenistic" Greek culture and material culture including ceramics. The 17 papers in this volume explore three themes: 1) chronologies, especially ceramic chronology (often based on evidence dependent on the violent nature of the period), 2) the production and consumption of Hellenistic ceramics particularly in Asia Minor and the Pontic region, focusing on selected ceramic types, and 3) Hellenistic socioeconomics and the impact of ceramic culture across much of the eastern Mediterranean and into the Black Sea. The volume has a "Preface" (p. 7), editorial "Introduction" (pp. 9-14, 5 endnotes), and extensive "Bibliography" (pp. 337-370) containing 622 entries, a comprehensive combined topical and proper noun "Index" (pp. 371-383), and "List of Contributors" (pp. 385-387) with addresses and emails for the 26 authors. The 17 contributions (unnumbered chapters) are divided and grouped into three parts defined by the three themes.

Part 1. Chronologies: five chapters. "The Contribution of Inscriptions to the Chronology of Rhodian Amphora Eponyms" by Nathan Badoud (pp. 17-28, 59 endnotes). The author deconstructs past scholarship and proposes new correlations. He details possibilities and limitations of traditional dating methods and focuses on what can be learned from inscriptions. "The Lower City of Olbia Pontike Occupation and Abandonment in the 2nd Century BC" by M. L. Lawall, P. Guldager Bilde, L. Bjerg, S. Handberg, and J. M. Højte (pp. 29-45, 24 figures [10 in color], 57 endnotes). Datable artifacts include vessels stamped with makers' marks and coins. In addition, there is a valuable discussion of pottery accumulations and discard. The color illustrations are magnificent. "Bridging the Gap: Local Pottery Production in Corinth 146-44 BC" by Sarah James (pp. 47-63-3 figures, 1 table, 75 endnotes). She argues against the view that Corinth was utterly abandoned ca. 146-44 BCE, noting that there was a continuation of the production of local Corinthian pottery. Previous research is recounted and data from the 2006 excavations are summarized. South Stoa wells

contained Linear Leaf moldmade bowls. “A Re-examination of some of the South Stoa Wells at Corinth” by Guy D. R. Sanders, Yuki Miura, and Lynne Kvapil (pp. 65-81, 3 tables, 43 endnotes). The authors reexamine material evidence from wells in the Corinthian South Stoa, the proposed dates when these were filled, and the morphological development of Corinthian pottery types. Few moldmade bowls appear in the ceramic assemblage. “Sulla and the Pirates” by Susan Rotroff (pp. 83-109, 6 figures, 2 tables, 112 endnotes). Rotroff employs evidence from French and Greek excavations in order to distinguish two textually attested attacks on Delos. Materials from Athens and Delos are documented. Fine wares included Eastern Sigillata A, Proto-ESB, Pergamene sigillata, plain wares, and cooking vessels.

Part 2. Typology: nine chapters. “Mouldmade Relief Bowls from Ephesos - The Current State of Research” by Christine Rogl (pp.113-139, 23 figures [8 in color], 32 endnotes). Hellenistic pottery research is summarized and the author details moulds, signatures, rosette types, vessel profiles, ten fabric groups, decorations and motifs, phases of production, and pottery workshops. Scale of production includes a discussion of exports, imitations, and local production. “The Hellenistic Mouldmade Bowl Production at Priene— A Case Study Concerning the Reception of Ephesian Examples” by Nina Fenn (pp. 141-156, 10 figures, 53 endnotes). The history of production is documented and the characteristics of local mouldmade bowls focuses on six motifs rather than fabrics. Mouldmade bowls imported from Ephesos are detailed in terms of types and locations of molded decorations. “Table Ware from Knidos: The Local Production during the 2nd and 1st Centuries BC” by Patricia Kögler (pp. 157-173, 23 figures, 14 endnotes). Eight vessel types and their molded decorations are documented. “Hellenistic Pottery from the Necropolis of Olbia Pontike” by Georgij Lomtadze and Denis Žuravlev (pp. 175-197, 10 figures, 96 endnotes). The authors review the history of early excavations and focus on a detailed analysis of the ceramic assemblages from Graves 34, 41, 25, 35, and 39 dating from early 3rd to early 1st century BC. “A Pontic Group of Hellenistic Mouldmade Bowls” by Anelia Bozkova (pp. 199-214, 32 figures, 40 endnotes). Pottery of East Aegean origin or of East Aegean type is the emphasis of this research with variants among skyphoi, cups, amphorae, kraters, and unguentaria detailed. Pontic pottery including kantharoi and skyphoi are briefly detailed. “Imports and Local Imitations of Hellenistic Pottery in the Northwest Black Sea Area: Hadra and Pseudo-Hadra Wares” by Aneta Petrova (pp. 215-231, 16 figures, 58 endnotes). The author reviews the “technology” of clays – fabrics are identified by the use of Munsell color chart references. Vessel shapes, molded

decoration, Pontic area distribution, chronology (2nd-1st century BC), and origins of moldmade vessels are reviewed. “Late Hellenistic Pottery and Lamps from Pantikapaion: Recent Finds” by Vasilica Lungu and Pierre Dupont (pp. 233-254, 20 figures [3 in color], 99 endnotes). The authors focus on imports and the fabrication of local imitations of Hadra style ceramics which are identified by decorative technique. Shapes and fabrics, ten decorative motifs, and chronology are reviewed, and the results of XRF analyses of 24 sherds reported by cluster analysis. A majority of the specimens had a chemical pattern “fitting quite well with those of Istro-Pontic colonial products” while the imported material “inspired a new, diverse, and rich Pontic tradition” (p. 248). Further details on the chemical analysis are not provided. “Late Hellenistic Pottery and Lamps from Pantikapaion: Recent Finds” by Denis Žuravlev and Natalia Žuravleva (pp. 255-286, 23 figures [7 in color], 125 endnotes). Imported moldmade Hellenistic tablewares documented include Bosporean moldmade bowls (late 3rd and most of the 2nd century BC), Pergemene sigillata (mid-2nd century BC), Eastern Sigillata A, Late West Slope Ware, Pelikai moldmade bowls, Bosporean sigillata, Bosporean wheel-made lamps, and both imported and local wheel-made relief lamps. “Late Hellenistic Red-Slip Ware in Oblia” by Valentina Krapivina (pp. 287-394, 23 figures [7 in color], 125 endnotes). Two types of jugs, two types of bowl-cups, one type of cup, two types of plates as well skyphoi, beakers, saltcellars, a krater, and a lekaniis are characterized primarily by Munsell Color Charts.

Part 3. Ceramics and Culture: three chapters. “Pots and Politics: Reflections on the Circulation of Pottery in the Ptolemaic and Seleukid Kingdoms” by John Lund (pp. 297-205, 80 endnotes). Lund reports on pottery produced within 1) the Seleukid kingdom: Antiocheia moldmade bowls and Eastern Sigillata A; 2) the Ptolemaic kingdom: Ptolemaic queen’s oinochoai and Cypriot Sigillata; and 3) produced outside of the Seleukid and Ptolemaic kingdoms: Gnathia vases, Hadra vases, Graeco-Italic amphorae (Will type 1), and Rhodian transport amphorae. Lastly, he discusses five preliminary conclusions. “Dining In State: The Table Wares from the Persian-Hellenistic Administrative Building at Kedesh” by Andrea Berlin, Sharon Herbert, and Peter Stone (pp. 307-321, 14 figures [13 in color], 25 endnotes). The authors report tablewares recovered from a storeroom at the Levantine site of Kedesh, a large administrative center dated 3rd-2nd century BC. Petrographic analysis defined the fabrics as from the coastal plain near the Carmel Mountains, hence, the ware is called Central Coastal Fine. The precise production locale is unknown and there may have been multiple fabrication sites. Serving vessels

(table amphorae, jugs, and dipper juglets) are in a peach-brown fabric called Semi-fine. Saucers and small bowls in an orange-red slip, Northern Coastal Fine, are also documented. The authors ask the question: what do archaeologists mean when talking about ESA and proto-ESA and what do we think this meant in antiquity. Lastly, “Les campaniennes A et B, deux aspects d'une 'globalisation' économique et culturelle des céramiques tardo-hellénistiques” by Jean-Paul Morel (pp. 323-335, 6 figures, 25 endnotes). Morel documents these two pottery types in the late Hellenic world in terms of vessel forms, especially variations in vessel ring bases. He perceives relationships between forms and geography – Germany and France, the Pontic Black Sea coast, the North African littoral, and Eastern Mediterranean.

In the main, the volume contains specialist research for a specialist audience. Two of the 18 chapters provide some use of scientific analyses: Vasilica Lungu and Pierre Dupont (pp. 233-254) discuss the results of XRF, while Andrea Berlin, Sharon Herbert, and Peter Stone (pp. 307-321) employed petrographic analysis. Bibliographic references provide some documentation of these scientific studies.

Persian Pottery in the First Global Age: The Sixteenth and Seventeenth Centuries by Lisa Golombek (Project Director and Editor), Robert B. Mason, Patricia Proctor, and Eileen Reilly, Arts and Archaeology of the Islamic World Volume 1, Leiden: Brill, 2014. xxiv + 502 pp., 550 illustrations. ISBN-10: 9004260854, ISBN-13: 978-9004260856, €164,00 / \$201.50 (hardcover). The four co-authors of this volume are well-known experts on Persian ceramics. Lisa Golombek (Ph.D., University of Michigan, 1968) is Curator Emeritus (Royal Ontario Museum) and Professor Emeritus (University of Toronto). Her publications on Islamic art range from architecture to portable objects and include *The Timurid Architecture of Iran and Turan* (Princeton University Press 1988) and *Tamerlane's Tableware* (ROM Press 1996). Robert Mason (D. Phil, University of Oxford, 1994) is Associate Professor at the University of Toronto, and is an archaeological scientist at the Royal Ontario Museum. He has published widely on the typology, technology, and provenance of the ceramics of the Islamic world, including *Shine Like the Sun: Lustre-painted and Associated Pottery from the Medieval Middle East* (ROM Press, 2004). Patricia Proctor (M.A., University of Toronto, 1968) is a retired Curator of Chinese Ceramics at the Royal Ontario Museum. She has played a major role in exhibitions and galleries at the ROM and published translations and articles on Chinese ceramics. Eileen Reilly (M.A., 1998) is a collections care specialist, artist, editor and appraiser who has worked at

the Royal Ontario Museum and the Art Gallery of Ontario. The multidisciplinary approach of the authors leads to a reconstruction of the narrative about Safavid pottery and revises commonly accepted notions. The book includes easily accessible reference charts to assist in dating and provenancing Safavid pottery on the basis of diagnostic motifs, potters' marks, petrofabric, shapes, and Chinese models. Hence, these specialists have integrated petrography and archaeology with traditional art history.

Persian Pottery in the First Global Age: the Sixteenth and Seventeenth Centuries focuses on the ceramic industry of Iran in the Safavid period (1501-1732) and the impact which the influx of Chinese blue-and-white porcelain, heightened by the activities of the English and Dutch East Indies Companies had on local production after 1700 CE. The Safavid period was a truly *global age* evidenced by its material culture. In this path-breaking survey of both elite Iranian pottery and imported Chinese porcelain, Golombek and her colleagues have separated fact from fiction and extracted relevant details from a paucity of documentary sources, to unravel a concise linear narrative. This critical analysis places this overlooked luxury ware in its socioeconomic and cultural context. Consumption is introduced through discussions of shape and purpose; caravanserai, Armenian merchants and East India Company distribution networks; and the importance of contemporary connoisseurship, imperial collecting and royal kitchens are also introduced. The commoditization of the potteries, potters and technological innovations are other themes in the narratives.

The Preliminary Material (pp. i-xxii) includes a “Preface” (vii-x) which is, in the main, a summary of the contents; “Conventions” (p. x) documenting the methods of transliterations from Arabic and Persian to English; “Collections Cited” (pp. x-xii) comprised of 34 public, 15 private, and 17 archaeological collections; “Important Dates” (p. xiii) covering 21 dates and events of the Safavid Dynasty (1501-1722); “Maps” (pp. xv-xvii); and “Photo Credits” (pp. xviii-xxiii). The “Introduction” (pp. 1-9, 1 color image) informs the reader about sources for the study of Safavid ceramics, recounts European travelers, reviews trading company documents, and summarizes epigraphical and archaeological evidence, and comments on the collections cited, ceramic petrography, and decoration and shape analyses. The volume is divided into three parts containing eight chapters and two appendices, a “Bibliography” (pp. 481-494) with 365 entries, and a comprehensive triple-column “Index” (pp. 495-501) comprising topics and proper nouns.

“Part I: Safavid Pottery and Society” contains five chapters. “Chapter One: Safavid Society and the Ceramic Industry” by Lisa Golombek (pp. 11-55, 10 color images, 5 plates) provides background on Iran under the Safavids and reviews topics including the dynamics of supply and demand, potters (all of whom are low status persons in Safavid society), describes workshops, and names individual potters (two from the sixteenth century and seven from the seventeenth century). Other subjects include Chinese porcelain in Iran (ten vessel types), Safavid pottery markets, the Safavid court and elite, foreign markets (Europe, South Asia, and the Far East), and The Safavid Potter and the First Global Age. An essay, “The Object: Shapes and Functions of Safavid Pottery” by Lisa Golombek and Eileen Reilly (pp. 36-55) documents open shapes (dishes, bowls, and cups) and closed shapes (storage jars and vases), as well as multi-nozzle (Tulip) vases, water pipes, and spittoons. “Chapter Two: Dominant Fashions and Distinctive Styles” by Lisa Golombek (pp. 56-121, 108 color images) reviews post-Timurid pottery styles, five regional workshops (Tabriz, Nishapur, Qazvin, and Qumisheh/Isfahan), and notes that there was a monopoly and mass production at Tabriz. Major changes occurred in Iranian craft industries after 1588, with Mashad and Kirman/Mashad workshops, a Kerman “Boutique” workshop with potters’ markets. There are unidentified workshops, and major production at Isfahan (Qumisheh), and molded monochrome wares were developed. Other essays review “China at the Door: The Sixteenth Century” and “China in the House: The Seventeenth Century”. Golombek defines four phases of production: Phase I: 1615-1640; Phase II: 1640-1650 and the development of matchlock bottles; Phase III: 1650-1680 with black-banded dishes, incised and molded dishes, slip-painted and excised monochrome wares, pseudo-Celadon, polychrome slips, and Kraak-style Chinoiserie; and Phase IV: 1680-1722 characterized by underglaze painted ceramic, lustre wares (shapes, decorations, and chronologies are reported), and monochrome wares, White, Opaque molded wares, and stamped monochrome wares.

“Chapter Three: The Measure of Faithfulness: The Chinese Models for Safavid Blue-and-White” by Patricia (Patty) Proctor (pp. 122-166, 64 illustrations, most in color) provides documentation on the replication of Chinese imports over two centuries. There are ten chronological divisions each of which provides information on four topics: close copies, borders and secondary bands, principle bands, and central medallion; additional comments about other characteristics are also included. The ten “model” periods are: 1) Mid-fourteenth century (Yuan lotus scrolls also occur); 2) Early fifteenth

century; 3) Late fifteenth to early sixteenth century; 4) Mid-sixteenth century (sprig petal panels, diaper bands, and individual motifs such as cranes in clouds and double-headed scrolls are notable additions); 5) Second half of the sixteenth century (egrets and lotus scrolls and the fungus scroll occur); 6) Popular sixteenth century motifs (collars, dotted diamond diaper, plantain blades, and petal bands); 7) Late sixteenth to early seventeenth century (new diaper patterns, diaper and *ruyi* flame, cloud ribbons, and peony plant motifs are noted); 8) Early to mid-seventeenth century; 9) Second half of the 17th century (stripe panels appear); and 10) Late seventeenth to early eighteenth century (zig-zag hatched lines, spirals, and half-florets occur). “Chapter Four: The ‘Kubachi Problem’ and the Isfahan Workshop” by Lisa Golombek (pp. 168-181, 12 color illustrations). Great quantities of art pottery from five or more workshops was produced for domestic consumption and also exported by European, Armenian, and Russian agents from 1450 to 1722. Kubachi ceramics were actually produced in Isfahan and not in North Caucasus. The Isfahan/Qumisheh Workshop was a notable producer of vessels with full-figure images, plant motifs, Kraak pottery imitations, and Blue-and-white incised line wares. “Chapter Five: The Safavid Workshops and Petrographic Analysis” by Robert B. Mason (pp. 182-210, 28 color images, 8 tables, and 6 histograms). The author specializes in Islamic and Iranian ceramic analyses and has published in major journals: *Antiquity*, *Archaeometry*, *Iran*, and *Muqaranas*. He discusses the importance of determining provenance, Safavid production centers and markets, petrographic microscopy and sample preparation methodology, and the importance of varieties of “clear” and “cloudy” quartz in the stonepaste ceramics he has analyzed. These varieties are related to petrofabrics and production centers. During the fifteenth and sixteenth century production centers included Mashad I, Nishapur, Tabriz, Isfahan, and Qazvin, while the sixteenth century production centered at Mashad II and Mashad III, Kirman, and Qazvin. Mason documents six stonepaste groups within seventeenth century Safavid ceramics and determined that Kirman was the primary export-oriented production center.

“Part II: Identifying Safavid Pottery – A Guide: has three chapters. “Chapter Six: Diagnostic Motifs” by Lisa Golombek and Eileen Reilly (pp. 211-243, 21 figures, 3 plates). Four chronological periods are noted: Rims: Sixteenth Century (22 variants); Backs: Sixteenth Century (13 variants); Backs: Seventeenth Century (23 variants); and Rims: Isfahan, Seventeenth Century (6 variants). “Chapter Seven: Potters’ Marks” by Lisa Golombek and Robert B. Mason, and Eileen Reilly (pp

244 -257, 7 plates) documents four chronological phases of Seal- Marks: Phase I: 1615-1640, seven seal-marks; Phase II: 1640-1650, two; Phase III: 1650-1680, three; and Phase IV 1680-1722, three. Tassel-marks have 18 variants while Character-marks have eight. "Chapter Eight: Shapes Study" by Eileen Reilly (pp. 258-278, 18 plates). Illustrations of 86 open and 30 closed shapes are related to production centers, wares, and chronologies. "Safavid potters followed their Chinese models faithfully" (p. 258).

"Part III: A Catalogue of the Safavid Pottery in the Royal Ontario Museum" by Lisa Golombek (pp. 279-429, 70 color images). The catalogue represents about 90% of the Royal Ontario Museum's Safavid pottery. For each specimen, vessel type, dimensions, source, and illustrations are reported; if known petrofabric and motif and decoration are noted. "Appendix A" (pp. 431-434) consists of lists of Dated Vessels (n = 26) and Dated Tiles (n = 15). "Appendix B: Concordance: Safavid Ceramics Project Numbers" (pp 435-480) has 679 entries identifying: Project Number, Collection, Accession Data, Object, Decorative Technique, Potters' Marks/Petrofabric, and References. The "Bibliography" and "Index" complete the volume.

The authors have taken a multidisciplinary approach, working under the auspices of the Royal Ontario Museum in Toronto, Canada, and have conducted the research for this book since 1996. The provenance of Safavid pottery has been a major question in the history of ceramics and it is through Robert Mason's petrographic studies that we now have a clear picture of the primary production centers, adding Qumisheh (a suburb of Isfahan producing stonepaste wares into the twentieth century) to historically-known Kerman and Mashad. The team was also able to clarify that Kubachi wares were not being fabricated at that location but were actually manufactured in Isfahan and exported to Kubachi in the North Caucasus where they were seen and reported by European travelers. This monumental specialized assessment of Safavid Persian pottery of the sixteenth and seventeenth centuries provides incredible detail and overwhelming data and may appeal to a limited academic and ceramic collectors' audience. Nonetheless, the research demonstrates the significance of petrographic studies for provenance and provides ceramic historians with a catalog of diagnostic motifs, potters' marks, and the evolution of vessel shapes and their chronologies. It is an incredible piece of scholarship accompanied by magnificent illustrations and documentation.

Sherds of History: Domestic Life in Colonial Guadeloupe, Myriam Arcangeli. Gainesville: University

Press of Florida, 2015, 256 pp., 32 black-and-white illustrations, 2, tables, 32 endnotes. ISBN-10: 0813060427, ISBN-13: 978-0813060422, \$74.95 (hardcover) is also available for download at Project MUSE: <https://muse.jhu.edu/books/9780813055206> Archaeologist Myriam Arcangeli has prepared a detailed and well-documented volume based on her 2012 Boston University dissertation, *For Water, Food, Tables, and Health: The Colonial Ceramic Culture of Guadeloupe, French West Indies* (2012). She contends that ceramics serve as one of the best-known artifacts excavated by archaeologists. Ceramics are carefully described, classified, and dated, but rarely do scholars consider their many and varied uses. Arcangeli examines potsherds from four colonial sites in the Antillean island of Guadeloupe to discover what these everyday items tell us about the people who used them. In the process, she reveals a wealth of information about the lives of the elite planters, the middle and lower classes, and enslaved Africans. By analyzing how the people of Guadeloupe used ceramics - whether jugs for transporting and purifying water, pots for cooking, or pearlware for eating - Arcangeli highlights the larger social history of Creole life. What emerges is a fascinating review of water consumption habits, changing foodways, and concepts of health.

The seven chapter narrative is supplemented by 32 monochrome images (alas, no color pictures except for sherds used to illustrate the cover), endnotes (pp. 183-185), a very useful bibliography with 206 entries (pp. 187-204), and a comprehensive double-column "Index" (pp. 205-212). Chapter 1: "A Ceramic Culture" (pp. 1-16, 3 figures, 1 table) provides a review of 40 typical forms of Guadeloupean ceramics, details data sources and 11 probate inventories, plus a map of a reconstructed Basse-Terre, ca 1780. In the subsequent chapter, "From Kakukera to Guadeloupe" (pp. 17-35, 1 table), the author has prepared a well-written historical context that focuses on the history of the archaeological sites with emphasis on the four Colonial study sites, notes that the bulk of the archaeological artifacts date to the 1770s and 1780s, characterizes the white and mixed-races populations, local demographics, and tabulates 26 identifiable occupations practiced by the inhabitants. The third chapter, "Just Add Water: Domestic Water Reserves and Water Storage Ceramics (pp. 36-63, 5 figures) focuses on water-storage ceramics which were an important component of Guadeloupe's ceramic culture, and procuring a good supply of water was a critical domestic issue in the early modern period. The topics Arcangeli considers include uses of ceramics, water sources, water-storage pottery (earthenware and faience), patterns in the ceramic containers, water quality employing ceramic

water filters, the roles of female servants in the households, and a comparison of water storage vessels in Guadeloupe and Paris.

Chapter 4: “A Canari in the Kitchen: Creole Cooks, Foods, and Cuisine” (pp. 64-98, 4 figures) inform the reader that an important part of Guadeloupe’s ceramic culture arose out of its kitchens, where enslaved female servants and cooks developed what is today considered the traditional Antillean cuisine. The sites and cookware inventories collectively provide an introduction to Colonial foods, Creole cuisine, and the varied uses of ceramic and metal cookware, and the author documents the importance of cooking pots imported from Vallauris. Arcangeli’s fifth chapter, “The Creole Art of the Table” (pp. 99-144, 16 figures), begins with a discussion clarifying that tableware is a special class of ceramics in Guadeloupe and “dominated archaeological assemblages and demands attention by its sheer quantity. In addition, its most frequent users were not slaves.” Guadeloupean tableware included plates, dishes, tureens, salad bowls, condiment dishes, ceramics for water, wine, and other drinks, and beverage services. Comparisons are made to Parisian ceramics of the same era and to modern wares, demonstrating the importance of hospitality and commensality in Creole society. Styles and decoration of French faience are discussed, documenting the importance of entertaining in French Creole homes and the importance of good manners. In Chapter 6, “For Healthy Bodies and Clean Houses (pp. 145-174, 4 figures), the narrative begins with a quotation from Lafcadio Hearn’s *Two Years in the French West Indies* (1903) that clearly illustrates Hearn’s servant Cyrillia and concerns about health and cleanliness. Her motives become clear once Creole hygiene, health, and medicinal practices are explained. These themes help recontextualize the use of chamber pots, bidets, barber’s bowls, soap dishes, and drug pots. These are related to health and folk medicine, folk therapies, grooming, and apothecaries and imported drugs. Lastly, Chapter 7: “Conclusion” (pp. 175-182), summarizes water storage, tableware, and feasting, reemphasizing that water storage in homes and water management were consistent features of early modern life. The author shows that information gleaned from the study of ceramics can contribute significantly to our understanding of how early modern households managed this vital resource.

This volume focuses on the interpretations of the locally-produced and imported ceramic assemblages excavated from four sites rather than typological and technical analyses of the pottery. Arcangeli offers a convincing assessment of Creole life in the Antilles in the 1770s and 1780s through the analysis of the material culture

augmented by probate inventories and other historical documentation. *Sherds of History* offers a convincing assessment of Creole life in the Antilles in the 1770s and 1780s through the analysis of the material culture augmented by probate inventories and other historical documentation. Her research in social history and historical archaeology expands our understanding of “ceramic culture” and issues of race, class, and gender in French-colonial societies in the Caribbean and the United States. Especially enlightening are the discussions of water consumption habits, changing foodways, and concepts of health. Readers will find similarities to Mark W. Hauser’s *Archaeology of Black Markets: Local Ceramics and Economies in Eighteenth-Century Jamaica* (Gainesville: University Press of Florida, 2008) reviewed in the *SAS Bulletin* 34(4):11-14 (2011).

Ceramics in America 2015, Robert Hunter (ed.). Milwaukee, WI: The Chipstone Foundation, distributed by the University Press of New England, Hanover and London, 2015. xiii + 266 pp., 165 illustrations, 5 appendices ISBN: 978-0-9827722-6-3, \$65.00 (Hardcover). Hunter is a fellow of the Society of Antiquaries of London, an archaeologist, and ceramics historian living in Williamsburg, Virginia. Now in its fifteenth year of publication, *Ceramics in America* is considered the journal of record for historical ceramics scholarship in the American context and is intended for historical archaeologists, curators, decorative arts students, social historians, collectors, and contemporary potters. This annual volume, like its predecessors, features a diverse range of essays, new discoveries, and book reviews on the latest research of interest to ceramics scholars. It begins with an “Editorial Statement” (p. vii) and “Introduction” (pp. ix-xii) both by Robert Hunter in which he points out that the contributions in earlier annuals of *Ceramics in America* focused on Anglo-American pottery and that this issue examines Native American and Colonial era ceramics. He discusses and summarizes the three contributions on Alta California 1542 ff. focusing on Spanish colonial and Mexican Republic era ceramics, California earthenware, and scientific analyses of these wares; a brief article on a Chinese art dealer and an American tycoon who built railroad rolling stock; and a detailed history of the evolution of Zuni pottery making in one family. Magnificent color images accompany these articles. This annual, unlike previous issues, does not contain short articles or book reviews but has a useful double-column “Index” (pp. 209-216) that contains topics and proper nouns.

“Rediscovering the Ceramic History of the Alta California Frontier” was prepared by Russell K.

Skowronek, Ronald L. Bishop, M. James Blackman, Michael Imwalle, and Ruben Reyes (pp. 1-51, 103 figures [12 are black-and-white], 1 table, and 89 endnotes). This contribution summarizes some of the materials found in *Ceramic Production in Early Hispanic California: Craft, Economy, and Trade on the Frontier of New Spain* by Russell K. Skowronek, M. James Blackman, and Ronald L. Bishop, with contributions by 10 others, Gainesville: University Press of Florida, 2014, reviewed by me in *SAS Bulletin* 39(1):5-8 (2016), [SAS Bulletin 39\(1\):5-8 \(2016\)](#).

The authors provide an historical context for Alta California and focus on the Santa Barbara Presidio, characterizing Glazed Wares through INAA. Brick and tile making in Colonial times are reviewed with “modern insights,” including kilns and kiln construction, and the Historic Pottery Project that Skowronek and his colleagues initiated more than a decade ago. Among the topics covered in the *Ceramics in America* chapter are local pottery production, replication experiments in vessel forms and fabrication techniques, firing technology, and the replication of a Spanish pottery kiln. There is also a section concerning *maiolica* production and firing.

“Charles Lang Freer and C. T. Loo, Mentor and Mentee: Cultural Clashes and Neuropsychological Insights” by Shirley M. Mueller (pp. 52-60, 6 figures [1 monochrome], and 14 endnotes). A history of the interactions between art dealer Loo and art consumer Freer makes for interesting reading, with the latter as “mentor” and unscrupulous activities in art collecting.

“Pride Flared Up: Zuni (A:shiwí) Pottery and the Nahohai Family” by Edward A. Chappell (pp. 61-208, 170 color figures, 16 black-and-white figures, and 542 endnotes) is a book-length treatment of the production and evolution of technologies and styles in Zuni Polychromes exemplified by the Nahohai family. Chappell provides historical context on Zuni Polychromes, noting the importance of external contacts resulting in old and new traditions in a Pueblo context. A decline in the quality of pottery production, cognitive choices, the fabrication of Zuni owl vessels, and pottery sales are detailed. Background on Josephine and Nat Nahohai’s traditional pottery making and innovations by son Randy are well-documented. Zuni history, the significance of birds and pottery and other Zuni arts and crafts are reported, and innovation on the making of conventional rainbirds pottery is explained. New geometric designs, corrugated pottery, and new rainbird designs by Randy Nahohai are acknowledged as are the Matsaki eye motifs on bowls and jars, ant-head flutists, rainbird motif renewals, and frog and lizard flutes are notable changes. Chappell also reviews the importance of thundercloud motifs, celestial

bowls and cosmic jars, sun spirals, feathered serpents, warriors and buffalo motifs, and “terraced” bowls as well as the influence Randy had on other artisans. Among the latter are Rowena Him (later Randy’s wife) and Eileen Yatsattie, Jaycee Nahohai, and teaching by Milford Nahohai.

Once again, Hunter has provided the reader with highly readable and well-illustrated discussions on North and Anglo-American ceramic production. Skowronek and his colleagues demonstrate that scientific analysis can help us understand ceramic innovation and acculturation.

Traditional Potters from the Andes to Vietnam, Isabelle C. Druc, Madison, WI: Deep University Press, Madison, 2016. 140 pp., 250 color photographs ISBN 978-1-939755-24-7 (paperback) \$39.99. eBook File Name: *Traditional Potters: From the Andes to Vietnam.pdf*, 10,648 KB, <http://stikerdinding.net/download/file.php?asin=1939755247> Druc (University of Wisconsin-Madison) specializes in ceramic studies, Andean archaeology and ethnoarchaeology and is coauthor with Bruce Velde of *Archaeological Ceramic Materials: Origin and Utilization*, Natural Science in Archaeology Series, Berlin, Heidelberg, and New York: Springer Verlag, 1999; reviewed by me in *SAS Bulletin* 23(1):17-21 (Spring 2000). More recently she authored *Portable Digital Microscope Atlas of Ceramic Pastes: Components, Texture, and Technology* with the technical assistance of Bruce Velde and Lisenia Chaves, Blue Mounds, WI: Deep University Press, 2015; reviewed in [SAS Bulletin 38\(4\):3-6 \(Winter 2015\)](#).

The volume under review here examines a selection of traditional potters and their work, and different hand building techniques and wheel throwing practices still in use in many parts of the world. The pottery makers are from Peru, Argentina, Mexico, Turkey, Thailand and Vietnam and her selection is based on her first-hand accounts over 25 years of ethnographic fieldwork. The selections include different potting traditions and production organization and relate choices made by the potters, the materials used and their preparation. The book is designed as a basic introduction to traditional potters and the main audience is the general public and students, but ceramists, ethnographers, and archaeologists will find value in this compendium.

There are ten chapters: “1. Introduction (pp. 7-10, 2 color images, and 18 items in Further Reading) in which she discusses clay and temper, pottery traditions, potters, their tools, and forming techniques. “2. Potters of the Andes” (pp. 11-46, 79 color images, 1 map, 12 print items for

further reading, and 4 videos). The Andes include Peru, Ecuador, and Bolivia where she has conducted fieldwork. Male and female potters from the communities Tarica (Callejon de Huaylas), Mangallpa, and Cajamarca City are featured. “3. Potters of Argentina” (pp. 47-52, 15 color images, 1 map, six print references and 1 video) document Traslasierra potters. “4. Potters of Mexico” (pp. 53-62, 16 color images, 1 map, 11 references, and 1 video) looks at pottery production in Taxco Guerrero and Francisco Uh Muy, Yucatan. The latter features Maya ceramic reproductions. “5. Potters of Turkey” (pp. 63-76, 28 color images, 1 map, 4 print references and 6 videos [5 created by Druc]) includes earthenware made by women in Sorkum, Çini (a porcelain-like pottery) made by men in Kütahya. “6. Potters of Thailand” (pp. 77-86, 20 color images, 1 map, 5 print references) focuses on the community of Ban Muang Kung where pottery is made by men and includes earthenware, celadon, and porcelain. “7. Potters of Vietnam” (pp. 87-102, 31 color images, no map, 4 print references, and 1 video by Druc) features male and female potters from the communities of Phu Lang and Bat Trang. Both stoneware and porcelain are made.

The subsequent chapter, “8. From the producer to the table” (pp. 103-116, 34 color images, 4 print references and 1 video by Druc), has four topics. Markets (with examples from Peru, Mexico, and Vietnam), shifting demand (Turkey), street kitchens (Peru, Thailand, and Vietnam), and “special pots for special drinks” (Chinese teapots, Peruvian jars, and Vietnamese water and wine vessels). “9. A Pot under a microscope” (pp. 117-122, 14 color images, 3 print references [2 are Druc], and 1 video by Druc) provides information on ceramic pastes, clay minerals and inclusions, and features the portable digital microscope. Six photomicrographs and ceramic cross sections are among the illustrations. “10. Conclusion” pp. 123-124, 4 color images) is a review of traditional production, resources, and distribution. In “Acknowledgments” (p. 125, 8 color images) she provides images of her informant-potters.

The volume is a fine introduction to potter-making technologies in traditional societies from obtaining resources to sales and the color illustrations (some over 20 years old) are beautifully reproduced. She notes that the six societies are selections and is not comprehensive of the range of production technologies. The references cited are generally up to date but I note that only one of Dean Arnold’s recent books on Ticul, Yucatan, Mexico (2008) is cited; Arnold’s 1985 theory volume and his 1993 Andean potters’ volume are listed among the references.

Previous Professional Meeting

The Society for American Archaeology’s 81st Annual Meeting was held 6-10 April 2016 in Orlando, FL, USA. There were an overwhelming 296 sessions (electronic and oral forums and symposia as well as poster presentations) of which 91 sessions had a total of 168 presentations featuring ceramic materials (pottery, figurines, clay smoking pipes, etc.); 53 of these sessions had two or more presentations on ceramics, and four sessions of these featured nine as the focus or topic was on pottery. A list of sessions focused on ceramics was provided in the last issue of the SAS Bulletin and, given the total number of papers and posters, I won’t present a list of these presentations and their authors. The Final Program and alphabetical list of presenters and abstracts is available

online:
<http://www.saa.org/AbouttheSociety/AnnualMeeting/2016Program/tabid/1537/Default.aspx>
<http://www.saa.org/AbouttheSociety/AnnualMeeting/Abstracts2016/tabid/1536/Default.aspx>

New Ceramics Journal

Journal of Hellenistic Pottery and Material Culture (JHP). For the Hellenistic Period ceramics and other commodities of daily life represent probably the most neglected objects in archaeological research. Yet, the study of Hellenistic material culture has intensified during the last twenty years, with a focus clearly on what is by far the largest category of finds, pottery. Meanwhile research has gained momentum, but still there has unfortunately been no parallel development in the media landscape. Apart from monographs, the publication of conference proceedings, which usually follow several years after the event, have remained the principal method of disseminating research results. Still lacking is a publication appearing regularly and at short intervals that focusses research on Hellenistic pottery and is easily accessible. *The Journal of Hellenistic Pottery – JHP* – wants to close this gap. The journal is due to launch in Autumn 2016 after which it is scheduled to appear once a year, more often if necessary. It will provide a forum for all kinds of studies on Hellenistic pottery and everyday objects. Apart from professional articles, the journal will contain book reviews, short presentations of research projects (including dissertations) and general news. The preferred language is English. Contributions in German and French will be accepted if they are supplemented by a detailed English summary. The Editorial Board is headed by Dr. Patricia Kögler, Dr. Renate Rosenthal-Heginbottom and Prof. Dr. Wold Rudolph. Submissions should be submitted to the following email address: jhellp@gmx.de. For more information visit the JHP page on the Archaeopress: <http://archaeopress.com/ArchaeopressShop/Public/default>

All.asp?Series=Journal+of+Hellenistic+Pottery+and+Material+Culture Archaeopress, Gordon House, 276 Banbury Road, Oxford OX2 7ED, England (Tel: +44 1865 311914; Fax: +44 1865 512231; E-mail: info@archaeopress.com ; Web: www.archaeopress.com)

Journal Note

The Journal of Roman Pottery Studies is published by Oxbow Books for The Study Group for Roman Pottery. The Journal publishes peer refereed papers on Roman pottery and related subjects. In addition to papers on material from Britain, it increasingly includes studies from across the empire. Volumes 6 to 15 are available from Oxbow Books, and the latest edition of the journal, Volume 16, has just been published. Volume 16 carries papers on a variety of subjects from Britain and the Continent, ranging from papers dealing with production sites to those looking at the distribution of types. There are case studies on kiln vessels from Essex, pottery production in Roman Cologne, excavations at Toulouse, as well as an examination of transport routes of Samian ware to Britain. Also included are an editorial, obituaries and book reviews. The Tables of Contents are online for Volumes 1-15; PDFs for Volumes 1-6 are also online <http://romanpotterystudy.org/jrps/>

ARCHAEOMETALLURGY

Thomas R. Fenn, Associate Editor

The column in this issue includes the following categories of information on archaeometallurgy: 1) New Books; 2) New Book Chapters/Articles; 3) Doctoral and Master Theses; 4) Forthcoming Meetings; 5) Research and Education Opportunities; and 6) Web-based Resources.

New Books

Rhesus' Gold, Heracles' Iron: The Archaeology of Metals Mining and Exploitation in NE Greece, by Nerantzis X Nerantzis, 2016, Archaeopress Publishing Ltd, Oxford, UK, 190 pgs, ISBN: 0956824021; 9780956824028, £35.00. East Macedonia in northern Greece has rich deposits of gold and silver as well as copper and iron ores. The gold and silver were important to Classical Athens and even more so to Alexander the Great's Hellenistic world. Copper was extracted as early as the Late Neolithic, and iron was worked from the Iron Age to Ottoman times. Bringing to life the essential background to this wealth derived from metals, this book

looks at the archaeological and archaeometallurgical evidence, some of it very new, for the mining and processing of the ores and the extraction of the metal. The book is written with the visitor to the region very much in mind, taking the reader closer to the landscapes where these practices took place to make sense of 'silent landscapes' where so much happened at one time but where nature has now taken over the remains of buildings, installations and heaps of waste rendering them 'mute' and meaningless for all but the expert historian of technology. Written by a native of the region who has himself been directly involved in field and laboratory work on ancient metallurgy, this book will raise the profile of this aspect of the region's past as well as the region's great natural beauty.

The main sections of the volume consist of: Chapter 1. Rhesos, king of the Thracians and his gold (p. 8); Chapter 2. The region, its environment and geology (p. 12); Chapter 3. The archaeology and history of the mining and metalworking tradition in NE Greece (p. 20; including: The Late Neolithic to the Iron Age; the rise of metallurgy in NE Greece; the Archaic period; the Classical and Hellenistic periods; the Roman period; the Byzantine period; the Ottoman period; and, modern Greek mining); Chapter 4. The making of iron, silver and gold: some technological principles (p. 52; including: Iron metallurgy in NE Greece; and, Precious metals extraction); and Chapter 5. Social aspects of metals technology in NE Greece: a holistic interpretation (p. 72; including: Social aspects of the industry; and, Iron of the Ottoman Empire). Final sections of the book comprise an Appendix (p. 79); Glossary (p. 80); Bibliography (p. 81); four itineraries: Itinerary I (p. 102; including: Thasian settlements, Classical Poleis and Ottoman workings in the Lekani Mountains: Kavala, Akontisma, Pistyros, Aghios Nikolaos, Makrychori, Koryfes, Palaia Kavala, Goriozofos, Mandra Kari, Zygos and Philippoi), Itinerary II (p. 126; including: Renowned Mount Pangaeon, rich in gold and silver: Amphipolis, Ikosifinissa, Nikisiani, Yiannaki Vrysi, Livadia, Asimotrypes, Palaiochori, Kryoneri, Vranokastro, Lofos Sina, Eletheroupolis, Hero Aulonitis, Avli, Valtouda, Pergamos, Phagres, Halepsos, Apollonia and Oesyme), Itinerary III (p. 148; including: Drama and Kato Nevrokopi: Byzantine-Ottoman bloomeries and modern industrial mining: Drama, Arkadikos, Sitagroi, Angitis, Granitis, Kato Nevrokopi, Vathytopos, Katofyto, Kato Vrontou and Ano Vrontou), Itinerary IV (p. 168; including: Serres and its northern region: Medieval gold and iron production centers: Serres, Sidirokastro, Lake Kerkini, Faia Petra, Angistro, Aghios Prodromos, Orini); Itineraries: References (p. 180); Epilogue (p. 181); and Index (p. 183). More details and purchase information can be found at this link:

<http://www.archaeopress.com/Public/displayProductDetail.asp?id={77682D21-A06F-4854-9564-AD8CCBCE1EE9}>.

Von Baden bis Troia. Ressourcennutzung, Metallurgie und Wissenstransfer. Eine Jubiläumsschrift für Ernst Pernicka. [= *From Baden to Troy. Resource Exploitation, Metallurgy and Knowledge Transfer. Studies in Honour of Ernst Pernicka on the Occasion of His Birthday*], edited by Martin Bartelheim, Barbara Horejs and Raiko Kraß, 2016, Oriental and European Archaeology, Volume 3 (OREA 3), VML Verlag Marie Leidorf GmbH, Rahden/Westf., 536 pages, 180 illus., 18 tabs., 2 pls., Language: English, German, ISBN: 3867570108 (hbk.), 9783867570107, €64.80. This volume honors Ernst Pernicka for his contributions to the investigation of metals and their socio-cultural aspects. It contains a foreword, a bibliography of the jubilarian, and 21 papers. These deal with resources in prehistoric societies from the perspective of archaeological and archaeometrical research with regard to both material and immaterial aspects. The focus is laid on Central Europe and the Mediterranean in the Copper and Bronze Ages. In detail, there are studies on Czech ore deposits, silver as a means of Copper Age representation, reasons for technological change in south-eastern European metal working, Caucasian gold in the 4th/3rd millennium, the cultural identification with settlements at Lerna and Tiryns as well as technological knowledge in Mediterranean fishery. Further aspects of socio-cultural implication are the introduction of metrical weight systems in the EBA, metallurgical processes on the Balkans and in Anatolia in the Copper Age, the EBA at Aegean and western Anatolian archaeological sites as well as the LBA and EIA in south-eastern Europe and the eastern Alps. A chapter on Troy contains recent research on this site and its role in the 3rd/2nd millennium.

Contributions to the volume consist of introductory sections, “Von Baden bis Troia – Ressourcennutzung, Metallurgie und Wissenstransfer” (Martin Bartelheim, Barbara Horejs, Raiko Krauß; p. 9), and “Publikationen” (Ernst Pernicka; p. 15), followed by four main sections of papers. Section 1, *Identifikation und Reflexion von Ressourcen*, consisted of “Die Anfänge der Silbermetallurgie in Eurasien” (Svend Hansen, Barbara Helwing; p. 41), “Ex oriente lux? – Ein Diskussionsbeitrag zur Stellung der frühen Kupfermetallurgie Südosteuropas” (Eva Rosenstock, Silvine Scharl, Wolfram Schier; p. 59), “Some Thoughts on Evolutionist Notions in the Study of Early Metallurgy” (Tobias Kienlin; p. 123), “Metals as Resources in the Early Bronze Age of Bohemia and Moravia” (Martin Bartelheim; p. 139), “The Persistence of Place and

Memory: The Case of the Early Helladic *Rundbau* and the Mycenaean Palatial *Megara* of Tiryns” (Joseph Maran; p. 153), and “Funde aus dem Müllhaufen der Geschichte im Befestigungsgraben von Punta di Zambrone – Angeln am spätbronzezeitlichen Mittelmeer” (Reinhard Jung, Marco Pacciarelli, Gerhard Forstenpointner, Gabriele Slepecki, Gerald E. Weissengruber, Alfred Galik; p. 175), while contributions to section two, *Soziokulturelle Implikationen von Ressourcennutzung*, comprised “The Beginnings of Social Inequality: Consumer and Producer Perspectives from Transcaucasia in the 4th and the 3rd Millennia BC” (Thomas Stöllner; p. 209), “Medizinische Versorgung für alle? Gedanken zu einigen Individualbefunden aus dem frühbronzezeitlichen Gräberfeld Franzhausen I” (Christine Neugebauer-Maresch; p. 235), “Neue Gewichtssysteme und metallurgischer Aufschwung im frühen 3. Jahrtausend – ein Zufall?” (Barbara Horejs; p. 251), “Varna und die Folgen – Überlegungen zu den Ockergräbern zwischen Karpatenbecken und der nördlichen Ägäis” (Raiko Krauß, Clemens Schmid, Dan Ciobotaru, Vladimir Slavchev; p. 273), and “Von stäbchenförmigen Anhängern und Knebeln (in Mitteleuropa)” (Daniela Kern; p. 317). Section three, *Ressourcenkomplexe und Produktionsprozesse*, papers comprise “Alpenkupfer – die Ostalpen als Rohstoffquelle in vorgeschichtlicher Zeit” (Joachim Lutz; p. 333), “Çukuriçi Höyük – Ein Metallurgiezentrum des frühen 3. Jts. v. Chr. in der Westtürkei” (Mathias Mehofer; p. 359), “Bronze Age Metal Sources and the Movement of Metals between the Aegean and Anatolia” (Zofia Anna Stos-Gale; p. 375), “Neues Licht auf alte Fragen – Einige besondere Metallobjekte aus dem Depotfund von Aiud, Kreis Alba, Rumänien” (Nikolaus Boroffka, Bianca Nessel, Michael Prange, Horia Ciugudean, Matilda Takács; p. 399), “Eine tierische Odyssee oder ein Kessel Bunter – Neue metallurgische Untersuchungen am Löwenkessel von Hochdorf” (Thomas Hoppe, Roland Schwab; p. 423), and “Ost und West, West und Ost, Mobilität und Technologietransfer” (Clemens Eibner; p. 439). Papers in the final section, *Troia und Nordwestanatolien*, consisted of “Das Troja-Gold in Philadelphia – Eine Forschungsreise mit Folgen” (Hermann Born; p. 455), “Die Karawane zieht weiter... Fernkontakte des Hisarlık Tepe/Troia in der 2. Hälfte des 3. Jahrtausends v. Chr.” (Stephan W. E. Blum; p. 473), “An Important Bronze Age Find from Barcın Höyük, South Marmara Region”. (Ivan Gatsov, Petranka Nedelcheva; p. 507), and “A Polity in Transition: Troy in the 2nd Millennium BC” (Magda Pieniżek; p. 513). More details including purchase information can be found at the following link: <http://www.vml.de/e/detail.php?ISBN=978-3-86757-010-7>.

Metals and Civilizations: Proceedings of the Seventh International Conference on the Beginnings of the Use of Metals and Alloys (BUMA VII), edited by Sharada Srinivasan, Srinivasa Ranganathan, and Alessandra Guimlia-Mair, 2015, NIAS Special Publication No. SP7-2015, National Institute of Advanced Studies (NIAS), Bangalore, India, xxii+250 pgs., 261 figs, 40 tabs, ISBN 978-93-83566-11-2, free online access (see link below). The proceedings of BUMA VII, held in 2009 in Bangalore as part of the renowned international conference series on the 'Beginnings of the Use of Metals and Alloys', are published as an edited volume entitled "Metals and Civilizations". With twenty eight valuable peer-reviewed papers covering inter-disciplinary research, it widens our knowledge of the use of metals in antiquity and several aspects of the archaeology, archaeometallurgy, historical metallurgy, crafts practices and metallurgical heritage of many Asian and some non-Asian countries.

Following a series of introductory contributions (e.g., forewords, preface, acknowledgements, etc.), the volume is divided into six general sections consisting of twenty-eight papers. The first section, ***Metallurgy and Interactions across the Ancient World***, comprises "The Bronze Age to Iron Age transition in Southeast Asia – a comparative perspective" (Ian Glover; p. 3), "What's mine is yours: the transmission of metallurgical technology in Eastern Eurasia and East Asia" (Katheryn M. Linduff; p. 14), "Hunnic gold in Hungary and the Hunnic-Asian connections" (Alessandra Guimlia-Mair, Béla Kürti; p. 23), "Khao Sam Kaeo – an archaeometallurgical crossroads for Trans-Asiatic technological traditions" (Thomas Oliver Pryce, Mercedes Murillo-Barroso, Berenice Bellina; Marcos Martinon-Torres; p. 33), and "Early use of iron in Aksum: trade and technology transfer across the Ethiopian highland" (Constantin Canavas; p. 4). Papers in the second section, ***Iron Technology***, consist of "Iron lumps formed from the ancient copper smelting: an example from Naganobori, Japan" (Eiji Izawa; p. 55), "Mass and heat balance of pig iron making by Tatar" (Kazuhiro Nagata; p. 62), "Manufacture, use and trade of late prehistoric iron billhooks from mainland Southeast Asia" (Anna Bennett; p. 68), "Crucible steel at Hattota Amune, Sri Lanka, in the first millennium AD: archaeology and contextualization" (Gill Juleff; p. 78), "A new discovery: manganese as a flux agent at the Song Dynasty [960 - 1279 A.D.] iron smelting sites in Xingye County, Guangxi, China" (Quansheng Huang; Yanxiang Li; p. 87), "Metallurgical innovations and pattern of adaptation of iron in early cultures of India" (Vibha Tripathi; p. 95), "Improvements in traditional Indian iron making

technology" (Ashok Kumar Vaish, Shiwa Dhar Singh; p. 103), and "Ancient Indian iron and steel and modern scientific insights" (Ramamurthy Balasubramaniam, Sharada Srinivasan, Srinivasa Ranganathan; p. 112). Section three, ***Copper Technology***, contributions comprised "Scientific examination of metal objects from the third excavation of Haimenkou site, Western Yunnan" (Xiaocen Li, Yali Yun, Rubin Han; p. 123), "Multiphase microstructures on late imperial Chinese brass coins" (Maria João Furtado, Rui J.C. Silva, M. Fátima Araújo, Francisco M. Braz Fernandes; p. 129), "Simulating investigation of the casting techniques for casting ancient Chinese bronze coins of Han Dynasty" (Hai-ping Lian, Yi-tao Yang; p. 137), "A preliminary study of solders and soldering methods of ancient Chinese bronzes (9th-3rd centuries BC)" (Shuyun Sun, Jianjun Mei; p. 142), and "Metallographic study of 27 metallic artefacts unearthed from two sarcophagus tombs at Beipiao, Liaoning Province" (Rubin Han, Ning Liu, Bingkun Xu; p. 150), while papers in section 4, ***Tin and Zinc***, consisted of "Resource areas of tin for ancient cultures of India (prior to 6th Century BCE)" (Prabhakar Upadhyay; p. 165), "Sources of zinc in early India: the evidence of numismatics, trade and lead isotope analysis" (Paul Craddock, Joe Cribb, Noel Gale, Lalit Gurjar; p. 174), and "Bidri ware and its black patina" (Susan La Niece; p. 185). Section five, ***Crucible Steel and Weapons***, papers comprised "New evidence for the early making and heat-treating of crucible steel: Kindi's iron treatise" (Brian Gilmour; p. 193), "Crucible steel in medieval European and Indian swords" (Alan Williams; p. 198), and "The analysis of Indian arms and armour at the Wallace Collection, London" (David Edge; p. 205), while section six, ***Ethnoarchaeology and Metals***, papers consisted of "Bronze image casting in Tanjavur District, Tamil Nadu: ethnoarchaeological and archaeometallurgical insights" (Sharada Srinivasan; p. 215), "Documenting copper mining and smelting technology" (Nils Anfinset; p. 223), "Traditional jewellery of South India" (Nanditha Krishna; p. 233), and "Caste, community and rituals in wootz making centres of Telangana – a cultural continuity in the wootz making tradition" (S. Jaikishan; p. 241). An e-print of the entire book can be found at: <http://eprints.nias.res.in/756/1/2015-SP7-Metals%20and%20Civilizations.pdf>.

New Book Chapters/Articles

From the ***Journal of Archaeological Science*** (2016, Vol. 70) comes "Experimental smelting of iron ores from Elba Island (Tuscany, Italy): Results and implications for the reconstruction of ancient metallurgical processes and iron provenance" (M. Benvenuti, A. Orlando, D. Borrini, L. Chiarantini, P. Costagliola, C. Mazzotta, V. Rimondi; pp. 1-14), and from (2016, Vol. 69) comes "Tin isotope

characterization of bronze artifacts of the central Balkans” (A.H. Mason, W.G. Powell, H.A. Bankoff, R. Mathur, A. Bulatović, V. Filipović, J. Ruiz; pp. 110-117), and from (2016, Vol. 68) comes “Platinum group placer minerals in ancient gold artifacts – Geochemistry and osmium isotopes of inclusions in Early Bronze Age gold from Ur/Mesopotamia” (Moritz Jansen, Sonja Aulbach, Andreas Hauptmann, Heidi E. Höfer, Sabine Klein, Michael Krüger, Richard L. Zettler; pp. 12-23), and from (2016, Vol. 67) comes “Tin ingots from a probable Bronze Age shipwreck off the coast of Salcombe, Devon: Composition and microstructure” (Quanyu Wang, Stanislav Strekopytov, Benjamin W. Roberts, Neil; pp. 80-92).

From *Journal of Archaeological Science: Reports* (2016, Vol. 6) comes “The use of computed tomography for the study of archaeological coins” (James Miles, Mark Mavrogordato, Ian Sinclair, David Hinton, Richard Boardman, Graeme Earl; pp. 35-41), “Archaeometallurgical investigation of thirteenth–twelfth centuries BCE bronze objects from Tel Beth-Shemesh, Israel” (D. Ashkenazi, S. Bunimovitz, A. Stern; pp. 170-181), and “Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry analysis of copper-based artifacts from Southern Ontario and the chronology of the indirect contact period” (Alicia L. Hawkins, Joseph A. Petrus, Lisa Marie Anselmi, Gary Crawford; pp. 332-341), and “Assessing the provenance of Poverty Point copper through LA-ICP-MS compositional analysis” (Mark A. Hill, Diana M. Greenlee, Hector Neff; pp. 351-360).

From *Archaeometry* (2016, Vol. 58, No. 1) comes “Late Bronze Age Copper Smelting Slags from Luserna (Trentino, Italy): Interpretation of the Metallurgical Process” (A. Addis, I. Angelini, P. Nimis and G. Artioli; pp. 96-114), and from (2015, Vol. 57, No. 6) comes “For Whom the Bells Fall: Metals from the Cenote Sagrado, Chichén Itzá” (B. Cockrell, J. L. Ruvalcaba Sil, E. Ortiz Díaz; pp. 977-995), “A New Method For Combining Lead Isotope and Lead Abundance Data to Characterize Archaeological Copper Alloys” (A. M. Pollard, P. J. Bray; pp. 996-1008), and “Fuel Efficiency of Ancient Copper Alloys: Theoretical Melting Thermodynamics of Copper, Tin and Arsenical Copper and Timber Conservation in the Bronze Age Levant” (B. Kaufman, D. A. Scott pp. 1009-1024). From *Archaeological and Anthropological Sciences* (2016, Vol. 8, No. 1) comes “Beeswax remnants, phase and major element chemical composition of the bronze age mould from Gaj Oławski (SW Poland)” (Justyna Baron, Beata Miazga, Theodoros Ntaflos, Jacek Puziewicz, Antoni Szumny; pp. 187-196), and “Sourcing copper ores for production of bronzes excavated at Shuangyantang, a Western Zhou (1046–771

bc) site in Chongqing (Southwest China): evidence from lead isotope analysis” (Xiaopan Fan, Di Mu, Jun Yi, Hongmin Wang, Wugan Luo; pp. 197-204). From *European Journal of Archaeology* (2016, Vol. 19, No. 2) comes “Patterns of Innovation Transfer and the Spread of Copper Metallurgy to Central Europe” (Silviane Scharl; pp. 215-244). From *Arabian Archaeology and Epigraphy* (2016, Vol. 27, No. 1), comes “Silver production at al-Radrad: archaeometallurgical analysis of ore, slag and technical ceramics from early medieval Yemen” (Stephen Merkel, Andreas Hauptmann, Thomas Kirnbauer, Florian Téreygeol; pp. 107-126).

Doctoral & Master Theses

Gold and silver production in imperial China: Technological choices in their social-economic and environmental settings, by Siran Liu (Doctoral thesis, Institute of Archaeology, University College London), July 2015, 381 pages, 138 figures, 59 tables, 9 chapters, 5 appendices, and bibliographical references.

The production of gold and silver was of major importance for almost all ancient societies around the world but has been rarely studied archaeologically. The high flexibility of this production process allows it to be conducted through various technological routes, while the choice among these potential routes was mainly determined by the producers’ social-economic and environmental settings. The comparison of these choices in different settings can therefore reveal information about numerous facets of ancient societies.

The subject of this thesis is to study the gold and silver smelting technology in imperial China based on archaeological materials from the sites of Baojia, Mengshan and Yanchuan, all broadly dated to the Tang-Yuan period (7th-14th century AD). The archaeometallurgical approaches were employed to investigate the production remains such as slag, furnace fragment, crucible and fuel-ash slag directly generated from the smelting processes, and to reconstruct the *chaîne opératoire* for these three sites. A range of unique technologies identified at these sites depicted a diversified picture of gold and silver production in imperial China. Iron reduction process (IRP) and iron oxide reduction process (IORP) were identified to be the main mechanisms for smelting the precious metal-bearing lead sulphide ores, while both furnaces and the coal-fired crucibles were used as the reaction containers.

The dynamic relationships between the smelting technology and their broader context are examined to reveal a range of factors which constrained the technological choices of the smelters and led to the

formation of varied technological traditions in the different regions of China.

This research also contributes to the development of the characterisation and interpretation methodology for the precious metal and lead smelting remains within and beyond China, and demonstrates the strength of a combination of high resolution technological reconstructions and contextualised comparative studies in the inquiry of the pre-modern craft production systems. [Abstract from thesis]

Forthcoming Meetings

The **Historical Metallurgy Society (HMS) Summer Meeting** will be held June 17-19, 2016 in Merthyr Tydfil, Wales, UK, to commemorate the 250th anniversary of the construction of Cyfarthfa Ironworks (1765-7) and the 225th anniversary of the first successful commercial implementation of the puddling process at Cyfarthfa (1791). The meeting will include a pre-conference fieldtrip on the 17th to an opencast mine (to examine both the natural resources and archaeological remains; numbers strictly limited), a reception on the evening of the 17th, a day of conference sessions on the 18th and visits to the industrial remains in the Taff Valley, Merthyr Tydfil, on the 19th.

There are still gaps in the program for offers of papers (oral or poster) across a wide range of related areas including:

- the story of puddling (technology, economics, social history, engineering implications, international adoption...);
- the wider story of the development of iron conversion technology;
- the development of Cyfarthfa Ironworks and its people (Anthony Bacon, the Homfrays, the Crawshays, their engineers and partners);
- the broader development, social history and context of the iron industry in Merthyr Tydfil and South Wales from 1750 to 1950.

Please submit an abstract (maximum of 500 words) to Tim.Young@GeoArch.co.uk as soon as possible, indicating whether you would prefer to give an oral or poster presentation. Further details (including a downloadable booking form and online booking) are available on the HMS website (www.hist-met.org). The booking deadline is May 1, 2016, but attendees are advised to book their hotel accommodation as soon as possible (see website for details and advice).

The conference, ***The Metalworker and His Tools / Le métallurgiste et ses outils: Symbolism, functions and***

technology in the Bronze and Iron Ages, will be held from June 23-26, 2016, Queen's University, Belfast, United Kingdom. The presence of metalworking tools in burials, hoards and sanctuaries, from the Bell Beaker period until the Iron Age, invites the question what the link was between the artisan and his tools, but also between the artisan and society. In these specific find contexts, tools not only provide technological evidence, but also acquire a specific symbolic value, as they form part of certain rituals. For example, in the Late Iron Age these ritual aspects of artisanship relate to the profound upheavals in society that lead to the emergence of oppida. But tools are also technological items that answer to a specific need, and therefore should not to be separated from their function and from the technical purpose in which they are employed.

The aim of this conference will be to gain a better understanding of the different roles of metalworking tools – in metal, stone, fired clay or organic material –, to comprehend their evolution from the beginning of metallurgy until the Iron Age, and to better understand the artisan's place within society.

The conference will be structured around three themes:

- The first theme entitled «tools and workshops» will analyze tools and site features related to metallurgical activities. The choices conditioning their formation, their evolution, their place within workshops, and their organization will be examined.
- The second theme «tools and technology» will focus on the link between tools and techniques and on the evolution of technology. Archaeometry and experimental archaeology may provide evidence for determining the position of tools within the respective *chaîne opératoire*.
- The last theme «tools, rituals and society» will look at the presence of these tools in different types of context, with a particular focus on their occurrence in burials, hoards and sanctuaries. The presence of metalworking tools in hoards and funerary contexts takes a wide variety of forms; this theme thus will be dedicated to reflecting on the role of tools in the ritual sphere, and to examining the parameters of this variation. The aim will be to try and analyze the motives that may have led to the deposition of tools in specific places. An underlying problem with which such an analysis will have to grapple is the controversial notion of artisans as specialists, and thus ultimately the question of how societies were organized.

This conference is intended to provide a forum for developing a better understanding of the role metalworkers played in society, and of the evolution of that role during the period conventionally referred to as Metal Ages. While the geographic focus will be mainly on Western and Central Europe, contributions that synthesize information about tool kits, workshop organization and the societal role of metalworkers in other geographic areas are warmly welcomed.

Sessions and presentations will begin Thursday (June 23) afternoon with a Special lecture/masterclass by Dr Barbara Armbruster “Gold during the Metal Ages” which will include “Gold at the beginning of metallurgy: case study of Varna, Bulgaria (5th millennium BC), Ur, Mesopotamia, and Maikop, Caucasus (3rd millennium BC)”, “Gold in Atlantic and Nordic Europe (Chalcolithic and Bronze Age)”, and “Gold during the Iron Age (Hallstatt, La Tène, Celtiberia, Iberia, Castros culture)”. Friday (June 24) presentations in the first session, *Tools and Technology*, will include “Stones in the metallurgical chaîne opératoire: an integrative functional assessment” (Selina Delgado Raack), “Defining early technological traditions in Iberia” (Mercedes Murillo Barroso), “Lithic metalworking tools from the chalcolithic hilltop settlement of Outeiro Redondo (Central Portugal)” (João Luis Cardoso, Dirk Brandherm, Linda Boutoille), “The axe of Ahneby or how to cheat a customer who wants to buy a precious foreign object” (Mechtild Freudenberg, Leif Glaser), “Tracing a Balkan metalsmith: tools, marks and debris in the 5th millennium BC” (Verena Leusch, Miljana Radivojević), “Tracing multimetal craftsmanship through metallurgical debris – Open air workshops and multimetallicity in Late Iron Age Scandinavia” (Andreas Svensson), “Minimum tools required: a system for organizing the metalsmith’s workshop” (Elpidia Fregni), “The changing face of the metalworker’s toolkit: a survey of the evidence from Bronze Age Scotland” (Trevor Cowie), “Impact of the mould material during casting of copper-based alloys artefacts: the non-equilibrium conditions” (Justine Vernet, Paolo Piccardo), “Soufflets et chalumeaux de l’âge du Bronze en Europe occidentale” (Thibault Lachenal), “Analyse fonctionnelle des supports de frappe de l’âge du Bronze” (Maxence Pieters), “A stone to die for-evidence for early gold working from Hacketstown, Co. Waterford” (Mary Cahill), and a UISPP commission “Metal Ages in Europe”.

Saturday (June 25) presentations in the second session, *Tools and Workshops*, will include “Tools and Techniques-Hands on experience” (Brian Clark), “Fine metalworking tools and workshops in Western and Northern Europe – a diachronic consideration” (Barbara

Armbruster), “Intentional or accidental design? The tale or Minoan double axes and chisels” (Maria Lowe Fri), “Un atelier de bronzier au milieu d’un habitat à Montélimar (Drôme, France)” (Sylvie Cousseran-Néré, Eric Néré, Marilou Nordez), “Réflexions sur la structuration de la production métallurgique des sites du Bronze final en Ile-de-France” (Paul Brunet, Patrick Gouge, Muriel Melin, Eric Néré, Théophane Nicolas, Rebecca Peake, Daniel Simonin, Linda Boutoille), “The place and space of non-ferrous metalworking in Iron Age Britain and Ireland” (Sophia Adams), “Tools, metal products and workshops in Early Iron Age: towards a first synthesis on metal craftsmen in West Hallstatt territories (630-425 BC)” (Emilie Dubreucq), “Bragny-sur-Saône and Talant, two late Hallstatt metallurgical production sites in central Burgundy” (Jean-Loup Flouest, Régis Labeaune), and “Un atelier du travail du fer du Hallstatt D – La Tène ancienne en contexte d’habitat, le cas de Weyersheim « les Hauts de la Zorn » (Bas-Rhin, France)” (Matthieu Michler, Patrick Clerc, Forent Jodry, Marion Béranger, Luisella Cabboï), while presentations in the third session, *Tools, Rituals and Society*, will include “Life histories of Bronze Age moulds” (Leo Webley), “Sacred or profane? Some considerations about use of hoarding metals in Bronze Age Western Europe” (Davide Delfino), “Hammers of the Gods: the role of metalworking tools in the interpretation of hoards in Late Bronze Age Britain” (Elpidia Fregni), “Tools in ritual contexts – Remarks on the social position of Bronze Age metal workers through the lens of their implements in hoards and graves” (Bianka Nessel), “Tools in tombs: an overview of Late Bronze Age funerary contexts in eastern France and Baden-Württemberg (14th-12th century BC)” (Rebecca Peake, Claude Mordant, Mafalda Roscio, Stefan Wirth), and “Artisans du métal laténiens et pratiques rituelles non funéraires: le cas de la Gaule du Ve av. J.-C. à la conquête romaine” (Thibault Le Crozanet, Gérard Bataille).

Poster presentations at the conference will include “Embossed ornaments on gold objects of the Early Iron Age in South-West-Germany – tools and experimental work” (Birgit Schorer), “Experimental casting pit for bronze items” (Alessandro Armigliato), “Mines-Copper-Artisans in the steppe of the Late Bronze Age” (Nikolai Shcherbakov, Miljana Radivojević, Iia Shuteleva, Tatiana Leonova), “Metallurgists and their craftwork in the archaeological record” (Katja Martin), “First results of micrometallographic analysis of metalworking tools in graves of metallurgists in Moravia/Czech Rep.” (Jaroslav Peška, Jindřich Štelcl), “The metalworking toolset found at Upton Lovell G2a, Wiltshire, England” (Linda Boutoille), and “Les outils lithiques liés à la déformation plastique des métaux du Site de Cuciurpula (Corse,

Bronze final/premier âge du Fer)'' (Kewin Peche-Quilichini, Linda Boutoille). A preliminary program and abstracts can be found at the following link: http://metools2016.sciencesconf.org/conference/metools2016/pages/Metool_PGRM_ABSTRACT.pdf.

The 22nd *Annual Meeting of the European Association of Archaeologist (EAA)* will be held in Vilnius, Lithuania, from August 31 – September 4, 2016. Two main sessions are dedicated to archaeometallurgy within the conferences six main themes. These are: “Iron making techniques and social change in the medieval and early modern Europe” (Abstract nr. TH1-32), and “Tradition, innovation and networks - metal working around the Baltic Sea: From the Bronze Age to the Middle Ages” (Abstract nr. TH1-32). More information about the conference and abstracts for the sessions is at: <http://eaavilnius2016.lt/>.

Iron in Archaeology: Bloomery Smelters and Blacksmiths in Europe and Beyond is an international conference in honor of Radomír Pleiner in the 50th year of the CPSA, to be held from May 30 – June 1, 2017, at the National Technical Museum in Prague, Czech Republic. The aim of the conference is to bring together scholars involved in research on early ironworking and to share the newest results and experiences achieved in this field. Very welcome contributions are those informing about recently excavated bloomeries and smithies, about results of analyses of slags and iron artefacts, about new analytical methods developed, new trends and achieved results in experimental archaeometallurgy of iron, etc.

The event will be held at Prague in the spring of 2017, thus 30 years after R. Pleiner himself organized a similar CPSA conference at Liblice near Prague. Conferences organized under the auspice of the CPSA have already a long tradition, which will be, by the forthcoming event, revived and continued. The first meeting was held at Schaffhausen in 1970, the others at Eisenstadt in 1975, Schaffhausen in 1979, Sankelmark in 1980, Vordernberg in 1981, Populonia in 1983, Belfast in 1984, Norberg in 1985, Mainz in 1986, Liblice in 1987 (the 20th anniversary of CPSA), Val Camonica in 1988, Kielce-Ameliówka in 1989, Sévenans-Belfort in 1990, Budal in 1991, Ripoll in 1993, Besançon in 1993, Plas Tan y Bwlch in 1997 (the 30th anniversary of CPSA), Bienno in 1998, Sopron-Somogyfajs in 1999, Sandbjerg in 1999 and Uppsala in 2001. All these conferences were the most enjoyable and friendly of occasions, which helped to bond together a family of scholars of European early ironworking. The organizers believe that the forthcoming conference in Prague will also be such an event.

Both oral presentation and posters are welcome. Proposals should be submitted with a short abstract via the preliminary registration form. Oral presentations (max. 20 min) as well as posters (A0, A1) must be prepared in English. Poster sessions will take place in a public area of the museum, i.e. will be accessible to all its visitors. Definitive Abstracts (not exceeding 400 words) for all accepted contributions will be published in a Booklet of Abstract, which participants will receive at the Conference. These abstracts must be prepared in compliance with the Instructions for Writing Definitive Abstracts can be submitted by email to J. Hošek (iia2017@arup.cas.cz).

Deadlines and key dates:

- Proposal submission (Title and Short Abstract):
January 15, 2017
- Acceptance of the proposed submission:
February 28, 2017
- Definitive abstracts for Booklet of Abstracts:
April 15, 2017

Additional information can be found at the following link: <http://www.arup.cas.cz/iia2017/index.html>.

Research and Education Opportunities

The Institute for Archaeo-Metallurgical Studies (IAMS) (<http://www.ucl.ac.uk/iams>) and the University College London (UCL) Institute of Archaeology invite applications for two student bursaries for postgraduate studies in archaeometallurgy leading to an MSc degree.

Bursaries

- IAMS Bursary in Archaeometallurgy (£5,000)
- Ronald F. Tylecote Bursary in Archaeometallurgy (£5,000)

Application procedure

Any candidates accepted for the MSc in the Technology and Analysis of Archaeological Materials (http://www.ucl.ac.uk/archaeology/studying/masters/degrees/msc_technology) are eligible for either bursary, provided that they express a commitment to write a dissertation on an archaeometallurgical topic. Students are welcome to suggest their own dissertation topics at the time of applying, but this is not a requisite. In the personal statement accompanying their application to the MSc, they should include a brief comment expressing their interest in being considered for the above bursaries. Applications will be assessed based on the academic merit of the applicants and their statements. **Deadline: June 1, 2016**

Any enquiries about the bursaries may be directed to Marcos Martín-Torres (m.martinon-torres@ucl.ac.uk). Enquiries about the Master's degree programs offered by the Institute should be directed to the Institute's Graduate Programmes Administrator, Lisa Daniel.

The **Cluster for Interdisciplinary Artefact Studies (CIAS)** at Newcastle University (Newcastle upon Tyne, UK) will present a workshop entitled *Metalwork Use-wear Analysis*, led by Dr Andrea Dolfini. The course will be offered Friday, June 10, 2016, from 9am-5pm, in the Wolfson Lab, KGVI 2.60, Newcastle University. The workshop provides a hands-on introduction to the use-wear analysis of metal objects, focusing in particular on prehistoric copper alloys. Use-wear analysis enables the recognition, evaluation, and interpretation of the marks visible on ancient and historic metalwork by observation and optical microscopy. It may yield tremendous insights into the life-cycle of objects including their manufacture, use, repair, deposition, and post-depositional history. The course comprises a short theoretical introduction to prehistoric copper-alloy technology and use-wear analysis, followed by hands-on sessions in which participants will learn how to observe, record, and interpret the marks visible on original prehistoric bronzes (in particular axe-heads and swords). Extensive reference collections of replica bronzes will also be available. This course does not require background knowledge of materials science or optical microscopy and is open to all participants interested in the scientific methods used in archaeometallurgy.

Key Learning Outcomes:

- To introduce and practice use-wear analysis for the investigation of ancient and historic copper-alloy artifacts;
- To enable participants to critically evaluate the manufacture, use, and post-depositional marks visible on ancient and historic copper-alloy artifacts;
- To enable participants to describe and record the observed marks graphically and photographically;
- To enable participants to use scientific equipment and software for the examination of ancient and historic copper-alloy artifacts

More information on this course can be found at: <http://research.ncl.ac.uk/cias/masterclasses/metalworkuse-wearanalysis/>.

The **Institute for Archaeo-Metallurgical Studies (IAMS)** (<http://www.ucl.ac.uk/iams>) is offering a two week Summer School Program in Archaeometallurgy.

Running for over a decade, the IAMS Summer School typically offers classes to those interested in the archaeology of metallurgy. The course is aimed at professionals, academics, students, and enthusiasts and covers a diverse range of topics, including mining, metal production, experimental reconstruction, field methods, to the analysis of metallic artefacts. Lectures typically cover both ferrous and non-ferrous metals and will involve artefact handling sessions as well as demonstrations with analytical instruments such as a scanning electron microscope with attached energy dispersive spectrometer (SEM-EDS) and portable x-ray fluorescence (pXRF). Past summer schools have been held as far away as Beijing and at times have had an overall theme, but they tend to cover as broad a range of topics as possible.

The Summer School will take place at the University College London (UCL) Institute of Archaeology during the two weeks of June 23 to July 1, 2016, and the program will be divided in two formats. The first week will include a lecture on iron smelting at UCL, followed by a three day experimental iron smelting workshop in Monkton Up Wimborne, Dorset. The workshop will focus primarily on the practical aspects of bloomery iron smelting, including ore preparation and roasting, furnace construction, smelting in two types of furnaces (induced and natural draft), slag formation and smithing. Students will be expected to get actively involved in these activities. The second week will follow the traditional format and will be focused on the archaeometallurgy of gold and silver. Lectures will be given by a series of academic experts in their respective fields.

Week 1: Bloomery iron smelting: theory, archaeology and experiment

- Monday: Foundations of bloomery iron smelting. Archaeological and ethnographic examples. Slag analysis and technological reconstructions (Jane Humphris).
- Tuesday-Thursday: Experimental iron smelting workshop. Monkton Up Wimborne, Dorset, UK.

A three-day workshop led by experienced iron smelter Jake Keen, together with archaeometallurgist Jane Humphris. The workshop will focus primarily on the practical aspects of bloomery iron smelting, including ore preparation and roasting, furnace construction, smelting in two types of furnaces (induced and natural draft), slag formation and smithing. Students will be expected to get actively involved in these activities.

Week 2: Archaeometallurgy of gold and silver

- **Monday:** Foundations. Gold and silver in nature. Smelting, cupellation, parting (Marcos Martín-Torres).
- **Tuesday:** Archaeometallurgy of gold and silver in the field: mining technology and smelting sites. Historical sources, field surveys and excavation (Brigitte Cech).
- **Wednesday:** Gold and silver in prehistoric Iberia: chemical analyses, isotopes and provenance (Mercedes Murillo-Barroso).
- **Thursday:** Gold and silver in the Staffordshire Hoard: technology, microanalysis and XRF (Eleanor Blakelock).
- **Friday:** Gold and silver in the Americas, before and after Columbus (Marcos Martín-Torres).

Registration fees:

Week 1: (20-23 June): £300 (includes travel, accommodation, and meals during the experimental workshop)

Week 2: (27 June – 1 July): £200

Two weeks: £450

Contact: Umberto Veronesi
(umberto.veronesi.13@ucl.ac.uk)

Some additional subsidy may be available for students in financial hardship – please contact Marcos Martín-Torres if you would like to discuss this (m.martinon-torres@ucl.ac.uk).

Web-based Resources

A review of *Gold and Silver Production in Imperial China: Technological choices in their social-economic and environmental settings*, a doctoral thesis by Siran Liu (previously reported in this SAS Bulletin) can be found at <http://dissertationreviews.org/archives/13478>.

How Ancient Bronze Statues Were Made is a short film—from Renana Aldor and Kobi Vogman—created for The Israel Museum in Jerusalem, and uses stop-motion and 2-D animation to show how the lost-wax technique works. Find the film at: http://www.slate.com/articles/video/video/2016/04/ancient-bronze-statue-were-made-using-the-lost-wax-method-video.html?wpsrc=sh_all_dt_tw_top. The sculpture (re)created in this video is the “Statue of Hadrian clad in body armour” (117–138 CE) from Tel Shalem, Israel, one of the three bronzes on display as part of the current exhibit “Hadrian: An Emperor Cast in Bronze” (<http://www.imj.org.il/en/exhibitions/2016/hadrian/>).

Bronze statues come to life differently than marble statues. Instead of carving a block of marble, the bronze artist uses the lost-wax technique to make a series of molds, and then pours melted bronze into the final mold to create the sculpture. This method has been around since 4500 BCE.

UPCOMING CONFERENCES**2016**

1-3 June. International Obsidian Conference Lipari (Italy).

General Information:

<http://rtykot.myweb.usf.edu/Obsidian%202016/>

9-12 June. DIG 2015 Sardinia. General information: <http://www.developinginternationalgeoarchaeology.org/fIRST.html>

26 June-1 July. Goldschmidt Conference, Yokohama, Japan. General information:

<http://goldschmidt.info/2016/>

31 July-5 August. Gordon Research Conference: Scientific Methods in Cultural Heritage Research, Newry, ME, USA. General information:

<http://www.grc.org/grc/programs.aspx?id=15101>

21-25 August. 252nd National Meeting and Exposition, American Chemical Society. Philadelphia, PA, USA. General information:

<http://www.acs.org/content/acs/en/meetings/fall-2016.html>

<http://www.acs.org/content/acs/en/meetings/abstract-submissions/acsnm252.html>

28 August-2 September. World Archaeological Congress, Kyoto, Japan. <http://wac8.org/>

4-8 September. Society of Glass Technology Centenary Conference (SGT100) and European Glass Society Meeting. Sheffield, UK. General information:

<http://www.centenary.sgt.org/Conference.htm>

18-23 September. SciX Conference 2016. Minneapolis, MN, USA. General information:

<https://www.scixconference.org/>

25-28 September. The Geological Society of America National Meeting. Denver, CO USA. General information: <http://www.geosociety.org/meetings/>

16-19 November. American Schools of Oriental Research Annual Meeting. San Antoni, TX, USA. General information: <http://www.asor.org/am/index.html>

16-20 November. American Anthropological Association 114th Annual Meeting. Minneapolis, MN, USA. General information: <http://www.aaanet.org/meetings/>

28 Nov-2 Dec. The Sixth International Congress on Underwater Archaeology (IKUWA6) Fremantle WA Australia General information: <http://www.aima-underwater.org.au/ikuwa6-2016/>

12-16 December. American Geophysical Union Fall Meeting, San Francisco, CA USA. General information: <http://fallmeeting.agu.org/upcoming-meetings/>

2016 New Zealand Archaeological Association Conference, Blenheim. General information: <http://nzarchaeology.org/cms/index.php/conferences>

2017

5-8 January. Joint Annual Meeting of the Archaeological Institute of America (AIA) and the Society for Classical Studies (SCS). Toronto, Canada. <https://www.archaeological.org/annualmeeting> Call for papers now open. Submissions deadline August 7, 2016 and August 21, 2016 (\$25 fee). <https://www.archaeological.org/meeting/CFP>

29 March-2 April. Society for American Archaeology. 82nd Annual Meeting, Vancouver, BC, Canada. General information: TBA

18-22 April. American Association of Physical Anthropologists Annual Meeting. New Orleans, LA. General information: TBA

2-6 April. 253rd American Chemical Society National Meeting and Exposition. San Francisco, CA, USA. General information: TBA

20-24 August. 254th American Chemical Society National Meeting and Exposition. Washington, DC, USA. General information: TBA

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