

SAS BULLETIN

NEWSLETTER OF THE SOCIETY FOR ARCHAEOLOGICAL SCIENCES

VOLUME 35 NUMBER 3

FALL 2012

DIGITAL ARCHAEOLOGY

The 39th International Symposium on Archaeometry was held in Leuven, Belgium in late May and early June this year. There was quite a turnout of participants, and some of the papers are highlighted within this issue (including the Taylor Student Poster Award winner). If you were unable to make the meeting, as I was, you may have followed along through different social media outlets. I am told that this was the first time ISA organizers really utilized Twitter, a practice that is more and more common at professional conferences. The use of various outlets can be integrated directly into the meeting, as when questions are tweeted to session chairs or live feeds are streamed around the world, or more informally employed to link interested participants afterward through Facebook.

For this year's ISA, I was kept up to date on many sessions by those blogging about the activities (see the writings of one such woman-on-the-scene at <http://findsandfeatures.wordpress.com/2012/06/10/international-symposium-on-archaeometry-2012-leuven-belgium/>). Web posts can expose all sorts of people to the way archaeological scientists work, and they don't have to be specific to conferences. The Day of Archaeology (June 29) is a project that seeks to share with the world

what it is that archaeologists do with all their time. The intent is to show, through images as well as words, that we don't all use whips and wear pith helmets. Rather, topics as varied as marine geophysics and digital archaeology are discussed. One example of what archaeology means to students in the field can be found here: <http://www.dayofarchaeology.com/working-with-the-public/>.

Once the holes are backfilled, the data are analyzed, and the artifacts are curated, there is still the issue of disseminating the results of your research. Increasingly, the Web 2.0 paradigm is shaping publishing as well. Many scholars are moving from the standard model of sending their work to large journals read by few and are beginning to distribute their research widely through open access formats. Not only does this sharing allow more people to be involved in the generation of knowledge, but it also leads to better preservation of information. These issues are discussed regularly in such places as the Digital Data Interest Group (<http://www.alexandriaarchive.org/blog/>).

Lastly, a new editor joins the *Bulletin* staff, but many of you may have already been reading her work. Katy Meyers is the author of the popular blog "Bones Don't Lie" (<http://www.bonesdontlie.com/>) and will be contributing bioarchaeological information within these pages.

James M. VanderVeen, Editor-in-Chief

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DAY OF
ARCHAEOLOGY 2012

a day in the life of
archaeologists

ANNOUNCEMENTS

Award

The winner of the **R. Ervin Taylor Student Poster Award Competition** at the 39th International Symposium on Archaeometry was Fabienne Eder of Vienna University of Technology, for her research “Chemical Fingerprinting of Hungarian and Slovakian Obsidian using Three Complimentary Analytical Techniques” (with co-authors Christian Neelmeijer, Nicholas J.G. Pearce, Johannes H. Sterba, Max Bichler, and Silke Merchel). A summary of the work follows:

The natural volcanic glass obsidian is one of the classical objects of archaeometrical analyses. Reliable provenancing by means of its highly specific chemical composition, the “chemical fingerprint,” can provide information about economy, policy and the social system of ancient societies. Although Mediterranean obsidian have mainly been the focus of characterization since the pioneer work of Cann & Renfrew (1964), provenancing of Central and Eastern Europe obsidian sources attracts increasing attention in the past decades. Fingerprinting of Hungarian and Slovakian obsidian sources is of great interest especially for Central European sites where obsidian has been widely used (Williams-Thorpe et al., 1984; Kasztovszky et al., 2008; Biró, 2009).

The application of three complementary analytical techniques on the same set of raw material samples allows both a more complete characterization of obsidian sources and a comparison of analytical results. The aim of this multi-methodical approach is to apply three different analytical methods, in particular: Instrumental Neutron Activation Analysis (INAA), Ion Beam Analysis (IBA) comprising of Particle Induced X-ray Emission (PIXE) and Particle Induced Gamma-ray Emission (PIGE), Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS), to detect a maximum element spectrum and to compare element concentrations determined with at least two analytical techniques. This way a check of self-consistency of analytical results is possible. Furthermore, it allows the identification of a maximum of compositional differences between Hungarian and Slovakian sources by revealing the most characteristic “chemical fingerprint” composed of more than 40 elements.

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Biró, K.T., 2009. Sourcing Raw Materials for Chipped Stone Artifacts: The State-of-the-Art in Hungary and the Carpathian Basin. In: Adams, B. and Blades, B.S. (Eds.) *Lithic Materials and Paleolithic Societies*. Wiley & Blackwell, pp. 47-53.

[Editor’s note: As your field work ends or your labs begin to get new people for the new academic year, please remember to invite your students to submit their research for the Taylor Award. The Society for American Archaeology’s 2013 meeting is in Hawaii, and abstracts are due in September.]

Call for Papers

Le colloque d'Archéométrie du GMPCA organisé à Caen (Basse-Normandie) du 22 au 26 avril 2013. Ce colloque est organisé par le Centre Michel de Bouiard, le laboratoire Géographie Physique et Environnement (Géophen LETG-UMR 6554 CNRS) et le service archéologie du Conseil général du Calvados. N'hésitez pas à répondre dès maintenant à l'appel à communication à l'adresse suivante: colloque.archeometrie@unicaen.fr. La date limite de soumission des communications et des posters est fixée au 15 octobre 2012.

Objectifs du colloque : le colloque d’archéométrie du GMPCA a lieu tous les deux ans depuis 1977. Il permet de réunir les archéomètres de toutes les disciplines. Il s’organise en de plusieurs sessions thématiques (toutes périodes confondues), dont certaines sont introduites par des communications orales. Des exposés plus courts et des posters permettent de présenter des avancées méthodologiques et des applications novatrices particulières. Les posters seront affichés durant toute la durée du colloque. Le colloque se tiendra à Caen, capitale régionale de la Basse-Normandie, dans une des plus anciennes universités de France. Située à proximité du rivage de la Manche et des plages du débarquement de 1944, la ville de Guillaume le Conquérant attire de nombreux visiteurs grâce à son riche patrimoine historique, son château, ses abbayes romanes, ses nombreux monuments, net grâce à ses musées dont le Mémorial pour la Paix. Les bombardements de 1944 ont marqué à jamais la ville et son environnement. Elle en a heureusement tiré le meilleur parti pour sa reconstruction.

ARCHAEOLOGICAL CERAMICS

Charles C. Kolb, Associate Editor

The column in this issue includes four topics: 1) Reviews of Books on Archaeological Ceramics, 2) Previous Meeting, 3) Forthcoming Meetings, and 4) Online Resource. Coming attractions in the next issue: a review of *Archaeological Ceramics in Thin Section: a Colour Guide* by Patrick Sean Quinn and Peter Martin Day, New York: Springer Verlag, 2012. This book (due to be published on 28 June 2012) was to have been the lead review in the column but has been delayed in publication. Sessions and papers to be presented at the American Anthropological Association annual meeting in San Francisco in November 2012 will be announced in August; contributions on ceramics will be summarized in the next *Bulletin*.

Reviews of Books on Archaeological Ceramics

Ceramics and the Spanish Conquest: Response and Continuity of Indigenous Pottery Technology in Central Mexico, Gilda Hernández Sánchez, *The Early Americas History and Culture*, Vol. 2, Brill, Leiden, 2011. 252 pp., 41 figures, 2 maps, 1 table. ISBN13:9789004204409, €105.00, ISSN: 1875-3264, \$144.00 US. (hardcover). Gilda Hernández Sánchez is adjunct researcher at the Department of Archaeology, Leiden University. Her previous studies focused on the analysis of pictographic decorations on ancient and present-day ceramic vessels found in Mexico, especially among the Mixteca. Although ceramics have been a key interest, the current monograph is new research and not based on her M.A. thesis or doctoral dissertation: *La Organización Doméstica en el Formativo Medio-Tardío. El Caso de Tetimpa, Puebla: Archäologie von Häusern aus Tetimpa, Puebla, 4 -3. Jhr. v.Chr. in Zentralmexi*, unpublished M.A. thesis/M.A. in Anthropologie mit Spezialisierung in Archäologie, Master-Arbeit, Puebla, Mexico: Universidad de las Américas, 2000. *Vasijas para Ceremonia. Iconografía de la Cerámica Tipo Códice del Estilo Mixteca-Puebla: Ikonegraphie von Mixteka-Puebla Keramik aus den 14-15. Jhr. n.Chr. in Zentralmexiko*, unpublished Ph.D dissertation, Leiden, Niederlande: CNWS Universiteit, 2005. She has published in journals including *Journal de la Société des Américanistes*, *Mexicon*, and *Latin American Antiquity*.

The present ceramic ethnoarchaeological treatise study combines Prehispanic archaeological data, colonial period history and archaeology, and ethnographic studies of contemporary potters. Her own research informs the latter. She rightly points out that the colonial period was

not one of decay or the weakening of indigenous culture although some traits were lost in adjustment, others maintained, and yet others transformed resulting in new, hybrid cultural forms. A growing body of archaeological research has led to a better understanding of Prehispanic ceramics while written Hispanic texts have been the mainstay of our knowledge about native cultures during the colonial era so that material culture during colonial times has until recently – 1960s to date -- been little considered by archaeologists – that has changed dramatically. This volume focuses on ceramics, an abundant category of material culture in Central Mexico (especially the Basin of Mexico nearby Basin of Puebla-Tlaxcala, and Valley of Toluca). The in the Post-Conquest era, native pottery retained its importance, main methods of fabrication, vessel forms, and patterns of decoration, but other components of production and distribution disappeared or were modified. Indigenous ceramic technology coexisted with Spanish ceramic technology, but some notable changes were adopted by some native potters, notably the use of the potter's wheel, glazing, and new forms of firing. Spanish workshops producing majolica were centralized in Mexico City and the city of Puebla.

Hernández Sánchez's volume has six chapters of which the central three are divided into discussions based on chronological periods: late pre-colonial, early colonial, and present-day. The basic format for these three chapters is an initial discussion of sources of information, the organization of production, and the impact of production and distribution. There is a 300-year gap between the latter two periods, in the main, because of a lack of historic and archaeological information; nevertheless, there is a great deal of cultural continuity. The "Bibliography" (pp. 227-244) has 357 entries and the "Index: (pp. 245-251) conflates topics and proper nouns. She depends and cites heavily the archaeological and documentary research of the late Thomas Charlton (7 single authored and 8 other coauthored works), Paty Fournier (4 entries and 2 other coauthored citations), John Goggin (4 citations), Florencia Müller (4 entries), Enrique Rodríguez Alegría (4 works), and Mike Smith (7 single-authored and 4 coauthored publications). There are 6 entries by Hernández Sánchez herself plus a coauthored manuscript. Dave Grove will be unhappy that he is cited twice as "Groove" (P.135, 234.)

The volume begins with "Acknowledgments" and an "Introduction" (pp. 1-17, 1 map) that elaborates the concept of cultural continuity, terminology, and the organization of this work. "Chapter 1. Archeology of Colonialism" (pp. 19-27) addresses issues of post-colonial thinking; colonies, colonization and colonialism;

hybridity and hybridization; the archeology of colonialism; and the archeology of colonialism in Mesoamerica. The second chapter “The Study of Material Culture” (pp. 29-41) is an essay dealing with the study of material culture, its changes, a method to study changes in material culture, the conservatism of potters, and change and continuity in pottery-making. “Chapter 3. Ceramic-Making before the Conquest” (pp. 43-90, 10 figures, 1 map) begins with a discussion of the sources for the study late pre-colonial ceramics, and dependent on the seminal works of Owen Rye (1981) and Sahagun’s *Florentine Codex* (1992) and, to a lesser extent, Prudence Rice (1987) book. Important research by the late Elizabeth Brumfiel, Cervantes, Charlton and colleagues, Fournier, Garraty, Michael Smith, and Whalen and Parsons have informed Hernández Sánchez. The organization of ceramic production focuses on six variables: 1) Clay preparation; 2) Vessel forming (coiling and horizontal molding); 3) Vessel surface finishing (polishing, slipping, and burnishing); 4) Firing (poorly known but in an oxidizing atmosphere); 5) Decoration (painting); and 6) Assembling vessel shapes (bowls, comals, censers, and wares for cooking, storage, and transport). Aztec Black-on-Orange, Red wares, and Cholula polychromes are discussed as are general domestic and elite ceramics. The impact of the Aztec empire on ceramic-manufacture and distribution are considered within frameworks of economics, trade, and transportation via human burden-bearers. She also discusses ceramics as ritual objects and a media of literacy.

“Chapter 4. Ceramic-Making in Early Colonial Times” (pp. 91-151, 13 figures, 1 table). The primary sources in the study of early colonial ceramics include the *Florentine Codex* (especially Book 10) and Robert Barlow’s (1951) *Códice de las Alfareros de Cuauhtitlan*, a colonial manuscript on native ceramics (1564), and reports sent to Spain. Other resources include field and archival research by Charlton and colleagues, Fournier, Garraty, Lister and Lister, Muller and by historian Charles Gibson. The author comments that “we still do not exactly know when the Spanish ceramic technology arrived to Mexico as this industry is scarcely mentioned in early colonial documents” (p. 103). The organization of ceramic production is reviewed by focusing on six variables: 1) Clay preparation (little variation in the clay recipes in the Basin of Mexico); 2) Vessel forming (the continued use of coiling horizontal molding since the wheel was not adopted in indigenous workshops. Bowls, comals, censers, and wares for cooking, storage, and transport continue with the addition of shapes with Spanish); 3) Vessel surface finishing (notably the introduction of lead glazes); 4) Firing (two-chamber

updraft kilns are introduced with two firings [bisque and final] and the use of saggars is noted); 5) Decoration (Black-on-Orange ceramics with European designs and motifs replace Aztec/Nahuatl painting; and 6) The repertoire of vessels. The author provided a lengthy discussion of the modifications to the repertoire as seen in lists of vessels (p. 134) including Black-on-Orange pottery, Red wares – which became a “favorite” (p. 119), and Cholula polychromes. The impact of the Spanish ceramic technology (pp. 140-149) includes the introduction of majolica and the formation of guilds. Archival documents and archaeological investigations in colonial era sites (Tlatelolco in Mexico City and the town of Otumba in the Teotihuacan Valley) inform our understanding of production and distribution. Otumba had colonial workshops for braziers and figurines. The colonial period conserved many aspects of Prehispanic ceramic shapes and added new details (lids and ring bases) and more forms of molcajetes (chili grinders) and the introduction of Spanish measures and weights altered and standardized vessel sizes. Ceramics as indices of cultural affiliation in early colonial central Mexico are further documented and early colonial ceramics in central Mexico are summarized focusing on Spanish vs. native workshops, lead glaze, decorative elements, and vessel morphology (pp. 149-151). There is a useful table correlating Nahuatl, Spanish, and English equivalent names for vessels (p. 137).

“Chapter 5. Ceramic-Making at the Present” (pp. 153-205, 18 figures) is dedicated to a study of contemporary pottery-making in Central Mexico, focusing on the towns of Amozoc and San Miguel Tenextatiloyan in the state of Puebla; Metepec, barrio de Santa Cruz Texcoco, Santa María Canchesdá, Santiago Coahucochitlan, and San Juanio in Estado de México; and Huasca in the state of Hidalgo. Again, we see cultural continuity in spite of a 300-year hiatus, but with noteworthy change since the 1960s. Hernández Sánchez has surveyed the ceramic ethnographic literature for the region and draws upon some examples from nearby Tonalá, Jalisco, and Aztompa, Oaxaca. The chapter has the same six variables in the organization of ceramic production: 1) Clay preparation (there is information about the introduction and impact of electric mills); 2) Vessel forming (the factory replacing the workshop and the impact of tourism are noted); 3) Vessel surface finishing (two distinct glazes are used and she reviews health issues in using lead glazes; very little unglazed pottery is produced – comals are the exception); 4) Firing (two-chamber updraft kilns are still used and she considers the use of fuel wood and replacement combustibles); 5) Decoration (the forms and functions of decoration have changed significantly); and 6) Assembling vessel shapes (new vessel shapes for the

tourist market are now made but traditional ollas, cazuelas, and comales are still produced. She notes that Red Wares are no longer produced (p. 180) and that “every stage of the sequence of production has changed” (p. 193) and the chapter concludes with detailed presentations on the environmental impact of ceramic-making, institutional programs that promote ceramic-making, and the economics of present-day ceramic-making in central Mexico – low pay for the product and restrictions of fuels. “Chapter 6. Ceramics, Cultural Continuity and Social Change” (pp. 207-225) focuses on six topics: The development of ceramic-making during early colonial times, ceramic-making at the present, cultural continuity, the role of material culture in the process of colonization, reactions of Mesoamerican potters to the colonization, and prospects for ceramic-making in the future.

Spanish colonization dramatically interrupted the autonomous development of ancient Mesoamerican culture. Nevertheless, most indigenous societies learn to adapt to an era that was a time of crisis, but also a creative time period in which material culture reflected indigenous peoples’ varied responses and adaptations to the changing circumstances. This is a useful summary of Central Mexican pottery-making over roughly five hundred years. An expansion of this research to include other regions and comparisons of the colonial and contemporary pottery-making in the Valley of Oaxaca, West Mexico (especially Michoacán), and the Maya region would be valuable. The book would be of interest to scholars and students of the colonial era of Mesoamerica and cultural continuity and adaptation. A few typographical and substantive errors do not detract from the overall goal of the volume.

Holding It All Together: Ancient and Modern Approaches to Joining, Repair and Consolidation, Janet Ambers, Catherine Higgitt, Lynne Harrison, and David Saunders (eds.), London: Archetype Publications, in association with the British Museum, 2009. xi +210 pp. ISBN-10 1904982476, ISBN-13 9781904982470, £50.00, \$90.00 US, (paperback). The five conference organizers are affiliated with the Department of Conservation and Scientific Research at the British Museum: Ambers, Scientist (Radiography and Raman spectroscopy); Higgitt, Head of Science Group (Organic analysis); Harrison, Conservator of organic artefacts; and Saunders, Keeper, Department of Conservation and Scientific Research. This volume constitutes the proceedings of a conference on the conservation of antiquities held at the British Museum in February 2008. The international assemblage of contributors focus on the choices, materials and techniques involved in creating an object

and the repairs and renewal processes that it has undergone. Presenters came primarily from the UK and the US, but also from Australia, Canada, the Czech Republic, Denmark, Finland, Germany, Greece, Italy, The Netherlands, Norway, Portugal, and Spain. The papers are diverse and wide-ranging and the book is especially useful for curators and conservators but also of interest to archaeologists working in the field and in the laboratory and scholars of material culture. Understanding the choices, available materials, and techniques involved in the creation of objects and their repairs and renewal processes are significant to conservators and curators. In addition, the evaluation of modern materials is an essential element in the conservation process, particularly for specific form of material culture and the chemistry of the adhesives and repairs that are made. The color images are superb and better illustrate the specimens and techniques discussed by the various authors.

The volume has a “Foreword” (p. ix), and “Acknowledgments” (p. xi) with the narratives (31 chapters) divided into three groups: ancient and traditional, modern and case studies. The papers within these divisions are organized by materials and then ordered chronological. The three parts are: Part 1: Joins and Repairs: Ancient and Traditional with four sections (pp. 3-88): Glass and Ceramics (5 contributions), Metals (3 chapters), Organics (5 essays), and Overview (1 paper). Part 2: Joins and Repairs: Modern (Post Nineteenth Century) with four sections (pp. 91-163): Modern Adhesives (2 essays), Glass and Ceramics (4 contributions), Stone (2 chapters), and Organics (2 papers). Part 3: Case Studies (7 chapters, pp. 166-210). Each of the 31 chapters has its own references and nearly all of the illustrations are in color. Following the order of presentation in the volume, I shall provide basic information on all of the chapters but with additional information on those dealing with ceramic materials.

Part 1: Joins and Repairs: Ancient and Traditional. (14 chapters, pp. 3-88): Gerhard Eggert and Daniela Simone Straub “Ancient glass gluing recipes” (pp. 3-7, 5 figures, 25 references). Renske Dooijes and Olivier Peter Nieuwenhuyse “Ancient repairs in archaeological research: A Near Eastern perspective” (pp. 8-12, 6 figures, 19 references). Repairs were generally confined to high quality serving bowls and three case studies are detailed, one each from the Neolithic, Uruk period, and Late Bronze Age (LBA). Drilling and crack lacking was common to all three periods with the use of bitumen as an adhesive and Dean E. Arnold “Joining clay: A comparison of modern and ancient techniques (pp. 13-17, 7 figures, 11 references). Arnold reports that potters are

concerned about breakage in the 14 communities of potters he has studied. He provides three case studies that illustrate a range of joining techniques: Ticul, Yucatan, Mexico where a fifteen-step moulding process is employed, the Valley of Guatemala where old fired pottery vessels are used as templates in forming the bases of new vessels, and among the ancient Inca of Peru where breakage typically occurred at coil boundaries. The choice of joining techniques is related to traditional motor habits. Chris White, Nancy Odegaard, and Arianna Lea Shackle "Prehistoric and ethnographic repair techniques and materials on southwestern Native American pottery" (pp. 18-24, 6 figures, 29 references) discuss drilling and lacing, the use of pine resin and creosote lac, and the recent adoption of organic adhesives. Analytical techniques (ultraviolet autofluorescence, chemical spot checking, and infrared spectrometry [FTIR]) and testing protocols are detailed. Arianna Lea, Shackle Dean Sully, Renata Peters, and Chris White "The use of ethnographic and scientific knowledge to explore creosote lac repairs on pottery vessels at the Arizona State Museum" (pp. 25-30, 4 figures, 1 table, 21 references) is a case study involving the use of creosote lac as a traditional repair material ethnographic pottery made by the Tohono O'odham in the ASU collections; GC-MS analysis is suggested as a next step in their study. Non-ceramic contributions include: Lucy Skinner "Bronze Age metalwork from central Norway: Some examples of ancient and modern repair" (pp. 31-34, 7 figures, 1 reference); Sonia O'Connor "Interpreting the construction and function of the terrets from the Ferry Fryston burial" (pp. 35-41, 8 figures, 14 references); Kim Cullen Cobb and Thomas Evans "Rivets: Connection and repair in Mississippian copper artefacts" (pp. 42-49, 6 figures, 18 references); Clare Ward, Janet Ambers, and Jill Cook "A 13,000 year old repair: New observations on a Late Magdalenian spearthrower from Montastruc, Tarn-et-Garonne France" (pp. 50-53, 8 figures, 9 references); Camilla C. Nordby "Continuity or change?: The use and function of birch bark tar in Norwegian Early Iron Age grave contexts" (pp. 54-61, 7 figures, 51 references); Rebecca J. Stacey and Caroline R. Cartwright "Construction, modification and repair of Mexican mosaics: Evidence from adhesives" (pp. 61-67, 7 figures, 1 table, 21 references); Andrew Honey and Athanasios Velios "The historic repair and reuse of Byzantine wooden bookboards in the manuscript collection of St. Catherine Sinai" (pp. 68-77, 8 figures, 1 table, 21 references, and 1 three-page appendix); and Suvi Leukumaavaara "The Pälkäne crucifix: Unusual joining materials in a polychrome crucifix from Finland" (pp. 78-82, 2 figures, 30 references). The final chapter in Part 1 deals with pottery and metals: Helge Brinch Madsen "Repairs in antiquity illustrated by examples from the

prehistory of Denmark" (pp. 83-90, 6 figures, 25 references). The author reviews repairs to utensils, weapons, jewellery, and garments fabricated from wood, wool, hide, clay, bronze, and silver. Part of the chapter reviews bored lashing holes in sherds and pots dating from Ertebølle (5th millennium BCE through the Viking Age (100 CE) and gap filling with resins and amber.

Part 2: Joins and Repairs: Modern (Post Nineteenth Century) (10 chapters, pp. 91-163) ; only Koob's chapter is concerned with ceramic materials: Jane L. Down "Poly(vinyl acetate) and acrylic adhesives: A research update" (pp. 91-98, 4 figures, 2 tables, 15 references); Petronella Nel and Deborah Lau "Identification of a formulation change in a conservation-grade adhesive" (pp. 99-106, 8 figures, 11 references); Sandra Davidson "A history of joining glass fragments" (pp. 107-112, 5 figures, 28 references); and Stephen P. Koob "Paraloid B-72®: 25 years of use as a consolidant and adhesive for ceramics and glass" (pp. 113-119, 5 references, 20 references). He reviews the use of stable acrylic resins in conservation as a consolidant and adhesive for ceramics and glass. There is an extremely valuable discussion of consolidation of ceramics by capillary action and consolidation prior to desalinization, a brief note on the application of B-72 on ceramics (covered in detail in other cited literature) and practical repairs to earthenware and terracotta as well as china, stoneware, and porcelain. The limitations of B-72 as adhesive, instructions for preparing B-72 as an adhesive for ceramics or glass, and modifications for use in archaeological fieldwork are detailed. Other contributions include: Katrin Willstadt and Peter Mottner "Internal fractures on stained glass windows: A conservation study" (pp. 120-126, 6 figures, 3 tables, 16 references); Inés Coutinho, Ana Maria Ramos, Augusta M. Lima, and Francisco Braz Fernandes "Studies of the degradation of epoxy resins used for the conservation of glass" (pp. 127-133, 4 figures, 3 tables, 21 references); Jerry Podany, Erik Rissler, and Eduardo Sanchez "Never forever: Assembly of sculpture guided by the demands of disassembly" (pp. 134-142, 9 figures, 9 references); Mersedeh Jorjani, George Wheeler, Carolyn Riccardelli, Wole Soboyejo, and Nina Rahbar "An evaluation of potential adhesives for marble repair" (pp. 143-149, 6 figures, 1 table, 13 references); Irena Kučerová and Daniela Drncová "The consolidation of wood with Paraloid B-72® solutions" (pp. 150-156, 8 figures, 17 references); and Gema Campo Francés, Anna Nualart Torroja, Marta Oriola Folch, and Cristina Ruiz Recasens "A study of the effects of PVAC on works of art on paper and wood: pH and colour change" (pp. 157-164, 3 figures, 2 tables, 10 references).

Part 3: Case Studies (7 chapters, pp. 166-210); only the final contribution by O'Grady focuses on ceramics: Jane T. Bouvard and Melangell Penrhys Jones "Means, materials and ethics: The conservation of two Egyptian Mummies for long-term display" (pp. 166-172, 8 figures, 10 references); Eleni Asderaki-Tzoumerkioti "Ancient and modern joining techniques on a bronze Hellenistic urn" (pp. 173-176, 5 figures, 17 references); Mary Davis and Annette Townsend "Modelling the Caergwrle bowl: Ancient, historic and modern methods" (pp. 177-183, 8 figures, 17 references); Susan D. Costelo, Katherine Eremin, and Francesca G. Bewr "An investigation of repairs to Chinese bronze artefacts at the Harvard Art Museum" (pp. 184-191, 7 figures, 10 references); and Sarah Headley-Dilkes and Jonathan Kemp "Boundaries and authenticity in the *Monument to Marchese Spinetta Malaspina*" (pp. 192-198, 7 figures, 15 references). Two essays have ceramic content: Elisabeth Huber, Antonio Iacarino Idelson, and Carlo Serino "The mechanical assembly of a Renaissance terracotta relief: Restoring a tin glazed work of art" (pp. 199-204, 6 figures, 7 references). The restoration of the terracotta relief begins with consideration of production techniques, condition of the fragments, restoration procedures, the use of supports, and the choice of mechanical assembly (costly and time-consuming). Lastly, Caitlin O'Grady "Investigation and analysis of historic early twentieth-century Mexican restoration fills and repairs at Casas Grandes ceramics at the Arizona State Museum" (pp. 205-210, 5 figures, 1 table, 16 references). The Casas Grandes (Chihuahua, Mexico) vessel collection at the Arizona State Museum has 34 ceramics with historic Mexican restoration repairs. The artifacts, description of repairs, curatorial information, conservation history, and methodologies are reviewed. The chemical composition of repairs was determined by the use of microchemical spot testing, FTIR, XRF, and SEM-EDX analyses; 13 ceramics had protein-based adhesives and 21 had non-proteinaceous repair recipes.

This is a valuable monograph volume that points out the significance of modern conservation materials and procedures. Collectively, these 31 brief and compelling contributions provide a window to the conservation of material culture in antiquity and our contemporary world. The museum conservator, field archaeologist, and a host of others can learn much about the conservation of different items of material culture in their collections and the preservation of the objects in their repositories.

Under the Potter's Tree: Studies on Ancient Egypt Presented to Janine Bourriau on the Occasion of her 70th Birthday, David Aston, Bettina Bader, Carla Gallorini, Paul Nicholson, and Sarah Buckingham (eds.).

Orientalia Lovaniensia Analecta 204. Leuven, Paris, and Walpole, MA: Uitgeverij Peeters en Departement Oosterse Studies, 2011. xxxiv + 1036 pp., ISBN 978-90-429-2472-7 (hardcover), €105/\$142.00 US (current online prices are much higher). This festschrift is for Janine Bourriau, a Senior Fellow at the McDonald Institute for Archaeological Research, Cambridge University who was largely responsible for developing the "Vienna System," a widely-accepted and influential schema of visual classification for ancient Egyptian ceramics, employed increasingly in Egyptian archaeology and in surrounding regions in which Egyptian ceramic objects have been excavated. The schema was initially drafted in the city of the same name during meetings held in 1980 between Dorothea Arnold, Manfred Bietak, Janine Bourriau, Helen and Jean Jaquet, and Hans Åke-Nördstrom (the International pottery Liaison Group). The system especially differentiated Nile Silt Fabrics (originally designated "Nile Fabrics") and Marl Fabrics. Its first published version was in 1985 but the definitive plan was authored by Hans-Åke Nordström and Janine Bourriau (1993), "The Vienna System," in Chapter 4 in *An Introduction to Ancient Egyptian Pottery Ceramic Technology: Clays and Fabrics, Fascicle 2*, Dorothea Arnold and Janine Bourriau (eds.), Deutsches Archäologisches Institut Abteilung Kairo Sonderschrift 17, Mainz am Rhein: Philipp von Zabern, pp.168-182, pls. I-VII. Bourriau is Anglo-French heritage (more precisely Anglo-Breton, an important distinction) and holds an MA in history from King's College, and a diploma in Egyptology from the University College London, 1965. She has studied and classified pottery from the major excavations in Egypt, including those at Saqqara, Memphis, Deir el-Ballas, Buto, and Deir el-Bersheh. The current festschrift honoring her includes "Janine's Bibliography" (pp. xxv-xxxiii) with 137 entries chronologically by year from 1969 through 2011 and includes: *Umm El-Ga'ab: Pottery from the Nile Valley before the Arab Conquest* by Fitzwilliam Museum Staff and Janine Bourriau, Cambridge University Press (softcover, 1981); *Pharaohs and Mortals: Egyptian Art in the Middle Kingdom* by Janine Bourriau and Stephen Quirke, Cambridge University Press (hardcover, 1988); *Understanding Catastrophe: Its Impact on Life on Earth* edited by Janine Bourriau, Cambridge University Press (softcover and hardcover, 1992); *An Introduction to Ancient Egyptian Pottery* by Dorothea Arnold and Janine Bourriau, Philipp von Zabern (hardcover 1993); *Egyptian Art* by Janine Bourriau, Eleni Vassilika, Bridget Taylor, and Andrew Morris, Cambridge University Press (softcover and hardcover, 1995); *Colour: Art & Science* by Trevor Lamb, Janine Bourriau, Cambridge University Press (softcover, 1995); *New Kingdom Pottery Fabrics* by Janine Bourriau, L. M. V. Smith, and Paul T. Nicholson,

David Brown Book Co. (softcover, 2000); *Invention and Innovation: The Social Context of Technological Change*, 2; *Egypt, The Aegean and the Near East, 1650-1150 BC, Proceedings of a Conference Held at the McDonald Institute* by Janine Bourriau, Jacqueline Sharon Phillips, and Jacke Phillips, Oxbow Books Ltd (softcover, 2004); and *The Memphite Tomb of Horemheb: The New Kingdom Pottery* by Janine Bourriau, Maarten J. Raven, René van Walsem, David Aston, and Colin Hope, David Brown Book Co. (hardcover, 2005). She has also authored numerous publications in the *Journal of Egyptian Archaeology*.

The title of this volume comes from Bourriau's favorite spot "under the potter's tree at Memphis where sherds were sorted, village life observed (and observed us) and where we were continually entertained by some of the local fauna" (p. xii). The monograph includes 50 wide-ranging articles written by international scholars in her honor. Chronologically, these essays date from the Predynastic Period to the 20th century CE and cover a variety of aspects of Egyptology. A majority of the contributions (35 of 50) deal with the topic for which she is most famous -- ceramic studies. These essays include reports on miniature pots, Aswan flasks, fish dishes, Bes vases, embalming caches, terracotta figurines, copies of ceramic vessels in glass, stone and metal, painted pottery, depictions of vases in Egyptian reliefs, newly excavated ceramic material, and the influence of Egyptian motifs on pottery of the 18th and 19th centuries CE. The non-ceramic contributions consider hair combs, soul houses, stelae, coffins, Nubia, the dormition of princess Meketaten, the length of the reign of Seti I, Late Period names, Ancient Egyptian science, Petrie's unpublished archives, and the geology of Luxor.

The book includes an "Editorial Foreword" (p. xi-xii); Harry S. Smith's "Janine – A Teacher's View" (xiii-xiv) in which he comments "No scholar better deserves the tribute of Festschrift from her colleagues than Janine Bourriau" (p. xiv), and Peter G. French's "Janine – A Husband's View" (pp. xv-xvii) in which he states that "In the last forty years or so, Egyptian archaeology has been catching up with the rest of the world, and a long overdue elevation of ceramics has brought it from an amusing occupation for the newest recruit to an indispensable dating tool, as well as a legitimate subject for study in its own right. For this Janine is in part responsible" (p. xvii). The final tribute is by Elham Ahmed el-Tawwil, Mahmoud Mohamed el-Shafei, Mohamed Ali Abd el-Hakiem, Mohamed Naguib Redd, Nermeen Shaaban Abayazeed, Shaimaa Rasheed Salem, and Sherif Mohamed Abd el-Monaem "Mother of the Ceramicists" أم ف IE mmU فخاريين – A Students' Tribute:

(pp. xix-xx). There is a "Tabula Gratulatoria" (pp. xi-xxiii) and "Janine's Bibliography" (pp. xxv-xxxiii) chronologically from 1969 to 2011. The 50 "Articles in Honour of Janine Bourriau" (pp. 3-1036) follow in alphabetical order by authors' last names and the vast majority is very substantive, lengthy, well-illustrated contributions. Each essay has its own bibliography and there is no index. The summaries of selected chapter follow; I have prepared summaries of all 50 chapters and would provide the full seven-page review via email if any reader is interested in receiving this document.

The editors and contributors are to be thanked for creating this splendid festschrift with its lengthy and substantive essays and excellent illustrations. It is a very worthy tribute to Janine Bourriau and her ceramic studies and teaching. Of special note are the chapters prepared by Catherine Defernez correlating Achaemenid ceramics and goldsmithing, Paul Nicholson's contribution on saggars production and use, Nordström's historical essay on pottery fabrics, Mary Owenby's synthesis of scientific and archaeological analyses noting the importance of thin section studies, and Margaret Serpico's study of Hatshepsut's Foundation Deposit jars and contents assessed by GC-MS. Catherine Defernez "Four Bes Vases from Tell el-Herr (North-Sinai): Analytical Description and Correlation with the Goldsmith's Art of Achaemenid Tradition" (pp. 287-323, 19 figures, 1 table): the evolution of Bes vases made of Marl clays dated to the Persian Period (mid-5th to 1st quarter of the 4th century BCE) and the development of the "international Achaemenid style" are discussed. Paul T. Nicholson "I'm not the saggars-maker, I'm the saggars-maker's mate...": Saggars Making and Bottom Knocking in Stoke-on-Trent as a Guide to Early Saggars Technology" (pp. 703-722, 9 figures): the essay provides a history of handmade saggars, their description, clays used in fabrication, and comparisons with British vs. Memphis products; oral history interviews were used for the British component. Hans-Åke Nordström "The Significance of Pottery Fabrics" (pp. 723-730, 1 figure): a history of fabric studies, the potter's craft, documentation, and the Vienna System of fabric identification are presented. Mary Owenby "Through the Looking Glass: The Integration of Scientific, Ceramic, and Archaeological Information" (pp. 751-767): her article includes a discussion of scientific analyses in Egyptian ceramic studies (production, distribution, and exchange), the use of NAA (1969), thin-section petrography, XRF, and SEM, with a section on sample selection, the distinctiveness of Marl clay A, B, C, and D fabric groups, petrography, and statistical analyses; Shepard, Matson, Adams, and Dorothea Arnold are cited. Margaret Serpico, with an Appendix by Ben Stern "The Contents

of Jars in Hatshepsut's Foundation Deposit at Deir el-Bahri and their Significance for Trade" (pp. 843-883, 9 figures, 3 appendices): the role of foundation deposits and jars and the selection of 10 specimens of jar contents for GC-MS analysis, and the results are documented; the contents are likely *Liquidambar* sp. or *Styrax officinalis* and there is a lengthy discussion of dating, interpretations, and trade implications in the eastern Mediterranean.

Major publications by two contributors, Rzeuska and Wodzinska, have been reviewed previously in the *SAS Bulletin: Studies on Old Kingdom Pottery* (Teodozja I. Rzeuska and Anna Wodzinska (eds.), Centre d'Archéologie Méditerranéenne de l'Académie Polonaise des Sciences avec la collaboration de l'Institut d'Archéologie de l'Université de Varsovie. Warsaw: Wydawnictwo Neriton, 2009). *SAS Bulletin* 34(4):9-11 (2011). *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* (Anna Wodzinska, AER Field Manual Series 1-4, Boston: Ancient Egyptian Research Associates, Inc., 2009-2010). *SAS Bulletin* 33(3):12-13 (2010). Teodozja I. Rzeuska, with an Appendix by K. O. Kuraszkiewicz "An Offering of a Beer Jar or a Beer Jar as an Offering? The Case of a Late Old Kingdom Beer Jar with an Inscription from West Saqqara" (pp. 829-841, 2 figures): five vessels deposited by the king in Shaft 98 as offerings are documented. Anna Wodzinska "Pottery and Chronology: Preliminary Remarks on Ceramic Material from Tell el-Retaba" (pp. 1015-1036, 14 figures): this site is a New Kingdom (18th to 20th Dynasty) settlement in the Eastern Delta with Marl fabric domestic pottery (mostly Marl D) plain and painted bowls as well as late 19th to early 20th Dynasty Red Slipped bowls in Nile B2 fabric, Third Intermediate (21st to 22nd Dynasty) cups and jars in Nile B2 fabric, and "a rich assemblage of pots" dating to the end of the Third Intermediate to Late Period in Nile B1 fabric but with large bowls and trays in Nile C fabric.

Household Ceramic Economies: Production and Consumption of Household Ceramics among the Maros Villagers of Bronze Age Hungary, Kostalena Michelaki. British Archaeological Reports International Series S-1503, Oxford: Archaeopress, 2006. xvi + 224 pp., 59 figures, 74 tables, 39 appendices, bibliography; ISBN: 1-84171-933-1, \$100.00 (softcover). The author studied archaeology at the Aristotle University of Thessaloniki in Greece (1991) and earned her MA in 1993 and her PhD in 1999, both in Anthropology, from the University of Michigan. In 2003 Michelaki joined the Anthropology Department at McMaster University (Hamilton, Ontario),

where she created and directed the Laboratory for Interdisciplinary Research on Archaeological Ceramics, funded by the Canada Foundation for Innovation. She joined the School of Human Evolution and Social Change at Arizona State University in 2010 where she is currently focusing on the exploration of ceramic technologies in southern Italy from the Early Neolithic to the Classical Greek period, as part of the Bova Marina Archaeological Project (Universities of Cambridge and Leicester) in Calabria, Italy. This research has been funded by the Social Sciences and Humanities Research Council of Canada (Major Research Grant and Research Development Initiatives). The project methodology involves a raw materials survey, experimental archaeology, and laboratory analyses of clays and ceramic samples from five closely spaced archaeological sites on the Umbro Plateau of Bova Marina. In addition, she continues her work begun at McMaster on Iroquoian ceramic technologies and specifically the introduction of shell-tempering techniques to Neutral-Iroquoian assemblages.

Michelaki's research centers on the study of human technological decision-making and the factors that affect it in the long term, through the interdisciplinary analysis of archaeological ceramics. Her holistic approach towards technology views it as simultaneously social, technical and traditional. In addition to the mechanical properties of raw materials and performance characteristics of finished vessels place upon a potter, she examines the specific ways in which potters choose to meet these constraints. Methodologically, she combines macroscopic, mineralogical (e.g., petrographic analysis and X-Ray Diffraction) and physicochemical (e.g. Instrumental Neutron Activation Analysis and Scanning Electron Microscopy) analyses of archaeological ceramics, with raw materials survey and experimental projects.

She has three recent publications: "Making pots and potters in the Bronze Age Maros villages of Kiszombor-Új-Élet and Klárafalva-Hajdova," *Cambridge Archaeological Journal* 18: 355-380 (2008); Michelaki and Ronald G.V. Hancock "Chemistry versus data dispersion: Is there a better way to assess and interpret archaeometric data?," *Archaeometry* 53:1259-1279 (2011); and Michelaki, Ronald G.V. Hancock, and Gregory V. Braun "Using provenance data to assess archaeological landscapes: an example from Calabria, Italy," *Journal of Archaeological Science* 39(2):234-246 (2012).

The monograph under review begins with a "Prologue" and "Acknowledgments" (p. ii), "List of Tables" (pp. viii-

x) n = 74; “List of Figures” (pp. xi-xiii) n = 59; and “List of Appendices” (pp. xiv-xvi), n = 39 primary appendices but a total of 61). There are nine chapters beginning with “1. Introduction” (p. 1) documenting the structure of this monograph, and “2. Theoretical Background” (pp. 2-9) in which she reviews six topics: practice-agency-structure; technology as a system of practices (Giddens and Pffenger); other approaches to technology (Mauss); technology, function, and style as a tripartite division (Binford, Skibo, Schiffer, Knappett, etc.); ceramic ecology (Matson and Arnold); and ceramic economics (Polyani), plus a brief review of ceramic economy models (those proposed by Costin 1986 and 1991 and Rice 1991). “3. Examining Ceramic Production and Use in the Archaeological record” (pp. 10-23, 7 tables) focuses on four topics: the operational sequences of ceramic production: raw materials, forming, drying, and rate of firing, temperature and atmosphere; the archaeological examination of pottery manufacture; vessel use and function: vessel form, technological characteristics of vessels, direct evidence of vessel use, and contextual information; and expected uses: cooking, food preparation without heat; serving, eating, and drinking; storage, and transportation, and identifying the principles of the organization of production.

“4. Background to the Maros” (pp. 24-36, 2 figures, 3 tables) deals with contextual topics. Michelaki discusses name changes over 130 years of archaeological research and settles on the term “Maros culture” introduced by Banner in 1931. She details the four phases of the history of investigations (1870-1910, 1910-1950, 1950-1980, and 1980-present) and briefly characterizes the environment. There are two types of sites: tells (large central settlements) and open settlements. Settlement locations and physical characteristics are documented; the documented sites include Pecica/Santul Mare (Péckka/Nagysanc), Periam/Sanchalom (Perjámos/Sánchalom), Rábe/Anka-Sziget, Ószentiván/Nagyhalom, Popin Paor, Kiszombor/Út-Élet, and Klárafalva-Hajdova. The cemeteries and material culture aid in defining the general site chronology as Central European Bronze Age with the Maros sequence dated 2700-1500 BCE. Notably, social organization is currently understood from mortuary data. Settlements have 5-8 households (40-60 persons) and are the main sociopolitical unit in autonomous villages lacking central authority. Ceramics (cups, jugs, jars, and handled bowls) are the most common artifact and there is a lack of metals and stone resources.

“5. Methodology” (pp. 37-51, 11 tables). All sherds were subjected to macroscopic analysis that documented paste/fabric and temper grains, while a select set of

specimens was examined by petrographic analysis by James Stoltman (University of Wisconsin, Madison); sample preparation and point-count analysis are reviewed. Instrumental Neutron Activation Analysis (INAA) was undertaken on most of this select sample using irradiation and Gamma ray energy spectra counting; sample preparation, irradiation sample preparation, and standards and checks are detailed. Scanning Electron Microscopy and X-ray Diffraction were also employed; sample preparations are documented. There was an issue with refiring experiments as the kiln thermometer was inaccurate and actual color changes took place at 1050° C rather than 950° C. “6. The Maros Household Ceramics: A Functional Classification” (pp. 52-90, 15 figures, 48 tables). The Kiszombor site (pp. 52-61, Tables 6.1-6.21) provided an assemblage of nearly 1,500 sherds, all grog tempered. Michelaki differentiates ware classifications and vessel functions in *coarsely sorted inclusions* (six variants) which account for 73.9% of all rims, bodies, and bases: cooking vessels, storage containers, and water storage jars); *medium sorted inclusions* (two variants 77% storage vessels and non-wheat food processing; and *fine inclusions* (one type, only 14 sherds). A shape classification produced nine clusters, three for cooking. The Kiszombor household ceramic assemblage had a high degree of homogeneity. The Klárafalva site had a 400 year time span (pp. 61-68, Tables 6.22-6.48, 6.5-6.15) and provided 3,049 sherds including 13 whole vessels for analysis. Ware classifications and vessel functions included *coarsely sorted inclusions* (seven variants) used for “multiple functions,” cooking, open-fire cooking, serving and storage, and water storage; *medium sorted inclusions* (five variants) used for multiple functions, serving and storage) and non-heat food processing; and *fine inclusions* (three variants). There were 11 groups distinguished in shape clusters including Restricted vessels with Rhomboidal Rims (n = 37 sherds), Restricted vessels with Ruffled Rims (n = 2), and “Fish-plates”/Crucibles (n = 8) – the latter inferring metal smelting. The Klárafalva ceramic assemblage reveals differences in the two site assemblages: 1) substantially different raw materials were used, 2) pottery and daub matched but there were differences in calcium content, 3) Kiszombor sherds were homogeneous but there were compositional groups identifiable at Klárafalva, and 4) there were functional similarities and differences in the two assemblages, and Klárafalva materials had a greater similarity to specimens from the site of Gyulavassánd. The same basic vessel shapes are found in both Kiszombor and Klárafalva, and there are distinctive types of storage vessels with vessel sizes remaining standardized in spite of the introduction of new shapes and changes in wares.

Chapter “7. The Operational Sequence of the Maros Ceramic Production” (pp. 91-123, 36 figures, 5 tables) provides a review of the evidence. Raw materials changed little at either site through time. Local clays were used at each location and the clays were very similar, with no diachronic change in the use of ceramic grog. Re-firing tests involved specimens from Kiszombor (59 sherds and 6 daubs) and Klárafalva (121 sherds and 6 daubs) and the results indicated an overall homogeneity between the two site assemblages. The petrographic analysis of 116 sherds is detailed (Table 7.2, Appendix C) also showed an overall homogeneity but a bimodal distribution of body temper matrices. Instrumental Neutron Activation Analysis data (Table 7.3 and Appendix D) was done at Michigan on 96 specimens (39 from Kiszombor and 57 from Klárafalva). SEM was performed at Michigan on 10 sherds (Table 7.4).

Among forming methods, coiling is common, slab-building seems confined to water storage jars, clay coiling plus a patty technique was also used and there was no clear evidence for pinching except on rims. Handles were formed as rolled cylinders and are significant in defining the “Maros style” of pottery. Surface treatments were mostly scraping and smoothing on vessel exteriors with some burnishing of jar interiors, while decoration consisted of prefire engraving and there was no painting. In the absence of kilns, firing temperatures were <800° (SEM suggested 700-800° C) in a predominantly oxidizing firing atmosphere and rates of heating and cooling were compared with data from other sites. Klárafalva specimens suggested more closely regulated temperatures. Michelaki also discussed the pottery production tools and facilities. Michelaki provides “8. The Maros Ceramic Economies: A Synthesis” (pp. 124-133, 6 figures) in which she infers the organization of Maros ceramic production in southeastern Hungary during the Bronze Age, 2700-1650 BCE cal. The notable change from Early Ma to Late Maros is that potters were more concerned with the appearance of vessels and she believes that there was a shift from pottery produced by independent individuals to potters working in households. In “9. Conclusions” (pp. 134-136), she critiques her analysis (small sample size) and rightly notes that studies of other crafts are needed. The role of ceramics in expressing wealth and social standing in Maros cemeteries changed from the Early to the Late phase as seen in funerary practices. Social display shifted from cemeteries to settlement probably indicating territorial contraction.

The analytical data is presented in “Appendices” (pp. 137-204). There are four sets of appendices, designated A through D, each of which has sub-appendices.

Appendix A includes “Profile Drawings” (pp. 139-161, with 19 primary appendices and further subdivisions for a total of 23). Appendix B is a “List of Sherds” (pp. 162-168, with 2 major appendices). Appendix C features the “Results of Petrographic Analysis” (pp. 169-172, with 2 primary appendices and further subdivisions for a total of 4). Lastly, Appendix D is a tabulation of the “Results of the INAA Analyses” (pp. 173-204, with 16 primary appendices and a total of 32). The “Bibliography” (pp. 205-224) includes 326 entries.

She argues that, although pottery making was one of many small-scale household tasks, the fabrication of and use of pottery were integrally related to expressions of status and identity, and that by the Late Maros Phase the identity of “potter” was likely acknowledged by the community as distinct from other identities, such as those of “weaver” or “stoneworker.” See her *Cambridge Archaeological Journal* 18:355-380 (2008) for details. This monograph provides an important study that establishes an analytical basis for future work in southeastern Europe. The combined use of petrography, INAA, SEM, and traditional ware analyses are valuable but show that when used together they can help illuminate the sociopolitical and economic structure of human societies.

The Menial Art of Cooking: Archaeological Studies of Cooking and Food Preparation, Sarah R. Graff and Enrique Rodríguez-Alegría (eds.), Boulder: University Press of Colorado, 2012. xviii + 248 pp., figures, tables, ISBN 978-1-60732-175-0, \$70.00 (hardcover). Graff is an Honors Faculty Fellow at Barret, The Honors College, Arizona State University, and Rodríguez-Alegría is an Associate Professor of Anthropology at the University of Texas, Austin. The editors comment that although the archaeology of food has long played an integral role in our understanding of past cultures, the *archaeology of cooking* is rarely integrated into models of the past. Cooking involves food preparation, consumption, and storage which, in a majority of cultures, involve the use of ceramics. The nine studies presented in this volume range from the Upper Paleolithic to colonial America and document the potential that the analysis of foodways, culinary practices, and the role of cooks provides an important view into other aspects of society and, as such, should be taken seriously as an aspect of social, cultural, political, and economic life.

This book is a collection of papers from a symposium organized by the editors that was presented at the annual meeting of the Society for American Archaeology in 2005 and is now augmented by other, solicited contributions. The essays examine techniques and

technologies of food preparation, the spaces where food was cooked, the relationship between cooking and changes in suprahousehold economies, the religious and symbolic aspects of cooking, the relationship between cooking and social identity, and how examining foodways provides insight into social relations of production, distribution, and consumption. This international group of scholars uses a wide variety of evidence to identify signs of cooking and food processing left by ancient cooks, including archaeological data; archival research; analysis of ceramics, fauna, botany, glass artifacts, stone tools, murals, and painted pottery; ethnographic analogy; and the distribution of artifacts across space. The editors rightly claim that this is the first archaeological volume focused on cooking and food preparation in prehistoric and historic settings around the world and would be of interest to archaeologists, social anthropologists, sociologists, and other scholars studying cooking and food preparation or subsistence. Each of the 10 chapters has its own references and there is an "Introduction" (pp. 1-18) and useful "Index" (pp. 245-248). Relevant materials on pottery and ceramics are noted in my brief assessments of the individual chapters:

"1. Culinary Preferences: Seal-Imprinted Vessels from Western Syria as Specialized Cookware" by Sarah R. Graff (pp. 19-45, 9 figures): Pottery from the Orontes Valley of western Syria dated to the 3rd millennium BCE is documented; a ceramic analysis is also presented (pp. 32-34). She also refutes the idea that the seal-imprinted vessels were "emblems of the state of Ebla" (p. 39). Ceramic vessels, cooking pots, clay griddles, pots, storage vessels, and vessels are discussed. The importance of calcite tempers in the fabrication of cooking vessels (pp. 32-34) and potters (pp. 32-35, 37) are reviewed in this important article. "2. Food Preparation, Social Context, and Ethnicity in a Prehistoric Mesopotamian Colony" by Gil J. Stein (pp. 47-63, 7 figures, 5 tables): Food Preparation from Late Chalcolithic Uruk colonial settlements includes a discussion of the ceramic evidence (pp. 55-59); cooking pots and storage vessels are described. "3. The Habitus of Cooking Practices at Neolithic Çatalhöyük: What Was the Place of the Cook?" by Christine A. Hastorf (pp. 65-86, 8 figures, 2 tables): Culinary practices in Neolithic Turkey focus on foods, ovens, and ceramic storage vessels; clay balls are mentioned. "4. Cooking Meat and Bones at Neolithic Çatalhöyük, Turkey" by Nerissa Russell and Louise Martin (pp. 87-97, 5 figures): Cooking practices dated to 7300-6200 BCE are documented. "5. From Grinding Corn to Dishing out Money: A Long-Term History of Cooking in Xaltocan, Mexico" by Enrique Rodríguez-Alegría (pp. 99-117, 4 figures): Cooking at Late Postclassic Xaltocan in the Basin of Mexico includes a

discussion of ceramics including griddles (comales), cooking pots, and "pots" but focuses on traditional versus commercial maize grinding.

"6. Cooking for Fame or Fortune: The Effect of European Contact on Casabe Production in the Orinoco" by Kay Tarble de Scaramelli and Franz Scaramelli (pp. 119-143, 7 figures, 2 tables): Manioc cooking practices from 1400 to 1920 are detailed for the Orinoco region and illustrate acculturation; ceramic griddles, pots, and cooking vessels are noted. "7. Crafting Harappan Cuisine on the Saurashtra Frontier of the Indus Civilization" by Brad Chase (pp. 145-171, 8 figures, 1 table): Cuisine at the site of Gola Dhara, an Harappan manufacturing community dated 2600-1900 BCE, is documented, and "ceramic vessels" mentioned. "8. Vale Boi: 10,000 Years of Upper Paleolithic Bone Boiling" by Tiina Manne (pp. 173-199, 2 figures, 3 tables): Grease rendering at this Upper Paleolithic Gravettian site in southern Portugal (27,000 BP) is discussed and "vessels" noted. "9. 'Hoe Cake and Pickerel': Cooking Traditions, Community, and Agency at a Nineteenth-Century Nipmuc Farmstead" by Guido Pezzarossi, Ryan Kennedy, and Heather Law (pp. 201-229, 8 figures, 2 tables): Cooking at this rural central Massachusetts residence 1727 ff. is detailed and ceramic vessels and storage vessels are discussed. "10. Great Transformations: On the Archaeology of Cooking" by Kathleen D. Morrison (pp. 231-244): The author reviews the papers in terms of cuisine, consumption, and display, and provides an assessment of the functions of cooking, cooking as a transformational process, the social aspects of cooking, and cultural arts of cooking. Clay griddles and cooking vessels are mentioned. The editors and authors provide the reader with examples of foodways that can help interpret the archaeological ceramic record. It is a valuable book for ethnoarchaeology.

Ancient Households of the Americas: Conceptualizing What Households Do, John G. Douglass and Nancy Gonlin (eds.), Boulder: University Press of Colorado, 2012. xviii + 448 pp., 6 black-and-white photos, 72 line drawings, 13 maps, 31 tables. ISBN 978-1-60732-173-6, \$85.00 (hardcover). This is a valuable volume on the important topic of household archaeology and nearly all of the 14 chapters use ceramics to derive relative chronometric dates or employ pottery as a means of interpreting or explaining household activities or craft within the household, workshop, or community. The authors often follow and expand on the basic work undertaken by Robert Netting, Richard Wilk, and Eric Arnould in *Households: Comparative and Historical Studies of the Domestic Group* (Berkeley: University of California Press, 1984) and *Prehispanic Domestic Units in Western Mesoamerica: Studies of the Household* edited

by Robert S. Santley and Kenneth Hirth (Boca Raton, FL: CRC Press, 1993). Douglas is a principal investigator and research director at Statistical Research, Inc. while Gonlin is an anthropology instructor at Bellevue College in Washington State. Douglass is also the author of *Hinterland Households: Rural Agrarian Household Diversity in Northwest Honduras* (Boulder: University Press of Colorado, 2002). In the main, the contributions to the Douglass and Gonlin edited volume derive from a session held at the Society for American Archaeology in Vancouver, Canada in 2001. The contributions by Dean Arnold and John Douglass and Robert Heckman are especially relevant to ceramic ethnoarchaeology.

Following the "Preface" (pp. xv), "Acknowledgments" (p. xvii), and the initial background chapter, the essays are divided into three sections: Household Production Organization, Households as Primary Producers, and Inter- and Intra-household Organization of Production. In "1. The Household as Analytical Unit: Case Studies from the Americas" by John G. Douglass and Nancy Gonlin (pp. 1-44, 1 figure). The household, its functions, architecture, and research issues are defined, and households as producers elaborated along with gender roles, urban-rural differences, and craft production including pottery. The organization of this volume is also reviewed.

Section I: Household Production Organization: Spatial and Social Contexts in the Past and Present (Chapters 2 through 7). "2. Occupation Span and the Organization of Residential Activities: A Cross-Cultural Model and Case Study from the Mesa Verde Region" by Mark D. Varien (pp. 47-78, 9 figures). Ceramic production from 600-1300 CE is documented at the household level, residential units and the role of ceramic vessels are elaborated and cooking pottery is used as a measure of site occupation spans (pp. 55-57). "3. Production and Consumption in the Countryside: A Case Study from the Late Classic Maya Rural Commoner Households at Copán, Honduras" by Nancy Gonlin (pp. 79-116, 1 figure). The analysis of architecture, ground stone tools, pottery, and ceramic spindle whorls at eight rural Late Classic Maya sites (550-800 CE) are reviewed. "4. Iroquoian Households: A Mohawk Longhouse at Otstungo, New York" by Dean R. Snow (pp. 117-139, 12 figures, 2 tables). The social organization of the 17th century communal Iroquoian longhouses is documented through ceramics (pp. 133-134), cooking practices, and use of tobacco smoking pipes. "5. Activity Areas and Households in the Late Mississippian Southeast United States: Who Did What Where?" by Ramie A. Gougeon (pp. 141-162, 3 figures, 2 tables). Ceramic and lithic production and cooking practices are revealed at the chiefdom-level site of Littler

Egypt in northwest Georgia (ca. 1400 to European contact). "6. The Social Evolution of Potters' Households in Ticul, Yucatán, Mexico, 1965-1997" by Dean E. Arnold (pp. 163-187, 10 figures, 2 tables). Contemporary ceramic production parameters from a 32-year longitudinal perspective are documented, including clay mines, clay preparation, vessel fabrication at household and workshop levels, and kinship relations among potters, pottery consumption, distribution and market systems are discussed. Databases of potters and their genealogies are reviewed and Costin's (1991) model of production examined. "7. Pots and Agriculture: Anasazi Rural Household Production, Long House Valley, Northern Arizona" by John G. Douglass and Robert A. Heckman (pp. 189-218, 5 figures, 2 tables). Ceramic production (pp. 192-196) and other craft activities among the Anasazi and at the community of Kayenta are revealed for the Pueblo II period (1100-1150).

Section II: Households as Primary Producers: Implications for Domestic Organization (Chapters 8 to 10). "8. Hohokam Household Organization, Sedentism, and Irrigation in the Sonoran Desert, Arizona" by Richard Ciolek-Torrello (pp. 221-268, 13 figures). The intensification of cultivation and use of irrigation systems are reviewed for the Late Archaic to Classic period (1000 BCE to CE 1200), and Flannery's (2002) paradigm is assessed. "9. Understanding Households on Their Own Terms: Investigations on Household Sizes, Production, and Longevity at K'axob, Belize" by H. Hope Henderson (pp. 269-297, 6 figures, 1 table) involves the testing of Wilk and Netting's (1984) ethnographic model of household economy; 72 agrarian households were examined in terms of sizes, composition, and longevity for the period 9th century BCE to 9th century CE. "10. Late Classic Period Terrace Agriculture in the Lowland Maya Area: Modeling the Organization of Terrace Agricultural Activity" by L. Theodore Neff (pp. 299-321, 9 figures, 1 table). Late Classic Maya (550-800) residential space, terracing, and ceramics are discussed.

Section III: Inter- and Intra-household Organization of Production: Households and Communities (Chapters 11 to 14). "11. Fluctuating Community Organization: Formation and Dissolution of Multifamily Corporate Groups at La Joya, Veracruz, Mexico" by Valerie J. McCormack (pp. 325-351, 5 figures, 17 tables). The community existed over a period of 1400 years (1300 BCE-CE 100), and there is a phase-by-phase examination of obsidian and ceramic production, noting ceramic vessels and clay figurines. "12. Relationships among Households in the Prehispanic Community of Mesitas in San Agustín, Colombia" by Víctor González Fernández

(pp. 353-379, 6 figures, 2 tables). Relative chronology derived from ceramics (p. 356), craft specializations in ceramics and lithics, household relationships, demographic changes, and land control are the topics reviewed for this Classic period (CE 1-900) chiefdom-level community in southwestern Colombia. "13. Interhousehold versus Intracommunity Comparisons: Incipient Socioeconomic Complexity at Jachakala, Bolivia" by Christine Beaulieu (pp. 381-406, 7 figures, 1 table). The ceramic and clay figurine artifact assemblages at this Altiplano archaeological site (150-1200 CE) are reviewed in a test of Hirth's (1993) model of political and economic complexity. Lastly, "14. Arrobas, Fanegas, and Mantas: Identifying Continuity and Change in Early Colonial Maya Household Production" by Darcy Lynn Wiewall (pp. 407-435, 1 table). The author develops a predictive model for understanding political and economic relationships between Maya households during the Spanish colonial era, ca. 1546.

Previous Meeting

The 39th International Symposium on Archaeometry: "50 years of ISA" was held in Leuven, Belgium, 28 May-1 June 2012. The full programme is posted at <http://ees.kuleuven.be/isa2012/scientific-programme/index.html>. Ceramics were very well-represented among the oral and poster presentations, and selected titles and authors are included here (space constraints limit the full listings, but they can be found in the link above).

"Ceramics, Glazes, Glass, and Vitreous Materials" Chaired by Josefina Perez-Arategui and Michael Tite. The following oral papers were on ceramics: "Sr isotope analysis for the provenance study of ancient ceramics: An integrated approach" by Christina Makarona, Karin Nys, and Philippe Claeys; "Ceramics and Palatial Power: The identification and characterisation of a ceramic production installation in Late Bronze Age Attica through thin-section petrography" by William Gilstrap, Peter M. Day, Noemi Müller, Elina Kardamaki, and Konstantina Kazak; "Amphora production in Hellenistic Rhodes – Patterns, Matter and Performance" by Anno Hein, Vassilis Kilikoglou, Aggeliki Giannikouri, Fani Seroglou, and Charikleia Palamida; "Archaeometry in Vesuvian Area: Technological features of thin-walled ware" by Lorena Carla Giannossa, Giuseppe Egidio De Benedetto, Rocco Laviano, and Annarosa Mangone; "Tracing Changes in Technology of Athenian Red-Figure Slips with μ -XRF" by Marvin Cummings, Marc Walton, Giulia Poretti, Karen Trentelman, Jeff Maish, and David Saunders; "Redefining Byzantine ceramics: 10 years of

research at the 'Laboratoire de Céramologie Lyon'" by Yona Waksman; "Life Goes On: Understanding the Craft Organisation and Economy of Early Postclassic Maya Lowlands Through the Analyses of Zakpah Pottery from Marco Gonzalez, Ambergris Caye, Belize" by Carmen Ting, Marcos Martínón-Torres, and Elizabeth Graham; "Lead-tin glazed ceramics from Southern Italy: evolution of production technology by archaeometric investigation" by Marianna Acquaviva, Lorena Carla Giannossa, Sabrina Loperfido, Rocco Laviano, and Annarosa Mangone; "The pigments applied on the Minai wares and the correlation with Chinese blue-and-white porcelain" by Rui Wen and Mark Pollard; "Technical Studies on Medieval Islamic Glazed Tiles from Northern India" by Maninder Singh Gill and Thilo Rehren; "New Data on the Soda Flux used in the Production of Iznik Glazes" by Michael Tite, Andrew Shortland, Nadine Schibille, and Patrick Degryse; "High Mg-faiences from Fulda (Germany)" by Marino Maggetti, Gregor Stasch, and Vincent Serneels; and "Technological change or consistency: strontium isotope analysis of Egyptian faience beads dating from the Middle Kingdom to the New Kingdom at Abydos, Egypt" by Esme Hammerle, Jane Evans, and Matthew Ponting.

"Metals and Metallurgical Ceramics" Chaired by Thilo Rehren. The oral presentations included: "When material science meet ceramic sociology: an archaeometallurgical study of crucibles from Mapungubwe, South Africa" by Shadreck Chirikure; "Making weapons for the Terracotta Army: technology, standardisation and logistic" by Marcos Martínón-Torres, Xiuzhen Janice Li, Andrew Bevan, Yin Xia, Kun Zhao, and Thilo Rehren.

Poster Presentations included: "Analytical study of ancient artifacts-bone, glass, pottery and pigments from archaeological site of Tell al-Husn and Khirbet ed-Darieh in Jordan: by Wassef A. Sekhaneh; "Archeomagnetic dating in Italy based on the full geomagnetic field vector: New results from Italian kilns" by Evdokia Tema, Juan Morales, Avto Goguitchaichvili, and Pierre Camps; "Optically stimulated luminescence chronology and characterisation of pottery sherds from Maligrad Albania" by Artemios Oikonomou, Konstantinos Stamoulis, Petrika Lera, Stavros Oikonomidis, Aris Papayiannis, Akis Tsonos, Christina Papachristodou-lou, and Konstantinos Ioannides; "Influence of fired clay ceramic composition and contaminants on rehydroxylation dating" by Andrea Hamilton, Moira A. Wilson, and Margaret A. Carter; "Ceramic Residue Dating: Predictive Testing as a First Step in Selecting Appropriate Samples" by Linda Scott Cummings and Donna C. Roper; "Linking milk processing to pottery function in Prehistoric Anatolia: Diachronic and regional

perspectives” by Hadi Özbal, Ayla Türkekul-Bıyık, Laurens Thissen, Turhan Doğan, Fokke Gerritsen, and Rana Özbal-Gerritsen; “Influence of cooking on the isotopic signals of fish species” by Ricardo Fernandes, John Meadows, Pieter M. Grootes, and Marie-Josée Nadeau; and “Exploring wine production and consumption in the Roman villa of Sa Mesquida (Mallorca, Balearic Islands)” by Alessandra Pecci, Verónica Martínez, Catalina Mas, and Miguel Ángel Cau.

“*Ceramics, Glazes, Glass, and Vitreous Materials*” Chaired by Josefina Perez-Arategui and Michael Tite. Ceramic-related papers only included: “Distant Neighbours: Early Helladic Ceramic Production in the Nemea Valley and Korinth” by Clare Burke Davies, Peter Day, John F. Cherry, and Daniel Pullen; “Among the aspects of the past : the detection of tin foil in Hellenistic terracotta figurines” by Eleni Asderaki-Tzoumerkioti, Manos Dionysiou, Argyroula Doulgeri-Intzesiloglou, and Polyxeni Arachoviti; “The mechanical properties of 16th century transport jars from Panamá and Seville” by Samantha G. Ferrer, Noémi S. Müller, and Vassilis Kilikoglou; “Production, Exchange, and Technological Identity: A Study of Islamic Umayyad pottery from northern Jordan” by Firas Alawneh; “Defining Local Ceramic Production at Hellenistic Syene, Upper Egypt” by Lisa Peloschek, Roman Sauer, and Sabine Ladstätter; “Portuguese glazed tiles (16th-18th centuries): INAA, XRD and luminescence for raw materials characterization and production technologies of the ceramic bodies, and chronology” by M. Isabel Prudêncio, M. Isabel Dias, Christopher I. Burbidge, Lurdes Esteves, M. José Trindade, Rosa Marques, Guilherme Cardoso, and Dulce Franco; “Home sweet home. Identifying ceramic production in the Burdur plain, S.W. Turkey” by Ralf Vandam, Dennis Braekmans, Eva Kaptijn, Patrick Degryse, Jeroen Poblome and Marc Waelkens; “The Tombs of Ayia Kyriaki and the circulation of pottery in EMI-II South-Central Crete” by Roberta Mentasana, Peter M. Day, Evangelia Kiriati, Simona Todaro, and David E. Wilson; “Petrographic analysis of ceramics from the Oyo Ceramic Complex at Ede-Ile (Nigeria)” by Dana Drake Rosenstein, Akin Ogundiran, and Bolanle Tubosun; and “Salt Damage Related to Physical Properties of Ceramics” by Brunella Santarelli and Nancy Odegaard.

Miscellaneous presentations included: “Rehydroxylation (RHX): A universal method for dating archaeological ceramics” by Moira A. Wilson, Andrea Hamilton, and Catherine M. Batt; “Dairying in the early Mediterranean Neolithic” by Cynthianne Debono Spiteri, Italo M. Muntoni, and Oliver E. Craig; “Finger-Imprinted

Phoenician-Punic Hearth Ceramics: Testing for Potential Metallurgical Usage” by Robert H. Tykot; and “Characterization of maize and manioc residues in prehistoric potteries: the contributions of GC and NIR spectroscopy to Archaeology” by Fernanda Silva, Ingrid Weber, Fernando Hallwass, Cláudia Oliveira, Fernanda Pimentel, and Simone Simões.

Forthcoming Meetings

Insight from Innovation: New Light on Archaeological Ceramics is the title of a conference held in recognition of Professor David Peacock’s many pioneering contributions to the field. The meeting is scheduled to be held at the University of Southampton, 19-20 October 2012. It is hosted by the Department of Archaeology of the University of Southampton with the support of the Prehistoric Ceramics Research Group, the Study Group for Roman Pottery, and the Medieval Pottery Research Group. Registration and logistical information is posted at: <http://innovationconference.wordpress.com/2012/06/01/hello-world/>.

The conference blurb states that “The study of ceramics is one of the pillars of archaeological research. Over the past few decades the field has seen dramatic shifts in methods of analysis and approaches to pottery and continued advancements are enabling greater insight into the lives of past peoples. This conference brings together those exploring applications of recent techniques and new approaches to archaeological ceramics to discuss their work and ideas. Some such methods may be in their infancy, while other approaches have reached a more mature stage. Either way, the conference offers a platform from which their impact on the study of archaeological ceramics can be assessed and debated. Our speakers represent a variety of areas of expertise and we hope that both emerging and established scholars will benefit from exposure to fresh ideas and methodologies. The aim is to provide an up-to-date and integrated platform from which research on archaeological ceramics can evolve.”

EMAC 2013: 12th European Meeting on Ancient Ceramics: The next EMAS is scheduled to be held 19-21 September 2013 in Padova, Italy. The aim of this meeting, in accordance with previous former symposia, is the promotion of the methodological development and use of scientific techniques in the study of archaeological and historical ceramic materials for interpreting and solving issues on provenance, production, usage, conservation, age, and technological changes over time and place. Due to the interdisciplinary character of this type of studies, researchers and scholars with both

humanistic and scientific backgrounds will share their experience and the results of their most recent research.

In addition to the traditional themes of the former editions, the 12th EMAC will also include a session on experimental firings, which will focus on the results of such firings in controlled conditions, as well as on experimental reproductions, in order to constrain production technology in the past.

Abstracts should be submitted only in English and the text (excluding title, authors and affiliations) should not exceed 400 words. Abstracts must be submitted before 15 February 2013. The organizers urge non-European participation and participants are encouraged to submit their manuscripts to be considered for publication in a special issue of the *Periodico di Mineralogia*, an open access ISI journal (see www.periodicodimineralogia.it) which also covers applied topics on archaeometry and cultural heritage.

For further information, please visit the meeting website: www.emac2013.geoscienze.unipd.it or contact the organizers by e-mail: congress.emac2013@unipd.it

Online Resource

Przed Kolumbem: Agnieszka Hamann reports that “We have just published a new section of our photogallery: over 370 photos of Maya ceramics from several museums. All photos were taken by the Polish mayanist Boguchwała Tuszynska during her travels over the Maya region. They represent all phases, styles, origins and purposes and show an important part of the Maya culture, as ceramics not only served utilitarian purposes, but also were used to record and pass on information, both in written and pictorial form.” These are color images without scale or information on site provenance or iconography; listings are by museum. <http://przedkolumbem.blogspot.com/p/ceramika-majow.html>. Seventy Jaina ceramic figurines are featured on another site. <http://przedkolumbem.blogspot.com/p/jaina.html>

ARCHAEOMETALLURGY

Thomas R. Fenn, Associate Editor

The column in this issue includes the following categories of information on archaeometallurgy: 1) New Books; 2) New Articles/Book Chapters; 3) Ph.D. Thesis; 4) Forthcoming Meetings; 5) Previous Meetings; and 6) Courses.

New Books

Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC: A conference in honour of James D. Muhly, Nicosia, 10th-11th October 2009, edited by Vasiliki Kassianidou and George Pappasavvas, 2012, Oxbow Books, Oxford, 304 pages, 154 b/w illus 24 tables, Language: English, ISBN: 978-1-84217-453-1 (hbk.); 1-84217-453-3 (hbk.), Price: £60.00. James D. Muhly is a distinguished scholar with a special interest in ancient metallurgy who has dedicated much of his research to Cypriot archaeology. His work on the metallurgy of ancient Cyprus endorses the true importance of the island as a copper producing region, as well as a pioneer in the development and spread of metallurgy and metalwork in the wider eastern and central Mediterranean region. This volume contains papers from "Eastern Mediterranean Metallurgy and Metalwork in the Second Millennium BC", an international conference organised in Muhly's honour by the University of Cyprus. Several archaeologists and archaeometallurgists from around the world whose research focuses on the metallurgy of this period in Cyprus and surrounding regions were invited to participate in the conference to compare and contrast the material culture associated with metallurgical workshops and to discuss technological issues and their cultural and archaeological contexts. Some papers are devoted to the metallurgy and metalwork of Cyprus, presenting material from various sites and discussing the production and use of copper in the eastern Mediterranean. Others are dedicated to the Minoan and Aegean metal industry and the connections between Sardinia and Cyprus. Moving eastwards, from Anatolia through the Syro-palestinian coast and Jordan and south to Egypt, papers are presented that discuss Late Bronze Age metallurgy in Alalakh, Ugarit, Faynan, Timna and Qantir. The volume, containing twenty-three papers in all, also includes papers on tin and iron.

The contributed chapters consist of “Reminiscences: working with Jim Muhly” (Robert Maddin; pp. 1-3), “Late Bronze Age copper production in Cyprus from a mining geologist's perspective” (George Constantinou; pp. 4-13), “Metallurgical production and trade on Bronze Age Cyprus: views and variations” (A. Bernard Knapp; pp. 14-25), “Pyrgos-Mavrorachi in Cypriot metallurgy” (M. R. Belgiorno, D. Ferro, D. R. Loepp; pp. 26-34), “Tinker, tailor, farmer, miner: metals in the Late Bronze Age economy at Kalavassos” (Alison K. South; pp. 35-47), “Standing on ceremony: the metallurgical finds from Maroni-Vournes, Cyprus” (Roger Doonan, Gerald Cadogan, D. Sewell; pp. 48-57), “From regional gateway

to Cypriot kingdom. Copper deposits and copper routes in the chora of Paphos” (M. Iacovou; pp. 58-69), “The role of the Apliki mine region in the post c. 1400 BC copper production and trade networks in Cyprus and in the wider Mediterranean” (Noel H. Gale, Zofia Anna Stos-Gale; pp. 70-82), “Reconstructing’ the Enkomi tombs (British excavations): an instructive exercise” (D. Pilides; pp. 83-93), “Metallurgy and metalwork in Enkomi: the early phases” (Vasiliki Kassianidou; pp. 94-106), “The Enkomi cup: niello versus *kuwano*” (Alessandra Giumlia-Mair; pp. 107-116), “Profusion of Cypriot copper abroad, dearth of bronzes at home: reflections on a paradox in Late Bronze Age Cyprus” (George Papasavvas; pp. 117-128), “Cyprus and Crete: the transformation of the Minoan metalworking industry” (Philip P. Betancourt; pp. 129-134), “Metallurgy and metalworking in the harbour town of Knossos at Poros-Katsambas” (N. Dimopoulou; pp. 135-141), “Cyprus and Sardinia, beyond the oxhide ingots” (Fulvia Lo Schiavo; pp. 142-150), “On the cessation of local copper production in the Aegean in the 2nd millennium BC” (Yannis Bassiakos, Thomas Tselios; pp. 151-161), “Late Bronze Age Alalakh and Cyprus: a relationship of metals?” (K. Aslihan Yener; pp. 162-168), “The evidence for metallurgical workshops of the 2nd millennium in Ugarit” (E. Dardaillon; pp. 169-179), “The merchants of Ugarit: oligarchs of the Late Bronze Age trade in metals?” (C. Bell; pp. 180-187), “A unique casting mould from the new excavations at Timna Site 30 (Israel): evidence of western influence?” (Erez Ben-Yosef; pp. 188-196), “New perspectives on Iron Age copper production and society in the Faynan region, Jordan” (Thomas Levy, Erez Ben-Yosef, Mohammad Najjar; pp. 197-214), “Alloying and resource management in New Kingdom Egypt: the bronze industry at Qantir – Pi-Ramesse and its relationship to Egyptian copper sources” (Thilo Rehren, Edgar B. Pusch; pp. 215-221), “On ancient tin, its sources and trade: further comments” (Vincent C. Pigott; pp. 222-236), and “Just a few rusty bits: the innovation of iron in the Eastern Mediterranean in the 2nd and 1st millennia BC” (Harald A. Veldhuijzen; pp. 237-250).

Scientific Research on Ancient Asian Metallurgy: Proceedings of Fifth Forbes Symposium at the Freer Gallery of Art, edited by Paul Jett, Blythe McCarthy, Janet G. Douglas, 2012, Archetype Publications (London) in association with the Freer Gallery of Art, Smithsonian Institution (Washington, DC), xiii, 254 pages, illus, 30 cm, Language: English, ISBN: ISBN: 978-1-904982-72-2 (hbk.); 1-904982-72-7 (hbk.), Price: UK Price: £55.00 (hbk.), US Price: \$120.00. These proceedings record the papers presented at a symposium held at the Freer Gallery of Art, Washington, D.C., in the fall of 2010. The use of scientific methods to study works of art began at the Freer

Gallery of Art in 1951 with the work of R. J. Gettens. While Mr. Gettens was active in many fields of research, his landmark publication was the volume of technical studies on the Freer Chinese bronzes, a collaborative effort by scientists, conservators, and art historians. These proceedings, and their companion symposium, commemorate that work and also present recent studies on ancient Chinese bronzes and Southeast and West Asian copper alloys.

Following a brief “Introduction” (Paul Jett; p. xiii), chapters are divided into four sections in the book. Contributed papers in the section “*Reflections on R. J. Gettens and the Technical Studies of Chinese Bronzes*” comprise “A Chemist Under a Spell: Rutherford John Gettens’s Early Encounters with Chinese Bronzes” (Francesca G. Bewer; pp. 3-11), “The Making of Volume 2 of the Freer Chinese Bronze Book” (W. T. Chase; pp. 12-22), and “Theories and Observations: Still Looking at the Freer Bronzes” (Robert Bagley; pp. 23-34). Chapters in the section “*Chinese Bronzes*” consist of “Recent Research on Early Bronze Metallurgy in Northwest China” (Mei Jianjun, Xu Jianwei, Chen Kunlong, Shen Lu, Wang Hui; pp. 37-46), “Recent Discoveries Concerning Metallurgy in Bronze Age Yunnan” (Jin Zhengyao, Li Gong, Wang Haigang, Tian Jianhua, Yan Lifeng, Jiang Zhilong; pp. 47-51), “Some Decorative Techniques and Corrosion on Chinese Bronze Mirrors in the Cotsen Collection” (David A. Scott; pp. 52-62), “Technical Studies of Three *Gui* Vessels of the Early Western Zhou Period in the British Museum Collection” (Wang Quanyu; pp. 63-72), and “An Enlightened Journey: Transitions in Casting of Chinese Buddhist Images” (Donna Strahan; pp. 73-82). Contributed papers in the section “*Southeast Asian Bronzes*” comprise “Looking East: The Coming of Tin Bronze in the Context of Bronze Age Trans-Eurasian Exchange—An Overview” (Vincent C. Pigott; pp. 85-100), “The High-Tin Bronzes of Thailand” (Ian Glover, Anna Bennett; pp. 101-114), “A Flux that Binds? The Southeast Asian Lead Isotope Project” (Thomas Oliver Pryce; pp. 115-123), “Khmer Bronze Metallurgy during the Angkorian Period (Twelfth to Thirteenth Centuries): Technical Investigation of a New Selected Corpus of Artifacts from the National Museum of Cambodia, Phnom Penh” (Brice Vincent, David Bourgarit, Paul Jett; pp. 124-153), and “Casting of Ancient Drums in North Vietnam” (Trinh Sinh; pp. 154-163). Chapters in the final section “*West Asian Copper Alloys*” consist of “Ten Millennia of Metallurgy in Western Asia” (Paul T. Craddock; pp. 167-173), “Copper-Zinc Alloys at Nuzi: Dilemmas from an Early Excavation” (Katherine Eremin, Susanna Kirk, Andrew Shortland, Megan Richters; pp. 174-182), “Reconstructing Ancient Technologies: Chalcolithic

Crucible Smelting at Tal-i Iblis, Iran” (Lesley D. Frame; pp. 183-204), “Metallurgy during the Middle Chalcolithic Period in the Southern Caucasus: Insight through Recent Discoveries at Mentesh-Tepe, Azerbaijan” (Antoine Courcier, Farhad Guliyev, Bertille Lyonnet; pp. 205-224), “The Casting Techniques of Antique South Arabian Large Bronze Statues” (Benoît Mille; pp. 225-247), and “Medieval Islamic Copper Alloys” (Susan La Niece, Rachel Ward, Duncan Hook, Paul Craddock; pp. 248-254).

Schätze der Anden: Chiles Kupfer für die Welt; Katalog der Ausstellung des Deutschen Bergbau-Museums Bochum 8. Mai 2011 bis 19. Februar 2012, edited by Rainer Slotta and Inga Schnepel, 2011, *Veröffentlichungen aus dem Deutschen Bergbau-Museum Bochum* Nr. 179, Deutsches Bergbau-Museum, Bochum, 608 pages, col. illus., 29 cm., Language: German, ISBN: 3-937203-53-2 (hbk.), 978-3-937203-53-9 (hbk.), Price: €29.90. This book represents the catalog and collection of related research papers in support of an exhibition at the Deutsches Bergbau-Museum, Bochum. Marking the importance of copper for the (cultural) history of mankind from the beginning to today the book is dedicated to the exhibition and the economic importance of CODELCO (Corporación Nacional del Cobre de Chile) at the national and international level as well as their diaries and underground installations belonging to the world's largest known of its kind. The focus is on the high Andes situated mining town of Sewell that now is a World Heritage Site. Also mentioned is the world's spectacular rescue of 33 trapped miners from the mine in San Jose. The closing of the exhibition notes the importance of copper for humanity as an essential life-supporting metal. The exhibition was held at the Deutsches Bergbau-Museum (German Mining Museum) in Bochum from May 8, 2011 to February 19, 2012.

Following several introductory contributions, chapters consisted of “Zur Geologie von Chile: Plattentektonik, Vulkane, Erdbeben” (Andreas Hauptmann; p. 17), “Erz- und Minerallagerstätten der Anden” (Andreas Hauptmann; p. 27), “Chile und seine Salpeterindustrie” (Rainer Slotta; p. 43), “Steinsalz aus der Atacama - Der Tagebaubetrieb des K+S Tochterunternehmens Sociedad Punta de Lobos im Salar Grande (bei Iquique, Nordchile)” (Rainer Stax; p. 77), “Lithium, Jod und Molybdän - Chiles Beiträge zur Weltversorgung mit Rohstoffen” (Stefan Brüggerhoff, Rainer Slotta; p. 87), “Lapislazuli - Das Blaue Gold” der Anden” (Thomas Roy; p. 99), “Chile-Eine kleine Landeskunde” (Werner Mikus; p. 103), “Die Staats- und Nationsbildung Chiles im 19. und 20. Jahrhundert” (Hans-Joachim König; p. 141), “Die vorspanische Kulturentwicklung im

Andenraum - Ein Überblick” (Markus Reindel; p. 159), “Prä kol um bisch er Bergbau in den Anden” (Thomas Stöllner; p. 181), “Der prähistorische Bergbau in der Atacama-Wüste (Nordchile)” (Lautaro Nunez; p. 213), “Das inka-zeitliche Kupferbergwerk bei El Abra” (Michael Prange; p. 225), “Der inka-zeitliche Schmelzplatz von Vina del Cerro bei Copiapó” (Rainer Slotta; p. 231), “Die Entwicklung der Kupfergewinnung in den südlichen Zentralanden von den frühesten präkolumbischen Anfängen bis in die Neuzeit” (Bianca Maldonado, Thilo Rehren; p. 235), “Gold in Südamerika” (Juanita Samper Säenz, Marcos Martinón-Torres; p. 245), “Zur frühen Gewinnung von Silber in Südamerika” (Thilo Rehren; p. 257), “Huayrachina - Ein Schmelzofen für nicht eisenhaltige Metallerze aus den Anden” (Florian Tereygeol, Pablo Cruz; p. 265), “Chilenische Kupferbarren aus Schiffswracks vor der Britischen Küste” (Paul Craddock; p. 269), “Der schöne Schein. Gold-Kupfer-Objekte in der religiösen Kunst des präkolumbischen Südamerika” (Doris Kurella; p. 273), “Die Corporación Nacional del Cobre de Chile (CODELCO) und ihre Bergwerks- und Hüttenbetriebe” (Alexander Leibbrandt; p. 283), “Die Kupfererzeugung Chiles - Rückblick und Aussichten für die Zukunft” (Alexander Leibbrandt; p. 327), “Die „Stadt der Treppen” - Die Bergarbeiterstadt Sewell des Erzbergwerks El Teniente. Ein chilenisches Nationaldenkmal als Teil des Weltkulturerbes” (Felipe Ravinet de la Fuente; p. 339), “Die „Fuente Alemana” im Parque Forestal in Santiago de Chile - Ein Denkmal auch für den chilenischen Kupfer- und Salpeterbergbau” (Rainer Slotta; p. 381), and “Das Kupfer- und Golderzbergwerk San Jose und das Grubenunglück” (Rainer Slotta, Michael Farrenkopf; p. 387). The book closes with a 200 page catalog of the exhibition.

History of Research in Mineral Resources : [35th Conference of the International Commission on the History of Geological Sciences (INHIGEO), Madrid y Almadén (España), 1-14 julio 2010], edited by José Eugenio Ortiz, Octavio Puche, Isabel Rábano, and Luis F. Mazadiego, 2011, *Cuadernos del Museo Geominero* No. 13, Instituto Geológico y Minero de España, Madrid, 405 pages, illus., 17cm., Language: English, ISBN: 978-84-7840-856-6. The study of the research history of geological resources is one of the main objectives of the International Commission on the History of Geological Sciences (INHIGEO), which was created in 1967 within the International Union of Geological Sciences (IUGS) and was also affiliated with the International Union on the History and Philosophy of Sciences (IUHPS). INHIGEO has many members from about 50 countries and promotes a major annual symposium with associated field activities. This book was born of a joint effort of the

INHIGEO Spanish delegation and the Sociedad Española para la Defensa del Patrimonio Geológico y Minero (Spanish Society for the Protection of Geological and Mining Heritage-SEDPGYM), which collaborated with the Geological Survey of Spain in the organization of the 35th International Conference of INHIGEO. The Instituto Geológico y Minero de España (Geological Survey of Spain-IGME) was established in 1849 with the aim of conducting the geological map of Spain and the geological study of all the provinces in order to exploit their mineral resources. Integrated in the Ministry of Science and Innovation, with its modern features as Geological Survey of Spain, IGME is the interlocutor of the IUGS, with which collaborates on many of its programs and commissions, such as the IGCP, ProGEO, Global Geosites, etc. Also, IGME sponsors activities related to teaching and spreading of the geology around the country and contributes to initiatives and meetings of scientific societies. Mining tradition of Spain starts in the Paleolithic and was particularly intense from the Roman times. In the eighteenth and nineteenth centuries, Spain was a global mining output, which was reaffirmed by its vast overseas territories and intense mineral trade with the rest of Europe. Even today our country has an important mining activity and leading the production of various minerals and ornamental stones in Europe. The interest in the conservation of the mining and industrial heritage from inactive mining regions, has resulted in numerous initiatives for protection and restoration of old underground and surface workings in different regions, with the creation of mining parks, museums, archaeological sites, and the enhancement of heritage-related issues in cultural heritage related to mining. The book contains 43 contributions that were given as oral presentations or posters in the Conference program, from 76 authors and coauthors from 16 countries. In collaboration with SEDPGYM and INHIGEO, the Geological Survey of Spain is pleased to contribute to the publication of this selection of key papers presented at the 35th INHIGEO Conference held in Spain.

The papers covered a wide range of geological topics on mineral resources including a number relevant to archaeometallurgy and the history of mining and metallurgy. These include “Neolithic and Chalcolithic - VI to III Millennia BC- Use of Cinnabar (HgS) in the Iberian Peninsula: Analytical Identification and Lead Isotope Data for an Early Mineral Exploitation of the Almadén (Ciudad Real, Spain) Mining District” (Mark A. Hunt-Ortiz, Susana Consuegra-Rodríguez, Pedro Díaz del Río-Español, Victor M. Hurtado-Pérez, Ignacio Montero-Ruiz; pp. 3-14), “Notes on Ancient Mining in Otero de Herreros (Segovia, Spain)” (Mariano Ayarzagüena Sanz, Santiago Valiente Cánovas; pp. 15-24), “Discovery and

Mining History of the "Calamine" in SW Sardinia (Italy)” (Maria Boni; pp. 25-32), “Sardinia's Historical Heritage of Mining Exploitation” (Pietrangelo Loru, Patrizia Medas, Francesco Muntoni, Luciano Ottelli, Roberto Rizzo; pp. 33-42), “Mining and Minerals Trade on the Silk Road to the Ancient Literary Sources: 2 BC to 10 AD Centuries” (David Sevillano-López, F. Javier González; pp. 43-60), “The Almadén Mercury Mining District” (Pablo L. Higuera Higuera, Luis Mansilla Plaza, Saturnino Lorenzo Álvarez, José María Esbri Víctor; pp. 75-88), “Metal Mining in Central America (Early 1500s-Late 1800s)” (Gerardo L Soto; pp. 89-98), “An Exploitation Method for the Ore Deposits in the Edo Period, Japan: Sansō-Hiroku (A Secret Document on the Appearance of Mountains)” (Toshio Kutsukake; pp. 99-104), “Matrices, Not Seeds. Vallisneri's Research on Mines: Between Empiricism and Philosophy” (Francesco Luzzini; pp. 105-112), “Spirito Benedetto Nicolis di Robilant (1724-1801) and the "Theory of Mountains and Mines”” (Ezio Vaccari; pp. 113-120), “Irish Mining in Richard Kirwan's (1733-1812) Time” (Sally Newcamb; pp. 121-130), “The Discovery and Exploitation of Iron Ores in Colonial Australia with Emphasis on the Deposits in the Tamar Valley District of Northern Tasmania” (Wolf Mayer; pp. 139-148), “Thomas Sopwith, Miner's Friend: His Contributions to the Geological Model-Making Tradition” (Susan Turner; pp. 177-192), “Geologists and the Burra Copper Boom, South Australia, 1845-1851” (Barry J. Cooper; pp. 193-200), “The Understanding of Resources and Knowledge of Raw Materials, as Presented at the Big World Exhibitions in the 19th Century” (Marianne Klemun; pp. 247-252), “A History of Early Copper Exploration in Katanga (D.R. Congo)” (Eric Pirard; pp. 271-280), and “Mineral Resources Survey on the Chinese Borderlands: The Sino-Swedish Scientific Expedition (1920s and '30s)” (Jiuchen Zhang; pp. 307-314).

New Book Chapters/Articles

From the book *Distant Provinces in the Inka Empire: Toward a Deeper Understanding of Inka Imperialism*, edited by Michael A. Malpass and Sonia Alconini, 2010, University of Iowa Press, Iowa City, comes the chapter “The Organization of Inka Silver Production in Porco, Bolivia” (Mary Van Buren, Ana María Presta; pp. 173-192).

From the *Journal of Archaeological Science* (2012, Vol. 39, No. 9) comes “Early Cambodian gold and silver from Prohear: composition, trace elements and gilding” (Sandra Schlosser, Andreas Reinecke, Roland Schwab, Ernst Pernicka, Seng Sonetra, Vin Laychour; pp. 2877-2887), and from (2012, Vol. 39, No. 8) comes “Internal

oxidation of cast iron artifacts from an 18th-century steel cementation furnace” (Colin Thomas, Richard Hunter, Robert Gordon; pp. 2714-2721), and from (2012, Vol. 39, No. 7) comes “A preliminary study on the role and implication of plate-type iron artifacts in the ancient iron technology of Korea” (Jang-Sik Park; pp. 1925-1932), “Investigating the production provenance of iron artifacts with multivariate methods” (Michael F. Charlton, Eleanor Blakelock, Marcos Martín-Torres, Tom Young; pp. 2280-2293), and “Historical signature of Roman mining activities in the Bidasoa estuary (Basque Country, northern Spain): an integrated micropalaeontological, geochemical and archaeological approach” (M. J. Irabien, A. Cearreta, M. Urteaga; pp. 2361-2370), and from (2012, Vol. 39, No. 6) comes “Large scale smelting of speiss and arsenical copper at Early Bronze Age Arisman, Iran” (Thilo Rehren, Loïc Boscher, Ernst Pernicka; pp. 1717-1727), and “Crucibles from Palaikastro, East Crete: insights into metallurgical technology in the Aegean Late Bronze Age” (Doniert Evely, Anno Hein, Eleni Nodarou; pp. 1821-1836).

From *Archaeometry* (2012, Vol. 54, No. 4) comes “From raw iron to semi-product: quality and circulation of materials during the Iron Age in France” (M. Berranger. P. Fluzin; pp. 664-684), and “Lead isotopic analysis of copper ores from the Sierra el Aramo (Asturias, Spain)” (G. Huelga-Suarez, M. Moldovan, M. Suárez Fernández, M. Ángel de Blas Cortina, F. Vanhaecke, J. I. García Alonso; pp. 685-697). From *ArchéoSciences: Revue d'Archéométrie* (2011 [2012], No. 35) comes “Metallurgical and Technological Investigation on Augustean Auxiliary Coins from Thraco-Moesia” (Irene Calliari, Maurizio Magrini, Rodolfo Martini, Chiara Tellini, Eugenio Vajna de Pava; pp. 9-18), “La production monétaire romaine en orichalque : caractérisation du monnayage et approche du processus d'élaboration par l'expérimentation” (A. Gaffiero, F. Téreygeol, A. Suspène, B. Gratuze, S. Zeller; pp. 93-102), and “Identification of Cinnabar by non-Destructive Techniques on a Human Mandible from Carrer Paris Chalcolithic Hypogeum (Cerdanyola del Vallès, Barcelona, Spain)” (G. Gómez-Merino, T. Majó, C. Lorenzo, F. Gispert-Guirado, M. Stankova, J. Francés; pp. 241-247).

From *Metalla (Bochum)* (2012, Vol. 18, Nos. 1/2) comes “Archaeometallurgical expeditions to the Sinai Peninsula and the Eastern Desert of Egypt (2006, 2008)” (Ali Abdel-Motelib, Michael Bode, Rita Hartmann, Ulrich Hartung, Andreas Hauptmann, Kristina Pfeiffer; pp. 3-59). From *Interdisciplinaria Archaeologica* (2011, Vol. 2, No. 2) comes “Probable Sources and Refining Technology of Parthian and Sasanian Silver Coins”

(Farhang Khademi Nadooshan, Mostafa Khazaie; pp. 101-107). From *Archaeology International* (2009-2011, Vol. 13/14) comes “Making Weapons for the Terracotta Army” (Marcos Martín-Torres, Xiuzhen Janice Li, Andrew Bevan, Yin Xia, Zhao Kun, Thilo Rehren; pp. 65-75), and “The Production of Silver in South America” (Thilo Rehren; pp. 76-83). From *Azania: Archaeological Research in Africa* (2012, Vol. 47, No. 2) comes “Reconstructing the iron production technologies of western Uganda: reconciling archaeometallurgical and ethnoarchaeological approaches” (Louise Iles; pp. 244-245).

From *Reports on Progress in Physics* (2012, Vol. 75, No. 3) comes “Archaeometallurgy using synchrotron radiation: a review” (Marcus L. Young; 15p.). From the *Journal of Raman Spectroscopy* (2011, Vol. 42, No. 12) comes “Characterization of an iron smelting slag from Zimbabwe by Raman microscopy and electron beam analysis” (Vânia S. F. Muralha, Thilo Rehren, Robin J. H. Clark; pp. 2077-2084).

The *European Journal of Mineralogy* published a Special Issue (2011, Vol. 23, No. 6) with the title of *Mineralogical Sciences and Archaeology*, guest edited by I. Turbanti Memmi, C. Ionescu and U. Schüssler. Several articles in this issue had archaeometallurgical relevance including “Provenance of the gold of the Early Bronze Age Nebra Sky Disk, central Germany: geochemical characterization of natural gold from Cornwall” (Anja Ehser, Gregor Borg, Ernst Pernicka; pp. 895-910), “‘Transylvanian gold’ of hydrothermal origin: an EMPA study in an archaeological provenancing perspective” (Dana Pop, Corina Ionescu, Ferenc Forray, Călin Gabriel Tămaș, Marcel Benea; pp. 911-923), “The chemical composition of tetrahedrite-tennantite ores from the prehistoric and historic Schwaz and Brixlegg mining areas (North Tyrol, Austria)” (Matthias Krismer, Franz Vavtar, Peter Tropper, Reinhard Kaindl, Bernhard Sartory; pp. 925-936), and “Early metal smelting in Aksum, Ethiopia: copper or iron?” (Thorsten Severin, Thilo Rehren, Helmut Schleicher; pp. 981-992).

From *Annual Review of Anthropology* (2012, Vol. 41) comes “The Archaeology of Money” (Colin Haselgrove, Stefan Krmnicek; pp. 235-250) and “Archaeometallurgy: The Study of Preindustrial Mining and Metallurgy” (David Killick, Thomas Fenn; pp. 559-575), and from *Current Anthropology* (2011, Vol. 52, No. 3) comes “Early Evidence (ca. 12,000 BP) for Iron Oxide Mining on the Pacific Coast of South America” (Diego Salazar, D. Jackson, J. L. Guendon, H. Salinas, D. Morata, V. Figueroa, G. Manríquez, V. Castro; pp. 463-475). From the *Journal of Anthropological Archaeology* (2012, Vol.

31, No. 3), comes “Crucibles of power: Forging copper and forging subjects at the Moche Ceremonial Center of Huaca Colorada, Peru” (Edward Reuben Swenson, John P. Warner; pp. 314-333).

From *Estudios Atacameños* (2010, No. 40) comes “Metalurgia prehispánica en las sociedades costeras del norte de Chile (quebrada Mamilla, Tocopilla)” (Diego Salazar, Valentina Figueroa, Benoit Mille, Diego Morata, Hernán Salinas; pp. 23-42), while from *Intersecciones en antropología* (2011, Vol. 12, No. 2) comes “Los metales en la cultura Diaguita chilena (ca. 900-1536 DC): una aproximación metodológica e interpretativa” (Elvira Latorre Blanco, Patricio López Mendoza; pp. 319-332), and (2011, Vol. 12, No. 1) “Estudios arqueométricos de evidencias de producción minero-metalúrgica durante la época colonial en Fundiciones 1 (Departamento de Rinconada, Jujuy, Argentina)” (María Florencia Becerra, Carlos I. Angiorama, Nicolás Nieva; pp. 5-16).

From *Revista SAM* (2011, Vol. 8, No. 3) comes “Estudio de los restos de un sable encontrado en el sitio histórico Fortín el Perdido” (Ricardo Romero, Adela Cuniberti, Marcelo Stipcich, Julio Merlo, María del Carmen Langiano; pp. 16-24), “Jubal y Tubalcaín en la herrería” (Ricardo Romero; pp. 32-33), and (2011, Vol. 8, No. 2) come “Metalurgia prehispánica de Sudamerica” (Tulio A. Palacios; pp. 15-28), and (2011, Vol. 8, No. 1) “Comienzos de la siderurgia colonial en la reducción indígena guaraníca de San Juan Bautista” (Tulio A. Palacios; pp. 18-26), while from *Estudos do Quaternário* (2011, Vol. 7) comes “O Depósito metálico da Bandeira, Viana do Castelo (norte de Portugal) no contexto dos depósitos do bronze médio do curso inferior da bacia do Lima” (João Oliveira Fernandes, Ana M. S. Bettencourt, Beatriz Comendador Rey, M. Isabel Caetano Alves; pp. 33-39).

An issue of *Trabajos de Prehistoria* (2010, Vol. 67, No. 2) was dedicated to some papers presented at the meeting *Archaeometallurgy: Technological, Economic and Social Perspectives in Late Prehistoric Europe*, TESME, held in Madrid, Spain, November 27-29, 2009, in honor of Salvador Rovira Llorens on his retirement. The papers in this issue, presented in Spanish, English and French, primarily focus on archaeometallurgy during the Bronze Age in Europe. Following a brief “Presentación” (Ignacio Montero-Ruiz; pp. 265-267), contributed papers comprised *Vingt ans de recherches à Saint-Véran, Hautes Alpes: état des connaissances de l’activité de production de cuivre à l’âge du Bronze ancien* (David Bourgarit, Pierre Rostan, Laurent Carozza, Benoît Mille, Gilberto Artioli; pp. 269-285), “Metal for Zambujal: experimentally reconstructing a 5000-year-old

technology” (Erica Hanning, Roland Gauß, Gert Goldenberg; pp. 287-304), “Preliminary study of slags and slaggy layers on ceramics from the Bronze Age metallurgical site of Peñalosa (Baños de la Encina, Jaén)” (Auxilio Moreno Onorato, Francisco Contreras Cortés, Martina Renzi, Salvador Rovira Llorens, Heber Cortés Santiago; pp. 305-322), “Metal and Social Relations of Production in the 3rd and 2nd Millennia BCE in the Southeast of the Iberian Peninsula” (Vicente Lull, Rafael Micó, Cristina Rihuete Herrada, Roberto Risch; pp. 323-347), “Cambio tecnológico en la metalurgia de las Baleares (Calcolítico y Edad del Bronce) (1)” (Bartomeu Salvà Simonet; pp. 349-357), “Metal functions between Bell Beakers groups. Gold versus copper. The example in the Region of Madrid” (Concepción Blasco, Patricia Ríos; pp. 359-372), “Metal consumption in the Late Prehistory of the central Iberian Peninsula: an approach through the analysis of pit grave contexts” (Eduardo Carmona Ballester, Miguel Ángel Arnaiz Alonso, Juan Montero Gutiérrez; pp. 373-387), “Bronze Age metal artefacts found on Cyprus - metal from Anatolia and the Western Mediterranean” (Zofia A. Stos-Gale, Noel H. Gale; pp. 389-403), “Palmela points: technological processes and experimentation” (Carmen Gutiérrez Sáez, Alba López del Estal, Álvaro Simón Martín, Pedro Muñoz Moro, Charles Bashore Acero, Jorge Chamón Fernández, Ignacio Martín Lerma, Elena Sanz Salas, Ana Isabel Pardo Naranjo, Juan Antonio Marín de Espinosa; pp. 405-418), “Chisels in the Italian Bronze Age: technological and typological aspects” (Claudia Speciale, Alessandro Zanini; pp. 419-430), “Carp’s-tongue swords - morphological, metallurgical and cultural aspects” (Dirk Brandherm, Magdalena Moskal-del Hoyo; pp. 431-456), “Metal finds at the Middle and Late Bronze Age settlement of Scoglio del Tonno (Taranto, Apulia): results of archaeometallurgical analyses” (Anna Maria Bietti Sestieri, Claudio Giardino, Mariantonina Gorgoglione; pp. 457-468), “The Metallurgy of the Sicilian Final Bronze Age/Early Iron Age necropolis of Madonna del Piano (Catania, Sicily)” (Alessandra Giumlia-Mair, Rosa Maria Albanese Procelli, Fulvia Lo Schiavo; pp. 469-488), “Metals from the ritual site of Shaitanskoye Ozero II (Sverdlovsk Oblast, Russia)” (Olga Nikolaevna Korochkova, Serguei Vladimirovich Kuzminykh, Yuri Borisovich Serikov, Vladimir Ivanovich Stefanov; pp. 489-499), “Early Iron Age gold buttons from South-Western Iberian Peninsula. Identification of a gold metallurgical workshop” (António M. Monge Soares, Pedro Valério, Rui J. C. Silva, Luis Cerqueira Alves, Maria de Fátima Araújo; pp. 501-510), “Environmental impact of copper mining and metallurgy during the Bronze Age at Kargaly (Orenburg region, Russia)” (Juan Manuel Vicent García, M.ª Isabel Martínez Navarrete, José Antonio López Sáez, Ignacio de Zavala Morencos;

pp. 511-544), and “Gestión del combustible leñoso e impacto medioambiental asociados a la metalurgia protohistórica de Punta de los Gavilanes (Mazarrón, Murcia)” (María Soledad García Martínez, María Milagrosa Ros Sala; pp. 545-559).

Also from *Trabajos de Prehistoria* (2011, Vol. 68, No. 1) comes “Orígenes del dorado por amalgama: aportaciones desde la orfebrería protohistórica del noroeste de la Península Ibérica” (Marcos Martín-Torres, Lois Ladra; pp. 187-198), and “Fe de erratas” (Anna Maria Bietti Sestieri, Claudio Giardino, Mariantonia Gorgoglione; pp. 217-218), and from (2012, Vol. 69, No. 1) comes “¿La primera orfebrería del nordeste de la Península Ibérica? Nuevas aportaciones a partir de la cuenta áurea de Cau del Tossal Gros (Torroella del Montgrí, Baix Empordà, Girona)” (Ignacio Soriano Llopis, Joaquim Soler Subils, Narcís Soler Masferrer; pp. 149-161).

In 2010 the *Boletín del Museo Chileno de Arte Precolombino* dedicated both issues of Volume 15 to papers presented in an organized session at the 53rd International Congress of Americanists (June 2009, Mexico) which focused on past mining and metallurgical activities in the southern Andes. These dedicated issues, entitled *Estudios sobre Minería y Metalurgia en los Andes Meridionales I* and *Estudios sobre Minería y Metalurgia en los Andes Meridionales II*, edited by Luis González and Diego Salazar, included ten contributed papers on archaeometallurgical subjects. These papers consisted of (Vol. 15, No. 1) “Minería y metalurgia en la costa arica de la Región de Antofagasta, norte de Chile” (Diego Salazar, Victoria Castro, Jaie Michelow, Hernán Salinas, Valentina Figueroa, Benoît Mille; pp. 9-23), “Una máscara de cobre de tres mil años. Estudios arqueometalúrgicos y comparaciones regionales” (M. Cristina Scattolin, M. Fabiana Bugliani, Leticia I. Cortés, Lucas Pereyra Domingorena & Marilyn Calo; pp. 25-46), “Fuegos sagrados. El taller metalúrgico del Sitio 15 de Rincón Chico (Catamarca, Argentina)” (Luis R. González; pp. 47-62), “Estudios técnicos y estilísticos en discos metálicos hispano-indígenas procedentes del Pukará de Tilcara (Jujuy, Argentina)” (Geraldine Gluzman; pp. 63-80), and “Antiguas evidencias de minería y metalurgia en Pozuelos, Santo Domingo y Coyahuayma (Puna de Jujuy, Argentina)” (Carlos I. Angiorama, M. Florencia Becerra; pp. 81-104), and in (Vol. 15, No. 2) “Procesamiento de metales durante el Horizonte Medio en el Altiplano Surandino (Escaramayu, Pulacayo, Potosí, Bolivia)” (Heather Lechtman, Pablo Cruz, Andrew Macfarlane, Sidney Carter; pp. 9-27), “Technological changes in silver production after the Spanish conquest in Porco, Bolivia” Mary Van Buren, Claire R. Cohen; pp. 29-46), “Oro de los señores. La

Tumba 11 de La Isla de Tilcara (Jujuy, Noroeste Argentino)” (Myriam N. Tarragó, Luis R. González, Gimena Ávalos, Marcelo Lamamí; pp. 47-63), “Late pre-Hispanic and early Colonial silver production in the Quebrada de Tarapacá, northern Chile” (Colleen M. Zori, Peter Tropper; pp. 65-87), and “Representación humana y género en piezas de metal del Noroeste Argentino” (Geraldine Gluzman; pp. 89-106).

Ph.D. Thesis

Ancient Iron Smelting Technology and the Settlement Pattern in the Kiri Oya Basin in the Dry Zone of Sri Lanka, Rose Solangaarachchi (Doctoral dissertation, Department of Anthropology, The University of Florida, Gainesville, Florida), 2011, 549p., 138 figures, 68 tables. The objective of this research is to examine the metallurgical and socio-political aspects of ancient iron smelting in the Kiri Oya Basin (KOB), Dry Zone of Sri Lanka. I used various archaeological methods, sub-disciplines of anthropology that included the study of historical sources and oral traditions. I concentrated on the settlement patterns from the 3rd century B.C. to the 10th century A.D., the period represented by the inscription evidence in the KOB.

I directed the settlement pattern survey that identified 112 archaeological sites. There are four major categories: ancient iron smelting sites, village habitations/settlements, religious centers, and places interlinked with the hydraulic network. Using survey data, I investigated three major topics: how the iron smelting centers were distributed in settlements; how the ancient settlement pattern in Sri Lanka described in the ancient chronicles (Buddhist monasteries, the surrounding settlement and the hydraulic irrigation network had an interconnected relationship) illustrating in the KOB settlements; and how we can trace political and religious legitimacy throughout the settlement.

I directed excavation at four different sites to identify the chronological order in the KOB settlements, to describe the material culture and its relevant social strata, to date the period that the smelting activities went on, and to reveal the metallurgical characteristics. My archival research was the basis for my description of ancient iron smelting technology and its connection with the socio-political organization.

The research results indicate that the iron smelting activities that were using an advanced bloomery process with magnetite ore were mainly conducted in the 4th century A.D., prior to King Kasyapa's reign in the 5th century A.D. This study enabled me to trace the authority

of the centralized political system over the settlement, the inter-connectivity of Buddhist monasteries with the settlements and different social stratifications that existed over the landscape. The material culture of the KOB settlements highlighted three main periods of activity: 3rd century B.C. to 2nd century A.D.; 2nd century to 5th century A.D.; 7th century to 10th century A.D. [Abstract from dissertation author]

Forthcoming Meetings and Conferences

A call for papers has been issued for the international conference *Mining for Copper Environment: Culture and Copper in Antiquity, In memory of Professor Beno Rothenberg*, will be held at Timna, Israel, from April 22-25, 2013. The passing of Professor Rothenberg was mentioned in last issues Archaeometallurgy column, and he was an important and influential figure in the field for many years. This conference will commemorate his work and life and the setting for the conference couldn't be more appropriate. The international conference will be dedicated to the research of copper-related geology and mining, production and cultural background in antiquity.

Abstracts of up to 350 words written in English must be submitted electronically at microarchaeology@gmail.com before October 31, 2012. The first call for papers circular can be found at the following link: <http://dl.dropbox.com/u/6120219/TimnaConference1Circ.pdf>.

The eighth International Conference on the *Beginnings of the Use of Metals and Alloys (BUMA VIII)* will be held from September 10-15, 2013. The international conference on the "Beginnings of the Use of Metals and Alloys" (BUMA) is an interdisciplinary gathering of scientists, engineers, archaeologists and historians with a focus on production and use of metals, and with emphasis on cultural interactions and evolutions over time and space especially between the West and the Asian region. BUMA VIII will be held in Nara, Japan in 2013. As the ancient capital of Japan, there are many historical and cultural attractions in Nara. The great bronze statue of Buddha (Daibutsu) in the Todaiji Temple was cast using ca.500 tonnes of copper in AD 747-749 and marks the beginning of the new age of the metal production in Japan.

The main theme at the Nara Conference is "Cultural Interaction and the Use of Metals". The Conference will provide a forum for discussion on the effects of metals on the culture and history with a special focus on Asian materials. Comparative studies and case studies on ancient and traditional metallurgy from other regions can

clarify the interactions between the Far East and the West through South Asia as well as Eurasia.

They will try and avoid parallel sessions, and the poster session will allow maximum participation. Papers presented at the conference and accepted by the editorial committee will be published in the proceedings. Special attention should be given to the archaeological and historical background of the studies and to the interaction between specialized researchers. The conference language will be English. Abstract submission deadline is April 1, 2013. More information can be found at the conference website (<http://buma8.wiki.fc2.com/>).

The *Historical Metallurgy Society (HMS)* will hold the 2012 Conference "*Not so much Gold, Silver, Bronze - more Copper, Zinc and Brass*" on the SS Great Britain, Bristol, England, on October 6, 2012. In this Olympic year the Historical Metallurgy Society would like to invite you to join us for a one-day conference on the real story behind non-ferrous metals - not just gold, silver and bronze, but copper, zinc, brass and others. This conference offers an opportunity to explore themes relating to the history and archaeology of all non-ferrous metals. With the SS Great Britain as a backdrop there will be a focus on the broad theme of communication; communication of ideas, metals as communication tools and the role of non-ferrous metallurgy in the slave trade. The conference on the 6th of October will be hosted in the stunning Victorian surrounds of the SS Great Britain, the world's first great ocean liner. Registration for the conference will include access to the ship, refreshments, a light lunch and afternoon tea. The Bristol area is rich with non-ferrous archaeological sites, and on Sunday 7th October there will be an opportunity to explore Roman lead workings and post-medieval copper works with expert guides. The booking form can be found at: <http://hist-met.org/conf2012book.pdf>.

Previous Meetings and Conferences

From the conference "*Archeologie et Peuplement*": *Hommes, Cultures et Environnements en Afrique*, held May 21-23 at the Unité d'anthropologie de l'Université de Genève, come the papers "La sidérurgie en Afrique de l'Ouest et son impact environnemental. Le cas d'une production intensive aux marges du plateau dogon" (Barbara Eichhorn), and "Emergence de la céramique et du fer : facteurs culturels et environnementaux" (Eric Huysecom).

The 39th *International Symposium on Archaeometry (ISA)* was held from May 28 - June 1, 2012, at the Katholieke Universiteit Leuven, Belgium. The

conference covered a wide range of topics in archaeometry including a number of presentations and posters on archaeometallurgical subjects. Complete program and abstracts can be found at https://ees.kuleuven.be/isa2012/scientific-programme/ISA2012_Programme_Abstracts.pdf. Some of the titles and authors are presented here.

Presented papers included “Using Pb and Sr isotopes to infer the source of turquoise at the Aztec Templo Mayor” (Alyson M. Thibodeau, Leonardo López Luján, David J. Killick, John T. Chesley, Joaquin Ruiz), “The emergence of tin bronzes c. 7000 years ago” (Miljana Radivojević, Thilo Rehren, Duško Šljivar, Julka Kuzmanović-Cvetković, Marija Jovanović, Ernst Pernicka, Peter Northover), “Mineralogical and isotopic characterization of the Late Chalcolithic slags from Bressanone/Brixen (Northern Italy)” (Ivana Angelini, Filomena Gallo, Gilberto Artioli, Paolo Nimis, Umberto Tecchiati, Benno Baumgarten), “Arsenical copper in Southwest Asia: Alloying technology and intentionality determined by the chemical analysis of production remains” (Loïc Boscher, Thilo Rehren, Ernst Pernicka, Ulf-Dietrich Schoop, Barbara Helwing), “Lung-powered copper smelting of the Sican period (900-1375 CE), North Coastal Peru” (David Killick, Frances Hayashida), “When material science meet ceramic sociology: An archaeometallurgical study of crucibles from Mapungubwe, South Africa” (Shadreck Chirikure), “Why is there a Bronze Age from the Atlantic to the Pacific? Analysing the earliest appearance and widespread adoption of copper alloys and production techniques across Eurasia” (Benjamin Roberts), “The metallurgical inventory from Tell Chuera (Syria) – a direct comparison between quantitative pXRF and qualitative WDS data” (Kristina A. Franke), “Minoan metal vessel manufacture: Reconstructing techniques and technology with experimental archaeology” (Christina Clarke), “A preliminary report on the study of Cypriot bronzes dating to the Early Iron Age” (Andreas Charalambous, Vasiliki Kassianidou, George Papasavvas), “Oodles of copper for the Chinese Emperors: The case of Sijiawan plant” (David Larreina Garcia, Kunlong Cheng, Thilo Rehren, Yanxiang Li), “Making weapons for the Terracotta Army: Technology, standardization and logistics” (Marcos Martín-Torres, Xiuzhen Janice Li, Andrew Bevan, Yin Xia, Kun Zhao, Thilo Rehren), “A multidisciplinary investigation of bloomery iron smelting” (David Dungworth, Brice Girbal, Zoe Hazell, Paul Linford, Sarah Paynter, Harriet White), “Ore, slag and inclusion: Measuring variability in the direct process and assessing its implications for provenancing iron using the SI method” (Thomas Birch, Peter Crew, Zsolt Kasztovszky, Boglárka Maróti, Tim Mighall), “Identifying the construction phases of gothic

cathedrals through their metallic supply using iron and lead analysis by LA-ICP-MS” (Maxime L’Héritier, Adrien Arles, Bernard Gratuze), “Quantitative 3-D mapping of Japanese ancient blades through Energy-Resolved Neutron Imaging” (Filomena Salvemini, Francesco Grazzi, Steven Peetermans, Francesco Civita, Riccardo Franci, Stefan Hartmann, Eberhard Lehmann, Marco Zoppi), and “Beyond the crucible: Field based methods for identifying primary metallurgy” (Ryan Eldridge, Roger Doonan, Colin Merrony).

The posters were many. Those with relevance to metallurgy included “Final Bronze Age Copper Slags from Transacqua and Segonzano (Trentino, Italy)” (Anna Addis, Ivana Angelini, Gilberto Artioli), “Experimental Archaeometallurgy: Towards the Understanding of the Late Bronze Age Cu Extraction Process in the Eastern Alps” (Anna Addis, Ivana Angelini, Gilberto Artioli, Gruppo ARCA), “Morphological Reconstruction of Roman Sagittae from *Iulia Concordia* (North-Eastern Italy)” (Ivana Angelini, Francesco Grazzi, Filomena Salvemini, Peter Vontobel, Alberto Vigoni, Marco Zoppi, Gilberto Artioli), “The Metallurgical Workshop of Piazza Madonna di Loreto (Rome)” (Lorna Anguilano, Vasco La Salvia, Mirella Serlorenzi, Sonia Antonelli, Marzia Tornese, Andrea Iacone, Simone Prosperi), “Characterization of Ancient Japanese Tsubas through Time of Flight Neutron Diffraction” (Elisa Barzagli, Francesco Grazzi, Antonella Scherillo, Francesco Civita, Marco Zoppi), “Using PGAA to Determine the Composition of Experimental Iron Smelting Residues: Strengths and Limitations of a Non-Destructive Analytical Technique” (Thomas Birch, Peter Crew, Zsolt Kasztovszky, Boglárka Maróti, Tim Mighall), “Forging Ahead: Using Experiment to Augment our Understanding of Ferrous Artefacts” (Jonathan Britton, Jessie Slater, Roger Doonan); and “Metals and Metallurgy at Shanga, Kenya, ca. 750-1200 CE: Technology Transfer within an Islamic World System” (Thomas R. Fenn, David Killick).

As well as “Elemental and Lead Isotopic Compositions of Metals from Fraga dos Corvos (N Portugal): First Results of an Integrated Study” (Elin Figueiredo, Filipa Lopes, Susana S. Gomes, Pedro Valério, M. Fátima Araújo, Rui J.C. Silva, João C. Senna-Martinez), “Variation in Roman Period Iron Smelting: A Case Study in SouthWest England” (Ruth Fillery-Travis), “Is it by design? An Investigation into whether the Black Colored Copper Sulfide Surface on a Roman Leaded Bronze Statue is Corrosion or a Manmade Patina” (Rita Giannini, Jeffrey Maish, Simon Garrett, Marc Walton), “Non-Destructive Characterization of two Japanese Swords through Time of Flight Neutron Diffraction” (Francesco Grazzi, Elisa Barzagli, Jeremy Uden, Heather Richardson, Laura

Bartoli, Antonella Scherillo, Francesco Civita, Marco Zoppi), “Women’s Sacred Silver Jewels from Patagonia (19th Century): Mapuche-Tehuelche Alloys and Technologies” (Maria-Filomena Guerra, Richard Haas, Paz Núñez-Regueiro), “An Approach to Inca Metallurgy: Votive Gold and Silver Figurines from the Empire (1400-1532)” (Maria-Filomena Guerra, Helena Horta, Paz Núñez-Regueiro, Valentina Figueroa), “Ball Site Copper-Based Metals: Where were they Discarded or Lost?” (R.G.V. Hancock, K. Michelaki, D. Knight, L.A. Pavlish), “Bullets over Gennep: Using Compositional Variation in Lead Musket Balls in Battlefield Archaeology” (Hans Huisman, Jan van Doesburg, Bertil van Os, Arjen Kroeze, Sjaak Mooren, Jade Kniep), “The Production of Chainmail” (Arne Jouttijärvi), “Crucibles and Ladles. The Casting of Copper Alloys in the 15th – 16th Century” (Arne Jouttijärvi), “A Characterisation of Roman Age Refractory Ceramics from Autun/France” (Daniela König), “ICP-AES/ICP-MS Analysis of Bronze Objects Found in Ancient Necropolis from Apollonia Pontika, South-Eastern Bulgaria” (Deyan Lesigyski, Boika Zlateva-Rangelova, Valentina Ljubomirova, Velislav Bonev), and “Copper Processing in Oasis Sites of Northwest Arabia. The Evidence from Tayma and Qurayyah” (Siran Liu, Thilo Rehren).

Finally, “The Evolution of Copper Metallurgy in the South-Western Iberian Peninsula – New Evidences from the Pre and Proto-Historic Site of Torre Velha 3 (Southern Portugal)” (Pedro Valério, António Soares, Fátima Araújo, Rui Silva, Eduardo Porfírio, Miguel Serra, Catarina Alves, Catarina Costeira, Susana Estrela), “How Can 17th Century Bronze Cannons be Magnetic?” (Bertil van Os, Hans Huisman, Arent Vos, Lucas van Dijk), “The 9th Century Bloomery Iron Smelting in Northeast Thailand: A Case Study from Ban Kruat, Buriram Province” (Pira Venunan, Thilo Rehren, Issarawan Yoopom, Surapol Natapintu), “Out of the Furnace and into the Field: The Implications of Reconceptualising Metallurgy as Practice” (Lucy Cheesman, Brad Comeau, Michael Romano, Jessie Slater, Roger Doonan), “Trace Metal Levels in Terrestrial Ecosystem: What Relation to Ancient Mining Activities in the Morvan (Burgundy, France)?” (Estelle Camizuli, Fabrice Monna, Claude Gourault, Paul Alibert, Alain Bermond, Florence Cattin, Gilles Hamm, Jérôme Labanowski, Rémi Losno, Renaud Scheifler, Folkert Van Oort), and “What Did it Look Like? Reconstructing the Original Appearance of Decorative Metalwork” (Justine Bayley).

The 21st *Biennial Meeting of the Society of Africanist Archaeologists (SAfA)* was held in Toronto, Ontario, Canada, from June 21-23, 2012. This conference included two sessions on ancient metallurgy in Africa and

a handful of archaeometallurgical papers scattered through other sessions. These papers included “Quelques exploits de la production métallurgique de la province du Gourma au Burkina Faso: cas des bijoux anciens en fer affinés de Yindouga” (Foniyama Elise Ilboudo-Thiombiano), “African Iron Production: A Two or Three-Stage Process?” (Edwinus Chrisantus Lyaya), “Early iron production in Africa: new research in Sudan and the application of a multidisciplinary dating strategy” (Jane Humphris), “Metallurgy as an ingredient of interaction in the Southern Waterberg, South Africa” (Foreman Bandama, Shadreck Chirikure, Simon Hall), “Un site archéométrallurgique à Nalenga dans la province de la Gnagna (Burkina Faso): Contribution de l’étude des vestiges à la connaissance du mode de réduction” (Foniyama Elise Ilboudo-Thiombiano), “Archaeological Examination of the Adome-Ghana Ancient Iron-Working Site: Alternative Site Conservation Strategies in Ghana” (Kodzo Gavua, Wazi Apoh), “Iron smelting by the Oromo buuftuu of Wollega (Ethiopia): re-enactment and reconstruction” (Bortie Temesgen Burka), “Meroitic iron working in a Global context” (Randi Haaland), “MetaAfrica, an online platform to promote and facilitate African Metallurgy Research” (Caroline Robion-Brunner, Antoine Constans), “Metals and Metallurgy in African History” (David Killick), “How improve the ancient metal provenance studies? An example through lead-silver ores from Imiter mine (Morocco, North Africa)” (Sandrine Baron, C. Robion-Brunner, J. M. Fabre, M. Souhassou), “Mosaics in Time and Space: Historic Iron Production and Environmental Impacts in the Ngotto Forest, Central African Republic” (Christopher Albert Kiahtipes, K. Lupo, D. Schmitt, J. C. Ndanga, C. Young, R. Lee, J. G. Jones), “Aspects of Industrial Iron Production in Africa” (Philip De Barros), “La transmission des savoirs concernant la fonte de fer: un cas malien actuel” (Eric Huyssecom), “Considering the practicalities” (Jane Humphris), “Traditional iron smelting and smithing practices as economic and intellectual resources” (Shadreck Chirikure), “Smelting as part of African artistic processes and production” (William J. Dewey), “African iron smelting as intangible cultural property – some skepticism” (David Killick), “Bio-archaeometallurgy, Archaeology, and Archaeometallurgy of Ironworking of the Hehe of Ininga Region, southern Tanzania” (Edwinus Chrisantus Lyaya), “La métallurgie ancienne du fer dans la région de Korhogo: l’état de la recherche et perspective à venir” (Timpoko Hélène Kienon-Kabore). Abstracts for the following papers and more can be found in the expanded program PDF found at the conference website: http://www.archaeology.utoronto.ca/safa_conference/SAfA_program_05_07_12.pdf.

Courses (Past)

Introduction to the Archaeometallurgy of Cyprus: A NARNIA Project Training Course was held from May 7-11 in Nicosia, Cyprus. The training course consisted of a number of lectures on archaeometallurgy combined with excursions to important archaeometallurgical sites in Cyprus. The presented lectures over the five days consisted of "The archaeometallurgy of copper - what we study, how and why?" (T. Rehren), "Forty years of archaeometallurgical studies in Cyprus (1970-2010)" (J. Muhly), "The beginnings of metalwork on Cyprus" (E. Peltenburg), "Metallurgical production and exchange on Bronze Age Cyprus: An overview" (B. Knapp), "Cypriot Late Bronze Age smelting technology" (V. Kassianidou), "The Uluburun ship: Copper and tin ingots, and the trade of copper" (C. Pulak), "On the making of the Uluburun copper oxhide ingots" (A. Hauptmann), "The Cyprus-Sardinia connection: Tighter than ever" (F. Lo Schiavo), "Cypriot Late Bronze Age metalwork" (G. Papasavvas), "Copper for the Kings. Cypriot copper production and trade in the Iron Age" (V. Kassianidou), "Iron Age metalwork in Cyprus. Insularity and connectivity" (H. Matthäus), "Archaeomagnetic investigations of copper slag deposits: potential for a direct dating method" (E. Ben Yosef), "Cypriot copper mining and smelting in the Roman period" (V. Kassianidou), "Analyses of slags: the slag heaps of Skouriotissa and Ayia Marina Mavrovouni" (M. Georgakopoulou), "Pyrotechnical ceramics used in metallurgy - Fabrication, performance and use" (A. Hein), "Charcoal analysis and archaeology. A case study from the ancient copper industry in Cyprus" (M. Socratous), "Fire and brimstone: the pyrotechnology of sulphide ores" (R. Doonan), and "Experimental simulation of copper smelting and alloying processes: laboratory versus field experiments" (D. Bourgarit).

BIOARCHAEOLOGY

Katy Meyers, Associate Editor

My name is Katy Meyers, and I will be replacing Gordon Rakita as the associate editor for bioarchaeology in the SAS bulletin. I am currently working on my PhD in Anthropology, with a focus in Mortuary Archaeology at Michigan State University, and I received my MSc in Human Osteoarchaeology from University of Edinburgh. I am also the creator and sole author for the blog *Bones Don't Lie*, which reports news and commentary on current bioarchaeology and mortuary archaeology.

As someone who is relatively new to the discipline, I have already noticed changes and shifts in the course of

bioarchaeology. Bioarchaeology is unique evidence in that it is the only type that can put the people themselves back into history. Artifacts and features can be interpreted as correlates of behavior, but only the bones themselves are a direct reflection of the people who created the past. While some journals and researchers maintain a bioarchaeology that favors isolation from the broader archaeology and takes a particularistic approach, there are others who are branching out from this and using bioarchaeology in novel ways to both challenge and complement the discipline as a whole. Bioarchaeology, defined here as the study of human remains from archaeological sites, is increasingly used as a line of evidence in creative ways. I want to highlight here some of the innovative ways in which bioarchaeology is being used beyond the traditional studies of health and demography in order to create more nuanced interpretations.

Stable isotope analysis is no longer a new technique, though it continues to reign as a buzzword and hot topic. While its use is well used in studies of diet and mobility, new applications of the technique are occurring that offer new lines of evidence. A new study by Jaouen et al. 2012 examines the use of iron, copper and zinc isotopes to determine sex. They propose that the analysis of iron and copper isotopes can be used to determine sex. These two isotopes are primarily found in the blood, and are therefore embedded in the bone. Iron is reduced and copper is enriched in women's blood relative to men's. They argue that by testing the levels of these isotopes we should be able to determine whether the individual is male or female. Since the isotopes can also vary with diet, carbon and nitrogen isotopes were also tested to see if the correlation was with diet rather than sex. The study showed that indeed there was a statistically significant difference between the ratio of iron isotopes, with females higher than males by 0.33%, and copper isotopes with females lower than males by 0.09%. While continued study is needed, it shows promise for future studies.

While dentition has always been important, the use of dental calculus is allowing for macrobotanical studies that can reveal exactly what a diet and more. Blatt et al. (2011) use the food inclusions found in human dental calculus in order to determine their diet as well as making an interesting discovery. Like the residue of cooking materials, the dental calculus has often been overlooked as a source of evidence. Pieces of food and debris that enter the mouth adhere to dental plaque. Over time this becomes mineralized and is preserved in situ on the teeth. They can provide evidence about the diet of the individuals. Blatt et al. (2011) recovered cellulose fibers from the teeth of human skeletal remains found in Ohio at

the Danbury site, dating 900 to 1100 CE. The fibers recovered are more commonly known as cotton. The presence of cotton fibers is not related to diet, but rather to a preparation of yarn by which one holds the fibers in between the teeth. In addition to learning about the diet of the individuals at the site from food particles, the presence of cotton is the earliest evidence of the occurrence of this fiber in the area, a find that has major implications for trade, interaction and lifestyle among this group.

These new techniques in bioarchaeology are important in creating more accurate interpretations. However, it is important that they continue to be placed within the broader archaeological framework and work as a supporting line of evidence in archaeology as a whole. A brilliant example of this is the report by Buzon et al. (2012), titled "The consequences of Wari contact in the Nasca region during the Middle Horizon: archaeological, skeletal, and isotopic evidence". In this article, the human remains are used in a number of ways to understand the nature of interaction between the expanding Wari and the local Nasca communities. They examined the La Tiza population from the Early, Middle and Late Intermediate periods in order to understand the nature of change. All skeletal remains were examined for demographic and pathological information, and stable isotope ratios were determined for carbon, oxygen and strontium. In addition to the remains themselves, they examined the artifacts and mortuary sites. By using this wide range of evidence based on the skeletal remains, Buzon et al. (2012) are able to develop a detailed and comprehensive interpretation of the changing interactions between populations during a period of transition. They conclude that Wari contact at the site of La Tiza led to not only population change with the introduction of foreigners and dietary shifts to increased maize consumption, but also changes in ideology and mortuary behavior.

Bioarchaeologists are consistently finding new ways to introduce new technology and techniques into their research. The rise in stable isotope analysis and the introduction of dental calculus studies are a testament to that. However, the research that most impresses and provides the most hope for the development of the discipline is that which is able to use these new techniques and methods in a way that supports archaeology as a whole and integrates the results into the broader interpretations. While bioarchaeology is a unique perspective that integrates the people themselves back into history, it is important that it remains a piece of evidence within a broader perspective.

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BOOK REVIEWS

David Hill, Associate Editor

Archaeological Theory in Practice. Patricia A. Urban and Edward Schortman. 2012. Left Coast Press, Walnut Creek, CA. 344 pp. US\$34.95 (cloth). ISBN 978-1598746297.

Reviewed by Deni J. Seymour, Research Associate, Jornada Research Institute and Adjunct Researcher, Colorado University Museum of Natural History, Boulder, Colorado

I approached this volume with skepticism, despite fervently hoping it would live up to its marketing. Yet, at the conclusion of each chapter all I could say was: Bravo! The authors have effectively taken modern archaeological theory from the realm of esoteric knowledge into domains accessible to the general practitioner. They do, in fact, make explicit the crucial link between theory and the actual conduct of archaeological research.

The approach taken in this well-written book is much needed at a time when the validity of archaeologically derived knowledge is under attack and many practitioners do not understand the important and everyday role of theory. While the authors do not specifically say so, the first two chapters and Chapter 10 are a response to the extreme relativist position of the postmodern critique, but their discussion is far more than this. The book is an effective response to both extreme relativism and extreme positivism, demonstrating a useful balance between the two, calibrating a fresh starting point for a new generation of theoretically informed archaeologists. The value of this approach is not lessened when in Chapters 7 and 9 we are told the authors are now advocates of practice theory, not surprising from the title of the book. Inevitably, however,

the question raised is whether it is the increasing sophistication of the authors throughout their careers in applying method and theory or the inherent superiority of practice theory in their work that has led to better founded and more interesting questions and inferences.

Each chapter includes sidebars that discuss certain influential individuals in detail and the chapter text is followed by a list of additional readings. This approach keeps the discussion flowing but allows more in-depth investigation for the interested. The first four chapters are especially fast moving and engaging, while Chapters 5 through 9 could be paired a bit. Nonetheless, the content is accessible to all and they describe theory in a way that, as they say, is dynamic and democratic where everyone plays a role in the theoretical development of our discipline.

Throughout the book the authors provide us with a clear treatment that addresses many modern concerns. In Chapter 1 they directly tackle and effectively explain the differences between world view and theory, discuss the positional nature of inquiry, and they explain different types of theory. They clarify that they are focusing on higher level theory, the type that is often perceived negatively and has tended to be practiced by a few specialists skilled in conceptual matters. They explain that while both world view and theory simplify events and processes, thereby making reality understandable, there are important differences. They clarify these differences by stating that scientific theories require explicit statements of basic concepts and repeated and rigorous testing against data derived from observations in the real world. This chapter conveys an important message, and is profitably reiterated in Chapter 10.

Chapter 2 is also important for establishing common ground in a sometimes contentious theoretical field of play. Today's archaeology is a somewhat eclectic endeavor, which results from the complex nature of what we study. For this reason it is useful to see "different theories as complementary, non-competitive tools. Using these concepts, we can specify which aspects of that reality can be observed, described, and explained by using different specific theories. In this view, the proliferation of theories in archaeology is not an unfortunate by-product of problems encountered in testing claims. Instead it is an essential feature of any discipline whose members seek to understand human actions. No one theory provides a complete and adequate description or explanation of the processes being investigated" (P 40). Rather than lamenting conceptual anarchy, they argue that we can acknowledge that different theories provide different ways of understanding

complex human behavior. Theoretical fusion is characteristic of today's practice which they argue is appropriate given the fundamental diversity and complexity of what we study.

The authors examine the relationship between data and theory, addressing the issue of whether we learn only what we set out to find. They clarify that theory's control is not so absolute that it cannot be overturned with new observations. This is important to the second half of the book which shows how, in fact, shifting paradigms played out in their own work and the work of others.

Inference to the best explanation—a concept important in archaeological inquiry—means that interpretations are always works in progress, which through time are calibrated closer and closer to past realities. We seek explanations that account for the data better than other available hypotheses. Theories advance research and understanding to the extent that they provide simplified views of reality that are relevant to the types of data at hand.

Data do effectively constrain our understanding of the past and despite working in a specific paradigm data emerge that are contrary to expectations. While evidence that does not fit may be initially ignored, deemphasized, or uneasily subsumed into existing perceptions, eventually the evidence becomes strong enough to overturn established concepts. It takes time for sufficient data to be collected that definitively contradict accepted understandings, but it is common for investigations to undermine the hypotheses that shaped them. In these instances where we reject our prevailing theory we know we have learned, gaining a more reliable understanding of the past. Using examples, the authors show how an interpretive structure is toppled by the gradual accumulation of observations that expose flaws in explanation. Observations counter to the prevailing conceptual model can be made even though concepts appropriate for describing them were not contained within the prevailing hypothesis. If theory rigidly controlled perception, theory would not change to account for unexpected findings, but, in fact, we can perceive data that run counter to our theoretically generated expectations.

Chapter 3 examines the ways in which high-level theories are constructed in archaeology. The authors outline the nature of assumptions underlying each approach, including causation, free will, and general principles. Many of the differences hinge on whether the researcher is assuming that people understand the basis for their

actions or whether people tend to react to similar stimuli in similar ways.

Chapter 4 provides a concise and clear discussion of the different schools in theoretical archaeology: Culture History, Processualism, Marxist, and Interpretivism (aka Post-Processual). They effectively summarize, compare, and contrast these different theoretical schools, and perhaps as expected, the subtleties and variations are not discussed although references are included in the additional reading. They stress the permeability of the schools from which archaeologists borrow. They argue that no one perspective is sufficient for addressing all questions relevant to archaeology because, by nature, theory focuses attention on limited aspects of human behavior.

True to their word, after the first four chapters address the general nature and wider applicability of theory, in Chapters 5 and 6 the authors provide examples from Stonehenge and Mesopotamia. They show how different theory applied in these contexts results in different conclusions.

Because it is possible to appreciate the important role of theory only when it is used, Chapters 7 through 9 discuss the decades-long development of the author's theoretical and professional careers in the Naco Valley of Honduras. They demonstrate the creative and changing nature of the interaction of data and theoretical position. These are not superficial musings but are founded in solid efforts to understand how we know what we think we know and specifically what was happening in the Naco Valley. We come to appreciate the evolution of thought and changes in their understandings and their use of the data, providing a perspective on what was involved as the authors changed their theoretical stance.

Through their discussion we can see that each of their theoretical positions had a role to play in understanding different aspects of the Mayan periphery and each addressed different types of questions. They would not have gotten to where they are without also addressing the more culture-specific aspects of sequences and boundaries (Culture History), aspects of behavior that are more generalizable (Processualism), and shifting power relations between core and periphery and within Mayan society in the southeast (Marxist). Each brings the researcher to a different place and is uniquely applicable to certain kinds of questions and data. And so it is reasonable that their focus would shift toward a decentralization of causation, from prime movers to complex interactions between structure and action (Interpretivism, Practice Theory).

As the title conveys the authors conclude their discussion of theory use in their own research with their current theoretical paradigm, practice theory. Whether you are a practice theory advocate or not, the volume provides a clear understanding of how theory affects interpretation and data gathering and vice versa. The authors demonstrate a depth of understanding and ease of communication that only comes with a long engagement with the topic. They are effective in conveying the role and intricacies of theory in the modern age, points that are reiterated in the final chapter. I recommend this book for the student as well as the seasoned scholar who has strayed from interest in theory.

***Ancient Starch Research.* Robin Torrence and Huw Barton (eds).** 2006. Left Coast Press, Walnut Creek, CA. 256 pp., 157 illustrations. US\$61.31 (cloth). ISBN 978-1598740189.

Reviewed by Yan Wu, The Laboratory of Human Evolution, Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences, Beijing100044, China

I am extremely grateful to Robin Torrence and Huw Barton for editing a good textbook. This book provides students and scholars particularly our Chinese students and scholars with the necessary background to use this plant microfossil. Compared with other types of microfossil analysis, ancient starch research has its unique advantage in identifying as diverse a set of issues including tool function, plant use, the origins of agriculture and ancient subsistence practices. From this book, we were surprised by the range of studies being undertaken underlining the importance and potential contributions of ancient starch research. However, starch residue analysis is a relatively new research direction, and there are still many problems that need to be addressed. For example, why do ancient starch granules survive for long periods of time when the preservation of starch granules can be influenced by local environmental conditions including temperature, texture, moisture content, enzymes? Is it possible to develop an easier method to make sure the material you found represent ancient starch granule and not contamination from later deposits? How can we increase the recovery rate of ancient starch grains from archaeological soils?

The first chapter (by Torrence) is a helpful overview of the historical and regional perspective on ancient starch research which highlights currently significant work being undertaken in this archaeological field. Chapter 2

(by Gott, Barton, Samuel, and Torrence) briefly summarizes very useful information of the biology and chemistry of starch granules. However, the more technical information is needed to understand why starch granules have unique features such as their shape and optical characteristics. Chapter 3 (by Barton and Fullagar) describes the microscopic techniques that have been used to analysis ancient starch. This chapter is particularly valuable for assisting students and scholars how to best operate imaging systems and what equipment might best suit their research purposes. Chapter 4 (by Beck and Torrence) highlights how starchy plants have been used by citing numerous ethnoarchaeological studies. This is useful and effective method to understand where archaeological starch residues come from. So this chapter is given to the words "starch pathways." Chapter 5 (by Barton and Matthews) outlines variables that affect starch preservation by looking at how starch granules are preserved or destroyed under different conditions and shows how the altered form of starch granules can provide different insights into both natural and cultural processes.

Chapter 6 (by Field) emphasizes that how to prepare a reference collection for use in ancient starch research. The chapter discusses sources for plant material, reference collection preparation methods and the types of information that need to be recorded for a well-documented collection. In my opinion, a good reference collection is very important for identifying starch grains from archeological contexts. Chapter 7 (by Torrence) discusses the identification and classification of starch grains including a particularly thoughtful discussion of the varying levels of identification necessary for various research goals. Identification and classification of starch grains are for the goal of ancient starch research. However, this chapter indicates the need for more work by everyone. Chapter 8 (by Torrence) describes the methodology for the extraction of starch from sediments, is very useful for our laboratory. Chapter 9 (by Fullagar) on the extraction of starch from artifacts is very useful for any scholar engaged in ancient starch research. Chapter 10 (by Samuel) emphasizes more research on modified starch derived from ancient remains. It is very useful for any researcher when we have charred remains. Chapter 11 (by Barton and Torrence) draws the book to a conclusion, and looks to the future. Currently Chinese students and scholars have done a lot ancient starch research. For example, we report preliminary starch grain analysis of groundstone tools from Baiyinchanghan site to gain a better understanding of use of these tools in the Northeast China. The result of this study indicates that many groundstone tools for the Early Neolithic period were used to process wild plant foods.

Anyway, Ancient Starch Research is an excellent book. It is essential and useful for any researcher who is thinking about working in this area and any scholar who wants to understand ancient Starch Research in this filed. More importantly, it is very helpful for any researcher engaged in ancient starch research. So I hope we can read it carefully.

UPCOMING CONFERENCES

Rachel S. Popelka-Filcoff, Associate Editor

2012

29 August- 1 September. European Association of Archaeologists. Helsinki, Finland. General information: <http://www.eaa2012.fi/index>

5-7 of September. 2nd Luminescence in Archaeology International Symposium. Lisbon, Portugal. General information: <http://www.lais2012.itn.pt/>

8-12 September. South African Association of Geomorphologists Conference, Gobabeb, Namibia. General information: <http://www.sasqua.net/meetings-um.htm>

12-14 September. UK Luminescence and ESR Meeting, Aberystwyth University, Scotland. General information: <http://www.aber.ac.uk/en/iges/research-groups/quaternary/luminescence-research-laboratory/uklum2012/>

13-16 September. XIX Biennial SASQUA Congress, Gobabeb, Namibia. General information: <http://www.sasqua.net/meetings-um.htm>

17- 22 September. Detecting Cultural Landscape in Mediterranean Archaeology. Tuscany, Italy. General information: www.charcoalab.unina.it

21-22 September. 2nd Annual European Society for the Study of Human Evolution. Bordeaux, France. General information: http://eshe.eu/abstract_submission_2012.html

30 September -4 October. Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) Meeting. Kansas City, MO, USA. General information: <http://scixconference.org/scix2012.html>. Special session: "Chemical Analysis in History and the Arts"

1-4 October. Joint Australasian Society for Historical Archaeology/ Australasian Institute for Maritime Archaeology Conference 2012, Fremantle, Australia. General information: <http://www.asha.org.au/conference/>

28-29 October. 3rd Balkan Symposium on Archaeometry "The Unknown Face of the Artwork", Bucharest, Romania. General information: <http://www.icom-cc.org/51/news/?id=180>

29 October- 2 November. 18th International Conference of Ethiopian Studies, Dire Dawa, Ethiopia. General information: <http://ices18.org/site/>

3-4 November. African Archaeology Research Days 2012. University of Southampton, UK. General information: L.S.Basell@soton.ac.uk

4-7 November. The Geological Society of America National Meeting. Charlotte, NC, USA General information: <http://www.geosociety.org/meetings/>

4-11 November. XVth International TICCIH Congress, Taipei, Taiwan. General information: <http://www.arch.cycu.edu.tw/TICCIH%20Congress%202012/congress-2.html>

10-12 November. Association for Environmental Archaeology, Autumn Conference -- Environmental Archaeologies of Neolithisation, University of Reading (UK). General information: <http://www.envarch.net/events/index.html>

11-14 November. American Anthropological Association 111th Annual Meeting. San Francisco, CA. General information: <http://www.aaanet.org/meetings/>

12-14 November. Dimensions of the Indian Ocean World Past: Sources and Opportunities for Interdisciplinary Work in Indian Ocean World History, Fremantle, WA, Australia. General information: http://www.warc.murdoch.edu.au/research/iow_conf.html

14-17 November. American Schools of Oriental Research Annual Meeting. Chicago, IL USA. General information: <http://www.asor.org/am/index.html>

27-30 November. 13th Colloquium of the West African Association of Archaeology, Côte d'Ivoire General information: <http://www.aaaa-waaa.org/>

6-10 December. AGU Fall Meeting, San Francisco, CA USA. General information: <http://www.agu.org/meetings/>

2013

9-13 January. Society for Historical Archaeology Conference and 46th Annual Conference on Historical and Underwater Archaeology, Leicester, England. General information: http://www.sha.org/meetings/annual_meetings.cfm

14-18 January. World Archaeological Congress WAC-7, Dead Sea, Jordan. General Information: <http://wac7.worldarchaeologicalcongress.org/>. Special session: Science and Technology: Methods Analysis and Tools.

11-12 February. PAGES (Past Global Changes) 2nd Young Scientists Meeting, Goa, India. General information: <http://www.pages-osm.org/ysm>

17-21 March. Pittcon Conference and Expo, Philadelphia, PA USA. General information: <http://www.pittcon.org/>

25-28 March. Across Space and Time: Computer Applications and Quantitative Methods in Archaeology. Perth, Australia. General information: <http://www.caa2013.org/drupal/>

7-11 April. 245th National Meeting and Exposition, American Chemical Society. New Orleans, LA USA. General information: http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_MULTICOLUMN_T5_33&node_id=644&use_sec=false&sec_url_var=region1&uid=0c2e0f14-ad17-4117-b5d3-81e6024d4fbd

3-9 April. Society for American Archaeology. 78th Annual Meeting, Honolulu, HI USA. General information: <http://www.saa.org/Default.aspx?TabId=1419>

3-9 April. Paleoanthropology Society Meetings, held in conjunction with the Society for American Archaeology. Honolulu, HI, USA. General information: <http://www.paleoanthro.org/meeting.htm>

9-13 April. Association of American Geographers (AAG) Annual Meeting, Los Angeles, USA. General information: <http://www.aag.org/cs/annualmeeting>

9-13 April. American Association of Physical Anthropologists Annual Meeting. Knoxville, TN, USA. General information: <http://physanth.org/annual-meeting>

15-18 May. 36th Annual Meeting: Society of Ethnobiology. "Climate Change and Ethnobiology". Denton, TX USA. General information: <http://ethnobiology.org/conference/upcoming>

26-31 May. International Federation of Rock Art Organizations (IFRAO). Albuquerque AZ USA. General information: <http://www.ifrao2013.org>

20-24 August. International Symposium on Chert and Other Knappable Materials, Romania. General information: <http://arheoinvestsymposium.uaic.ro/stone>

19-21 September. 12th European Meeting on Ancient Ceramics (EMAC2013). Padova, Italy. General information: <http://emac2013.geoscienze.unipd.it/>

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Published quarterly by the Society for Archaeological Sciences

Distributed to subscribers: \$20/yr regular membership; \$15/yr student and retired; \$35/yr institutional; \$300 lifetime.

Individuals add \$110/yr for *J. of Archaeological Science*; \$40/yr each for *Archaeometry* and *Archaeological & Anthropological Sciences*. ISSN 0899-8922.