

# SAS BULLETIN

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**LOOK! UP IN THE SKY! IT'S A BIRD! IT'S A PLANE! IT'S AN UNMANNED AERIAL VEHICLE!**

Archaeological prospection and the recording of archaeological sites and features can present many challenges despite technological innovations made over the years. Limitations on the usefulness of certain techniques and their accuracy in documentation can be caused by several factors that include terrain, weather, budgets, time required to collect and process the data, and need for specialized knowledge or training. Recently, there has been a rise in the use of unmanned aerial vehicles (UAV's) to either complement or replace traditional photogrammetric techniques. UAV's can be a more cost-effective and faster method for aerial photography and have been used for the discovery of new archaeological sites, for mapping current excavations, or for monitoring and protecting cultural heritage sites. Other advantages include the versatility of UAV's in different terrains, their ability to be used in tight spaces, they can generate spatial data and can be set up to image sites at different wavelengths, such as near-infrared (NIR).

In this issue of the *Bulletin*, you will find an article on the use of micro-UAV's by a group of researchers (which includes our *Geoarchaeology* Associate Editor Jane Entwistle) who are using this technique for their field work in Bulgaria. King, *et al.* describe the technique and their methodology and explain how they collect and process the data, in addition to offering some practical considerations. Please make sure to check out the article

which provides some helpful information for those who are thinking about using micro-UAV's or are looking for new methods for surveying sites or recording information during an excavation.

I also hope the article inspires those of you conducting field work or other types of archaeological research to submit short articles on current projects to share with your fellow SAS members. The *Bulletin* is a great way to disseminate your research, even in the early stages of a project. I hope you will all consider contributing.

*Vanessa Muros, Editor*

## ANNOUNCEMENTS

### **National Park Service's 2014 Archaeological Prospection Workshop**

The National Park Service's 2014 workshop on archaeological prospection techniques entitled *Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21<sup>st</sup> Century* will be held May 19-23, 2014, at Aztalan State Park in Jefferson County, Wisconsin. Lodging and lectures will be at the Comfort Suites in Johnson Creek, Wisconsin. The field exercises will take place at Aztalan State Park. Aztalan State Park is a National Historic Landmark and contains one of Wisconsin's most important archaeological sites. It showcases an ancient Middle-Mississippian village that thrived between A.D. 1000 and 1300. The people who settled Aztalan built large, flat-topped pyramidal mounds and a stockade around their village. Portions of the stockade and two mounds have been reconstructed in the park. Co-sponsors for the workshop include the National Park Service's Midwest Archeological Center, the Aztalan State Park, and the Wisconsin Department of Natural Resources. This will be the twenty-fourth year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this Nation. The workshop will present lectures on the theory of

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operation, methodology, processing, and interpretation with on-hands use of the equipment in the field. There is a registration charge of \$475.00. Application forms are available on the Midwest Archeological Center's web page at <http://www.cr.nps.gov/mwac/>. For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873; tel: (402) 437-5392, ext. 141; fax: (402) 437-5098; email: [steve\\_de\\_vore@nps.gov](mailto:steve_de_vore@nps.gov).

**PRACTICAL CONSIDERATIONS, WORKFLOW  
PROTOCOL, AND RESEARCH PROSPECTS OF  
MICRO-UAVS: UNCOVERING THE UPLAND  
ZONE ARCHAEOLOGICAL HERITAGE OF THE  
MIRKOVO BASIN, BULGARIA**

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The signatures of archaeological features in remotely sensed imagery are often difficult to differentiate and extract from subtle changes in terrain and in the reflectance of varying vegetation and soil types (Lasaponara, 2012). The collection of aerial imagery using a micro unmanned aerial vehicle (microUAV) offers great versatility and is a low cost solution to obtain high quality data for site prospection, especially in hard to access locations. A micro-UAV that can capture near infrared (NIR) as well as aerial imagery on one platform enables data collection with a higher image resolution (~1cm), at pre-selected locations and at multiple times of day and/or time of year than if captured using other forms of remote sensing. Images generated by the use of a micro-UAV that is NIR enabled can be processed to derive the following principle datasets used for archaeological prospection:

- (i) digital elevation models (DEMs);
- (ii) hill-shading, slope and aspect;
- (iii) near infrared (NIR) imagery;
- (iv) normalised vegetation index (NDVI);
- (v) false color composites (FCC);

- (vi) NDVI color composites (NCC).

The overall aim of the project reported here was to use this combination of datasets, derived for known archaeological locations in the area, to identify signatures characteristic of subtle changes in micro-relief, vegetation and soils potentially indicative of archaeological remains/disturbance. These signatures would then be used to prospect and identify features in unknown locations.

High resolution planar and oblique imagery of the Mirkovo basin and surrounding area was obtained for rapid dissemination to aid interrogation by the on-site archaeological team. Daily micro-UAV derived imagery was used to focus and plan subsequent data collection (Field Walking, Geochemical Survey and Landscape Geophysics) during the field season. The wealth of data collected also enabled further investigations on return from the field. This article will highlight the practical considerations and design protocols used during the project to deploy a micro-UAV<sup>1</sup>, to process the data collected, and to identify the prospects for such techniques in the rapid survey of areas of interest that would not normally be considered practical due to time and cost implications.

**Practical considerations: UAV flight logistics and planning**

Challenges identified for the use of micro-UAVs in this project were (1) UAV performance in an upland environment, (2) limited mapping coverage for accurate UAV placement (3) UAV robustness and an ability to manage system losses.

The following procedures and objectives were established:

1. The requirement for a careful examination of legal, environmental and equipment requirements prior to departure.
2. Once on site, undertake risk assessment protocol and rank/prioritize sites to be investigated.
3. Fly the low-risk/high-interest sites first, then diversify until all known sites are imaged, using on-task learning to rapidly increase experience and streamline flight protocols.
4. Design of an appropriate, tailored, data collection protocol; planar and oblique imagery, time of day, altitude of flight path and visible and NIR data collection.

<sup>1</sup> Please note that not all micro-UAVs have the same capacity for flight duration and windspeed capability, durability, camera dpi and sensor provision

5. The completion of all flights within 80% of the allotted time, to build in time for delays, repair and re-flights if needed.
6. To provide on-site processed imagery for sites flown within the constraints of processing time and on-site capabilities.

**Study area and deployment of the micro-UAV**

The total land surface, covered by a total of 27 flights flown over a period of 10 days, was 10km<sup>2</sup> and were categorized into five flying sites. All sites contained a mixture of land cover/use/terrain and sites of interest identified by the archaeological team from archived documents and provided a significant opportunity to set the local known archaeological sites into the context of prospective archaeological finds in the surrounding landscape. One site of potential interest was located in a steep forested area at high altitude and a site safety assessment identified difficult wind conditions (characterized by severe turbulence) and poor recovery potential of the UAV in the dense forest. As such this site was not flown.

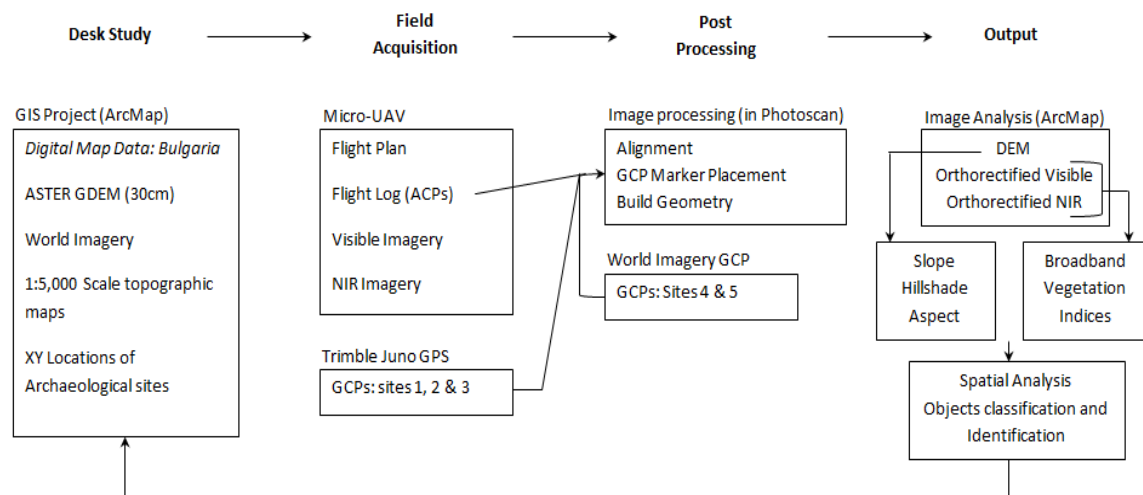
**Workflow protocol**

A workflow (figure 1) highlights the key components of the desk study, field acquisition, post-processing and outputs of the investigation. Each of the key items of the workflow is discussed below.

Desk study: In preparation for the fieldwork datasets freely available, but low in spatial resolution, were compiled to provide a platform for co-registering datasets in an initial ArcGIS project (ESRI ArcGIS v10; <http://www.esri.com>). Scanned copies of 1:5000 scale maps provided by the New University of Bulgaria were georeferenced to World Imagery. This information was essential to provide sufficient data to allow pre field season flight planning for UAV deployment.

Field acquisition: Ground control points (GCPs) are predominantly used to georeference UAV derived imagery. GCPs (two sheets of A4 paper placed at opposing corners) were placed in a rough grid formation (c.500m spacing) to ensure coverage underneath the flight path and clear visibility in the UAV images. The positional accuracy of the georeferenced image depends on the GPS that is used to collect/generate the location of the GCP. GCP positions were surveyed using a Trimble Juno GPS (provides 2-5m GPS positioning in real-time) set to record the position every second for five minutes (300 position measurements at each location).

A QuestUAV 300 fixed wing micro-UAV (QuestUAV, 2012) was autonomously flown carrying a system to collect NIR imagery in addition to the normal aerial images (dpi 12), offering a single platform for data collection. A flight path was generated using a combination of World Imagery and georeferenced 1:5,000 scale maps of Bulgaria.



- ACP – aerial control point
- NIR – near infra-red
- GCP – ground control point
- DEM – digital elevation model

Figure 1. A workflow highlighting the key components of the desk study, field acquisition, post-processing and outputs of the investigation.

Waypoints (XY coordinates; a location that the UAV flies to) were spaced to provide a suitable overlap of imagery for post-processing. The resulting flight paths were designed to generate a minimum of 60% overlap and 40% endlap of images for different altitudes flown and were modified on-site to take into account wind conditions (speed and direction). Approximately 200 images were taken per camera during each flight. All flight paths ensured a maximum 200ft clearance above potential obstructions (trees, pylons and marked changes in terrain). Flights were conducted over each site in a range of different light conditions and heights. In addition to the downward looking QuestUAV 300 (planar images), a QuestUAV 100 with a forward facing Panasonic DMC-LX3 camera was flown providing oblique imagery.

**Post-processing:** A number of software packages can be used to stitch digital photographs together, each with varying degrees of cost, accuracy, resolution, functionality, output and ability to manipulate the data. For the purposes of this project PhotoScan Professional Edition (Agisoft LLC, 2012) was used. PhotoScan is a low-cost, commercially available, software package increasingly used by archaeologists (Verhoeven, 2011). Images collected in the field were mosaicked at a medium alignment which provided a resolution of ~5cm for aerial imagery providing excellent detail to examine and identify features in the landscape in both visible and NIR.

GCPs laid out in the field were located in the mosaicked visible and/or NIR image and for each GPC its associated position in WGS1984 UTM Zone 35N coordinate system was inputted. Positional data collected in WGS84 was post-processed by GPS Pathfinder v4<sup>TM</sup> using data downloaded from SOPAC Sofia and converted into WGS1984 UTM Zone 35N. Only data corrected in post-processing of positions was averaged to generate the GCP position. Post-processing improved positional accuracy and image accuracy is on average is +/-2.2m. A flight log taken during flights also provided GPS positions for each image taken with an accuracy of +/-10m. These are known as Air Control Points (ACPs). This significantly improves the processing time when stitching images together as the geographic location of each image relative to each other is known. Differential GPS can be used to increase the spatial accuracy of the image output but for the purposes of rapid data collection and dissemination of processed data in the field it was found that the Trimble Juno GPS was fit for purpose.

**Output:** Once the mosaicked image has been updated to the coordinate system a georeferenced orthorectified aerial/IR image and associated DEM can be exported and the datasets listed in the introduction can be generated.

The time taken to process a full set of data on a medium alignment from a set of individual images to a complete set of derived datasets took between 24-36 hours per flight<sup>2</sup>.

### Research prospects – Example of the Mirkovo Project

Stitched visible images of all sites flown were made available to the team in the field. The timing of the field study in early September 2012 followed a dry summer and the resulting stress in vegetation in non-irrigated areas aided in the identification of disturbed ground for interpretation. The data was used to validate typical (or site specific) surface anomalies at each site and identify sites previously unidentified that were in close proximity. There is no doubt that the rapid availability of processed data maximized the use of Landscape Geophysics, Geochemical Survey and Field Walking during the field season.

Figure 2 illustrates the main output of NDVI, FCC and NCC datasets, generally known as broadband vegetation indices, shown in comparison to a standard visible image. Combined, these datasets can be used to identify archaeological features that are not readily visible in aerial imagery alone, such as the ridge and furrow that is visible in (iii) FCC and (iv) NCC in figure 2.

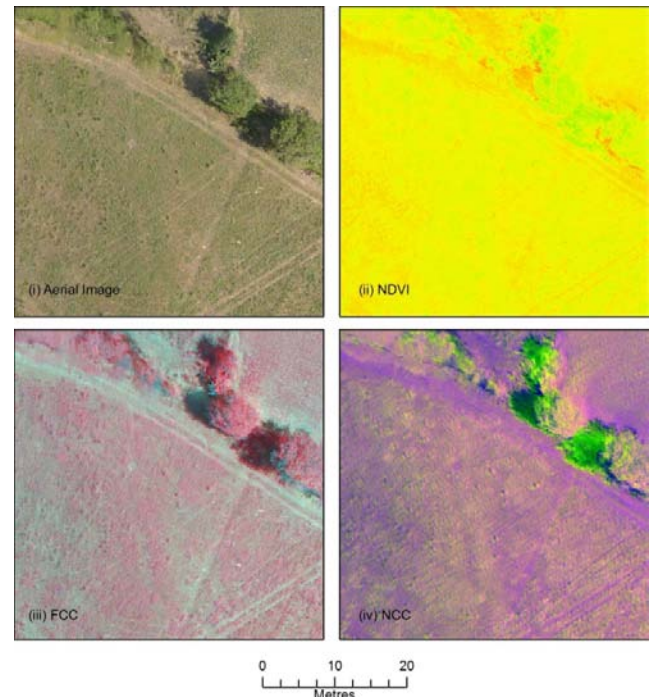


Figure 2. An illustration of derived datasets.

<sup>2</sup>All data in the field was processed using high spec HP Elitebook (8560W quadcore with 8mb Ram) and the following software: Agisoft Photoscan Pro, ArcGIS v10 and GPS pathfinder office v4.

The ridge and furrow shown in figure 2 was also identifiable in the ~30cm resolution DEM produced at the medium setting<sup>3</sup>.

In addition, the project has also shown that collecting NIR and aerial imagery on a single platform provides a wealth of data for subsequent analysis to aid in further identification and quantification of archaeological features. Cross sections, information on slope, aspect and hill-shading (modeling the shaded view with the sun set in a range of azimuths) can be generated from the DEMs. It will also be possible to analyze the added value of imagery collected at different times of the day at varying altitude in identifying archaeological features.

The following geo-statistics can be applied:

- Hillshading/micro relief: PCA - Principle component analysis can be applied to statistically identify features from the background noise of the terrain – techniques developed for use with Lidar (Lasponara *et. al.* 2012).
- Vegetation Indices/feature identification: Spatial Filtering, Hot-spot analysis – quantifying spatial clustering or random distribution of each pixel value in comparison with its neighbours and/or object based classifications (Sarris *et. al.* 2013).

The next step for the Mirkovo Project is to integrate the derived images in combination with other datasets collected in the field; landscape geophysics, field walking and soil geochemistry (portable x-ray fluorescence) for an integrated approach to site prospection. Micro-UAVs and the datasets that can be generated from their use highlights a technological step change in the prospection of archaeological sites which we are currently exploring using the datasets generated in this project.

### Acknowledgements

This joint project was made possible by funding awarded for High-Risk Anthropological and Archaeological Research by a collaborative program between the Field Museum and the American Research Center in Sofia, funded by the America for Bulgaria Foundation.

### References

Agisoft LLC. (2012). PhotoScan Professional. Available online:  
<http://www.agisoft.ru/products/photoscan/professional/>  
 (accessed on July 22, 2013)

<sup>3</sup> Reprocessing the data on an Ultra High setting improves aerial image resolution to ~1cm and DEM resolution to ~10cm.

Lasaponara, R., Masini, N., Holmgren, R., and Backe Forsberg, Y. (2012) Integration of aerial and satellite remote sensing for archaeological investigations: a case study of the Etruscan site of San Giovenale. *Journal of Geophysics and Engineering*, 9 (4) 26 – 39.

QuestUAV Ltd (2012) QuestUAV 300. Available online at <http://questuav.co.uk/quest300.php> (accessed on November 14, 2012)

Sarris, A., Papadopoulos, N. Agapiou, A, Salvi, M.C., Hadjimitsis, D.G., Parkinson, W. A., Yerkes, R.W., Gyucha, A. and Duffy, P. R. (2013) Integration of geophysical surveys, ground hyperspectral measurements, aerial and satellite imagery for archaeological prospection of prehistoric sites: the case study of Vésztő -Mágor Tell, Hungary. *Journal of Archaeological Science*, 40, 1545-1470.

Verhoeven, G. (2011) Taking ComputerVision Aloft Archaeological Three-dimensional Reconstructions from Aerial Photographs with PhotoScan. *Archaeological Prospection*, 18, 67–73.

## ARCHAEOLOGICAL CERAMICS

*Charles C. Kolb, Associate Editor*

This issue contains four topics: 1) Book Reviews on Ceramics; 2) Internet Resources; and 3) Forthcoming Professional Meetings.

An update on a promised review: The book, *Archaeological Ceramics in Thin Section: a Colour Guide*, by Patrick Sean Quinn and Peter Martin Day (New York: Springer, 2013), originally scheduled for publication in June 2012, has been delayed at least four times but apparently, according to the Springer Website, will be published “soon” only as an [eBook](http://www.springer.com/social+sciences/anthropology+%26+archaeology/book/978-3-642-15467-6). See <http://www.springer.com/social+sciences/anthropology+%26+archaeology/book/978-3-642-15467-6>

### Book Reviews

*Ancient Maya Pottery: Classification, Analysis, and Interpretation*, James John Aimers (ed.), Ancient Maya Pottery Series, Gainesville: University Press of Florida, 2013. 353 pp., illustrations, references, index; ISBN-10: 0813042364, ISBN-13: 978-0813042367, \$79.95 (hardcover). Aimers, Associate Professor of Anthropology at the State University of New York, Geneseo (Geneseo, New York, USA), specializes in ceramic and architectural analyses and focus on the

Maya. He is the author of *Cultural Change on a Temporal and Spatial Frontier* (British Archaeological Reports International Series S-1325, Oxford: Archaeopress, 2004) and more than a dozen other major publications [www.geneseo.edu/anthropology/aimers](http://www.geneseo.edu/anthropology/aimers). The ancient Maya produced a broad range of ceramics that has attracted concerted scholarly attention for over a century. His new volume is not your basic monograph or catalog of regional ceramics or a chronological presentation of ceramic types and wares. Maya archaeologists have emphasized the use of the type-variety system developed in 1960 and the type-variety-mode as standard operating procedures (see R. E. Smith, G. R. Willey, and J. C. Gifford "The Type-Variety Concept as a Basis for the Analysis of Maya Pottery," *American Antiquity* 25(3):330-340, 1960). Aimer's edited study brings together leading Maya ceramicists, many highly-regarded senior scholars (Rice, the Chases, Fry, Ball, and Urban and Schortman) and a number of their students who provide candid assessments on how they classify pottery. Hence, the volume is a significant contribution to the study of ancient Maya ceramics and provides new research results and state-of-the-art thinking. It serves as a valuable resource for archaeologists involved in pottery classification, analysis, and interpretation, and explores Mayan culture interactions.

The book has 13 chapters, 60 figures, 11 tables, one set of references (pp. 239-280) with 559 entries, and a valuable detailed 11-page index conflating proper nouns and topics. In the "Foreword" (pp. xi-xii) the Series Editors Diane and Arlen Chase comment that when they decided to start the Maya Studies series with the University Press of Florida, they had two specific goals in mind: 1) a volume that synthesized all of the results of the various archaeological projects that were then taking place in central Belize, and 2) how Maya ceramics are studied and interpreted. This volume is a contribution to that second goal. Aimers, in his "Preface" (pp. xiii-xv), points out that most of the contributions to this book derive from papers presented at two electronic symposia held at the Society for American Archaeology (SAA) meetings in 2005 and 2007. All of these dealt in one way or another with type: variety-mode method and theory. Electronic symposia require that the participants prepare their written papers in advance and these are posted on the SAA Website to be read by SAA members. The actual meetings involve the presenters giving brief summaries or highlights of their contributions, with the bulk of the symposia devoted to a discussion among the presenters and the audience. I had the opportunity to attend both symposia where differences of opinion were aired in a (mostly) congenial atmosphere. Aimers also defines type-variety, type-variety-mode, pottery and ceramics,

and paste and fabric. The editor provides the first written chapter, an "Introduction" (pp. 1-10), in which he notes that the ancient Maya produced a broad range of pottery, which has attracted concerted scholarly attention for nearly a century. He rightly contends that the authors of the chapters in his volume address a range of issues concerning the classification, interpretation, and analysis of ancient Maya pottery linked in one way or another to the type (type-variety and type-variety-mode). Aimers also provides salient summaries of these contributions, concluding that these chapters "raise a host of issues about type-variety-mode specifically and the study of Maya pottery more generally" (p. 10).

"2. Type-Variety: What Works and What Doesn't" by Prudence M. Rice (pp. 11-28, 2 tables): Rice comments that "the type-variety system has been used for pottery classification in the Maya area for nearly half a century, surviving - or "doomed to success" (Adams 2008) - despite recurrent attacks. The type-variety approach works well at what it was originally intended to do - structure descriptions of archaeological pottery for spatiotemporal comparisons..." (p. 11). She provides an overview of pottery classification, schematic classificatory principles (procedures and unit relations resulting in phenomenological groupings and ideational classification), the historical development of the type-variety system and its use in the Maya Lowlands, and provides a case study of Petén Postclassic ceramics from her own research. Rice correctly notes that Maya archaeologists place too heavy a reliance on slip characteristics rather than compositional analysis and she make a pitch for the continued use of the ware concept since there is a great variety of paste formulae used by ancient Maya Lowland potters. "3. Types and Traditions, Spheres and Systems: A Consideration of Analytic Constructs and Concepts in the Classification and Interpretation of Maya Ceramics" by Cassandra R. Bill (p. 29-45, 3 figures): Bill notes that types and spheres (integrative categories, horizons, and systems) have been some of the most, if not the most, common constructs employed in the analysis and interpretation of ceramic complexes from the Maya Lowlands. These, she states, have served well as a means for categorizing the contents of individual site assemblages. In addition, they allowed for the exploration and expression of degrees of similarities between assemblages from different sites. She discusses macro-traditions, different kinds of ceramic spheres, and sphere affiliations, and observes that Maya polities had distinctive histories. "4. Interpreting Form and Context: Ceramic Subcomplexes at Caracol, Nohmul, and Santa Rita Corozal, Belize" by Arlen F. and Diane Z. Chase (pp. 46-73, 8 figures, 1 table): The authors remind us that "the vast majority of artifactual materials

recovered at Maya sites are broken sherds recovered from the fills of stratigraphic excavations” (p. 46). Complete vessels are incorporated into ceramic analysis, but these are generally less plentiful than pottery sherds and, thus, are less likely to be the primary unit of ceramic analysis. They also comment on the expansion of analyses to incorporate alterations to the type-variety-mode system. The Chases focus on stratigraphy and ceramic analyses, and provide case studies from their work at Nohmul Structure 20, Santa Rita Corozal Structure 81, and Caracol Palaces and Structure A31. Mortuary practices and censer ware subcomplexes are discerned and they observe the need to integrate type-variety-mode and contextual analyses of the complete vessels whenever possible. This is an expansion of an SAA paper presented in 1999.

“5. Ceramic Resemblances, Trade, and Emulation: Changing Utilitarian Pottery Traditions in the Maya Lowlands” by Robert E. Fry (pp. 74-90, 7 figures, 1 table): Fry examines the role of exchange and emulation in assessing resemblances among regional ceramic assemblages, and reviews changing assumptions about the nature of ceramic production and distribution in light of recent research. He reviews ceramic production and exchange systems in the Maya Lowlands, and pottery styles seen in 4,437 rim and diagnostic sherds from 12 sites (part of the Uaymil Project). From ceramic attributes, he discerns coefficients of dissimilarity for each pair of sites. The Late Classic types resemble slipped bowls from Quintana Roo. Panregional trade, emulation, and multidimensional scaling are discussed.

“6. Type-Variety on Trial: Experiments in Classification and Meaning Using Ceramic Assemblages from Lamanai, Belize” coauthored by Aimers and Elizabeth Graham (pp. 91-106, 2 figures): Since 1972, excavations at this site have produced an exceptional collection of ceramics from the Terminal Classic and Postclassic periods (ca. AD 960-1450). The authors detail contextual analyses, style and interaction, “problems” with type-variety (that it is an entrenched system, the use of the ware concept, naming consistencies, and systems and spheres in the type-variety concept). They provide a case study of Zalal Gouge-incised pottery Buk phase unslipped vessels, and Ponzo unslipped ceramics. Petrographic analyses and iconographic studies are also discussed.

“7. Establishing the Cunil Ceramic Complex at Cahal Pech, Belize” by Lauren A. Sullivan and Jaime J. Awe (pp. 107-120, 8 figures, 1 table): The authors provide new data on a Late Formative component from Jenny Creek (300-600 BC), employing ware groups (Dull Ware and Coarse Ware) types and varieties of the Cunil Complex and respond to the criticisms of Ball and Taschek (2004).

“8. Technological Style and Terminal Preclassic Orange

Ceramics in the Holmul Region, Guatemala” contributed by Michael G. Callaghan, Francisco Estrada-Belli, and Nina Nieves de Estrada (pp. 121-141, 8 figures, 5 tables): Maya ceramic exchange and interaction using concepts of style (a thorny issue) and the application of multiple analytical methods to ceramic data sets is the focus of the volume and this paper. The team employs seven years of ceramic data in examining “Protoclassic” period in the Maya Lowlands and the Terminal Preclassic period at Homul. Orange gloss pottery composite bowls have 10 paste variants discerned through INAA, stereomicroscopic, and petrographic analyses. Calcite and ash variations were documented from INAA done at the MURR Laboratory; four INAA groups and five type-forms were found.

“9. Acanmul, Becán, and the Xocom Phenomenon through a Type-Variety Looking Glass: Resolving Historical Enigmas through Hands-On Typological Assessments” by Joseph Ball and Jennifer Taschek (pp. 142-162, 6 figures): Ball and Taschek examine the chronology and historical significance of the Late Classic Becán site ceramic assemblages, notably the Pa’xil Complex and Cehpech Ceramic Sphere. They reassess two assemblages from Becán (the Chintok and Xcocon assemblages), and provide comparative type-variety data on six wares.

“10. Looking for Times: How Type-Variety Analysis Helps Us “See” the Early Postclassic in Northwestern Honduras” written by Patricia A. Urban, Edward M. Schortman, and Marne T. Ausac (pp. 163-184, 5 figures, 1 table): The authors examine ceramic data from three regions, Classic through Postclassic periods and discuss terminology and temporality for rim and jar forms. Three million sherds were excavated from the site of Gualjoquito on the Rio Ulua in the Naco Valley, providing a case study for the assessment of paste wares, type and variety groups. Zones within the valley were discerned, and they detail paste wares, surface finishes, and decoration. They do not discuss the theory or practice of typology in general or of type-variety analysis in particular. Type-variety-modes, they conclude, does not take into account technological variables, especially in paste, and they mention the importance of petrographic and NAA analyses.

“11. Slips, Styles, and Trading Patterns: A Postclassic Perspective from Central Petén, Guatemala” by Leslie G. Cecil (pp. 185-202, 6 figures): Cecil, a student of Rice, examines the techniques that various sociopolitical groups of Postclassic Maya in central Petén used to slip their vessels reflecting differences in resources, manufacturing recipes, and decorative programs. She provides an assessment of the sociopolitical geography of the Central Petén Lake region and uses visual and chemical (LA-ICP-MS) analyses of slips and pastes. Snail inclusion in paste wares, slip

variants (n = 50), and some double slipping are reported, and Cecil discusses relationships with the Late Classic Maya pottery and two potential production loci of Postclassic pottery. “12. Mayapán’s Chen Mul Modeled Effigy Censers: Iconography and Archaeological Context’ contributed by Susan Milbrath and Carlos Peraza Lope (pp. 203-228, 7 figures): Full-figure effigy censers are best known from Mayapán, a major regional capital in the lowland Maya area during the Late Postclassic period. The southern boundaries of this polity are uncertain but may well have included Petén, where ceramics and architecture show some specific overlaps with Mayapán. The authors document the origins and chronology of modeled censers and archaeological contexts in temples and shrines. A maize god and skeletal god are notable types. They also review the distribution of censers and external contacts, iconography, and the relationships between different deities. The final chapter is by Aimers: “13. Problems and Prospects in Maya Ceramic Classification, Analysis, and Interpretation” prepared by Aimers (pp. 229-238). He points out that in various ways the authors of the chapters in his monograph examine the use of pottery in interpretations of the lives of ancient Maya people. Each chapter addresses issues of general method and theory related to type-variety and modal classification. He documents six criticisms of type-variety-mode, challenges and prospects of using multiple classification systems, the significant issue of consistency in classification, and assumptions underlying conclusions. Aimers concludes with the hope that this book will “stimulate a more lively conversation.” It will.

This is a very significant contribution to ceramic studies and especially pottery from sites from the Maya Lowlands. It is nearly 30 years since a similar compendium has been assembled and it might have been useful to assess where the study of Maya ceramics has advanced (or not) by comparing this millennium with the past effort. I speak of Prudence M. Rice and Robert J. Sharer’s edited 1987 monograph, *Maya Ceramics: Papers from the 1985 Maya Ceramic Conference*, 2 vols. (British Archaeological Reports International Series S-345, Oxford: British Archaeological Reports). The conference was held December 3-4, 1985, in Washington, DC, and sponsored by the National Endowment for the Humanities. The volume is long out of print but Dean Arnold’s summation is available on the Internet: “Maya Pottery after 20 Years: Archaeological Implications,” *Maya Ceramics*. pp. 545-561. [academia.edu/3589608/Maya\\_Pottery\\_after\\_20\\_years\\_Archaeological\\_Implications\\_In\\_Maya\\_Ceramics](http://academia.edu/3589608/Maya_Pottery_after_20_years_Archaeological_Implications_In_Maya_Ceramics). None of the contributors to Aimer’s *Ancient Maya Pottery: Classification, Analysis, and Interpretation* references the

Rice and Sharer benchmark. In addition, no references are made to two other important volumes on Lowland Maya ceramics, both of which demonstrate the importance of thin-section petrography: Lea D. Jones, *Lowland Maya Pottery: The Place of Petrological Analysis*, British Archaeological Reports International Series S-288, Oxford: British Archaeological Reports, 1986; and *Ancient Maya Ceramic Economy in the Belize River Valley Region: Petrographic Analyses* by Kay S. Sunahara, British Archaeological Reports International Series S-2018, Oxford: Archaeopress, 2009. The latter is based on Sunahara’s 2003 dissertation with the same title (McMaster University, Department of Anthropology, Hamilton, Ontario, Canada), and was reviewed in *SAS Bulletin* 33(2):8-9 (2010). Nonetheless, Aimers has established a new benchmark and it will be interesting to see if another SAA symposium (electronic or not) emerges.

***The Cyrus Cylinder: The King of Persia’s Proclamation from Ancient Babylon***, Irving Finkel (ed.), New York: I. B. Tauris & Co. Ltd in association with the Iran Heritage Foundation, 2013. xi + 144 pp., 56 illustrations, 81 references, index ( 5 pp.); ISBN 978-1-78076-063-6, \$35.00 (hardcover).

The volume edited by Assistant Keeper of Ancient Mesopotamian Script, Languages and Cultures at the British Museum, is different from another similar publication the *Cyrus Cylinder and Ancient Persia: A New Beginning for the Middle East*, John Curtis, London: British Museum Press, 2013, 144 pp., ISBN-10: 0714111872, ISBN-13: 978-0714111872, \$40.00 (hardcover). John Curtis (Keeper of the Middle East Collections at the British Museum) and Neil MacGregor (Director of the British Museum) are authors and Irving Finkel provides the current translation. Don’t confuse the authoritative non-fiction Finkel and Curtis volumes with *The Cyrus Cylinder* by Nicholas Hazel (Bloomington, IN: Xlibris Corporation, 2012), [a murder mystery](#).

Some context: The Cyrus Cylinder is a 2600-year old object of modern importance, and a symbol of multiculturalism, tolerance, diversity, and human rights. It is a clay cylinder, now broken into several fragments, on which is written a declaration in Babylonian/Akkadian cuneiform script in the name of the Achaemenid king Cyrus II (Cyrus the Great), 559-530 BCE. It dates from the 6<sup>th</sup> century BCE and was discovered in the ruins of Babylon in Mesopotamia (today modern Iraq) in 1879. Presently, it is in the possession of the British Museum, which sponsored the expedition that discovered the Cylinder. It was once believed that it was created and used as a “foundation deposit” following the Persian



conquest of Babylon in 539 BCE, when the Neo-Babylonian Empire was invaded by Cyrus II and incorporated into the Persian Empire. Recent scholarship concludes that it is a “proclamation” rather than a foundation deposit. The Cylinder’s text praises Cyrus, includes his genealogy and portrays him as a monarch from a long line of kings. The text also refers to the Babylonian king Nabonidus who had a low-born origin, was defeated and deposed by Cyrus, and denounced as an oppressor of his people. The victorious Cyrus is portrayed in the text as having been chosen by the chief Babylonian god Marduk to restore peace and order to Babylonia and indicates that Cyrus entered the city peacefully and was welcomed by the people of Babylon as their new ruler. The Cyrus Cylinder has been called “the first declaration of human rights” and the text has traditionally been viewed by Biblical scholars as corroborative evidence of Cyrus’ policy of the repatriation of the Jewish people following their Babylonian captivity.

The focus of my review is on Irving Finkel’s edited book and on the Cylinder as a ceramic artifact rather than its discovery, or display. It has been initially described as a barrel-shaped “unburnt” clay cylinder, about 23 cm long and 10 cm wide and roughly shaped like an American football or English rugby football, broken into many pieces (some of which have not been recovered) and reconstructed on three occasions. The volume’s contributors consider the remarkable history of the Cylinder and discuss the object, its context, the latest research, and a new, complete translation by Finkel. It has an “Introduction,” five detailed chapters, an “Afterword,” and an “Appendix” with the new translation, and serves as a catalog for the exhibition of this iconic clay artifact. This is the first ever tour of the object to the United States, along with sixteen other objects from the British Museum’s collection. The British Museum, in partnership with IHF America, the Farhang Foundation (for the Los Angeles venue), and an indemnity from the United States Federal Council on the Arts and the Humanities, has enabled a tour so that the Cylinder can visit the US for the first time in 2013 through a national tour with exhibitions in five major museums across the country. The Cylinder was on display at the Smithsonian’s Arthur M. Sackler Gallery and Freer Gallery of Art, Washington, DC (March 9-April 28, 2013) and viewed by 155,000 persons. The other venues are: Museum of Fine Arts, Houston, TX (May 3-June 14); Metropolitan Museum of Art, New York, NY (June 20-August 4); Asian Art Museum, San Francisco, CA (August-September 22); and, lastly, the J. Paul Getty Museum at the Getty Villa, Los Angeles, CA (October 2-December 2, 2013).

Irving Finkel, “Introduction” (pp. 1-3) and “The Cyrus Cylinder: The Babylonian Perspective” (pp. 4-34, 11 figures, 2 tables), points out that the object was embedded in a wall in Babylon and “neither the cylinder nor its inscription was meant for human eyes” (p.11), as it was to be read only by gods or later monarchs who might rebuild the structure in which it was housed. Finkel reviews the original discovery in 1879, joining it with a fragment from the Yale Babylonian Collection in 1971, and with two pieces from the British Museum’s collections in 2009 (the beginning and end pieces of the inscription). There are still missing fragments. He provides general information on the structure of the Cylinder (an initial core with wrapped outer layers of clay) and successfully dismisses forged Chinese “bone texts.” Lastly Finkel includes a list of authors and 15 scientific papers, plus one public lecture, by international experts who took part in a two-day workshop, 23-24 June 2010 at the British Museum. Jonathan Taylor, “The Cyrus Cylinder: Discovery” (pp. 35-68, 10 figures, 2 tables, 21 endnotes) begins with Sir Henry Rawlinson’s paper given on November 17, 1879 at the meeting of the Royal Asiatic Society, announcing the Cylinder’s discovery (published in the following year). Using archival documents and correspondence, Taylor considers the context of the find, determining that it was recovered between March 17 and 23, 1879 by workers under the direction of Hormuzd Rassam. The Cylinder was included in the second of three shipments of artifacts to the British Museum and arrived broken. Taylor investigates the location of the Cylinder and how and when it was broken, since it was intact when first recovered. He also reviews information on other Babylonian cylinders, their method of manufacture and the production of the Cyrus Cylinder (pp. 66-67). Cylinders were made in various sizes (7-30 cm in length) of “good quality” clay tempered with vegetable matter, often formed on a wheel but also hand-rolled, and were designed to sit on one end, with texts written top to bottom. The “medium-sized” 23 cm-long Cyrus Cylinder is slightly different, made of clay tempered with pebbles (1-5 mm in size possibly in the original clay rather than added as temper) and the text written in a single column. It was kiln-fired with an uneven firing in antiquity. St. John Simpson, “The Cyrus Cylinder Display and Replica” (pp. 69-84, 17 figures, 10 endnotes) documents that the Cyrus Cylinder has been more or less on display since 1879. It was reinstalled in a new exhibition in 1931 but dismantled during the World War II era (1936-1952) - an interesting set of dates - then reinstalled. In 1961 it was re-fired as part of a conservation treatment of clay cylinders and tablets and molds were made in 1962; secondary casts were made and replicas given to several governments and even sold commercially. The Cylinder was loaned to Tehran briefly

in 1971. Apparently, no other scientific analyses were undertaken or reported at the 2010 conference or in this book.

John Curtis, "The Cyrus Cylinder: The Creation of an Icon and its Loan to Tehran" (pp. 85-103, 15 figures, 4 endnotes) reports on depictions of the Cylinder on medals and postal stationery and stamps, and its loan to the National Museum of Iran, September 2010 to January 2011. Shahrokh Razmjou, "The Cyrus Cylinder: A Persian Perspective" (pp. 104-125, 3 figures, 18 endnotes) traces the history of Babylon before the arrival of Cyrus, the rule of Nabonidus, Cyrus's arrival in Persia and his title of King of Anshan, the capture of Babylon, the significance of Pasargadae and Cyrus's tomb, the conquest of Lydia, and the fall of Babylon. He also reviews the contemporary sources of information, the importance of the Cylinder and its relation to other inscriptions. Finkel provides the "Afterword" (pp. 127-128) and "Appendix: Transliteration of the Cyrus Cylinder Text" (pp. 129-135), documenting sources the transliteration, and notes on the inscription.

***Functional Aspects of Egyptian Ceramics in their Archaeological Context: Proceedings of a Conference held at the McDonald Institute for Archaeological Research, Cambridge, July 24<sup>th</sup>-July 25<sup>th</sup>, 2009*** Bettina Bader and Mary F. Ownby (eds.), *Orientalia Lovaniensia Analecta* 217, Leuven, Belgium: Peeters Publishers and Department of Oriental Studies, 2013. xii + 430 pp., figures, plates, tables/charts, bibliographies; ISBN 978-90-429-2581-6, \$122.00/€90.00 (clothbound).

Bader, a Ceramologist at the Institute of Archaeology, University of Vienna, Vienna, Austria, is a native Austrian interested in ancient Egyptian ceramics of the First Intermediate Period, through New Kingdom (c.1540–1069 BC) and uses statistical applications on archaeological material, particularly ceramics, and is interested in ceramic typologies, fabric distinctions, and chronological implications. She holds an M.A. in Egyptology from the University of Vienna, where her thesis was *Die Mergeltonkeramik (Vienna System: C) im Mittleren Reich und der Zweiten Zwischenzeit* (1997) Her research on material culture at Tell el-Daba and Kom Rabia formed the basis for her doctorate in Egyptology, with the thesis titled *Tell el-Daba/Auaris und Kom Rabia/Memphis in der Zweiten Zwischenzeit* (2004) also from the University of Vienna. She has worked in Egypt for nearly two decades and written two books published by the Austrian Academy of Sciences (2001, 2009). She served as coeditor of *Under The Potter's Tree. Studies On Ancient Egypt Presented To Janine Bourriau On The Occasion Of Her 70th Birthday* with David Aston, Carla

Gallorini, Paul Nicholson, and Sarah Buckingham (*Orientalia Lovaniensia Analecta* 204, Leuven: Uitgeverij Peeters en Departement Oosterse Studies, 2011) (reviewed in *SAS Bulletin* 35(3):7-9 (2012)). Mary Ownby has been Research Petrographer at Desert Archaeology, Inc., Tucson, Arizona, USA, since 2010 and is Instructor and Research Associate in Anthropology, University of Arizona. Her M.Sc. thesis at the Institute of Archaeology, University College London, was *Non-Destructive X-Ray Fluorescence Spectrometry of Marl C Sherds from Kahun, Egypt* (2006) and her doctorate is from Wolfson College, University of Cambridge, where her dissertation was *Canaanite Jars from Memphis as Evidence for Trade and Political Relationships in the Middle Bronze Age* (2010). Ownby specializes in archaeological chemistry and petrography, ancient ceramic technology, ceramic exchange and social systems in Egypt and the ancient Near East.

The book under review was published in March 2013 and includes the papers given at an international conference on "Functional Aspects of Egyptian Ceramics within their Archaeological Context," which was held 24-25 July 2009 at the McDonald Institute for Archaeological Research, University of Cambridge, UK. Other papers were added subsequently for a total of 17 authored by an array of international scholars. The goal of this conference was to consider Egyptian pottery in different archaeological contexts and the importance of ceramics for understanding these deposits. In addition, some archaeological contexts were utilized to gain insights into the function of pottery, in order to integrate both approaches. The contributions cover domestic, funerary, festival, and ritual contexts and the ceramic finds within them. Additional topics include the widely neglected reuse of pottery and how ceramic material can be interpreted in its wider socio-economic context. The case studies consider pottery derived from many sites in Egypt from the Delta in the north to Elephantine in the south, and cover a chronological range from the Old Kingdom to the Coptic period. This broad approach ensures that the focus was on the role of Egyptian pottery within past societies as seen through various types of archaeological contexts. Each contribution has its own set of footnotes, references, and illustrations (the latter are sometimes incorporated into the narratives and, in other cases, clustered at the end of the article). Structurally, there is the usual set of introductory materials, and the subsequent 17 chapters are grouped within five topical "Chapters" with three contributions in all but the first which has five presentations. There is no overall concluding chapter and (alas) no index.

The volume begins with a “List of Participants” (pp. ix-x) which includes academic affiliations and email addresses. The “Preface” by Ownby and Bader (pp. xi-xii) provides background to the conferences, and acknowledges support. An “Introduction” by Bader (pp. 1-27, 8 figures, 2 plates, 66 footnotes, and 75 bibliographic references) includes a schematic diagram of the relationship of sources (archaeological, ethnographic, pictorial, textual, technical analyses, and ceramic material [complete vessels and sherds]) and subdivides these. The discussion of ceramic vessels sometimes considers shapes, traces of use, fabric, and mechanical performance characteristics; pictorial evidence focuses on offering scenes, ritual scenes, and scenes of daily life (two- and three-dimensional art [wooden models]); archaeological context; reuse of pottery; textual evidence, ethnographic comparisons, and experimental archaeology.

There is very little mentioned about technical studies leading to the determination of clay types, but let us remember that the volume focuses on the functions of ceramics. Physicochemical, archaeobotanical, organic chemical, abrasion, and other studies would augment and strengthen a number of the inferences made in these contributions.

“Chapter 1: Domestic Environment” (five papers, pp. 31-137): “The Function of the Traditional Offering, the So-called Beer Jar, in the Old Kingdom According to Pictorial and Written Sources” by Ashraf El-Senussi (pp. 31-52, 26 figures, 79 footnotes, 49 references) focuses on offerings often termed “beer jars” but include vessels used for other purposes. Scenes inscribed and painted on walls and hieroglyphic texts are employed to discern functions. These uses include agricultural (transporting irrigation water), food production (water for bread dough), as containers for water used as a lubricant for moving stone statuary on skids, and as offering vessels situated with the deceased in tombs. A need for chemical analysis of the vessels’ contents is needed (p. 33). “About Bread Moulds and Bread Trays: Evidence for an Old Kingdom Bakery at al-Shaykh Sa’id” by Stephanie Vereecken (pp. 53-77). 8 figures, 2 plates, 34 footnotes, 20 references) concentrates on a large “food facility,” interpreted as a state-controlled bakery and part of a larger “food facility.” The majority of the pottery is in the form of bread molds, dough vats, and bread trays; calcite temper is mentioned. White carinated bowls and jar seals are represented and she infers the presence of an elite group at the site as well as a larger number of workmen, noting that different types of bread were produced depending on status. “Dinner is Served: Remarks on Middle Kingdom Cooking Pots from Elephantine” prepared by Teodozja I. Rzeuska (pp. 73-

97, 6 figures, 5 plates, 1 table, 26 footnotes, 27 references) centers on a functional analysis of pottery from the settlement and technical analyses of the cooking vessels. Six fabrics are discerned, manufacturing techniques and surface finishes, and contexts are delineated. Vessels and fabrics are related to cooking methods on the basis of soot studies, and there is evidence of Nubian influence. Inferences are made about thermal shock and fabrics but no technical studies are reported. “Function and Reuse of Pottery within a Middle Kingdom Baking Area in Syene/Aswan” by Irene Forstner Müller and Wolfgang Müller (pp. 99-117, 9 figures, 52 footnotes, 25 references) draws attention to housing at the site and the determination of 13 clay fabrics (Nile C2 silt fabric predominates). The pottery includes cups, dishes, jars, baking trays, bread molds, and cooking pots, as well as tall and ring ceramic stands to support vessels. “Baking Bread in Roman Egypt” contributed by Roberta Tomber (pp. 119-137, 3 figures, 73 footnotes, 35 references) emphasizes that bread making in Pharonic Egypt is well-known in terms of bread molds, platters, and plates. The lesser-known Roman period Eastern Desert sites (late 3<sup>rd</sup> century AD) have kitchens with bread ovens, and archaeobotanical evidence documents the use of barley and hard wheat (*Triticum durum*) and Tomber discusses the use of two specialized pottery forms, bread molds and baking trays or platters, but there are questions about their exact functions. Her research enhances *Eastern Desert Ware: Traces of the Inhabitants of the Eastern Deserts in Egypt and Sudan during the 4th-6th Centuries CE* by Hans Bernard (British Archaeological Reports International Series S-1824, Oxford: Archaeopress, 2009) (reviewed in *SAS Bulletin* 35(1):8-10, 2012).

“Chapter 2: Festival and Cult” (three contributions, pp. 141-213): “Domestic and Cultic Vessels from the Priests’ Quarter in Karnak: The Fine Line between the Profane and the Sacred” prepared by Aurélia Masson (pp. 141-164, 10 figures, 4 plates, 50 footnotes, 42 references) concentrates on Karnak as a site with a lengthy occupation during the 1<sup>st</sup> millennium BC. The author attempts to reconstruct the daily lives of the inhabitants, noting the use of plain and decorated bread molds, decorated vases, and Bes jars which suggest the presence of a cult. There is an abundance of incense burners but the most common ceramic artifacts are cups. A multiplicity of vessel functions and reuses are considered. “Domestic and Votive Pottery from Giza: A View from Heit el-Ghurab Settlement and Khentkawes Town” prepared by Anna Wodzinska (pp. 165-184, 11 figures, 27 footnotes, 21 references) focuses on the contemporaneity of two Giza plateau sites (both dated to late 4<sup>th</sup> Dynasty). Heit el-Ghurab ceramics are mainly

bread molds and trays, large storage jars, and beer jars, while the Khentkawes assemblage (based on three new excavations with 36 pottery-bearing features) has flat and conical bread molds, large serving plates, beer jars, and miniature vessels. She compares the assemblages and concludes that Heit el-Ghurab represents a workmen's quarter versus a settlement of higher officials at Khentkawes. Wodzinska is the author of *A Manual of Egyptian Pottery*, 4 vols.: *Vol. 1: Fayum A-Lower Egyptian Culture*, *Vol. 2: Naqada III-Middle Kingdom*, *Vol.3: Second Intermediate through Late Period*, *Vol.4: Ptolemaic through Modern Period* (AER Field Manual Series 1-4, Boston: Ancient Egyptian Research Associates, Inc., 2009-2010) (reviewed in *SAS Bulletin* 33(3):12-13, 2010). "Festival Pottery from New Kingdom Egypt: Three Case Studies" prepared by Julia Budka (pp.185-213, 5 figures, 116 footnotes, 96 references) centers on the function of blue painted pottery which is found in a variety of contexts and used by members of diverse social strata. She presents three case studies from the sites of Elephantine, South Abydos, and Umm el-Qaab, providing an outline of site characteristics and material remains. Overlapping characteristics of the ceramics and other material culture are documented. The site of Amarna appears to be an exceptional case in terms of the presence of blue painted ceramics.

"Chapter 3: Afterlife and Funerary Rituals" (three papers, pp. 217-290): "A Pottery Assemblage from the Tomb of Harwa (Western Thebes): Mortuary and Cultic Reuse of a 25<sup>th</sup> Dynasty Funerary Structure" written by Sabine Laemmel (pp. 217-247, 46 figures, 2 charts, 82 footnotes, 53 references) concerns the functional assessment of the ceramic funerary assemblage, with the tomb as a case study. Four Nile silt and five Marl fabrics are documented in the production of dishes, bowls, jars, amphora, goblets, stands, and cooking pots. She differentiates: 1) funerary ceramics from 2) pottery associated with funerary cults and 3) with mummification activities. Ptolemaic, Roman, and Coptic materials were also recovered. "Red Vases at Dra Abu el-Naga. Two Funerary Deposits" by María J. López Grande (pp. 249-272, 6 figures, 4 plates, 54 footnotes, 36 references) examines Deposit A (slender bottles and tapered jars) and B (slender bottles, tapered jars or beakers, decorated jars, flat-based and carinated dishes, and bowls. The ritual killing of some vessels is documented. "Functional Aspects of Funerary Pottery: A Dialogue between Representation and Archaeological Evidence" authored by Susan J. Allen (pp. 273-290, 7 figures, 27 footnotes, 31 references) spotlights differences between Old and Middle Kingdom royal and elite burial ceramics by using evidence from representations, texts, and assemblage contexts. Beer jars are common in the Old Kingdom.

"Chapter 4: Reuse" (three papers, pp. 293-349): "The Secondary Function of Pottery - a Case Study from Qantir-Piramesse" contributed by Henning Franzmeier (pp. 293-349, 4 figures, 2 tables, 21 footnotes, 14 references) provides a case study of the ceramic assemblage from an 8-meter-deep Ramesside well that had seven primary stratigraphic layers. About 40,000 sherds were recovered representing 14 shapes (mostly jars - Egyptian and Canaanite - dishes, bowls, amphorae, and some blue painted pottery). There are 22 fabrics Nile silt, Marl clays, and mixed clays as well as Levantine imports. The author compares the well and its content with a modern local well and infers that the use of sherds in the bottom of the well served to keep the well water clear or silt. "The Afterlife of Sherds: Architectural Re-use Strategies at the Monastery of John the Little, Wadi Natrun" prepared by Gillian Pyke and Darlene Brooks Hedstrom (pp. 307-325, 1 figure, 9 plates, 52 footnotes, 39 references) focuses on a 6<sup>th</sup> to 15<sup>th</sup> century monastery, beginning with a discussion of the floor plan and the use of sherds in the original architectural. Transport jar vessel necks were employed in the "sherd-augmented" ventilation and lighting systems, large sherds inserted into mud brick walls served as storage shelves, and jar necks served as chimney flues for the kitchen ovens. Sherds were used in the oven construction and imbedded in mud as flooring surfaces. Rim shoulders were set into floors but the use is unclear. "La 'jarre aux papyrus' d'Edfou et autres jarres de stockage d'époque arabe découvertes à Tebtynis, Fayoum (deuxième moitié du VIIe – Xe siècle apr. J.-C.)," written by Sylvie Marchand (pp. 327-349, 6 figures, 6 figures, 3 plates, 19 footnotes, 29 references), draws attention to five types of wheel-made storage jar forms. She provides details on contexts, chronologies, fabrication, decorations (painting or appliqué), and compares and contrasts these jar forms.

"Chapter 5: Engagement with Pottery" (three chapters, pp. 353-411): "Conversations between Objects: Ambience and the Egyptian Ceramic World at Beth Shan" by Linda Hulin (pp. 353-3 figures, 35 footnotes, 72 references) provides an illuminating view involving cognitive anthropology and sensory habitus or ambience. Disparate objects are often combined to create a consistent sensory experience. Examples from older and modern material culture are employed as ethnographic parallels prior to a case study of the Egyptian garrison housed at Beth Shan. The range and types of table wares, perfume, jewelry, and cosmetics are documented - notably the bulk of the material culture is Canaanite. "Mother's Best Tea Service - Pottery as Diplomatic Gifts in the Second Intermediate Period" authored by David A. Aston (pp. 375-401, 4 figures, 52 footnotes, 71 references) notes that giving and receiving diplomatic

gifts likely included pottery. Gifts of pottery from the Levant included 26 bowls, dishes, and jugs; two vessels came from the Late 13<sup>th</sup> Dynasty court; and there is some pottery from Nubia and Cyprus. It would be useful to know if these vessels contained something of value, such as precious metals, gems, spices, foodstuffs, etc. "Wells and Kilns: Local Ceramic Production and Use at Tell Basta in Roman Times" contributed by Mandy Mamedow (pp. 403-421, 5 figures, 1 plate, 37 footnotes, 27 references) documents the excavation of a well and a kiln at this site in the Eastern Nile Delta which produced Late Roman and Coptic materials. The well's contents included sherds from cooking pots, amphora, and strainers. The 1<sup>st</sup> century AD kiln is similar in form to Roman kilns excavated in France and Germany, but the Tell Basta kiln contents revealed a firing of a mixed set of vessels: beer jars, beakers, bowls, and water pots (saqiya). Firing experiments are mentioned (p. 417).

This volume provides archaeological and ceramic insights that are especially significant to Egyptian archaeology but includes information and interpretations that are useful beyond ancient Egypt. A number of these contributions augment Paul T. Nicholson and Ian Shaw's edited *Ancient Egyptian Materials and Technology* (Cambridge, New York, and Melbourne: Cambridge University Press, 2000), a meticulous, and comprehensive compendium that documents Northeast African procurement and processing of materials and food technologies for the period 5500-332 BCE. It has seven chapters on inorganic materials (stone, soil, painting materials, pottery, metals, Egyptian faience, and glass), 12 on organic materials (papyrus, basketry, textiles, leather, skin products, ivory and related materials, ostrich eggshell, wood, mummification, oil/fat/wax, resins, amber, bitumen, adhesives/binders, and hair), plus five chapters on food technology (cereal production and processing, brewing and baking, viticulture and winemaking, fruits, vegetables, pulses, condiments, and meat processing). Some authors have referenced this compendium.

### Internet Resources

***Ecomiki Artefact Catalog:*** The Late Bronze Age site of Enkomi, Cyprus, is located in the now occupied part of Cyprus and the objects excavated by the British (1894-1896) from 100 tombs are dispersed in different museums of the world. A report on the excavation was published in 1900. Two thirds of the objects were transferred to the British Museum as per the terms of the Antiquities Law at the time which allowed the excavator, the owner of the land and the Government a share of one third each of the total number of objects found. The excavators usually bought the land and were, therefore, granted two thirds of

the finds. The Cyprus Museum share was kept in the old premises at Victoria Street and transferred to the new Cyprus Museum, around 1909, and was given new accessory numbers. The idea for digitizing the catalogs, objects, and other materials is similar to a project undertaken by the Greek and Roman Department of the British Museum. This collaborative effort between the Department of Antiquities, the Open University of Cyprus, and the British Museum was proposed in 2008, funding secured, and the digitization undertaken over a 24-month period, 2009-2010. Dr. Despo Pilides, Curator of Antiquities, Department of Antiquities, Cyprus, has announced the availability of the database and catalog: [www.enkomicm.org/digitisation-artefacts-enkomi-tombs](http://www.enkomicm.org/digitisation-artefacts-enkomi-tombs). The Cyprus Museum collection consists of 440 objects, of which 235 are ceramic vessels, 132 pieces are gold objects, 41 are stone objects, and 32 are objects of various materials (faience, ivory, bone, alabaster, etc.). The descriptive catalog records and color images of the objects are linked. The ceramics may be accessed at <http://www.enkomicm.org/ceramics>

***A Visual Glossary of Greek Pottery*** by Mark Cartright became available in May 2013. Color images and definitions of 51 vessels and other ceramics are included. <http://www.ancient.eu.com/article/489/>

***Corpus Vasorum Antiquorum Online.*** Beazley Archive, University of Oxford, Saint John's College, Oxford, 2004 ff. 300+ fascicules of Greek and related wares have been published by more than 120 collections in 26 countries. CVA by museum and by country: <http://www.beazley.ox.ac.uk/cva/city.htm>  
<http://www.beazley.ox.ac.uk/cva/Countrylist.htm>

***BIAA: British Institute at Ankara (Turkey): Pottery and Collections Database.*** The Institute houses a collection of pottery assembled between the 1940s and the 1970s. The majority is fragmentary pottery (and occasional stone items) from surface surveys, such as the Central Anatolian Survey, but there is also sample material from some important excavations carried out in Turkey under the auspices of the British Institute such as Mersin, Hacilar, Beycesultan and Çatal Höyük; and some obsidian from Ashikli Höyük. There are over 1000 boxes of material organized into 3 broad categories: survey, excavation and published material; as well as a 'study' and 'slide' collection. All periods are represented, from the Neolithic to the Ottoman and although not all types of pottery from Anatolia may be represented, examples of the vast majority of types can be found. The database has search and browse capabilities. Site Names and ID Number, Region (n = 1991. Total number of pages: 100). Each site has a Google map (zoom in and out

capabilities), lists of assemblages, occupation periods (if known), and images of the pottery. There are lists of nearby sites, additional site information, and book titles in the library. The database also has pottery assemblages (n = 4808. Total number of pages: 241) with assemblage origins (survey, excavation, etc.; storage location information; and inventory counts). Visit <http://www.biaatr.org/collections/index.php>

### Forthcoming Meetings

#### *American Anthropological Association Annual Meeting.*

Two sessions focus on ceramics. *Ceramics, Technology, & People* : “Ceramic Innovation and Interregional Interaction: A Study from Formative Cahal Pech, Belize” by Isabelle M. Martinez-Muniz (University of Kentucky); “Underwater Excavations Reveal Ancient Maya Classic Period Salt Works, Paynes Creek National Park, Belize” by Elizabeth C. Sills (Louisiana State University) and Heather McKillop (Louisiana State University); “Monagrillo, the Earliest Panamanian Vessels (~4500-3200 BP): Researching and Inferring Producers' Intended Functions” by Fumie Iizuka (University of Arizona); “Early Pottery Use and Exchange at Torihama, Japan” by Kevin Gibbs (University of Aberdeen); and “Mixed-Style Pottery in Western Sicily: A Material Response to Social Entanglement” William Balco, Jr. (University of Wisconsin-Milwaukee).

#### *Ceramic Ecology XXVII: Honoring Charles C. Kolb*

“Ceramic Ecology XXVII: Honoring Charles C. Kolb” organized and chaired by Kostalena Michelaki (Arizona State University) and Sandra L Lopez Varela (Universidad Autónoma del Estado de Morelos) will be held at the American Anthropological Association’s 112<sup>th</sup> Annual Meeting in Chicago, IL, USA, 20-24 November. The names and affiliations of the 17 presenters of 12 papers and their abstracts follow the Session Abstract: Ceramic Ecology is an international and interdisciplinary symposium, reflecting the range of scholarly work currently undertaken on the examination and analysis of ceramics. The 27<sup>th</sup> in the annual series celebrates the work of Charles C. Kolb, whose vision and intellectual leadership has brought together scholars from all over the world to discuss multiple theoretical and methodological approaches through twenty-five years of “Ceramic Ecology,” a symposium series initiated at the 1986 AAA meeting at the suggestion of Frederick R. Matson. The papers in this session honor Charlie’s commitment to relate environmental parameters, raw materials, technological choices and abilities, and sociocultural variables to the manufacture, distribution, and use of pottery, supported by physicochemical and ecological approaches. Interpretation of these data and explanations

of the ceramic materials utilize methods and paradigms derived from the natural and social sciences, humanities, and the arts to approach fundamental anthropological questions, such as the socio-economic context of production, the effects of economic development, social systems of learning, communities of practice, or the formation of identity. Moreover, the close, serious, and equal consideration of raw material properties, landscapes and people, advocated by Charlie, is finally getting the attention of archaeologists who consider the relation between humans, things and non-human organisms as symmetrical, see things for what they are and can do, rather than only for what they symbolize, and refuse to separate things, from their properties and from their meanings.

“Charles C. Kolb and the Sociology of Knowledge: A Personal View,” Dean E Arnold (The Field Museum). Paper Abstract: In any academic discipline, the sociology of knowledge involving the creation and sustenance of networks is often as important as the knowledge itself for the introduction and dissemination of information about ceramic research. This paper reviews the intellectual contributions of Charles C. Kolb to ceramic studies and his role in the creating and sustaining the knowledge of ceramic studies through his work in writing, reviewing and fostering a climate of interaction during the last 45 years. It will review his role in creating and organizing the ceramic ecology sessions at the American Anthropological Meetings since 1986, and its significance in fostering networks of communication in ceramic studies, and introducing new scholars into those networks.

“Cross-Cultural Ceramic Ecology: Albania and Yucatán in the Keck Lab at Millsaps College” Michael L. Galaty (Millsaps College), George Bey (Millsaps College) and Timothy J. Ward (Millsaps College). Paper Abstract: We are honored to present this paper to our friend and colleague, Charlie Kolb. In his own work, Charlie frequently employs his impressive global knowledge of pottery studies to draw wide cross-cultural comparisons of ceramic-ecological systems in different regions at different times. The W. M. Keck Center for Instrumental and Biochemical Comparative Archaeology at Millsaps College is committed to a similar goal: to study production and distribution of pottery in Albania and Yucatán, and compare the disparate paths to complexity taken in both regions. To date, we have used ICP-MS to analyze 604 sherds and clay samples from various periods in Albania and 204 sherds from the Middle and Late Preclassic periods in Yucatán. Our results indicate very different ceramic systems in both regions, and likewise very different systems of political economy. In Albania,

pottery was rarely exchanged prior to historic periods, prehistoric peer polities remained at the “chiefdom” level of political-economic organization, and indigenous states did not form. In Yucatán, trade in pottery contributed to interconnection of peer polities and, eventually, state formation. The work in the Keck Lab affirms, as Charlie has always known, that a comparative approach, such as that encouraged from the start by ceramic ecology, provides an extremely useful and enlightening, if necessarily broad, view of human behavior.

“Long-Term Ceramic Taskscapes: Examining Materials, Tasks and Skill in Prehistoric Calabria, Italy” Kostalena Michelaki (Arizona State University). Paper Abstract: This presentation uses data from the petrographic and instrumental neutron activation analysis of archaeological ceramics and geological clays from the Comune di Bova Marina in southwestern Calabria, Italy, to explore how the local potters oriented themselves in their landscape from the Early Neolithic to the Late Bronze Age. Ethnoarchaeological research has shown that small scale producers often do not prospect for clays, but instead happen upon them while performing other daily tasks that make them focus on soil (e.g. digging in their gardens). By exploring the distribution and properties of local clays systematically and comparing them to the choices ancient potters made, we gain a glimpse into what those ancient taskscapes were, moving beyond a typical and homogenizing characterization of production as simply ‘local’. “Geological and Behavioral Choice in Tarascan Ceramic Pastes” Amy J Hirshman (West Virginia University). Paper Abstract: The ceramic typology for the late Prehispanic Tarascan state, and for the Lake Pátzcuaro Basin, Michoacán, Mexico, more generally, emphasizes paste variability. This conclusion is reinforced by archaeological and chemical compositional studies of the ceramic from the Basin, and points towards dispersed household production both before and after state formation. In the tradition of ceramic ecology, this petrographic study builds on previous paste variability and tempers studies and assesses the relative contributions of geology, potter choices, and production organization in the production of diverse Tarascan ceramic pastes.

“Investigating the Production and Circulation of Pottery Vessels in Peripheral Tikal during the Classic Period” Kirk Damon Straight (Pennsylvania State University). Paper Abstract: This paper presents a distributional study of Classic period (ca. AD 300-850) serving vessel sherds recovered from 60 test-pits excavated at residential sites in peripheral Tikal, Guatemala (Maya Lowlands). A representative sample of 164 pottery sherds was sampled for Instrumental Neutron Activation Analysis (INAA) to

formulate compositional reference groups reflecting different ceramic production traditions. Patterns of consumption are discussed, with emphasis on the range of circulation of related types, form classes, and compositionally similar pottery. Sherd collections from settlement within a 250 m corridor running the 13.6 km length of the northern earthwork are compared to collections from the secondary center of Ramonal in terms of differential consumption patterns. Proportional differences between the northern and southeastern peripheries of Tikal in consumption rates of pottery from different compositional reference groups suggest overlapping exchange ranges likely indicative of peripheral marketplace exchange. I conclude that production was fairly redundant with numerous production units manufacturing very similar pottery, indistinguishable at the type level alone. I suggest that unrestricted access to suitable raw materials for pottery production over an ecologically similar landscape encouraged the development of peripheral production for exchange. Furthermore, this study supports the position that compositional analysis combined with type-variety analysis has the potential for isolating the products of different production units at the intraregional level, in spite of the rather homogenous raw material base.

“The Conundrum of Volcanic Ash Temper in Ancient Maya Ceramics” Anabel Ford (University of California Santa Barbara). Paper Abstract: Materials science of ceramics is the bailiwick of Charles Kolb, who we honor here. Our work with volcanic ash tempered pottery in the Maya area is well known to him. He would assume, as we did, that physicochemical analyses would uncover the origins of Maya ceramic composition. In our case physicochemical analyses have opened up more questions that it has resolved. Each deeper and more resolute and detailed study of the volcanic ash temper has, like a matryoshka doll, revealed a more complex and problematic picture. Petrography, microprobe, and now zircon analyses present a conundrum. We will discuss our research process and our results in an effort to enjoin ideas from our colleagues. “Pottery, People, and pXRF: Toward the Development of Intraregional Provenance Assays for Southeast Mesoamerican Ceramics” David Rafael McCormick (University of South Florida) and E. Christian Wells (University of South Florida). Paper Abstract: Portable X-ray Fluorescence (pXRF) is increasingly used to answer a wide range of questions regarding the composition and properties of archaeological materials. However, few studies have emerged that explore the provenance of ceramics, probably because of the compositional complexity of pottery's constituent raw materials. This paper describes our research on the ways and extent to which pXRF can

be used to assay the chemical composition of earthen materials (including ceramics, clays, plasters, and daubs), with the greater goal of reconstructing the provenance of pottery on a regional scale. With its ability to collect compositional data rapidly from highly specific locations on individual artifacts and its non-destructive capacity, pXRF offers the potential to aid in understanding small-scale social and economic dynamics through studies of ceramic chemistry. In this study, we used a Bruker Tracer III-V handheld pXRF analyzer to study ceramics and other earthen substances from Classic period (ca. AD 250-1000) contexts in three contiguous valley systems in southeast Mesoamerica: Motagua Valley (Guatemala), Naco Valley (Honduras), and Cacaupala Valley (Honduras). The aim of the research was to determine if we could use pXRF to identify pottery made from the resources within a particular valley and to distinguish those items produced in adjacent valleys. The greater goal of the project was to begin to construct baseline chemical profiles of local raw materials that were used to manufacture ceramics in specific regions in southeast Mesoamerica. Quantitative assessments of the pXRF data reveal both opportunities and challenges, which are outlined in the paper.

“Of Polychrome and Politics in Southern Veracruz, Mexico” Philip Arnold (Loyola University Chicago). Paper Abstract: Along the south Mexican Gulf lowlands, Tuxtlas Polychrome ranks among the most widely recognized Classic Period pottery types. Despite such widespread recognition, surprisingly little is known regarding the production, distribution, and consumption of this ceramic. Using a combination of physico-chemical and stylistic data, this paper begins an examination of Tuxtlas Polychrome, with a particular focus on the southern Veracruz region that lends its name to this distinctive fine ware. These data suggest that, in addition to its more generic elite association, Tuxtlas Polychrome served as a medium for geo-political maneuvering and identity politics during the latter half of the first millennium AD. “Using Ceramic Ethnoarchaeological Models to Evaluate the Organization and Scale of Production of Utilitarian Pottery in Tlajinga 33, Teotihuacan, Mexico” James J Sheehy (Pennsylvania State University / Juniata College). Paper Abstract: Years ago, in an earlier Ceramic Ecology symposium, I attempted to relate the production scale (output) among traditional potting establishments around the world to variability in technology, resources and human labor for the individual stages in the manufacturing process. I identified six levels in the scale of production representing a continuum of ceramic output ranging from a few pots per year, among foraging groups, to an output of several hundred thousand vessels in some state level

societies. In this paper, I draw upon the earlier work to construct multiple competing hypotheses to evaluate the organization and scale of production of the Classic Period Tlajinga 33 potters producing San Martin Orange utilitarian pottery during the Xolalpan Phase at Teotihuacan. For each of the levels of the production scale, I examine individual stages in the manufacturing process, including the acquisition, preparation, forming, finishing, decorating, and firing stages, to distinguish individual traits or clusters of traits (variables) for each stage. These variables associated with different production levels can then be compared with the archaeological assemblage from the Tlajinga 33 to test which of the levels of production scale best approximate that within Tlajinga 33.

“Clay Phoenix? Three Historical Moments of Decline and Revival in a Costa Rican Ceramic Tradition” Jim Weil (Science Museum of Minnesota / Monteverde Institute, Costa Rica). Paper Abstract: In what is now Costa Rica's Pacific Northwest, sixteenth-century Spanish explorers reported contacts with ceramic producers and traders on an island along the coast. The societies of the region were in a phase of decline. Archaeological sites have been found in areas which no longer were inhabited at that time. The most elaborate styles of the regional Greater Nicoya tradition - including southwestern Nicaragua - are dated to earlier centuries. The trauma of Spanish colonization included epidemics, slave raiding and demoralization, and the remaining societies soon collapsed. Despite a few accounts of tribute in ceramics for Spanish encomenderos, production of iconographically rich ritual ware must have ceased almost immediately. Evidence of ceramics over the intervening centuries is lacking, but as of the early twentieth century, in one cluster of hamlets, a cottage industry still was producing comales, tinajas, and other housewares. The persistence of pre-Columbian forms and uses and identical slips of locally available colored clay strongly suggests a continuous tradition, albeit in an attenuated form with minimal decoration. As of the middle of the twentieth century these ceramics were being replaced by store-bought equivalents made of metal, glass and plastic. Beginning in the late 1960s, the rise of tourism stimulated a revival of the elegant pre-Columbian styles, but the current market increasingly favors less expensive pieces with simpler "motivos ecológicos." Ethnographic research since 1993 is reviewed, covering a period of the development of an ecomuseum which has supported the artisans' struggle to maintain and enhance their age-old heritage. “Using Traditional Pottery as a Tool for Reviving Local Identity” Aleksandra A Wierucka (University of Gdansk). Paper Abstract: Traditional methods of making pottery disappeared in Poland many



years ago. Some local artists use it for their art; nevertheless it does not have any importance anymore. People for years regarded pottery as something outdated. Some of them would even treat pottery as an art suitable only for children. Few years ago in the small village in the Mazury region in northern Poland, a group of people realized that pottery is actually very important cultural heritage. They organized “Garncarska wioska” which means “Pottery Village”. For quite few years now they have been teaching local people the almost forgotten art of pottery. It started as kind of art classes for people with hobby but soon grew into much bigger initiative. Pottery Village now teaches local people about their own heritage. Traditional pottery is used as a tool for reviving local identity. Thus people learn not only the skill but also the historical and cultural values of their region and as they mostly come from other parts of Poland (Mazury region was repopulated after the Second World War) it enables them to relate to the region and become the part of it. Drawing on fieldwork done between 2010 and 2012 (based on interviews as well as participating and non-participating observations) the presentation will focus on the role of traditional pottery in the process of gaining cultural identity by the local people as well as the influence of the Pottery Village in promoting the Mazury region in Polish society.

“Landscapes of Memory: Pots and Griddles as Hermeneutic Expressions of Tlaloc at Tejalpa, Morelos” Sandra L Lopez Varela (Universidad Autónoma del Estado de Morelos) and Daniel Aguilar Escobar (Universidad Autónoma del Estado de Morelos). Paper Abstract: The hermeneutics of occupation explores the practices acting on the landscape during a performative process, leading most of the Tejalpa community to a water cave that has provided enough rain for their agricultural success. In understanding how the community builds a relationship to the material world through this process, it became evident that these practices create a sense of place that was once the dwelling of Tlaloc, the rain deity, who sustained human life through the fruits of agriculture. The landscape evokes the fragmented pieces of a collectively lived history dating to the XVI century, the “raising up poles”, a practice indicating it was time to sacrifice the children for the tloaque, the suppliers of food, who lived in the interior of the mountains. Women no longer remember that in using their pots and griddles to feed the water cave, their practice materializes the relationship between life and water that Tlaloc sustained, as well as, that of maize and caves that was nourished by offering him the children, the fruits of the human body. What makes the community bring fragments of the past into the present, relates to the workings of social and habit memory, but

also, to the awareness that in recreating this landscape of memory every year, their heritage is preserved, even if local authorities identify it as an ecological reserve. “Discussant” Christopher A Pool (University of Kentucky) and “Discussant” Charles C Kolb (National Endowment for the Humanities, Retired).

*The International Symposium on Archaeometry* (ISA) will be held in Los Angeles, CA, USA. Los Angeles 19-23 May 2014 with presentations focusing on recent studies and the results of archaeometric research on a broad range of topics across time and space. This interdisciplinary symposium relates the natural sciences, engineering, and archaeology to reconstruct and understand human behavior through the study of material culture, see <http://www.archaeometry2014.com/>. The symposium is organized around the classic ISA session themes with the addition of two special sessions. These include: 1) Archaeo-Chronometry (including Radiocarbon and Historical Chronologies); 2) Biomaterials and Bioarchaeology; 3) Ceramics, Glazes, Glass and Vitreous Materials; 4) Human-Environment Interactions; 5) Metals and Metallurgical Ceramics; 6) Remote Sensing, Geophysical Prospection and Field Archaeology; and 7) Stone, Plaster and Pigments. The two special ISA 2014 Sessions are: 1) Forensic Science Investigations in Art and Archaeology; and 2) The Transition from the Bronze to the Iron Age. Keynote, oral and poster presentations as well as panel discussions are planned. The deadline for the submission of abstracts, (<http://www.archaeometry2014.com/abstracts/>) is 16 December 2013. Early-bird registration ends 18 February 2014 (\$320 full price and \$160 student); Regular Registration after 19 February 2014 (\$370 full price and \$185 students); and for member of the Society for Archaeological Sciences (\$300 full price and \$150 students, anytime). For registration please visit: [http://tickets.getty.edu/loader.asp?target=show\\_events\\_list.asp?shcode=474](http://tickets.getty.edu/loader.asp?target=show_events_list.asp?shcode=474) Registration fees will underwrite publication of the program, transportation from Santa Monica - Westwood to the conference locations, catering of coffee breaks and lunches, costs of hosting several keynote speakers (lodging, not airfare), the Martin Aitken student poster prize, and a mid-week excursion to see Watts Towers as well as other sites around Los Angeles.

### ARCHAEO-METALLURGY

*Thomas R. Fenn, Associate Editor*

The column in this issue includes the following categories of information on archaeometallurgy: 1) New Books; and, 2) Previous Meetings.

## New Books

*The World of Iron*, edited by Jane Humphris and Thilo Rehren, 2013, Archetype Publications, London, 498 p., illus., ISBN: 9781904982975 (pbk.); 1904982972 (pbk.), £75.00/\$150.00. Information about ordering the volume can be found at: <http://www.archetype.co.uk>. *The World of Iron* fills a crucial gap within the literature on the history of iron production by bringing together, in one extensive volume, 53 conference papers which examine research from around the world, as well as thematic papers focusing on current major themes within the discipline.

Iron continues to be one of the most important materials produced and used by humanity. Its ductility when heated and its strength when cooled has allowed those with the necessary skills and resources to manufacture adornments, tools, weapons and structures that have helped to revolutionize social, ritual, economic and political systems. From enormous buildings such as the cathedrals of Europe that were erected in all their glory with a backbone of iron, to farmers who for thousands of years have used iron tools to clear land and harvest their crops, iron has had a fundamental impact on people's lives, all over the world. The diversity of technological approaches to the production of iron is astounding, while traces of the ritual and symbolic nature of this powerful metal bear testament to the mystical and powerful status that iron was associated with in many instances.

Contributions from colleagues working across Africa, the Indian Subcontinent, West and Central Asia and the Far East provide the reader with a comprehensive understanding of the latest data and conclusions about the technologies, role and impact of iron production within these regions. Ethnographic, archaeological, experimental, materials science and anthropological approaches are presented side-by-side to reveal the rich and diverse history of this metal. Themes including innovation and inspiration, theoretical and scientific approaches to iron technology and environmental considerations not only ensure a significant European focus in addition to the more global perspective, but also illustrate the pioneering ways in which iron is being studied, and the dedication and enthusiasm that our fellow colleagues bring to this field of academia.

*The World of Iron* forms a key text for students, academics and those with a general interest in the history of ferrous metallurgy world-wide, and how this can be studied.

Based on the original conference organization, contributions to the volume are arranged within eight broad regional and analytical categories: *Africa*; *Indian sub-continent*; *Invention, innovation and inspiration*; *West and Central Asia*; *Theoretical approaches to technology*; *East Asia*; *Scientific approaches to technology*; and, *Environmental considerations*. Following the introductory Foreword (pp. ix-xi) and Conference Sponsors (pp. xii-xiii), contributions to the *Africa* section comprise "Iron and its influence on the prehistoric site of Lejja" (Pamela Eze-Uzomaka; pp. 3-9), "A comparison of early and later iron age societies in the Bassar region of Togo" (Philip de Barros; pp. 10-21), "Our iron smelting <sup>14</sup>C dates from Central Africa: from a plain appointment to a full blown relationship" (Bernard Clist; pp. 22-28), "Yoruba iron metallurgy: raw materials, routine and rituals" (O. Akin Ige; pp. 29-34), "Mining and moving specular haematite in Botswana, ca. 200-1300 AD" (Edwin N. Wilmsen, Alec C. Campbell, George A. Brook, Lawrence H. Robbins, and Michael Murphy; pp. 35-45), "Late Iron Age Technology of Mt. Kenya region: the case studies of the Kangai and Kanyua archaeological sites in Mbeere District" (M'Mbogori Freda Nkirote; pp. 46-55), "Pre-colonial iron production in Great Lakes Africa: recent research at UCL Institute of Archaeology" (Jane Humphris and Louise Iles; pp. 56-65), "Bricolage, ritual performance, and habitus [forgotten] in Barongo iron smelting" (Peter R. Schmidt; pp. 66-72), and "Refining narratives: transformations of iron-working traditions in Ghana – 19<sup>th</sup> to 21<sup>st</sup> centuries" (Len Pole; pp. 73-80).

Contributions to the *Indian sub-continent* section comprise "Indian iron and steel, with special reference to southern India" (Sharada Srinivasan; pp. 83-90), "Recent archaeometallurgical discoveries of iron in Southeast Rajasthan, India" (Lalit Pandey; pp. 91-96), "Smelting: a sacred process. Observations of iron smelting in Madhya Pradesh, India" (Jake Keen; pp. 97-103), "An ethno-archaeological survey of iron working in India" (Vibha Tripathi; pp. 104-115), "New insights on the *wootz* steel of Telangana" (Jaikishan Sriperumbudar; pp. 116-123), and "Iron Age – Early Historic period in Eastern India. A study in material culture and technology: evidence from the site of Badmal-Asurgarh, District Sambalpur, Orissa, India" (Pradeep K. Behera, Pranab K. Chattopadhyay; pp. 124-134).

Contributions to the *Invention, innovation and inspiration* section comprise "Invention, innovation and inspiration: optimisation and resolving technological change in the Sri Lankan archaeological record" (Gillian Juleff; pp. 137-145), "Iron working in an Indian Ocean context" (Randi Haaland; pp. 146-155), "The world's earliest iron

smelting? Its inception, evolution and impact in Northern Nigeria” (Patrick Darling; pp. 156-167), “Casting iron in ancient China” (Han Rubin and Chen Jianli; pp. 168-177), “Questioning research on early iron in the Mediterranean” (Martina Renzi, Salvador Rovira, M. Carme Rovira Hortalà and Ignacio Montero Ruiz; pp. 178-187), and “Iron, myth and magic: perceptions of smiths and metal workers through cultural evidence from Britain and beyond” (Peter Halkon; pp. 188-200).

Contributions to the *West and Central Asia* section comprise “Early Iron in the Near East, a review of evidence” (H. Alexander Veldhuijzen; pp. 203-213), “The iron ore mine of Mugharet al-Wardeh, Jordan: excavations and new dating” (Yosha Alamri and Andreas Hauptmann; pp. 214-222), “Forging activities in Jaffa during Ottoman Palestine” (Sylvain Bauvais; pp. 223-233), “Characterisation of iron technology at Medieval Talgar in Kazakhstan” (Jang-Sik Park and Dmitriy Voyakin; pp. 234-242), and “New aspects of the 9<sup>th</sup> and 10<sup>th</sup> century Islamic period metallurgical workshop excavated at Merv, Turkmenistan: reassessing the slag compositions” (John Merkel; pp. 243-253).

Contributions to the *Theoretical approaches to technology* section comprise “Variability in iron smelting practices: assessment of technical, cultural and economic criteria to explain the metallurgical diversity in the Dogon area (Mali)” (Caroline Robion-Brunner, Vincent Serneels and Sébastien Perret; pp. 257-265), “Epistemic communities and epistemological translocations in early modern southern Africa, ca. CE 200-900” (Edwin N Wilmsen; pp. 266-272), “Superstition or ingeniousness: re-thinking symbolism in indigenous African iron technology” (Bertram B.B. Mapunda; pp. 273-280), “Applying ethnographic presents to archaeological pasts: preliminary thoughts on memories of iron production from western Uganda” (Louise Iles; pp. 281-287), “Evolutionary analysis of ironmaking slag” (Michael F. Charlton, Stephen J. Shennan, Thilo Rehren, and Peter Crew; pp. 288-295), “Nature’s laws & culture’s norms. A proposed systematic classification framework for the study of material culture and technology (SOMCAT)” (Ann Feuerbach; pp. 296-302), “Symmetry in the archaeology of technology: nailing down manufacturing processes and networks of innovation in colonial ironworking” (Krysta Ryzewski; pp. 303-312), “Manufacturing techniques, technological traditions and social choices in ancient Greece” (Maria Kostoglou; pp. 313-321), and “The acquisition and circulation of iron during Iron Age II in the northern region of the Paris Basin (France)” (Sylvain Bauvais, Philippe Fluzin; pp. 322-328).

Contributions to the *East Asia* section comprise “The East Asia Session” (Han Rubin; pp. 331-332), “Preliminary studies on Western Han Dynasty iron smelting sites and slag found in Pingnan County, Guangxi Province, China” (Huang Quansheng and Li Yanxiang; pp. 333-341), “Iron production in the Han Period in the Chengdu Plain, Sichuan, China. Preliminary report on recent fieldwork” (Yasuyuki Murakami; pp. 342-344), “Manufacturing techniques and dates of iron objects found recently at Chinese archaeological sites” (Chen Jianli and Han Rubin; pp. 345-354), “Technology transfer across the Indian Ocean and South China Sea: a case study of the iron industry at Santubong, Sarawak” (Brian Gilmour and Chris Doherty; pp. 355-362), “Iron and steel making in Ancient Korea inferred from the microstructure of iron artefacts” (Jang-Sik Park; pp. 363-370), and “Protohistoric iron weapons and tools from a burial site in West Central Thailand” (Anna Bennett; pp. 371-379).

Contributions to the *Scientific approaches to technology* section comprise “Geochemical survey and metalworking: a case study from Exmoor, southwest Britain” (Chris Carey and Gillian Juleff; pp. 383-392), “Three ores, three irons and three knives” (Quanyu Wang and Peter Crew; pp. 393-401), “Iron and processes in Scandinavian blacksmithing workshops from the Iron Age to the 14<sup>th</sup> century” (Arne Jouttijärvi; pp. 402-408), “Iron? Which iron? Methodologies for metallographic and slag inclusion studies applied to ferrous reinforcements from Auxerre Cathedral” (Maxime L’Héritier, Philippe Dillmann, Sylvain Aumard and Philippe Fluzin; pp. 409-420), and “Measuring variation in iron smelting slags: an empirical evaluation of group-identification procedures” (Michael F. Charlton, Peter Crew, Thilo Rehren and Stephen J. Shennan; pp. 421-430).

Contributions to the *Environmental considerations* section comprise “Environment” (Donald B. Wagner; pp. 433-434), “Fuel for iron – wood exploitation for metallurgy on the Dogon Plateau, Mali” (Barbara Eichhorn, Caroline Robion-Brunner, Vincent Serneels and Sébastien Perret; pp. 435-443), “Use of charcoal species for ironworking in Tanzania” (Edwinus Chrisantus Lyaya; pp. 444-453), “Quantifying iron production in medieval Europe: methodology and comparison with African metallurgy” (Danielle Arribet-Deroin; pp. 454-461), “The environmental impact of Romano-British ironworking on Exmoor” (Ralph Fyfe, Lee Bray, Gillian Juleff, Jessie Woodbridge, and Peter Marshall; pp. 462-472), and “The fuel supply and woodland management at a 14<sup>th</sup> century bloomery in Snowdonia: a multi-disciplinary approach” (Peter Crew and Tim Mighall; pp. 473-482).

*Metalurgia y Sociedad en el Nordeste de la Península Ibérica (finales del IV – II milenio cal ANE)* [=Metallurgy and Society in the Northeastern Iberian Peninsula (4th – 2nd Millennium cal BC)], by Ignacio Soriano, 2013, BAR International Series 2502, Archaeopress, Oxford, England, ii+317 p., illustrated throughout, 2 color plates, data appendices, Language: Spanish, ISBN: 9781407311180 (pbk.), £46.00.

This paper focuses on prehistoric metallurgy and the role played in the bosom of the human communities of the northeastern Iberian Peninsula (the present-day area of the Autonomous Region of Catalonia and the Principality of Andorra). The study covers the period from the first use of the different metals (gold and copper) during the Late Neolithic to the structured production of the Bronze Age. In chronological terms this time lapse can be dated to between the end of the fourth and the middle of the second millennium cal BC.

The exposition has been divided into two subject blocks with three chapters each. The first block (Chapters One to Three) deals with the archaeological groups of this period, while the second (Chapters Four to Six) focuses exclusively on metallurgy. The seventh and final chapter consists of an evaluation and discussion of metallurgy in prehistoric communities.

The first chapter begins with a historiographic review of the different Copper and Bronze Age periodizations in the study area. This is followed by a critical analysis of those that have used radiocarbon dating and periodization based on certain proposed methodological, statistical and calibrational considerations. The archaeological contexts of all the radiocarbon dates, both those used and those excluded, are described. As a final result absolute chronology is used to extract a new temporal delimitation in periods and phases. This model shows the contemporaneity between the Late Neolithic and the Bell Beaker groups, as well as a clear separation and diachrony with respect to the Bronze Age groups. In addition, thanks to the inclusion of data of a social nature, it is possible to propose a division of the Early Bronze Age into three phases based on the changes in settlement patterns (the establishment of “dug-pit sites”), funerary practices (the use of dug-pit and chambers with an entrance shaft) and archaeological materials (discarded Epicampaniforme pottery - later Beaker style - and the appearance of Polada pottery - cups with a handle topped by a flat appendix).

The second and third chapters offer a summary of the data currently available on the socioeconomic, political

and ideological materiality and inferences of the human communities in the study area. These communities include the Véraza, Bell Beaker, Early Bronze Age and Segre-Cinca I groups. The approach of the third chapter follows the theoretical and methodological proposals of historical materialism and reveals which categories are used. As a result, the data referring to each archaeological group are shown according to the same basic scheme: food production, the manufacture of artifacts (movable and immovable) and social production relations. The palaeoenvironmental data summarized at the beginning of the second chapter make up the general framework for the rest of the data. The most significant results show an absence in the Late Neolithic of specialized production and social dissymmetry within a funerary collectivism in megalithic tombs and caves. In the Beaker socioeconomic group there are signs of the appearance of incipient inequalities. This can be seen in the funerary individualization in tombs of varying types, the specialized production of certain stone products and the participation in long-distance relational networks all over Europe. The Beaker people must also be seen as a specific social sector within the Late Neolithic communities and not as an independent archaeological group. The Early Bronze Age saw a substantial increase in agricultural productivity and the degree of sedentariness. At the same time, there was a temporal toning down of the social dissymmetries and the gestation of new strategies that would tend to fragment the communities into family groups. Segre-Cinca I constitutes the introduction of significant changes in agriculture (millet, flax, animal-draught ploughing) and settlement stability. Participation in Mediterranean trading circuits and the generalization of individual burials should also be highlighted.

The nucleus of this book is the second block, which focuses exclusively on the different aspects of prehistoric metallurgy. Copper metal production is examined in the fourth chapter. Firstly the available analytical data for the study area (chemical composition, metallography, lead isotopes) are given. Subsequently, the different processes involved in this production are looked at. These range from the mining, processing and reduction of the copper ore to the smelting, finishing and maintenance of the metal products obtained. Among the subjects taken into account are the potential mineral resources, air insufflation techniques, fuel, crucibles and molds, as well as the combinations of post-smelting treatments applied (hammering, annealing, etc.). Among the most interesting aspects is the use during the whole chronological framework of smelting vessels, a technology typical of the Iberian Peninsula. Another is the possible manufacture of compacted-sand casting molds, at times

contemporaneously with those made of stone. Of the latter we only know examples with dies for axes, chisels, bars or very occasionally daggers. In the Early Bronze Age we document a specific type of crucible that is unique on the Iberian Peninsula and is distinguished by having a hole for fitting a handle. The closest parallels are to be found on the French Atlantic and in the north of Italy (the Polada and Terramaras peoples). Finally, we have to point out the documentation for the first time of a metalworker burial: the individual tomb of an adult male with tools specifically linked to smelting.

The fifth chapter deals specifically with the production and use of fine metals, i.e. gold and silver. As in the previous chapter, those aspects related to the available analytical data, potential mineral resources and the techniques of working these two metals are dealt with. This is followed by details of the characteristics of the gold and silver objects documented in accordance with their archaeological context, chronology, technology and use. The typological analysis and the parallels described show that there was some exchange of objects between the study area and south-eastern France during the Late Neolithic. This was limited to gold beads for daily use within a context of a profusion of adornments made of various materials (stone, bone and shell). With the emergence of the Bell Beaker people the production of gold ornaments began and new types are documented throughout the Iberian Peninsula and France. Their use, however, was restricted to funerary or political and ideological-type activities. During the Early Bronze Age the use of fine metals diminished appreciably. Silver is the only metal documented, with bronze being the raw material used to manufacture most of adornments.

Copper and bronze objects are analyzed in Chapter Six. They are divided into twelve previously defined groups: flat axe, flanged axe, tanged dagger, riveted dagger, halberd, arrowhead, Palmela point, awl, bead, bracelet, spiral and hoop/ring. To these we have to add minority objects (with two or more examples), including ornamental plates/breastplates, diadems, needles, torques, perforated discs and chisels. In all cases the archaeological context, possible use, existing typology and analytical data are shown. For the first time a morphometric study was carried out on these objects. This provided a classification with a statistical basis that takes into account chronological, technological and functional aspects. Among the results obtained, those that initially stand out are linked to the Early Bronze Age flat axes. In these we observe a gradual increase in the useful surface (cutting edge) of the tool in relation to the work put into it by means of a modification to its morphology. Their morphometric coincidence with flanged axes allows

us to hypothesize that in addition to being contemporary they were made with the same type of mold, traditionally described as a flat axe mold. Modifications to the tanged dagger handle system are seen with the emergence of the Bell Beaker people. The solid handle was replaced by one with two separate parts appreciably improving the durability of these tools/weapons. The characteristics of the Palmela points suggest they were used as body-to-body spears and, to a lesser extent, as javelins or assegais, placing their interpretation as arrowheads in serious doubt. The majority of beads and spirals are found in Early Bronze Age and Segre-Cinca I contexts. Their presence in individual tombs can be linked to the development of social dissymmetry situations. Finally, a major collection of objects proves the existence of close links between different European archaeological groups throughout the second millennium cal BC: the Polada and Terramaras in the north of Italy (arrowhead, flanged axes); the Unetice, Unterwöbling and Nitra in Central Europe (torques, diadem, beads); and the Rhone Basin in eastern France and Switzerland (needle, riveted dagger).

The role played by metallurgy in each prehistoric community and its relationship with the other elements involved in social life is explained in the last chapter. Questions such as the origin of this technology, its social value in relation to the other productions or the importance traditionally given to it in the development and consolidation of social dissymmetries are dealt with in depth in the context of each archaeological group.

Metallurgy played a secondary role throughout the Late Neolithic (3300 - 2250 cal BC). Human communities were simple consumers of metal products and knew nothing about how they were made. These artifacts were decorative elements and, to a lesser extent, utilitarian implements made of gold and copper. Their morphology tends to reproduce objects that already existed in other materials and their use can be related to the daily needs of the communities: adornment, woodcutting, meat carving, working skins, etc. Metal was more an object of curiosity than a material with known properties and in no case did it come to monopolize any area of social production. The data referring to the origin of metallurgy in the northeastern Iberian Peninsula points, without any doubt, to the south of France. This is indicated by the early datings from the mining district of Cabrières-Peret (Hérault, Languedoc-Roussillon); the typological parallels with metal objects from that area; and the extensive cultural interactions attested through the material culture and certain ideological practices in the Véraza, Treilles, Ferrières and Fontbousse groups. The first metallurgical production data correspond to the Bell Beaker people (2800 - 2350 cal BC). The whole

community took part in the extraction and processing of ore at small, open-cast mines. The rest of the metallurgical process was, however, restricted to a specific group of persons in a magical and/or ritual atmosphere. Metallurgy was an element of social differentiation both through the control of the process and in the use of the manufactured items, as can be seen from the funerary record. Gold ornaments took on new morphologies, while copper was used for making tools and weapons. The technical characteristics of the latter improved considerably and they acquired a marked economic importance. Despite this, the metallurgical technology used shows a limited understanding of the process, a meager amount of effort invested in it and a somewhat basic development.

During the Early Bronze Age (2350 - 1300/1200 cal BC) metallurgy took on a predominant position. For the first time we document copper mining on a certain scale in which extraction and processing with picks and miner's hammers are attested. Around this there were various caves with workshops for ore smelting, although with little or no evidence of metal objects. The casting and finishing of metal is only attested in certain settlements spread out over the territory and in the already mentioned metalworker tomb with specialized implements (crucibles, molds) being used. Mining, smelting and casting are activities located at archaeological sites that are geographically separated but between which there is a segmentation, organization and interdependence. The mainly bronze metal implements and weapons fulfilled basic economic functions within society and the contexts in which they are found vary. Ornaments, in contrast, are found only in individual tombs and denote the existence of hierarchical relations in the bosom of these communities. Furthermore we see that metallurgy transcended the borders of the northeastern Iberian Peninsula thanks to evidence of technological and artifactual links and interactions with diverse areas of the European continent. The development of this technology is unprecedented and without a doubt constitutes a central aspect of the society, without which it would be impossible to understand the economic, political and ideological organization of these communities. [Summary by book author].

***Ambelikou Aletri metallurgy and pottery production in Middle Bronze Age Cyprus***, by Jennifer M. Webb and David Frankel, with contributions by Myrto Georgakopoulou, Thilo Rehren, George Constantinou, and Ioannis Panayides, 2013, *Studies in Mediterranean Archaeology* vol. 138, Paul Ångströms Förlag, Uppsala, xx, 245 p., illus. (some col.), maps, Language: English, ISBN: 9789170812507 (pbk.), €76.00.

This volume presents the full documentation, analysis and discussion of the excavations carried out by Porphyrios Dikaios in 1942 at Ambelikou Aletri. The site lies to the west of the modern village of Ambelikou, northwest of the Skouriotissa copper mines, in the northern foothills of the Troodos Mountains. It has always been known for the evidence of copper mining and processing through the discovery of Middle Bronze Age pottery in modern mines and the casting moulds and other evidence for metal processing at the site itself. Less well known is a potter's workshop. Here the catastrophic abandonment of the workshop, its installations and artifacts (including some four dozen jugs from the last kiln load) provides an insight into aspects of craft practices shortly after 2,000 BCE. The book contents consist of: "Introduction" (pp. 1-10), "The mining geology of Cyprus with special reference to Ambelikou Aletri" (George Constantinou; Ioannis Panayides; pp. 11-23), "Ancient mining, initial soundings and trial trenches" (pp. 25-32), "Area 1" (pp. 33-51), "Area 2" (pp. 53-71), "The pottery" (pp. 73-131), "The ground stone assemblage" (pp. 133-167), "The small finds" (pp. 169-188), "pXRF analysis of pottery" (pp. 189-195), "Report on the analyses of metallurgical samples from Ambelikou Aletri" (Myrto Georgakopoulou; Thilo Rehren; pp. 197-199), "Ambelikou Aletri in context" (pp. 201-225), and bibliographical references (pp. 227-245).

***Die Schilde der Bronzezeit in Nord-, West- und Zentraleuropa*** [=The Shields of the Bronze Age in Northern, Western and Central-Europe], by Marion Uckelmann, 2013, *Prähistorische Bronzefunde* III.4, Franz Steiner Verlag, Stuttgart, Germany, 243 p., 28 b/w illus., 12 tabs., 169 b/w plates, Language: German, ISBN: 9783515103787 (hbk.), \$147.00.

After a new record of the pieces in the original, the 101 previously known shields of the Bronze Age in Northern, Western and Central Europe are introduced. 85 of these are bronze plate, five are from either wood or leather material with a bronze plate hanger and ten are organic shields with a bronze trim. After a detailed study of the types of structured shields and the circumstances of their discovery, their dating and their dispersion, this volume focuses on the interpretation and of this corpus of shields as well as the analysis of their function. This is based on a close examination of the technical characteristics and new analysis of the metal alloys and metallographic examinations. The volume draws comparisons between contemporaneous accounts from other parts of Europe as well as exemplary pieces from the eastern Mediterranean, the Near East and Egypt. Finally, the role of the shields and other Bronze Age weapons (armor, helmets, greaves) in Bronze Age battles is investigated.

***The Early and Middle Bronze Age Spearheads of Britain***, by Richard Davis, with a contribution by Jeremy Peter Northover, 2012, *Prähistorische Bronzefunde V.5*, Franz Steiner Verlag, Stuttgart, Germany, 223 p., 114 plates, Language: German, ISBN: 9783515103503 (hbk.), \$147.00. Work on British early and middle Bronze Age spearheads includes the early tanged and socketed forms. Formal aspects, origin, context, distribution and chronology are discussed in detail at the level of individual groups or types. An appendix by J. Peter Northover on the metallurgical aspects of the material contains information about the origin of the raw material or imported spearheads.

***British Museum Anglo-Saxon Coins I: Early Anglo-Saxon Gold and Continental Silver Coinage of the North Sea Area, c. 600-760***, compiled by Anna Gannon, with contributions by Marion Archibald, Duncan R. Hook and Gareth Williams, 2013, *Sylloge of Coins of the British Isles 63*, British Museum Press, London, 304 p., 37 b/w plates, Language: English, ISBN: 9780714118239 (hbk.), \$100.00.

This volume is dedicated to the British Museum's collection of early Anglo-Saxon gold coinage as well as the Anglo-Saxon and Continental silver coinage of the North Sea area, dating from the early seventh to the mid-eighth centuries. This was the coinage which circulated during the age of Bede, the Lindisfarne Gospels and Sutton Hoo, and which is widely celebrated for its historical significance and artistic accomplishment. Both these features are well illustrated in this volume by more than 850 coins, which together form one of the largest, oldest and most representative collections of this complex coinage. The last catalog of this part of the British Museum's collection was published in 1887 and since then the collection has more than tripled in size. This new catalog includes comprehensive coverage of all new acquisitions, among them material from several significant hoards, as well as full details on the provenance and identification of individual coins. A major introduction sets the coins in context and reassesses their classification. New metallurgical analyses of the gold coinage and authoritative interpretation of the results, as well as a survey of the history of the collection, constitute further valuable supplements to the catalog.

***Design and Techniques in Early Medieval Celtic Metalwork***, by Niamh Whitfield, 2013, Pindar Press, London, 580 p., 243 illus., Language: English, ISBN: 9781904597339 (hbk.), \$300.00.

Author, Niamh Whitfield is a leading authority on the metalwork of early Medieval Ireland and Scotland. Celtic metalwork of the seventh to twelfth centuries is extremely accomplished technically, and she has aimed at a thorough understanding of its manufacture. She has also been concerned to place Early Medieval Celtic design in its European context, and to analyze its relationship with Anglo-Saxon and continental work, as well as its debt to traditions which ultimately originated in the Classical world. Dr. Whitfield has written about subjects as diverse as the origins of the gold used in early Medieval Ireland and Scotland, the development of animal ornament and geometrical principles of design. Her archival studies have succeeded in identifying the find-spot of the celebrated 'Tara' brooch and in documenting panels of ornament which are now missing. In addition, she has explored early Irish texts for attitudes to jewelry and clothing, considered the brooch as an emblem of status, looked at how brooches were worn, and whether descriptions of clothing and accessories in an early Irish saga provide an accurate description of contemporary finery.

***Bronzezeitliche Färbetechniken an Metallobjekten nördlich der Alpen. Eine archäometallurgische Studie zur prähistorischen Anwendung von Tauschierung und Patinierung anhand von Artefakten und Experimenten***, by Daniel Berger, 2012, *Forschungsberichte des Landesmuseums für Vorgeschichte Halle Band 2*, Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt, Landesmuseum für Vorgeschichte Halle, Halle an der Saale, 334 p., illus. (chiefly col.), 7 maps, Language: German, ISBN: 9783939414810, €49.00.

The presented work primarily focuses on both the damascene and patination technique which are archaeometallurgically treated within the framework of the Bronze Age north of the Alps. The aspect of patination is here perceived as a pure artificial procedure. On the one hand the investigation should reveal how damascenings were realized on bronze objects and if the observations provide evidence for clarifying the provenance of the rarely used inlay technique – a major question that is still unsolved. On the other hand authentic methods are to be examined in detail that once presumably allowed the patination of prehistoric damascened items for enhancing the weak color contrasts between base metals and inlays.

First of all the study shows that metal inserts were not used frequently throughout the whole Bronze Age and in the different areas north of the Alps. There were longer gaps between the various stages of the era. In contrast platings as a special form of damascening (»surface

damascening») were applied continuously since period Montelius II, yet this decoration is only a characteristic feature for the Nordic circle that was not adopted in southern regions. Using only electron as decoration metal throughout the entire Bronze Age platings differ from damascenings with metal inlays («inlaid damascening») in another point that besides gold or electron they mainly availed of unalloyed copper. Later the spectrum of inlaid damascenings was enlarged by pewter, bronze, and iron. The investigation demonstrates furthermore that the cavities for inlays on most objects were already designed prior casting. However, multiple evidence is found for reworking cast grooves. Only in some cases the grooves were made exclusively by chasing or engraving.

For Late Bronze Age artifacts it becomes clear on account of stylistic and technical characteristics that the metal inlay technique was practiced only by few workshops, nevertheless probably having influenced each other. Such considerations are much more difficult to prove for the Early and Middle Bronze Age as there are less damascened pieces. Yet, similar decoration patterns and techniques suggest interactions between single craftsmen or workshops. Unfortunately, the provenance of the damascene technique still remains unclear despite this new investigation. Though, it is at least unlikely that the polychrome decoration was directly adopted from Mediterranean or even Greek prototypes, but the stimulations rather have to be searched in the Carpathian region. Finally, also a self-contained development somewhere in Central or Northern Europe cannot be completely ruled out.

On the basis of patination experiments it can be shown that in fact human urine is suitable for coloration of damascened objects with copper inlays. Ideally, the medium produces purple-black patinas on unalloyed copper while the addition of elements such as tin or arsenic to copper gives somewhat lighter appearances. High concentrations of tin result in light yellow or slightly green-gray coatings. Even these colors may have been desired in prehistory on tin bronzes as they perfectly contrast with purple-blackish patinated copper inlays. The investigated method therefore emerges as a possible and formerly neglected way for patinating many damascenings of the Bronze Age north of the Alps. For this, however, some preconditions have to be fulfilled which are discussed in detail in the following work. [author's summary]

### Previous Meetings and Conferences

The international conference **Rust, Regeneration and Romance: Iron and Steel Landscapes and Cultures** was

held from July 10-14, 2013, at the **Ironbridge International Institute for Cultural Heritage, Ironbridge, UK**. Multiple simultaneous sessions of presentations and discussions were held each day within several broad themes: “Understanding iron and steel landscapes - historic and contemporary perspectives”, “Human - technology relationships”, “Challenges in the presentation and interpretation of iron and steel heritage”, “Touring and tourism in iron and steel landscapes”, “Histories and ethnographies of iron and steel communities - labor relations and working environments”, “Architectural tropes surrounding mining and fabrication”, “Representations of iron and steel cultures in the ‘popular’ media”, “The ‘cultural industries’ (arts, sport, tourism, etc.) in the regeneration of iron and steel communities”, “Languages of steel cities - dialects and territories”, and “Symbolic economies of iron and steel - iconography, art and design”. A complete program of the conference (as a Word document) can be found at the conference website: <http://ironandsteel2013.wordpress.com/>.

### BOOK REVIEWS

*David Hill, Associate Editor*

***Historical Technology, Materials and Conservation: SEM and Microanalysis***, Nigel Meeks, Caroline Cartwright, Andrew Meek, and Aude Mongiatti (eds.), London: Archetype Publications in association with The British Museum, 2012. 224 pp., 108 color and 195 halftone illustrations, ISBN 978-1-904982-65-4, \$100.00/£47.50 (paperback).

*Reviewed by Charles C. Kolb, Independent Scholar (retired NEH), 1005 Pruitt Court, SW, Vienna, Virginia 22180-6429*

This volume contains edited versions of oral and poster presentations given at a two-day international conference, “SEM and Microanalysis in the Study of Historical Technology, Materials and Conservation,” held at the British Museum on 9-10 September 2010, and organized by the Department of Conservation and Scientific Research at the museum in association with Hitachi High-Technologies Europe. The purpose of the meeting was to explore the significant influence that Scanning Electron Microscopy (SEM) and microanalysis have had on the understanding of the material technologies and associated cultures that produced such artifacts and on the conservation and preservation of these cultural heritage and materials. In the decades since it was first used to examine works of art and archaeological artifacts,



scanning electron microscopy (SEM) has become an essential analytical and research tool in current museum conservation and cutting-edge research. This highly technical monograph has two basic themes, SEM and microanalysis, and the 46 contributions range from the application of established techniques to explore diverse materials. Many focused on manufacturing techniques, wear patterns, and/or conservation treatments.

Metallurgical studies accounted for a majority of the contributions: metallurgy (16 instances), often involving a number of different metals: gold (12): beads, torcs, threads, tesserae, gilded tile, and gilded plaster; silver (5): torcs, coins; copper alloy (2); and bronze (5): weapons, mirrors, and pins. Other contributions related to ceramics (5): pottery, porcelain, tiles, and crucibles; organic remains (5): wood, textiles, feathered textiles, paper, and elephant ivory; oil paintings (5): pigments, smalt, and gesso; mural paintings (4): stucco, plaster, and fresco; mineralogy (3): lapis lazuli, jade, marble and schist; parchment (2); and glass (2): beads and frit. There was one study each on glass-plate photographic negatives, Japanese dyestuffs, and an analysis of a collection of diverse materials: fossils, figurines, coins, and a meteorite.

In addition to SEM and SEM-EDX (Energy Dispersive X-ray), case-studies highlighted the use of complementary scientific techniques including OM (Optical Mineralogy), TEM, FIB-SEM, high resolution X-radiography, XRF, XRD, EBSD and SEM-CL. The volume contains a "Foreword" and "Acknowledgments," followed by the written versions of the 18 oral papers (5-10 pages each) and 28 poster presentations (2-3 page descriptions each). All of the contributions include acknowledgments, references, and the authors' addresses. The titles, authors' names, pagination, and brief descriptions follow:

"The Bedford Lemere Collection: Investigating degrading glass plate negatives" by Sarah Allen, Jenny Hodgson, David Dungworth, and Sarah Paynter (pp. 1-6, 6 figures, 1 table): The authors devised a conservation and digitization plan for 23,000 large-format negatives in this English collection; analyses included mainly SEM-EDX and some XRD and FTIR studies. Sodium and potassium calcium sulfate crystals complicated the conservation procedures. "Understanding Viking filigree and granulation with the aid of scanning electron microscopy" by Barbara Regine Armbruster (pp. 7-13, 8 figures [1 in color]): Armbruster employed SEM and EDX in her analysis of 9<sup>th</sup>-century Danish gold-working technology. "A pilot application of scanning electron microscopy

and high-resolution X-radiography for the conservation of paintings" by Aviva Burnstock, Alexander D. Ball, Lauren E. Howard, and Genevieve Silvester (pp. 14-20, 8 figures): Paint samples from an 1888 painting by Gottfried Lindauer from the Royal Collection were studied by high-resolution X-radiography SEM, and XuM imaging; the limitations of these methods were detailed. "Organic cores from the Iron Age Snettisham torc hoards: Technological insights revealed by Scanning Electron Microscopy" by Caroline Cartwright, Nigel Meeks, Duncan Hook, Aude Mongiatti, and Jody Joy (pp.21-29, 6 figures [3 in color], 2 tables): The authors examined twisted wire neck-rings (torcs) made of gold, silver, and copper alloy dated to the Late Iron Age from the Castle Museum collections, Norfolk, UK, using OM (Optical Microscopy) and SEM. "Iron Age glass beads from Carthage" by Katherine Eremin, Patrick Degryse, Nathaniel Erb-Satullo, Monica Ganio, Joseph Greene, Andrew Shortland, Marc Walton, and Lawrence Stager (pp. 30-35, 6 figures, 2 tables): The team assessed natron glass black-colored beads, determining that iron slag was a colorant by using SEM-EDX, XRD, and Raman spectroscopy.

"Reconstructing firing practices of Middle Minoan polychrome ware: The role of bloating pores in slips" by Edward W. Faber (pp. 36-42, 3 figures, 7 tables): Faber studied 208 specimens from seven sites using OM/petrography, SEM, EDX, and NAA, discerning 173 calcareous and 11 calcareous examples fired 850-1080° C; the procedures were useful only in some sherd groups. "Examination of organic remains preserved by metal corrosion" by Andrea Fischer (pp. 3-48, 6 figures): Fischer discussed the use of VP-SEM in conservation treatments of textiles, leather and metals by using air-dried and hydrated samples. "A study of pre-Columbian gold beads from Panama" by Ainslie Harrison, Kim Cullen Cobb, Harriet F. Beaubien, Paul Jett, and Julia Mayo" (pp.49-55, 5 color figures): Using specimens from the U.S. National Museum of Natural History, the National Museum of the American Indian, and from recent excavations at Sitio Conte, Panama, the team examined the metallography of rolled and joined beads through surface and cross-sectional analyses using SEM-EDX and SEM-BSE. "Subsurface analysis by application of FIB-SEM to samples of geological and historical importance" by Diane Johnson, Stuart Kearns and Monica M. Grady (pp. 56-61, 5 figures, 1 table): The results of FIB-SEM studies on dinosaur fossils, Egyptian Ushabti figures, coins, and a meteorite were reported. "Scanning electron microscopy imaging of tool marks on Qin bronze weapons using silicone rubber impressions" by Xiuzhen Janice Li, Marcos Martinon-Torres, Nigel Meeks, and Yin Xia (pp. 62-68, 6 figures [3 in color]):

The group employed SEM to analyze chiseling, filing, and grinding tool marks on bronze artifacts associated with the Terracotta Army through the use of vinyl polysiloxane impressions; application problems and results were reported.

“A forgotten tradition: The rediscovery of Mexican feathered textiles” by Hector Manuel Meneses Lozano (pp. 69-75, 5 figures [2 in color], 2 tables): Eight specimens of late 17<sup>th</sup>-early 18<sup>th</sup> century twisted feather textiles from the Museo Textil de Oaxaca were studied by SEM. “Applications of Electron Backscatter Diffraction in archaeology” by Shirley Northover and Peter Northover (pp. 76-85, 8 color figures, 1 table): The Northovers employed a combination of conservation science and humanities using EBSD and FEGSM in a crystallographic analysis of the methods of manufacture of gold, silver, copper, and bronze artifacts. “Gold usage: Wear marks and/or deterioration in site conditions” by Alicia Perea and Oscar García-Vuelta (pp. 86-92, 5 figures, 2 tables): Three case studies of Iberian pre-Columbian jewelry made from gold-silver-copper alloy employed SEM-EDX in the assessment of wear factors versus burial deterioration. “A case study of ancient parchment biodeterioration using variable pressure and high vacuum scanning electron microscopy” by Flavia Pinzari, Vanja Cialei, and Guadalupe Piñar (pp. 93-99, 7 figures [2 in color], 1 table): The authors employed SEM-EDX and fluorometric assay to examine fungal biodeterioration in parchments dated AD 1299-1767; the need for additional studies using FTIR was suggested. “Arsenic and apricots: Understanding the sober still lifes of Adriaenn Ciierte” by Carol Pottasch and Kees Mensch (pp. 100-106, 6 color figures): SEM-EDX studies of his paintings dating 1702-1705 suggested that the artist used “uncommon” painting techniques; additional works by Ciierte are needed for further study. “ESEM-EDX analyses for the characterisation and reproduction of nineteenth-century gold tesserae” by Martina Raedel, Martin Sabel, Michael Bucker, and Brita Unger (pp. 107-113, 6 figures [5 in color]): A corpus of 110 gold mosaics was studied, 2/3rds by SEM-EDX in order to determine the glass characteristics of several replicas. “Quantitative energy dispersive X-ray analysis of the blue pigment smalt in the variable pressure scanning electron microscope” by Marika Spring, Veronika Kugler, and Stewart Bean (pp. 114-122, 6 color figures, 1 table): Nine specimens of 16<sup>th</sup>-18<sup>th</sup> century paintings whose artists used smalt, a cobalt-containing glass (almost always potash) in their work, were evaluated using SEM-EDX and VP-SEM. “SEM and TEM analyses of chrome yellow and chrome orange dyestuffs used for imported and domestic cotton fabrics (Touzan) in Japan in the nineteenth century” by Nahoko Sugioka and Masahiro

Kitada (pp. 123-131, 10 figures [2 in color]): The microanalysis of chrome dyestuffs using SEM, TEM, and some XRD, determined that natural Japanese dyestuffs were replaced by artificial European ones during the 19<sup>th</sup> century.

The Poster Papers included: “Metallurgical and chemical characterisation of Venetian silver denarii dating to the late twelfth century” by Irene Calliari, Michele Asolati, Andrea Saccocci, Francesco Grazi, and Antonella Scherillo (pp. 132-134, 1 figure, 2 tables): OM, SEM-EDX, and XRF were used to determine that one of the later rulers (*doge*) debased his coins. “Using stereo imaging in a scanning electron microscope study of the anatomical changes to *Mimosa* wood from the traditional kilns in Pernambuco, north-east Brazil” by Caroline Cartwright, Chris Jones, Peter Gasson, and Claudia Luizon Dias Leme (pp. 135-137, 1 color figure): VP-SEM and FESEM were employed in charcoal analysis and a replication study; temperature-induced crystal structure of calcium oxalate figures in the deterioration. “Microstructure and impurities of bronze mirrors fabricated in the Koryo period (tenth-fourteenth century)” by Jung Eun Choi and Masahiro Kitada (pp. 138-140, 2 color figures): OM, SEM, EDX, and TEM were used to study metal craft technologies; variations in copper sulfide grains were discussed. “Characterisation of an eighteenth-century Meissen plate from the Götzendorf-Grabowski service using VP-SEM and HV-SEM” by Kelly Domoney, Andrew Shortland, and Sebastian Kuhn (pp. 141-144, 1 color figure, 1 table): A high-status Meissen presentation plate from Saxony, Germany, dated to the 18<sup>th</sup> century was broken in 1945 and afforded the opportunity to use SEM-EDX to assess the composition of the porcelain body, glaze, and overglaze enamel colors; further research using HH-XRF is contemplated. “An example of the application of SEM-EDX-XRF to the study of ancient gold artefacts” by Daniela Ferro and Vania Virgili (pp. 145-146, 2 figures [1 in color]): Italian gold hoop earrings were studied by the authors to determine manufacturing technologies; they also discussed the complementary capabilities of SEM-EDX-XRF. “Preliminary archaeometric study of the metallic grave goods from a rich Late Roman burial at Torrejón de Velasco (Madrid, Spain)” by Oscar García-Vuelta, Alicia Perea, Fabián Cuesta, Marc Gener, Ignacio Montero-Ruiz, Mercedes Murillo, and Martina Renzi (pp. 147-149, 4 figures [2 in color]): A Late Roman (4<sup>th</sup>-5<sup>th</sup> century AD) burial provided 16 objects (including gold and silver buckles, a situla, a copper brazier, and silver spoon and bowl) for VP-SEM analysis; copper objects had distinctly different alloys; further studies are anticipated. “Characterisation of metal threads from the decorations of the audience room in Dresden castle uses SEM-EDX

analysis” by Sylvia Hoblyn and Christoph Herm (pp. 151-156, 3 figures): SEM-EDX and SEM-SE were employed to analyze gold threads in textiles from a throne; the threads were actually silver with gold plating. “Metal threads: Evaluation of a cleaning method” by Ingrid Karina Jiménez Cosme, Carolusa González Tirando, Jannen Contreras Vargas, and José Luis Ruvalcaba Sil (pp. 152-155, 5 figures [2 in color]): OM and SEM were applied to an analysis of 38 silver metal strips wound around silk; corrosion creating silver sulphides was delineated and the authors concluded that there is no really safe cleaning method.

“Tetitla, Porch 25: Scientific analysis applied to the preservation of a mural painting from Teotihuacan” by Ingrid Karina Jiménez Cosme (pp. 155-157, 6 figures [2 in color]): This conservation project at a Mesoamerican Classic Teotihuacan period residence (ca. 200-300 AD), involved a mural discovered in 1963; OM and SEM-EDX analyses of pigments and plaster and a replication study suggested that the artists understood surfactants or emulsifiers in their use of black, green, and blue pigments. “Decorations of Pīr-i Hamza Sabzpūš’s tomb in Iran” by Amir-Hossein Karimy and Parviz Holakooei (pp. 158-160, 1 figure, 2 tables): SEM-EDX and XRD were used in an in situ analysis of ten specimens of pigments and stucco in a 12<sup>th</sup> century Seljuk tomb. “A study of the microstructure and condition of thin sheets of painting support ivory using SEM and ESEM” by Satomi Kitano, Alan Derbyshire, Nigel Meeks, Caroline Cartwright, Chris Stain, and Geoffrey Mitchell (pp. 141-142, 1 color figure): This conservation research involved the problem of the warping of elephant ivory supports used in late 18<sup>th</sup>-early 19<sup>th</sup> century portrait miniatures from the V&A Museum (London); collagen degradation was determined and the authors discuss potential damage from the use of electron beams. “White grounds applied to the main altarpiece of the Coimbra Old Cathedral: Historical technology and material characterisation” by Agnès La Gac, Ana Isabel Seruya, Maria José Oliveira and Isabel Ribeiro (pp. 163-165, 1 color figure): OM, SEM-EDX, and XRD were applied in a study of a 16th century Baroque period Portuguese altar; 100 samples of gesso were analyzed, and the authors comment on Gothic polychromy (1502), Baroque polychromy (1685), and a 1900 restoration. “Characterisation of lapis lazuli for a provenance study by means of SEM-EDX and SEM-cathodoluminescence” by Alessandro Lo Giudice, Alessandro Re, Debora Angelici, and Giovanni Pratesi (pp. 166-168, 1 color figure, 1 table): SEM-EDX and SEM-CL were employed in an analysis of specimens from four lapis sources (Afghanistan, Tajikistan, Siberia, and Chile); distinct compositional differences were characterized among the four. “Secondary phases in

archaeological and historical materials: A microstructural approach for interpreting the correct sequences of crystallisation” by Lara Maritan, Michele Secco, Claudio Mazzoli, and Gilberto Artioli (pp. 169-172, 1 figure): XRD, FTIR, and SEM figured in the study of crystallization in Iron Age pottery and concrete; a four-stage alteration model was proposed.

“Scanning Electron Microscopy investigation of Late Bronze Age high-tin socketed axes: Hoards from Langton Matravers, Dorset, southern England” by Nigel Meeks, Aude Mongiatti, Duncan Hook, Ben Roberts, Andrew Fitzpatrick, and Peter Woodward (pp. 173-175, 1 figure): Four hundred unfinished brittle cast axes dated 800-600 BC from Dorset were assessed by SEM-EDX and XRF; the metallurgical structures and chemical compositions were discerned. “Analytical characterisation of bole used in gilded plasterwork (Arab Room, Palácio da Bolsa, Oporto, Portugal)” by Patricia Mestre, Fernando Rocha, and João Coroado (pp.176-178, 1 figure, 1 table): Ten samples dating 1862-1880 were studied using SEM-EDX and XRD; bole was used in the preparation layers and the “water gilding” technique employed. “Scanning electron microscopy and optical microscopic study of gilded tiles from Darb-i Imam Tomb in Isfahan, Iran: by Moslem Mish Mast Nehi, Hamid Reza Chaman and Mohammad Mortazavi (pp. 179-181, 1 color figure): Broken tiles provided samples from this important tomb which was started in 1453 followed by repairs and additions to 1925; OM and SEM-EDX helped discern two gilding methods. “Evaluation of white rot deterioration in historic wood cellular structure by scanning electron microscopy and FTIR analysis” by Mohsen Mohammadi Achachluei, Gholamreza Vatankhah, and Aliakbar Enayati (pp. 182-184, 2 figures [1 in color]): This conservation science analysis of the biodeterioration of eight specimens from a 200-year-old door frame from Isfahan, Iran, employed SEM and FTIR. “The contribution of SEM-EBSD analysis to a microstructural interpretation of the elasticity of ancient fibulae springs” by Luca Peruzzo, Daniela Ferro, Vania Virgili, Irene Calliari, and Stefano Buson (pp. 185-187, 2 color figures, 1 table): An SEM-EBSD archaeometallurgical examination of three 6<sup>th</sup>-7<sup>th</sup> century BC bronze fibulae demonstrated the effects of corpse cremation as a factor resulting in homogenization of alloy structure. “Variable pressure scanning electron microscopy applied in the study of ancient manuscripts and inks” by Flavia Pinzari and Marina Bicchieri (pp. 188-189, 1 figure): VP-SEM, EDX, ATR-FTIR, and Raman spectroscopy and XRF were employed in the assessment of three parchment and three paper manuscripts from Islamic Yemen dating to the 7<sup>th</sup>-8<sup>th</sup> century AD; iron-gall and iron-tannic inks were discerned.

“Scanning electron microscopy and ceramic technology: Crucibles from late prehistoric Scotland” by Daniel Sahlén (pp. 190-192, 1 figure, 1 table): SEM, EDX, and PLM (Polarizing Light Microscopy) were used to evaluate 38 specimens that span the Late Bronze Age to Early Historic period (1000 BC-AD 800); different heating processes were determined with the diachronic development of specialized technologies. “Scanning electron microscopy study of Chinese jade working technology: Comparing excavated Bronze Age artefacts with jades in the British Museum” by Margaret Sax, Li Boqian, Nigel Meeks, and Qin Ling (pp.193-195, 3 figures [2 in color]): Nephrite jade-working (3500 BC to the present) was studied by an analysis of 21 specimens from the British Museum and 30 from Peking University; VP-SEM and ESED were used to determine the use of rotary and non-rotary tools used by Bronze Age artisans. “A petrographic study of the anthropomorphic stelae from the megalithic area of Saint-Martin-de Corléans (Aosta, northern Italy)” by Margherita Serra, Lorenzo Appolonia, Alessandro Borghi, Stefano De Leo, and Valentina Rubinetto (pp. 196-198, 1 color figure): Lithology and fabrication dating 3000-2000 BC were assessed by OM, and SEM-EDX, and helped define loci of manufacture of schist and marble stelae in a region of complex geology. “Scanning Electron Microscopy investigation of the Nuzi frits” by Andrew Shortland, Katherine Eremin, Marc Walton, Susanna Kirk, Patrick Degryse, and Joseph Greene (pp. 199-201, 1 figure): SEM was used on Hurrian-era frits from Nuzi (500 BC-AD 400, major occupation was in the Late Bronze Age); 50 beads (blue, dark blue, red, yellow, cream, and black beads) were cross-sectioned and the production processes differentiated. “Use of low vacuum scanning electron microscopy to study the morphology and degradation of organic materials” by Michelle Taube, Anna-Grethe Rischel, and Maj Ringgaard (pp. 202-204, 2 figures): LV-SEM and XRD were employed in an assessment of textiles, paper, wood, and waterlogged wood specimens to discern methods of manufacture, morphology, and deterioration parameters.

“SEM-EDX technological studies of some remarkable Early Bronze Age gold artefacts from Bulgaria” by Svetla Tsaneva, Martin Hristov, Victoria Karatsanova, and Zdravko Tsintsov (pp. 205-206, 2 figures): 21,000 small gold artifacts dating to the Early Bronze Age were studied; alluvial gold was the apparent source for the beads, and the authors note that cluster analysis was unsuitable in their investigation; cotton thread (earliest in this region) was found and bulrush seed-heads in a closed pottery vessel were used to “protect the beads.” “The formation of complex crusts in oil paints containing lead

white and smalt: Dissolution, depletion, diffusion and deposition” by Annelies van Loon, Petria Noble, and Jaap J. Boon (pp. 207-209, 1 figure): Paint specimens from Rembrandt’s “Homer” (1663) were examined by LM (Light Microscopy) and SEM-EDX and showed a depletion of potassium and the diffusion and migration of lead and potassium. “Uncovering painted surfaces in historic buildings: A comparison of paint removal techniques using light and Scanning Electron Microscopic surface imaging” by Edwin Verweij (pp. 210-211, 1 color figure): LM and VP-SEM were employed in APR (Architectural Paint Research) assessment of a building in The Hague built in 1740; 23 layers of paint and ten different color schemes were differentiated; mechanical, thermal, and chemical issues were discussed.

The 46 contributions to *Historical Technology, Materials and Conservation: SEM and Microanalysis* illustrate the breadth and depth of this field of research, as well as tried and tested and new directions in SEM and microanalysis, especially with SEM-EDX coupled with XRF. The authors and editors are to be congratulated for the timely publication of the contributions to this 2010 symposium. The presentations are clearly written and the texts and illustrations printed so that even small fonts are easily read - kudos to Archetype Publications

## UPCOMING CONFERENCES

*Rachel S. Popelka-Filcoff, Associate Editor*

### 2013

20-23 November. American Schools of Oriental Research Annual Meeting. Baltimore, MD USA. General information: <http://www.asor.org/am/index.html>

20-24 November. American Anthropological Association 111<sup>th</sup> Annual Meeting. “Future Publics, Current Engagements” Chicago, IL USA. General information: <http://www.aaanet.org/meetings/>

2-4 December. Association of Critical Heritage Studies, Canberra, Australia. General information: <http://conferences.criticalheritagestudies.org>.

9-13 December. American Geophysical Union Fall Meeting, San Francisco, CA USA. General information: <http://www.agu.org/meetings/>. “Special session on Aeolian Dust in Earth's Climate System”

1-4 December. Australian Archaeological Association Annual Conference, Coffs Harbour, NSW, Australia. General information:

[www.australianarchaeologicalassociation.com.au/conference](http://www.australianarchaeologicalassociation.com.au/conference)

## 2014

8-12 January. Society for Historical Archaeology Conference Montreal, Canada. General information: [http://www.sha.org/meetings/annual\\_meetings.cfm](http://www.sha.org/meetings/annual_meetings.cfm)

2-6 March. Pittcon Conference and Expo, Chicago, IL USA. General information: <http://www.pittcon.org/>

16-20 March. 247th National Meeting and Exposition, American Chemical Society. Dallas, TX USA. General information: <http://www.acs.org>.

19-24 March. REHAB 2014 International Conference on Preservation, Maintenance and Rehabilitation of Historic Buildings and Structures. Tomar, Portugal. General information: [rehab2014.greenlines-institute.org/rehab2014website/](http://rehab2014.greenlines-institute.org/rehab2014website/)

8-12 April. American Association of Physical Anthropologists Annual Meeting. Calgary, Alberta, Canada. General information: <http://physanth.org/annual-meeting>

23-27 April. Society for American Archaeology. 78<sup>th</sup> Annual Meeting, Austin, TX, USA. General information: <http://www.saa.org/AbouttheSociety/AnnualMeeting/tabid/138/Default.aspx>

15-17 May. Medieval copper, bronze and brass: History, archaeology and archaeometry of the production of brass, bronze and other copper alloy objects in medieval Europe (12th-16th centuries) – Dinant-Namur Belgium. General information: <http://www.laitonmosan.org>

19-23 May. International Symposium on Archaeometry (ISA). Los Angeles, CA, USA. General information: <http://www.archaeometry2014.com> Abstract deadline December 16 2013.

19-13 May. Current Archaeological Propection Advances for Non-Destructive Investigations in the 21<sup>st</sup> Century. Aztalan State Park in Jefferson County, WI USA. General information: Steven L. DeVore: [steve\\_de\\_vore@nps.gov](mailto:steve_de_vore@nps.gov), <http://www.cr.nps.gov/mwac/>

8-13 June. 20<sup>th</sup> World Congress of Soil Science. Jeju, Korea. General information: <http://www.20wcss.org>.

25-28 June. New Zealand Archaeological Association Conference, Cambridge New Zealand. General information:

[http://www.nzarchaeology.org/cms/index.php?option=com\\_content&view=section&id=10&Itemid=60](http://www.nzarchaeology.org/cms/index.php?option=com_content&view=section&id=10&Itemid=60)

14-18 July. 4th Congress of the Pan African Archaeological Association for Prehistory and Related Studies and the 22nd Biennial Meeting of the Society of Africanist Archaeologists. Johannesburg, South Africa. General information:

<http://www.paa2014.co.za/index.php/en/>

10-12 September 2014. Synchrotron Radiation in Art and Archaeology. Paris, France. General information: <http://www.sr2a-2014.org>

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