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FROM TABOONS TO TESLAS: ADVENTURES IN LEVANTINE ARCHAEOMAGNETISM

By Michele D. Stillinger

Graduate student, U. Minnesota Dept. of Earth Sciences
and winner of a recent SAS grant

Thanks in part to the generous support of the Society for Archaeological Sciences Student Research International Travel Award, I was able to travel to Israel this summer at the invitation of the Tell el-Hesi Regional Project (<http://www.hesiproject.org/>). I began my first field season collecting archaeomagnetic samples from the small tell of Khirbet Summeily, an Iron Age (11th to 7th century BCE) village site in the northern Negev desert. Summeily is situated along an ancient transportation route between Gaza and Hebron, on the very edge of the Philistine/Judahite border. The site contains elements from both cultures, leading to compelling questions about cultural interaction and exchange between two groups that were purportedly in conflict.

My analytical speciality is archaeomagnetism, the study of the ancient magnetic field of the Earth stored within archaeological materials. Ancient field strength and direction is recorded by grains of magnetic minerals, such as iron, magnetite, and hematite, found within materials made of stone, clay, sediment, and soils. When these materials are heated above their Curie temperature and then cooled, the minerals' magnetizations align parallel to the Earth's magnetic field and "lock" a permanent recording in place. The direction and intensity of this magnetic field record can be measured in the



laboratory using standard paleomagnetic techniques, such as stepped thermal demagnetization. Field strength and direction are highly dependent on geographic location and databases of measurements for a particular region can be used to construct magnetic, secular variation curves, similar in many ways to a radiocarbon curve, which can then be used as an alternative absolute dating method. The primary goal of my current research is to contribute to the record of magnetic variation for Israel in order to refine both the archaeomagnetic dating curve for the region and the archaeologically derived dates for the 10th through 8th century BCE, which have been the subject of debate due to an overlap in the radiocarbon dating curve that occurs for that time period.

Summeily is located in a region that has been extensively irrigated for agriculture; therefore, the dry desert heat I anticipated for my five-week field season no longer exists. Our mornings began at 4am in a dense fog that

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grew into a sweltering, muggy sauna and finally subsided with the hot afternoon breeze. This area of the Negev is composed of compacted loess sediments, making it difficult to distinguish between sedimentary infill and mudbrick, the primary building material during the Iron Age. Although my role was to collect archaeomagnetic samples, as an archaeologist, I feel it is critical to understand the sedimentary context, excavation strategies and archaeological setting. Therefore, when not collecting archaeomagnetic samples, I participated in excavation, artifact processing and interpretation to better understand the context of the site and assist in the overall research aims of the project. Many hours were spent screening for artifacts and I was pleased to find a chert sickle blade from the Canaanite Period and a large fish otolith (or inner ear bone), most likely from a Nile perch. The latter was further testament to the significance of regional trade at the site.

The first few weeks at Summeily were spent opening new units around the previous year's excavation, which showed evidence for a large destruction fire. A taboon (small conical bread oven made of clay) was discovered, ideal for archaeomagnetic testing because its fixed, in-place position allows for the measurement of both magnetic intensity and direction. Pottery, by contrast, has been displaced from its original firing position and only yields magnetic intensity information. During the third week of excavation, I was fortunate to travel north to Tell es-Safi, the site of ancient Gath. Safi is one of the largest pre-classical sites in the Levant and was continually occupied from the Chalcolithic period (5th millennium BCE) until the mid-20th century, yielding a tremendous amount of archaeological materials from across several periods. I spent five days at Safi under the instruction of geologists and archaeologists from the Kimmel Center for Archaeological Science, part of the Weizmann Institute of Science, looking at Bronze and Iron-Aged deposits and learning how to incorporate Fourier Transform Infrared Spectroscopy (FTIR) and phytolith identification into my research. Small portable FTIR units can be used in the field for quick analysis of soil and sediment samples, such as identifying the difference between unaltered chalk and human-manufactured limestone plaster. Upon my return to Summeily, I collected several ash samples from various destruction layers and hearths for FTIR analysis in hopes of identifying whether the ash represents sediments burnt in-situ.

By the fourth week of excavation at Summeily, several more taboons were discovered, along with hearths and ash layers containing burnt pottery and mudbrick, providing me with additional samples for archaeomagnetic testing. Samples were collected by

encasing them in plaster, which was leveled and scribed with a fiducial mark to preserve orientation of true north. Upon returning to the Institute for Rock Magnetism at the University of Minnesota, these samples will be cut into small specimen cubes for testing. During my field season, I was fortunate to work with William Isenberger, the surveying and GIS specialist at the site. His technical resources and expertise were invaluable, enabling me to orient my samples using GPS, which should improve the accuracy of my final directional measurements.

I am deeply grateful for my research experience in Israel this summer, and I am looking forward to returning next year to collect additional samples at other sites, in order to further refine the archaeomagnetic database for Israel. Thanks to the generous support of SAS, I had a rewarding and successful first field season, established number of new contacts and friends, and developed a greater understanding and appreciation for the challenges involved in efficiently collecting archaeomagnetic samples.

ANNOUNCEMENTS

Opportunities for Students

For those researchers planning to attend the Society for American Archaeology meeting in Hawaii next year, please consider applying for, or letting a student know about, the ***R. E. Taylor Award***. As a result of a collaborative effort with the Society for American Archaeology, SAS will acknowledge an outstanding student poster for its innovative contribution in the use of scientific technologies to archaeological research by granting the award, consisting of US\$100 and a one-year subscription to the SAS Bulletin. Financial support for the Taylor Award derives from the membership royalties of those who have joined us in our quest of making of archaeological sciences relevant to the study of humankind by using the tools of tomorrow.

This prestigious award is named in honor of Professor Emeritus R. Ervin Taylor of the University of California at Riverside for his outstanding contributions in the development and application of radiocarbon dating in archaeological research and dedication to the founding of the Society for Archaeological Sciences, for his leading role as President (1980) and General Secretary (1981-2002) and his committed service as editor of the SAS Bulletin. In 2004, the SAA recognized his invaluable contributions with the granting of the 2004 Fryxell Award for Interdisciplinary Research.

For more than a decade, receiving the Taylor R. E. award has enhanced the career of those who are now prominent young scholars and professionals. For 2012, SAS will offer the R. E. Taylor Award at the SAA 78th Annual Meeting in Honolulu, Hawaii. Entries will be judged on the significance of the archaeological problem, appropriateness of the methods used, soundness of conclusions, quality of the poster display, and oral presentation of the poster by the student, who should be the first author in order to compete.

Students must submit an application via email to Destiny Crider (destiny.crider@asu.edu) by February 15, 2013 to be considered for this award. Applications in form of an email message must include the title and abstract of the poster, proof that you have registered for the SAA meetings, and proof of your status as an undergraduate or graduate student (usually appears on your SAA registration). An email confirmation that your application has been received will be sent to you. Please keep this email confirmation. Students will also submit a .pdf version of their poster on or before February 15, 2013. This will give the judges adequate time to evaluate your posters. Judges will be present in person at the SAA meetings to judge posters and to ask students questions about their research. Prizes will be awarded at the SAA meetings following the end of the last poster session (final program is pending).

A new program in Archaeometry is the *Erasmus Mundus Master in Archaeological Materials Science (ARCHMAT)*. According to the website (<http://www.erasmusmundus-archmat.uevora.pt/>), this is a highly innovative two year course of study that teaches advanced scientific methods as applied to archaeological materials. ARCHMAT is made possible through a consortium of South American and European institutions, and classes are held in Greece and Italy.

The *Groupe des Méthodes Pluridisciplinaires Contribuant à l'Archéologie (GMPCA)* awards two prizes of €1000 maximum (*) every two years to the best PhD theses written in French or in English relating to original work in archaeometry, in any of the different scientific fields contributing to archaeology. These prizes are usually given to the winner(s) at the time of the GMPCA's biennial conference.

This prize is open to all researchers under 40 years of age who do not hold a full time academic position or a permanent contract. The applicants for the GMPCA prize must have written and defended a thesis in French or

English in a university within the European Union and have been awarded a doctorate between January 1st 2011 and December 31st 2012. Candidates cannot apply twice. Applications must be sent by post to the secretary of the association, or to one of the members of the board. Applications must be received no later than January 8th 2013. The prize winner(s) is (are) committed to submitting an article within a reasonable delay to the journal *ARCHEOSCIENCES - Revue d'Archéométrie*. More information at http://gmpca.u-bordeaux3.fr/doc/%5BGMPCA%5D_Prix2013_Prize2013.pdf

Upcoming Conferences

The next *GMPCA Archaeometry* conference will take place in Caen, from the 22nd to the 26th of April, 2013, at the invitation of the Centre "Michel de Boüard", the laboratory "Géographie Physique et Environnement" and the archaeological service of the "Conseil général du Calvados". The conference website (<http://www.unicaen.fr/archeometrie2013/index.htm>) is now available for further information.

PER TERRAM, PER MARE: Production and Transport of Roman Amphorae in the Eastern Mediterranean is scheduled for Nicosia, Cyprus, 12-15 April 2013. An international conference organized by the Roman Amphorae from Cyprus (ROMACY) project and the Maritime Archaeology Research (M.A.RE) Lab, Archaeological Research Unit, Department of History and Archaeology, University of Cyprus. The aim of the conference is to provide an in-depth and multi-faceted approach to amphora studies and to produce a synthesis of the data obtained from recent research in the eastern Mediterranean. The intention is to bring together specialists from various fields in order to exchange ideas and communicate results on issues relating to the nature of amphora production and trade. The topics that will be addressed range from typology, archaeometry and seaborne trade to statistical analysis and theoretical perspectives. The conference will comprise oral presentations and workshops, including the demonstration of manufacturing techniques in a pottery workshop, the examination of the finds from an amphora kiln-site and the inspection of thin-sections of eastern amphorae identified in Cyprus. The objective is to achieve a practical understanding of the issues that will be examined during the sessions and to stimulate further discussion. The programme will include excursions to a number of archaeological sites. English will be the official language of the conference.

Specialists and researchers are invited to submit titles and abstracts (300 words maximum) for a presentation related to one of the following broad themes: 1) Amphora typology, 2) Petrography and geochemical properties 3) Modes of production, 4) Seaborne trade, 5) Shipwrecks, and 6) Amphora contents and capacities. All abstracts must be written in English and must be submitted as a Microsoft Word or PDF document. The applications need to state: Full Name, Title and Affiliation, Country, Postal Address, and Electronic Address. Please send your application no later than 30 November 2012 to ptpm@ucy.ac.cy.

ARCHAEOLOGICAL CERAMICS

Charles C. Kolb, Associate Editor

The column in this issue includes four topics: 1) Previous Meetings; 3) Forthcoming Meetings; 4) Research on Faience; and 4) Internet Resource. *Archaeological Ceramics in Thin Section: a Colour Guide* by Patrick Sean Quinn and Peter Martin Day, New York: Springer Verlag, 2013, was originally due to be published on 28 June is now scheduled for distribution on 28 October 2012. This was to have been the lead review in this column; stay tuned, it will be reviewed eventually. James Skibo's *Understanding Pottery Function* (2013) is discussed in the Book Review column of this issue.

Previous Meetings

Athenian Potters and Painters III was the theme of an international conference held at the College of William and Mary 11-14 September 2012, in Williamsburg, Virginia, USA. This conference was the follow-up to the highly successful international conferences, *Athenian Potters and Painters I and II*, held in Athens, Greece, at the American School of Classical Studies in 1994 and 2007. The proceedings of the 2012 meeting will be published by Oxbow Books. Athenian pottery was the most important fine ware in the ancient Mediterranean during the Archaic and Classical periods, and is also a crucial dating tool for archaeologists. Topics investigated at this four-day conference included excavation pottery, ancient pottery workshops, iconography, painters and potters, export and trade, shapes, theory, chronology, and the influence of Athenian pottery on vases from other regions and vice versa. Twenty-five speakers varying in age, interests, and nationality presented papers. There was an exhibit of Greek vases at the College's Muscarelle Museum in coordination with the conference. The oral presentations and their authors were: "Opening

Remarks" by John Oakley, Michael Halleran, and Stephen Hanson; and a Keynote Lecture by Joan R. Mertens, "Chariots in Attic Black-figure Vase-painting: Antecedents and Ramifications." She is curator, department of Greek and Roman art at the Metropolitan Museum of Art in New York, and the author of "How to Read Greek Vases." The presentations were divided into five thematic "sections."

Section I: Potters, Painters, and Workshops: Alan Shapiro, "The Robinson Group of Panathenaic Amphorae"; Mario Iozzo, "Plates by Paseas"; Athena Tsingarida, "The Attic Phiale in Context. The Production of Red-figure Workshops"; and Phil Sapirstein, "Painters, Potters, and the Structure of the Attic Black- and Red-figure Industry." Section II: Context: Sheramy Bundrick, "Under the Tuscan Soil: Reuniting Attic Vases with an Etruscan Tomb"; Jutta Stroszeck, "Pottery and Topography: The Relationship between the Production Center, the Actual Use and the Find Spots of Attic Red-figure Pottery: Case Studies from the Kerameikos II"; Robert Sutton and Yannis Kourayos, "Attic Pottery from the Sanctuary of Apollo at Mandra on Despotiko in the Cyclades"; Heide Frielinghaus, "Cup Fragments from the Kerameikos"; and Keely Heuer, "Facing West: Isolated Heads and Attic Vases in Etruscan Contexts." Section III: Iconography I – Shape: Seth Pevnick, "Good Dog, Bad Dog: Canine Behavior in Attic Red-figure"; Martina Seifert, "Oikos and Hetairoi: Black-figure Departure Scenes Reconsidered"; Thomas Mannack, "Beautiful Men on Vases for the Dead"; Mark Stansbury-O'Donnell, "Menelaus in Attic Vase-Painting"; and Stefan Schmidt, "Democratic Vessels? Changing Shapes of Athenian Vases in Late Archaic and Early Classical Times." Section IV: Special Vases and Trade: Michael Padgett, "Who Are You Calling a Barbarian? A Column-Krater by the Suessula Painter"; Susan Rotroff, "A Smile and a Scorpion: Two Vases in the Kemper Museum at Washington University"; David Saunders, "An Amazonomachy Attributed to the Syleus Painter"; Phoebe Segal, "A Kantharos in the Museum of Fine Arts, Boston and the Reception of Athenian Red-figure in Boeotia" and Kathleen Lynch and Stephen Matter, "Trade of Archaic Athenian Figured Pottery and the Effects of Connectivity." Section V: Iconography II – Style: Tim McNiven, "The View from Behind the Kline: Symposial Space and Beyond"; Guy Hedreen, "The Iambic Artist in the Kerameikos"; Thomas Carpenter, "The Rape of Chrysippos in South Italy"; Beth Cohen, "Baskets, Nets, and Cages: Indicia of Spatial Illusionism in Athenian Vase-Painting"; and Tyler Jo Smith, "Guess Who's Coming to Dinner: Red-figure Komasts and the Performance Culture of Athens."

The 14th International Conference of the European Association of Southeast Asian Archaeologists (EurASEAA 14), hosted by the University College Dublin School of Archaeology, was held 18-21 September 2012 in Dublin Castle and the Chester Beatty Library; for details please visit the conference Website: <http://www.ucd.ie/archaeology/euraseaa14/index.html>.

There were 21 sessions, one of which was devoted to ceramics, and a total of 21 papers and two posters on ceramics. The symposium entitled “Understanding Southeast Asian ceramics: reflections on the past, current research, and future directions” was organized by Judy Voelker (Northern Kentucky University) and Ally Halliwell (Macquarie University); voelkerj1@nku.edu and ally.halliwell@mq.edu.au. Abstract: “Ceramics from Southeast Asia are widespread throughout the archaeological record and suggest dynamic and sophisticated cultures from prehistory to the historic period. Analysis of archaeological ceramics is an integral facet of archaeological research, providing insight into both the social and economic composition of past communities. The study of ceramics can elucidate complex patterns of exchange and interaction across large regions, patterns that tell us a great deal about the character of prehistoric and historic communities, and how they changed over time. Current ceramic research in Southeast Asia is remarkably diverse in topics and theoretical frameworks, as well in their methodological approaches. This session will highlight and explore current research trends in ceramic studies in the region and aims to provide a framework for discussion on future research.” The titles of papers, names of authors’ and abstracts follow.

“Earthenware production of Han people in Yunnan province” by Wang Yawen (Yunnan Nationalities University). In present-day Yunnan province, China, both earthenware and stoneware continue to be made, marketed and used, and play different roles in local people's lives. Earthenware production has a deep local tradition; potters are from indigenous ethnic groups and make pots using indigenous technologies. Stoneware production was introduced into Yunnan by Han immigrants at different times, particularly in the Ming and Qing dynasties; potters are mostly Han peoples. Based on surveys in Yunnan, I discovered five sites of earthenware production where the potters were Han people. Here I would like to briefly describe these sites and discuss some of the questions they raise.

“Developing a typology and a preliminary chronology of ceramics found in Sriksetra, Bagan and Tagaung” by Goh Geok Yian (Nanyang Technological University). Ceramic types found in Burma/Myanmar vary from locally and

regionally produced earthenware to Burmese glazed stoneware types to Chinese porcelain. In this paper, the focus is on earthenware sherds found in three Burmese archaeological sites: Sriksetra, Tagaung and Bagan, listed in historical sequence. Archaeological research in Burma has largely emphasised the study of architectural remains, and where discussion extends into ceramic studies, this focuses mainly on burial jars, containing deposits of either human remains (secondary burial) or other artefacts. Relatively less attention is paid to research on broken sherds, although one should note the significance of Don Hein and the Myanmar Ceramic Society’s work on Burmese ceramics and kiln sites. This study will look at samples of earthenware types found at three sites, and discuss a preliminary typology developed which could be of use in classifying earthenware types produced in Burma. This preliminary classification system will be used and tested in future research to be undertaken in Burma. An initial chronology of locally-produced earthenware will be created using stratigraphic information (if available) and, in lieu of the former, Chinese porcelain types (being recognised chronological markers) will be used to ascertain the approximate periodisation of the earthenware pottery. There will also be a discussion of the decorative motifs.

“Detecting style in the decorated non-anthropomorphic vessels found in Ayub Cave in Maitum, Sarangani Province, southern Philippines” by Eliza Romualdez-Valtos (University of the Philippines). The problem of gathering and recording data for design bands found in Philippine Iron Age pottery assemblages with ambiguous stratigraphic profiles has not gone beyond the descriptive word. This has hampered efforts in ceramic studies concerning the spatial and temporal relationships of prehistoric people in the southern Philippines. One main reason for this is the lack of an explicit, replicable, and controlled method that can be applied to banded decorations found in the pottery from the region. This study approaches the problem by analysing the decorated non-anthropomorphic earthenware assemblage from Ayub Cave in Maitum, Sarangani Province, focusing on the methods and procedures developed for the analysis of form and decoration found in the pottery assemblage from the site. The analysis resulted in the detection of a particular style utilising specific design processes that correlated to specific forms of pottery. As a result, the veracity of the identification of Philippine Metal Age Pottery complexes using Solheim’s ‘One Design Band Diagnostic Process’ is called into question. After over 50 years since the creation of Solheim’s approach, a reassessment of this identification method is now in order.

“The conical rollers of Ban Non Wat, northeastern Thailand” by Christina Sewall (Independent Scholar). Ban Non Wat is a well-stratified mounded site in northeast Thailand that has yielded thousands of artefacts and hundreds of burials dating throughout the Neolithic, Bronze and Iron Ages. Among the most regularly occurring artefacts are the earthenware objects which have been informally referred to as 'conical rollers'. Remarkably, these artefacts have not been reported from any other sites, even those closest to Ban Non Wat. Despite the fact that these artefacts appear to be confined to the period of transition from the Bronze Age to the Iron Age, and are closely associated with certain stratigraphic features and locations at the site, their purpose remains unknown. With well over 1500 examples recovered, understanding what these artefacts are and how they were used will clearly help us to understand life at Ban Non Wat in prehistory. This paper presents a description and formal analysis of the physical characteristics of conical rollers, and establishes a fundamental typology. It analyses these artefacts both across the site and stratigraphically, and describes associated finds and features. Several hypotheses as to their function are explored, although their function remains unknown.

“The Kok Moh kendis of Ban Pah O in the Satingpra Complex and their distribution” by Janice Stargardt (University of Cambridge). In 1972 and 1973 the Cambridge-Silpakorn research group excavated a remnant of the Kok Moh kiln and its spoil heap, which had survived thus far because it had been incorporated into the massive bund of a rice field. All the ceramics produced at this kiln were unglazed earthenwares of several categories. The most striking category was finely formed kendis, produced in the following colours: white, grey, buff, red and, in a single instance, grey body with a black slip. For most, their original heights can only be estimated at from 22-30 cm. Several were conserved in Cambridge and returned to Thailand (now in the National Museum Songkhla). All kendis from this site were exceptionally finely formed from well-levigated clay. Production at this fragment of the kiln has been dated to the 11th and 12th centuries, but may have commenced earlier and continued later at other parts of the kiln, which were destroyed before our work. These kendis were reported in the 1970s and 1980s as widely distributed in Southeast Asia: at other sites of the Satingpra complex and Nakorn Sri Thammarat close by in South Thailand, at Butuan in the Philippines, Muara Jambi and Kota Cina in Sumatra, and possibly Gresik in East Java. A few kendis resembling the Kok Moh tradition were found in 1997 among the cargo of the Intan wreck, and very similar kendis have been recorded in large numbers among the cargoes of the Cirebon and Karawang wrecks. It has thus

become relevant to revisit the database of the Kok Moh kendis so as to identify the ways in which they do, or do not, relate to these more recent finds.

“Distribution and dating: a preliminary analysis of Chinese qingbai (bluish-white glazed) and white ware covered boxes from several sites at Angkor, with cross-reference to contemporary shipwreck artefacts” by Linda McLaren (University of Sydney). Whether in concert with the study of temples and epigraphy or the more recent shift to evaluating occupation sites, a consistent feature of scholarship at Angkor has been the recording and analysing of imported ceramics. Despite their potential for informing us on foreign trade, and economic and social organisation, few reports have been published that shed light on their frequency and distribution. As an example of their value, Chinese trade wares can be used to identify the changing patterns of occupation in Angkor. This research provides preliminary results of quantitative analyses of one ware type, the ubiquitous covered box. Qingbai and white ware covered boxes from excavations and surface surveys from several sites at Angkor are compared with shipwreck artefacts. Dated wares from excavated kiln sites and tombs in China are also referenced, as are new technologies for testing provenance, such as chemical characterisation for comparison of sherds from kiln sites in China with those discovered in Angkor.

“Ceramics from the Musi riverbed” by John N. Miksic (National University of Singapore and Nalanda-Sriwijaya Centre, Institute of Southeast Asian Studies). Land-based archaeological research in Palembang and environs has yielded important evidence of ceramic imports from China, starting in the Tang Dynasty. The waters off southeast Sumatra have attracted increasing attention from maritime archaeologists. Numerous shipwrecks near the Karimata and Gaspar Straits and the western Java Sea from the ninth to fifteenth century have been studied, some more systematically than others. One potentially important source of archaeological data has yet to be tapped by archaeologists: the bed of the Musi River in Palembang, site of Sriwijaya's capital in the ninth century. This river has been a major artery of commerce for 2,000 years. It is likely that a major proportion of the area's archaeological heritage lies on the riverbed. Chinese porcelain of the ninth and subsequent centuries, ostensibly from this area, has recently appeared on the local antiquities market. One particular bowl has been interpreted by some Chinese archaeologists as a very rare example of *mise* or "secret colour" ware.

“Chinese ceramics found at Angkor” by Thon Tho, Rachna Chhay, and Em Socheata (all APSARA

Authority). The relationship between the Khmer and Chinese ceramic industries during the Angkorian period and later is important for understanding cultural exchange between political entities in Mainland Southeast Asia and China. In archaeological sites in the Angkor region, it is common to find Chinese ceramics in association with Khmer ceramics and with other trade ware. Chinese ceramics found in Angkor (dating from Tang to late Ming, 9th -17th century) show an important relationship between Khmer ceramics and Chinese ceramics in the everyday life of Khmer people in the past, especially regarding the revival of Khmer life during the post-Angkorian era in Angkor. This paper undertakes a comparative study of ceramics used in the everyday life of the ancient Khmer by examining quantities and chronology of ceramics, in order to develop a better understanding of the contribution and demand for Chinese ceramics used in Angkor. The research is based mainly on artefacts from many excavation sites in Angkor.

“Upper peninsular Thailand ceramics indicative of late prehistoric exchange with the South China Sea” by Aude Favereau (Musée national d'histoire naturelle) and Bérénice Bellina (Centre national de la recherche scientifique). Since 2005, the Thai-French archaeological mission in upper peninsular Thailand has been surveying and excavating sites belonging to various environments, social groups and of multiple uses. These include a proto-urban settlement of a cosmopolitan nature, Khao Sam Kaeo, caves used as campsites or burials along the coast, such as Tham Tuay and Tham Pla (province of Chumphon), on islands offshore, (e.g. Koh Din, province of Surat Thani), as well as in the interior along the earliest trans-peninsular routes (sites in the district of Sawi). Some of these ceramics share a common morpho-stylistical repertoire, amongst which is a Sa Huynh-Kalanay-related type that may be indicative of links to the South China Sea cultural sphere. This assemblage thus helps us to understand the interplay between the various groups present in or in contact with the upper peninsula, and how their circulation and exchange participated in the fashioning of their identity.

“Community, society and the environment: factors influencing the development of pottery production at Ban Non Wat, Thailand” by Ally Halliwell (Macquarie University). The actions of daily life, such as food cultivation, processing, preparation and consumption, require the production of various material items, such as pottery, that accompany and facilitate these activities. All productive behaviours, either primary or secondary to meeting basic subsistence needs, take place within specific social and environmental contexts. How these

processes are organised and managed, what role the local environment plays in the selection of appropriate resources, how this impacts on task management, and how these processes can be identified in artefact datasets should be addressed more frequently in archaeological research. This research investigates the inter-relationships between human society and the environment during the Neolithic period in Thailand, using Ban Non Wat as a case study. To better understand how pottery manufacture and production was organised during prehistory, the current research model investigates firstly whether factors like the effort required to process materials or seasonal workloads can influence the organisation of labour, and secondly if local environmental factors impacted on or influenced the intensification of ceramic manufacture at the site. Three principal sources of data have been chosen to identify the organisation of ceramic manufacture at Ban Non Wat: 1) experimental data on pottery manufacture using local materials, 2) ethnographic data on pottery production in local communities, and 3) archaeological data from Ban Non Wat.

“Ceramics and social practices at Ille Cave, Philippines” by Yvette Balbaligo (University College London). This paper discusses the ceramics from Ille Cave, a multi-period burial and occupation site, and other caves sites in the Dewil Valley where Ille Cave is situated. The pottery shows a range of decorations, and some forms suggest that certain vessels were associated with burial rituals. While some of the pottery shares similar styles with earthenware found elsewhere in Island Southeast Asia, there are technical and stylistic differences within the earthenware pottery from Ille Cave, and between it and other cave sites in the Dewil Valley. This paper discusses the communities of practice who produced this range of pottery, and its role in burial practices, in order to evaluate what this can tell us about the social organisation of the people who used the Dewil Valley. This paper will also assess the cultural links between the Dewil Valley and wider Island Southeast Asia, and consider how pottery and burial practices at the site relate to larger-scale and longer-term chronologies in the region.

“Chinese porcelain trade in the Philippines: preliminary chemical analysis” by Rory Dennison Laura Junker (both University of Illinois at Chicago). This research examines how the social and political dynamics in 10th - 16th century Philippine maritime trading polities may have affected mainland Asian trading strategies with the archipelago, as examined through typological and compositional analyses of porcelain. It is suggested that the variable and culturally-specific social contexts in which ceramic imports were used, their significance as a form of political currency for brokering power

relationships in specific Philippine societies, and the degree to which local trade networks were available to serve as intermediaries, were likely factors in Chinese merchant decisions about what porcelain forms they could most profitably market, and whether both large single shipments to prominent ports and numerous "island hopping" trade voyages were practised. While a project on Philippine imported porcelain sourcing in mainland Asia (i.e. the "supply" side) is only in its preliminary development and not reported here, this paper focuses on some initial results of compositional and typological analyses on porcelain from settlement features and burials in secure archaeological contexts in the Tanjay Region of Negros Island. Typological analysis allows the identification of ceramic preferences in local populations of the 12th-16th centuries, and the specific archaeological contexts of porcelain types provide evidence for differing local social valuations of porcelain, and their symbolic importance in activities like feasting and mortuary rites. The study uses LA-ICP-MS and other compositional techniques to identify ceramics groupings based on associated kilns where they were produced, which may distinguish Philippine settlements receiving large bulk porcelain shipments directly from foreign traders from those which relied on multiple down-the-line exchanges. Though preliminary in nature, this work offers insights into the "demand" side of the Southeast Asian porcelain trade.

"The Austronesian face: human face representation on ceramics in Austronesian prehistory in eastern Indonesia" by Jean-Christophe Galipaud (Muséum national d'Histoire naturelle), Truman Simanjuntak (Pusat Penelitian Arkeologi Nasional), Hallie Buckley (University of Otago), Daud Tanudirjo (Universitas Gadjah Mada), and Fadhila Azis (Universitas Gadjah Mada). The human face has long been recognised as a major element of Lapita design, and is associated with the initial Austronesian diaspora towards the uninhabited islands of the western Pacific 3000 years ago. In Southeast Asia human faces on pottery are not so common and are more often found in post-Neolithic assemblages. A complete pot with appliqué face design from an urn cemetery on the island of Flores, eastern Indonesia, is described and compared with face designs from similar contexts in other parts of Indonesia. Face designs on Neolithic and Palaeometallic pottery in Indonesia indicate that the human face was as important a symbol in Island Southeast Asia as in Oceania, and should such be regarded as a major marker of the Austronesian diaspora.

"Ban Bang Pun ceramics within their social and economic context" by Pimchanok Pongkasetkan

(Bangkok University). Many archaeological projects in central Thailand, especially those on ancient settlements dating to the 14th-16th centuries AD, have discovered ceramics from Ban Bang Pun kilns, which show high similarity and a relationship with Dvaravati and Khmer ceramics. These have also been discovered from sunken ships in Southeast Asia and some settlement sites in Kyushu, Japan. The appearance of Ban Bang Pun ceramics in the world market marks a big evolution in Thai ceramics before the Sangkalok or Sukhothai-Srisatchanalai Ceramics Age, and also the continuity of social, economic and technological organisation in central Thailand during this time. This paper will focus on the economic and social context in central Thailand during the 14th-16th centuries AD, by considering archaeological ceramics of the Ban Bang Pun kilns, from related ancient settlements around the kiln area and evidence from sunken ships, to explore their origin and relevance for the world market during this period. It will also discuss the social circumstances in central Thailand after the fall of the Dvaravati culture.

"The role of potters in establishing identity at Neolithic An Son, southern Vietnam (second millennium BC)" by Carmen Sarjeant (Australian National University). The relationship between artefacts and identity has always been important in archaeological inquiry. In Vietnam, there has been a tendency to define archaeological sites and cultures according to one marker type of artefact, identified in terms of stone tool, metal or pottery morphology. Sites have been assigned to a named "culture" according to the presence of the chosen artefact and their geographic proximities to other sites with this item. In my ceramic research on Neolithic assemblages in southern Vietnam, I have utilised various analytical methods to explore another approach. I investigate concepts of identity within southern Vietnam, and in connection with wider Neolithic cultural phenomena in Southeast Asia. A comprehensive analysis was conducted on the ceramic assemblage from the Neolithic site of An Son (second millennium BC), identifying the temporal ceramic sequence, variations in the spatial use of the site, and the use of ceramics in domestic and ritualistic settings. I have also investigated standardisation in manufacture and aspects of craft organisation, and the roles of potters in developing, following and deviating from mental templates associated with the marking of identity. The results of my research reveal complex and blurred boundaries of social interaction when comparing the ceramics and other material culture of An Son with other sites in southern Vietnam and other regions of Southeast Asia. An Son provides an example of a site at which continued interaction with other populations is evident throughout the occupation. The potters both

recalled the past through continuing adherence to incipient and widespread Neolithic ceramic traditions, and at the same time invested in new traditions that reaffirmed local identity.

“New excavation of a brown glazed kiln site east of Angkor” by Darith Ea (APSARA Authority). Research on Khmer stoneware kiln sites is recently progressing after many kiln sites were identified in the Angkor area and along the ancient roads connecting the capital to other provinces. From the 1980s, some brown glazed stoneware kiln sites in Buriram province were excavated by the Thai Fine Arts Department; these brown glazed wares were thought to have been brought to the capital by an ancient road connecting Angkor to Phimai. From 1996 to date, green glazed stoneware kiln sites were found and excavated in the Angkor area by joint research projects between APSARA Authority and teams from the National Research Institute for Cultural Properties, Nara, Sophia University Angkor International Missions and Osaka Ohtani University. The excavations revealed the structures of kilns to be similar, with a fired box, a firing chamber and a vent. From December 2011, the APSARA Authority and the Institute of Southeast Asian Studies of Singapore excavated a brown glazed kiln at Torp Chey, along the Angkorian east road from Angkor Capital to Bakan (known as Preah Khan Kampong Svay). The kiln structure is very large, 21m long and 2.8m wide. The kiln lay on a mound, consisted of one fired box, three additional fired trenches, four firing chambers and a vent. To date, this kiln is considered to be the largest kiln in Southeast Asia. The new discovery of this kiln shows the development of kiln technology and demand of ceramics for use during the great Khmer empire.

“New evidence for utilitarian ceramic production in the Angkor Empire’s core: the site of Kok Phnov, Siem Reap Province, Cambodia” by Rachna Chhay (APSARA Authority), Heng Piphah (University of Hawaii Manoa), and Alison Carter (University of Wisconsin-Madison). The archaeological site of Kok Phnov lies immediately southeast of Sras Srang in the Angkorian core, and was identified as an occupational and ceramic industrial site more than 13 years ago. No systematic excavations were undertaken at Kok Phnov, however, until the February-March 2012 field season. Greater Angkor Project crew members completed a systematic surface ceramic collection and test excavations at one of the site’s several occupation mounds. This work produced ceramics from three main cultural groups: 1) Khmer stoneware (unglazed, green and brown glazed), 2) trade wares (Chinese, Thai and Vietnamese), and 3) locally-manufactured utilitarian wares (earthenwares and high fired [possible] stonewares with transparent or glassy

glaze and/or ash-glaze). Use of a relative ceramic chronology dates the Kok Phnov site to the 10th to 17th centuries AD, making it a rare example of a multi-component site whose occupation spans the entire Angkorian to post-Angkorian sequence. The 2012 excavations produced evidence (raw materials, kiln fragments, and manufactured objects) for ceramic manufacture at Kok Phnov between at least the 10th through 12th centuries. Kok Phnov is also an unusual example of a kiln site located within the Angkorian urban core; most recorded kilns lie either in the Kulen Mountains to the east, or at greater distance to the northwest or southeast of the area. This paper discusses the Kok Phnov local production system by examining vessel form/shape and by comparing the Kok Phnov wares with utilitarian ceramics recovered from other occupation sites in the urban Angkor core.

“Identification of Phnom Kulen ware found in Thailand” Pariwat Thammapreechakorn (Southeast Asian Ceramics Museum, Bangkok University). Previous kiln excavations in both the Buriram kilns in Thailand and the Phnom Kulen kilns in Cambodia reveal the differences between Phnom Kulen and Buriram wares in type, shape, glaze, decoration, Chinese inspiration, and kiln technology. Defining these differences enables a better understanding of Cambodian ceramic-making technology, and allows us to create a preliminary classification and typology of ceramic wares found from each kiln. This classification also enables comparative studies of Khmer ceramics found in both excavations. A small number of ash-glazed ceramics from the Phnom Kulen kilns, together with ash-glazed ware from the Buriram kilns, have been found at several archaeological sites in northern, central, eastern and northeastern Thailand. This paper argues that both Phnom Kulen ware and Buriram ware were widely distributed, and not limited to their areas of production only. This analysis enables a new interpretation of the development of Khmer ceramics.

“New ceramic research on the Middle Period of Cambodia, based on archaeological survey at the Krang Kor site” by Yuni Sato and Sok Keo Sovannara (both Nara National Research Institute for Cultural Properties). This paper presents the results of excavations conducted at the Krang Kor site since 2010. The study is a joint initiative of Nara National Research Institute for Cultural Properties and the Cambodian Ministry of Culture and Fine Arts. The Krang Kor site, Kompong Chhnang Province, Cambodia, was discovered after the issue of looting by villagers was brought to light. Excavations at the site resulted in the discovery of burials, one of which escaped looting and was found in good condition. The artefacts so far discovered in the study are diverse, but the

burial goods unearthed from the unlooted burial are especially worthy of mention. They include a Chinese celadon dish, Sri Satchanalai celadon plate, bowl and large bowl, Khmer earthenware, iron knives, bronze earrings, and glass beads. Additionally, numerous imported ceramics from China and Southeast Asian countries, including Khmer brown glazed jars dated to the 14th to 16th centuries AD, on the basis of dates for the better-known Chinese and Thai ceramics, have been found as surface collections. The 14th to 16th centuries were a time of transition from the late Angkor period to the post-Angkor period. The ceramic findings suggest that a dominant force with enough power to acquire considerable amounts of imported ceramics existed during this time in the Krang Kor area.

“Re-thinking Khmer ceramics through old scripts and bas-reliefs: primary study of Khmer and Sanskrit words for ceramics and metal pots based on inscriptions” by Sok Keo Sovannara (Nara National Research Institute for Cultural Properties). Ceramics have an important role in everyday life, beliefs and religious activities. The evidence of archaeological materials indicates the Khmer produced ceramics and metal pots before the beginning of history. On the other hand, ancient Khmer inscriptions show numerous words concerning ceramics and other pots that important in society. These were mostly indicated as gifts given to kings or high-ranking officers, and offered to temples or religious buildings, and sometimes related to the names of people or places. Generally, these words were used in texts written in Khmer, and, rarely, in Sanskrit. Through these inscriptions, around 45 words are known to describe various types or shapes of ceramics and metal pots. In the pre-Angkor period, the 'words of ceramics' were usually interpreted as the names of people and places, and sometimes presented as real objects given to temples or to people. By the Angkor period, the 'words of ceramics' or other pots were presented as real objects given to kings or high-ranking people and temples. And some new words, especially Sanskrit words, never seen in pre-Angkor inscriptions, were used regularly for specific types of pots. But over time most of these words were forgotten and are not used by the present-day Khmer. Through this current study using the old words of Khmer and Sanskrit, bas-reliefs, artefacts and modern words used for pots, I try to interpret and identify individual types or shapes of both clay and metal pots. Future research will focus on currently unidentified types of pots named in the inscriptions.

“The glass bead industry of Bagan, Burma – misinterpretation delays recognition of an important industry” by Don Hein (Independent Scholar).

Monochrome drawn glass beads have been found in numerous Southeast Asian archaeological contexts, and represent bead production and trade over millennia. Some evidence of manufacture has been presented, usually describing small-scale output at a local level. Given the scale and ubiquity of finds, major industries must have existed to meet demand, but hitherto no such Southeast Asian site has been found. Seven furnace constructions at Myinkaba, Bagan, Burma, previously reported as ceramics kilns, have now been identified as glass furnaces for both the smelting of raw glass from local materials and the manufacture of beads. Output capacity potential was large enough to anticipate contribution to domestic and long-distance markets. This paper reports on the infrastructure and operation of the industry and its possible relationship to Asia-Pacific trade.

“Iron Age sites in Cambodia, glass beads and ceramics analysis” by Sophy Song (Ecole des Hautes Etudes en Sciences Sociales). Extensive archaeological research on the Iron Age has come from many parts of the Southeast Asian mainland, but there has been a distinct lack of information from Cambodian sites. This work carries out a combination of site studies, technological investigations, style and compositional analysis on glass beads and ceramics, with expected results making it possible to reconstruct internal exchange between the Iron Age sites in Cambodia and Southeast Asia, and aims to more fully understand the groups and components of beads and ceramics through classification and the different techniques of their manufacture. The finds selected for this research are glass beads and ceramics from ten Iron Age sites in Cambodia which were discovered from 1996 to 2010. Most come from excavations, while others were from donations made by villagers near the sites. Glass beads and ceramics from these sites were analysed macroscopically and using LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectrometry).

“Prehistoric technical ceramics: examining casting molds from the Khao Wong Prachan Valley, central Thailand” by Judy Voelker (Northern Kentucky University). The Thailand Archaeometallurgy Project (TAP) has focused on the Khao Wong Prachan Valley, central Thailand in an effort to better understand the origins of mining and metallurgy in Southeast Asia. TAP has excavated three culturally and technologically related copper production and habitation sites in this valley: Non Pa Wai, Nil Kham Haeng, and Non Mak La. Ceramic tools of metal production are common at these sites and include crucibles, furnace chimneys, ingot molds, and bivalve casting molds. This paper examines over five hundred ceramic bivalve casting molds that were recovered from

deposits at the three sites. Bivalve casting molds were widely used throughout Southeast Asia in prehistory to cast copper-base artefacts such as socketed axes, blades, spear points, and jewellery.

“Martabani dragon jar cemeteries of the southern Kelabit Highlands, Sarawak” by Borbála Nyíri (University of Leicester). Dragon jars are large ceramic storage vessels first produced in Song Dynasty China (AD 960-1279). The expansion of trade during the 14th century AD took these vessels to the ports of Island Southeast Asia, where, since their appearance was strikingly different from locally-made pottery, they soon became sought-after items by many indigenous groups. The vessels gained new meanings and became elevated to the level of prestige goods. In the Kelabit Highlands of Borneo, for example, dragon jars were also used as burial containers. This paper presents an overview of these vessel types as recorded at nine dragon jar cemeteries (total of 80 fragmented vessels) in the southern Kelabit Highlands, surveyed in 2007-2009 under the remit of the Cultured Rainforest Project. The structure and form of the cemeteries are discussed, and the wider connections of the southern Kelabit Highlands with other regions of Southeast Asia considered.

“Metal Age jar burials: viewshed analysis of sacred spaces in the Philippine Islands” by Alexandra De Leon, Nida Cuevas, and Sheldon C. Jagoon (all National Museum of the Philippines). This paper explores the spatial nature of jar burial sites located in several islands of the Philippines, and discusses landscape features that may have influenced decisions in choosing sacred spaces. These jar burials, largely dated to the Philippine Metal Age (c. 500 BC-AD 800), include anthropomorphic imagery, elaborate earthenware pottery assemblages as burial accompaniments, exotic beads and metal objects, and what appear to be purposeful arrangements related to natural landscapes and phenomena. Using Geographic Information Systems (GIS)-based viewshed analysis this paper looks at aspects such as directionality, views of sunset and sunrise, proximity to coasts, mountain summits and rivers, to assess the significance of particular environments for prehistoric cosmologies. It determines that water bodies, particularly oceans and rivers, are significant features that Metal Age populations considered in their choice of sacred sites in the Philippines about 2000 years ago.

The poster presentations were: “A pottery analysis of the earthenware assemblage recovered from Ille Rockshelter in Palawan, Philippines” by Eliza Romualdez-Valtos and Anna Pineda (both University of the Philippines). This poster presents a descriptive analysis of the form and

decorations found in the earthenware assemblage recovered from Ille Rockshelter in Palawan, Philippines. The earthenware vessels, both plain and decorated, were recovered during excavations in 1999-2011. The poster gives a brief introduction to Ille Rockshelter, its location and relative importance to the development of the prehistory in the region, the excavations conducted from 1999-2012, and a description of the materials recovered from the site. The methodology used in the analysis of the assemblage for both form and decoration will also be presented. Results from Romualdez-Valtos and Pineda's ceramics analysis will be highlighted in the poster. The results include an inventory of both earthenware vessel forms and decorations found in the assemblage. Correlations between certain pottery forms and decorative elements found in the assemblage are also presented.

“Guide to understanding Khmer stoneware characteristics, Angkor, Cambodia” Rachna Chhay, Thon Tho, and Em Socheata (all APSARA Authority). The developed Khmer kiln used a cross draft technique to produce glazed and unglazed stoneware; study of these allows us to understand how and when Khmer potters developed their characteristics. The cultural material from excavated Khmer kilns, and artefacts uncovered from Angkorian occupation sites, provide an understanding of ceramic production and consumption. This poster summarises Khmer stoneware production and the development of kiln technology during Angkorian times, showing some characteristics of each production centre in Angkor and around Angkor, including the northwest of Angkor, known as Buriram Province, Thailand.

The XXXIII International Conference on Archaeological Sciences was held in Dubai, UAE, 8-9 October 2012. This meeting brought together leading academic scientists, researchers and scholars to exchange and share their experiences and research results about all aspects of Archaeological Sciences, and discuss the practical challenges encountered and the solutions adopted. The conference was sponsored by WASET (World Academy of Science, Engineering and Technology), a scholarly open access, peer-reviewed, interdisciplinary, monthly and fully refereed journal focusing on theories, methods and applications in science, engineering and technology: <http://www.waset.org/conferences/2012/dubai/icas/> As of this report (mid-October 2012), the full agenda and abstracts were not available online and only one ceramic-related paper appears in the WASET program: “Waste Clay Brick as a Supplementary Replacement of Clinker in Blended Cement and Mortar” Cherait Yacine and Ghania Nigri, Civil Engineering Department, University 08 Mai

45, Guelma, Algeria.
<http://www.waset.org/conferences/2012/dubai/icas/>

New Light on Archaeological Ceramics was the title of a conference held at the University of Southampton, UK, 19-21 October 2012. The conference was held in recognition of contributions to archaeological artefact studies by Emeritus Professor David P.S. Peacock and was hosted by the Ceramics Research Group of the Department of Archaeology, University of Southampton, UK. This conference brought together specialists who explore applications of recent techniques and new perspectives to archaeological ceramics; some approaches were in their infancy, while others have reached a more mature stage. The meeting provided a forum for discussing archaeological ceramics and interdisciplinary ideas and methods. Visit the Website for further information and abstracts of the papers: <http://www.southampton.ac.uk/innovationconference/index.page> The Plenary Session included keynote addresses by Michael Fulford, Roberta Tomber, Ian Whitbread, and Peter Day. Based on the preliminary program, the oral presentations and presenters were:

“Title TBC” by Ina Berg; “Prehistoric Calabrian Clay Taskscapes Through Time” by Kostalena Michelaki; “Fired Fingers. The study of finger imprints on pottery as a new method to investigate pottery production in archaeology” by Yvonne de Rue; “Title TBC” by Helen Marton; “And some loquacious vessels were... Investigating the role of hunter-gatherers in the origins of pottery and the role of pottery in the lives of hunter-gatherers” by Peter Hommel, Peter Day, Peter Jordan, and Viktor M. Vetrov; “Pots and Stories” by Joanna Sofaer; and “Pots and Pies: Adventures in the archaeology of eating habits” by Joanita Vroom. Other presentations included “Rehydroxylation (RHx) dating, perhaps the technique archaeology has been waiting for?” by Moira Wilson; “Cooking residues and C14: the use of Bayesian modelling to refine ceramic chronologies” by Alistair Barclay; “The chronology of Saxon Stafford Ware: multi-technique Bayesian chronological modelling compared with historically attested events” by Seren Griffiths; “Title TBC” by David Knight / Prehistoric Ceramics Research Group, Jane Evans / Study Group for Roman Pottery, and Duncan Brown / Medieval Pottery Research Group; “Use of automated scanning electron microscopy (QEMSCAN®) to characterise the texture and mineralogy of medieval and post-medieval pottery from Somerset” by Jens Andersen, Gavyn Rollinson, and David Dawson; “Taking the coarse with the fine: the application of automated SEM-EDS with QEMSCAN® to ceramic assemblages in the Bronze Age Aegean” by Jill Hilditch, Duncan Pirrie, Carl Knappett, Nicoletta

Momigliano, and Gavyn Rollinson; and “Analytical Developments in the Study of Islamic Glazes” by Michael Tite. The final papers were Phytolith analysis of ceramic thin section. Experimental and technological contributions: phytolith visibility and firing temperatures” by Akos Peto and Luc Vrydaghs; “Vessel volumes and visualisation: innovative computer applications for ceramicists” by Matt Brudenell, Vicki Herring, and Donald Horne; “Non-destructive analysis of Samian ware from Scottish military sites” by Richard Jones and Louisa Campbell; “Microscopic sourcing of ceramic components: case studies from South West England Henrietta” by Quinnell and Roger Taylor; and “Islamic Ceramic Art: Contextualising Museum Collections through Archaeological Evidence” by Rebecca Bridgman.

Forthcoming Meetings

American Anthropological Association 2012 Annual Meeting is scheduled for 14-18 November in San Francisco, CA. This is the 111th Annual Meeting and has a theme of “Borders and Crossings.” The year's program has 717 sessions, 34 workshops, 13 innovents, and 183 special events. There was one symposium on ceramics and three separate papers on ceramic materials. The latter includes: “The World On a Plate: Consumption and Commerce At Magdalena De Cao Viejo Through the Lens of Ceramic Analysis” by Nathaniel Parker VanValkenburgh (Washington University in St. Louis); “The Harmful ‘Mexicaness’ or Transported ‘Beauty’: Contested Interpretation of High Temperature Ceramic Art (stoneware) In Contemporary Mexico” by Kanae Omura (University of the West); and “Ceramic Traditions In San Vicente De Nicoya, Costa Rica: Tourism and the Display of Shifting Lifestyles In a Community Museum” by Danielle R Merriman (University of Colorado).

The symposium, Ceramic Ecology XXVI: Current Ceramic Research 2012, was organized by Sandra L. Lopez Varela (Universidad Autónoma del Estado de Morelos) and Kostalena Michelaki (Arizona State University). It was also to be chaired by them, but both are on the AAA's Archaeology Division Board and could not attend because of a scheduled board meeting. Charles C. Kolb (National Endowment for the Humanities) serves as Chairman on their behalf, and Brenda J. Bowser (California State University-Fullerton) is the discussant. The abstracts of the presentations follow. Session Abstract: “The papers in this international and interdisciplinary symposium, the 26th in the annual series, reflect the range of scholarly work currently undertaken on the examination and analysis of ceramics. This session demonstrates the value of the cross- fertilization which results when investigators ranging from art historians and

professional potters to ethnoarchaeologists and archaeometricians come together in a forum devoted to a topical consideration: ceramics. The variety of theoretical approaches, the multiplicity of methodologies and the variability of cultural and temporal contexts considered in this session, provide a rare opportunity for transdisciplinary interactions and push the boundaries of human experience that can be understood through the systematic and creative study of ceramics. As a methodological and theoretical approach inspired by Frederick Matson's work, Ceramic Ecology aims to better understand the peoples who made and used pottery and seeks to redefine our comprehension of the significance of these materials in human societies. On the one hand, it seeks to evaluate data derived from the application of physiochemical methods and techniques borrowed from the physical sciences within an ecological and sociocultural frame of reference. It relates environmental parameters, raw materials, technological choices and abilities, and sociocultural variables to the manufacture, distribution, and use of pottery and other ceramic artifacts. On the other hand, interpretation of these data and explanations of the ceramic materials utilize methods and paradigms derived from the social sciences, humanities, and the arts to approach fundamental anthropological questions, such as the socio-economic context of production, social systems of learning, communities of practice, the formation of identity, or how communities perceived their landscape. These papers continue a symposium series initiated at the 1986 AAA meeting by students of ceramic materials who are members of the informal "Ceramic Studies Interest Group," an organization formed at the suggestion of Matson."

"Introduction to Ceramic Ecology 26" Sandra L. Lopez Varela (Universidad Autónoma del Estado de Morelos). Paper Abstract: In 1965, Frederick Matson introduced the concept of Ceramic Ecology to study pottery under a cultural perspective by providing insights into the learned patterns and mechanisms by which mankind has attempted to adjust itself to the environment and to its social world. Thus, Ceramic Ecology has been an invitation to study pottery through a wide range of method and techniques borrowed, for example, from the physical and chemical sciences, but also, under paradigms derived from the social sciences, the humanities, and the arts. In 2011, the Ceramic Ecology (CE) symposium reached its silver anniversary milestone. Ceramic Ecology 26 brings together a group of scholars working all over the world, interested in investigating the relationship between pottery and environmental parameters, raw materials, technological choices and abilities, sociocultural variables to the making, distribution, and

uses of pottery, and other clay objects. The papers presented in this session will take us, as Matson once said, "beyond the conventional limits of anthropology" through a variety of perspectives focusing on present-day analyses and the future of ceramic studies, enhanced by the discussants and an open forum in which the audience will be invited to participate. "A Consideration of the Influence of Environmental and Depositional Diversity on Late Classic Maya Ceramic Assemblages from the Upper Belize River Area, Belize" Jonathan B. Pagliaro (University of California Santa Barbara). Paper Abstract: Ceramic analysis methodologies used by archaeologists in the Maya Lowlands are commonly used to organize ceramic data, identify assemblage homogeneities and heterogeneities, and infer patterns of socio-economic and political organization. Variation in prehistoric Lowland Maya ceramic assemblages identified through these analyses may oftentimes discount the influence of diversity in the landscape and depositional context on pottery production and consumption. In this paper, prehistoric pottery collections from the Upper Belize River Area, Belize will be used to illustrate how contextual and environmental factors may affect the composition of ceramic assemblages.

"Pottery Designs As Sources of Information about Past Environments on Roatán Island, Honduras Whitney Goodwin" (Southern Methodist University) and E. Christian Wells (University of South Florida). Paper Abstract: Prehispanic pottery designs and motifs featuring animals and other environmental features in southeastern Mesoamerica are often interpreted in terms of cosmic connections. However, environmentally-themed designs can also provide important information about the structure and organization of past ecosystems. In this paper, we present an analysis of ceramic wares dating ca. AD 800-1200 from the site of El Antigüal on Roatan Island, Honduras, with the goal of identifying design motifs. We argue that such motifs can be grouped into a number of basic environmental themes. Some of these themes can be explained by faunal species' preference for certain habitats (especially manatee and tapir), which may reveal aspects of regional aquatic and terrestrial environmental conditions in Prehispanic times. "Combining Ethnoarchaeology and Petrography of Classic Period Maya Ceramics at Yaxuná, Yucatán, Mexico" Travis W. Stanton (Universidad de las Américas Puebla). Paper Abstract: This paper presents a petrographic study of Classic period ceramics from the Maya site of Yaxuná, Yucatán. A series of physical experiments on local raw materials used for pottery production were conducted in 2006. The results of these experiments are compared to petrographic slides to understand the changing use of tempers and clays of

ceramics excavated from a deep refuse pit on the North Acropolis dating from A.D. 300-900. This study uses observations from indigenous potters from the town of Muna, Yucatán to interpret the use of tempers in certain vessel form categories that have been subjected to detailed modal analysis.

“Five Decades of Classic Teotihuacan Period Ceramic Studies: Where We Were, Where We Are, and Where We Need to Go” Charles C. Kolb (National Endowment for the Humanities). Paper Abstract: Fifty years ago the three major archaeological projects were underway at Teotihuacan, Mexico to study the ceremonial center, the city itself, and the rural supporting region: Proyecto Teotihuacan (Instituto Nacional de Antropología e Historia), Teotihuacan Mapping Project (University of Rochester), and Teotihuacan Valley Project (Pennsylvania State University). A collaborative effort of the three projects with 14 participating archaeologists concentrated on ceramic analysis which played a significant role in defining relative chronologies, locally produced versus imported wares, and spatial distributions for the Preclassic Patlachique phase through Postclassic Aztec V. I worked on both the Mapping and Valley projects, and in this paper I focus on research undertaken on Classic Teotihuacan period ceramics that has taken place since then to define the ceramic wares, their sources of production, and mechanisms of distribution. Among the ceramics to be considered are: Fine Matte, Burnished, Polished, Copoid, Stuccoed and Painted, and San Martin wares, as well as foreign ceramics (Thin Orange and Granular wares). Studies using thin-section petrography through INAA and LA-ICP-MS have aided in answering the original basic questions as well as new anthropologically-oriented research questions. “Ceramic Dating: A Review of Techniques, with a Special Focus on Rehydroxylation Kostalena” Michelaki (Arizona State University) and Timothy Scarlett (Michigan Technological University). Paper Abstract: Although probably the most ubiquitous archaeological find, pottery remains hard to date accurately. After a review of the benefits and problems of the most common pottery dating techniques (examination of style and context, as well as thermoluminescence), we will focus on the newly proposed Rehydroxylation technique and discuss its principles, challenges, and potential. This paper reviews work already completed by laboratories in the United Kingdom and in the United States at Michigan Technological University and California State University, Long Beach. A major new collaboration combines those research teams, and also Arizona State University and the University of Tel Aviv, in an international effort to measure the reliability and veracity of RHX dating for archaeological ceramics.

“Petrographic Perspectives on Tarascan Ceramic Production Amy J. Hirshman (West Virginia University) Paper Abstract: Previous NAA of ceramics from the Prehispanic Lake Pátzcuaro Basin indicates six compositional groups, utilizing ash tempers, with broad provenance locales within the basin, but little evidence for production at Tzintzuntzan, the capital of the Late Postclassic Tarascan State (AD 1350-1525). This petrographic study focuses on clay and ash samples within the Basin and furthers our understanding of paste composition and the organization of ceramic production within this region of western Mexico. “Why No Style? Boring Pottery At the Pambamarca Fortress Complex In Northern Ecuador As An Explanation for Successful Resistance Against the Inca Empire” Samuel V. Connell (Foothill College), Ana Gonzalez (Foothill College) and Chad Gifford (Columbia University). Paper Abstract: This paper makes the case that pottery stylistic analysis can tell us something about the nature of resistance to imperialism along frontiers. At Pambamarca we argue that the lack of stylistic diversity represents a segmentary or heterarchical social organization of the indigenous Cayambe peoples who, according to chroniclers, resisted the advancing Inca armies for more than a decade. Additionally, our prediction is that the initial lack of prestige items in the local ceramic assemblage of northern Ecuador slowly changes over time as a result of Inca influences along the contested borderland. “Changes to Hohokam Red-on-Buff Pottery Recipes Through Time: An Analysis of Clay Mixing and Clay Papules” Sophia Kelly (Arizona State University). Paper Abstract: Throughout the Hohokam Preclassic period (AD 700-AD 1100), potters manipulated pottery paste compositions to create specifically desired ceramic recipes. For instance, potters carefully controlled the chemistry of red-on-buff pottery paste in order to lighten the surface color and to prevent lime spalling. Recent research suggests that these ceramic technologies may have been even more complex than previously imagined. Potters may have selected clays of different compositions and then mixed them within their pottery pastes. An alternative theory is that potters chose clays with papules of unweathered clay that present the appearance of clay mixing. This paper examines chemical data from LA-ICP-MS analyses to assess 1) if Hohokam potters were mixing clays of different compositions, and 2) if the incidence of clay mixing or clay papules in decorated pottery production shifted through time. The results provide insight on technological decisions in Hohokam ceramic manufacture.

“Trench Kiln Clusters and Communal Firing In the Northern San Juan, Southeastern Utah” Sandra Arazi-

Coombs (University of New Mexico). Paper Abstract: The Northern San Juan is home to a unique ceramic firing feature known as the trench kiln. Dotted across this vast landscape, these features exhibit distinct locational and morphological qualities which may yield clues about the social structures that revolved around ceramic production and distribution in this area. In this paper, I discuss the social environment of the Northern San Juan region through the lens of ceramic production in the Pueblo III period. Focusing on a specific cluster of kilns (~30+ kilns in a 1000 x 1000 meter area), this paper provides a preliminary analysis of the types of environmental factors (distribution of resources, seasonality, etc.) and social relationships (division of labor, degree of specialization, location of kiln clusters to surrounding communities) that may have surrounded ceramic production in the area. As a conclusion, I tentatively propose that certain kiln firing groups in the Comb Ridge region represent a form of community specialization. The paper addresses topics relevant to social complexity, such as the possibility of communal firing practices, overproduction of ceramics and the implication of agricultural scheduling conflicts on ceramic production. "Between Memory and Materiality: Biographies of Iroquoian Smoking Pipes" Gregory Vincent Braun (University of Toronto). Paper Abstract: Smoking pipes are ubiquitous finds at many Iroquoian domestic settlements; however the traditional focus on their decoration may limit our understanding of the social and mechanical performance of these objects. This paper therefore employs a biographical approach in order to better understand the various contexts in which smoking pipes were manufactured, used and discarded. Petrographic, macroscopic and experimental techniques are used to examine the ceramic industries at two Middle Ontario Iroquoian villages that were occupied during the late 13th century AD. The resulting data suggest that an important interplay existed between memory and materiality throughout the life-cycle of smoking pipes – beginning with the selection of symbolically charged raw materials for their manufacture, and ending with their decommissioning, deliberate breakage and discard.

The 17th European Maya Conference (EMC) will be held in Helsinki, Finland, 9-15 December 2012. The theme of the symposium is "On Methods: How we know what we think we know about the Maya." The theme of the conference differs from the customary, concentrating on the processes of scientific investigation, rather than on the end results of research. Consequently, the conference deals with methodological issues, challenges in interdisciplinary research, questions that rise in the liminal area between disciplines, as well as experimental and cutting-edge disciplinary research. The conference is not intended to be a showcase of different sub-disciplines

(and their methods) in Maya Studies but, rather, a platform where scholars from different branches of learning will discuss the premises of scientific knowledge and expose the processes and methods of their work – rather than merely the outcome of research. The speakers include: Dmitri Beliaev and Albert Davletshin (Russian State University for the Humanities); Jesús Carretero Pérez (Universidad Carlos III de Madrid) and José Luis González (Information Technology Laboratory Center of Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV) Ciudad Victoria, Mexico); Elizabeth Graham (University College London); Daniel Graña-Behrens (University of Frankfurt); Sven Gronemeyer (La Trobe University); Nikolai Grube (University of Bonn); John S. Henderson (Cornell University) and Kathryn M. Hudson (University at Buffalo); John Hoopes (University of Kansas); Kerry Hull (Reitaku University); Harri Kettunen (University of Helsinki); Milan Kováč (Instituto Eslovaco de Arqueología e Historia); Felix A. Kupprat (UNAM); Alfonso Lacadena (Universidad Complutense de Madrid); Simon Martin (University of Pennsylvania Museum); Peter Mathews (La Trobe University); Romelia Mo' Isem (Guatemala); Shawn Gregory Morton, Meaghan Peuramaki-Brown, Peter C. Dawson & Jeffrey D. Seibert (University of Calgary); Alexander Safronov (Lomonosov Moscow State University); Rogelio Valencia Rivera (Centro Knorosov-Xcaret, Universidad Veracruzana, Xalapa); Gabriel Wrobel (Michigan State University); Eriko Yamasaki (University of Bonn); and Marc Zender (Tulane University). Although the titles have not been listed, there will certainly be a great deal of ceramic content. In addition to workshops, the EMC also includes a visit to the exhibition "Maya III: Life, Death, Time" at the Didrichsen Art Museum in Helsinki on Thursday, 13 December. More information and registration details can be found on the Wayeb-website: http://www.wayeb.org/conferencesevents/emc_now.php.

The Society for American Archaeology annual meeting in Honolulu, HI, 3-7 April 2013: A very late "call for papers" was sent less than a week before the deadline; a notice was posted on SASNet. "Archaeometric techniques are increasingly applied in the field and in the laboratory for the characterization of archaeological and historic materials. This session will focus on geochemical and material analysis techniques (including but not limited to UV-VIS-NIR, XRF, XRD, ICP-MS, GC-MS, SEM-EDS) that are used in archaeometric studies to provide information on chemical composition, microstructure and isotopic signatures that are used for sourcing, provenance, environments, migration, craft specialization, trade and conservation/ preservation. The papers in this session will address the methods of

acquiring the data and how the data is treated in light of the complexities posed by the heterogeneous nature of archaeological materials and the alterations that they undergo during burial. This session aims to bring forward a discussion of the advantages and limitations of different techniques based both on hardware design and application methodology and the pitfalls in the acquisition and interpretation of results. Papers that focus on the analysis of materials from an excavated context are preferred, but those discussing the analysis of artifacts from museum collections are also welcome.” Abstracts were due to the organizers by 8 September 2012; for further information, please contact Vanessa Muros (vmuros@ucla.edu) or Dr. Ioanna Kakoulli (kakoulli@ucla.edu).

The XV International Clay Conference will be held in Rio de Janeiro, Brazil, 7-11th July 2013. The Brazilian Clay Group of the Brazilian Geochemical Society, on behalf of AIPEA, Association Internationale pour L'Etude des Argiles, invites participation in this meeting. There are 28 technical topics/sessions on the program, among them “Archaeology and archaeometric investigations and clay minerals” and “Ceramic applications of clay minerals.” Information about presenting a paper, submitting an abstract, and registering may be found on the conference website www.15icc.org.

Research on Faience

Can Egyptian Paste Techniques (Faience) Be Used For 3D Printed, Solid Free-form Fabrication of Ceramics?

The University of the West of England, Bristol, announced that the UK's Arts and Humanities Research Council awarded a three-year research grant from 01/09/2012 - 31/08/2015 to study aspects of ancient Egyptian faience. Details and images at: http://www.uwe.ac.uk/sca/research/cfpr/research/3D/research_projects/Egyptian_Paste.html.

David Huson and Professor Stephen Hoskins seek to develop a process based upon historic Egyptian Faience techniques, which should enable ceramic artists, designers and craftspeople to print 3D objects in a material which they are familiar with and that can be glazed and vitrified in one firing. Faience was first used in the 5th Millennium BC and was the first glazed ceramic material invented by man. Faience was not made from clay (but instead composed of quartz and alkali fluxes) and is distinct from Italian Faience or Majolica, which is a tin, glazed earthenware. (The earliest Faience is invariably blue or green, exhibiting the full range of shades between them, and the colouring material was usually copper). The researchers believe that it is possible to create a contemporary 3D printable, self-

glazing, non-plastic ceramic material that exhibits the characteristics and quality of Egyptian Faience. It is the self-glazing properties that are of interest for this research project. In the 1960's, Wulff in 'Egyptian Faience a possible survival in Iran' postulated that the technique he observed in Qom, Iran described as cementation glazing, could have been a method used by the Egyptians from 4,000 BC. In order to glaze the unfired object, it is buried in a glazing powder, in a sagger (a protective vessel of fireclay to support and protect delicate objects) then fired. During firing, a glaze is formed directly by chemical reaction on the surface of the body but the glaze mass as a whole does not melt. Modern techniques employ 3D printing to form physical models by a variety of methods from a virtual digital file. An additive layer manufacturing process is employed to deposit a variety of materials: commonly UV polymer resins, hot melted 'abs' plastic and inkjet binder or laser sintered powder materials. These techniques have previously been known as rapid prototyping (RP). With the advent of better materials and equipment some RP of real materials is now possible. These processes are increasingly being referred to as solid 'free-form fabrication' (SFF) or additive layer manufacture. To create a printable Faience we will investigate, three methods used by the Egyptians. Application glazing: similar to modern glazing techniques where glaze slurry is applied to a body. Efflorescent glazing: where the glazing materials in the form of water-soluble salts are mixed with the body. The salts migrate to the surface forming a layer, which fuses to a glaze when fired. Cementation glazing: the unfired object, it is buried in a glazing powder, in a sagger then fired. During firing, a glaze is formed directly by chemical reaction on the surface of the body but the glaze mass as a whole does not melt. We will use these techniques as a basis for developing contemporary printable alternatives. In addition the research team will work with a group of art/design/craft practitioners who will be selected as case studies and co-contributors to the project. In Egypt, from the New Kingdom onward, the colour palette of Egyptian Faience was extended and a new method of manufacture was developed. A Ph.D. studentship will research this method, more like a glass, where the body is entirely homogeneous without a separate coating of glaze. The surface was generally, but not always, glossy. The glassy phase results from the addition of coloured frit to the Faience mixture.

(Frit, a mixture of glass ingredients that have been incompletely reacted together, is a material in its own right and can be used as a pigment or for making objects). The research will investigate whether the addition of coloured frit may enable an Egyptian Faience like material suitable for 3D printing with a greatly increased

colour palette. This project offers the theoretical possibility of a printed, single fired, glazed ceramic object - something that is impossible with current technology.

Internet Resource

POTSHERD: *Atlas of Roman Pottery*: This is a collection of pages on pottery and ceramics in archaeology, principally of the Roman period (1st century BCE-5th century CE) in Britain and Western Europe. The pages include an introductory *Atlas of Roman Pottery*, containing descriptions and distribution maps of types of Roman pottery (particularly types found in Britain). The pages of the Atlas describing the individual wares can be accessed through the main menu, which lists the wares by CLASS (table wares, cooking wares, transport amphoras etc.) or SOURCE (by province of origin). Links to these indices will also be found in the main menu bar. The work is based on Paul Tyers's *Roman Pottery in Britain*, first published London: B. T. Batsford Ltd, 1996; reprinted London: Routledge, August 1999 and October 2003, but out-of-print since November 2005; ISBN: 0-7134-7412-2 (Batsford) and 0-415-21441-6 (Routledge). The permanent URL for this site is <http://potsherd.net> with a backup copy of some of the content at <http://www.potsherd.demon.co.uk> Please visit: <http://potsherd.net/atlas/potsherd.html>

ARCHAEOLOGICAL CHEMISTRY

Ruth Ann Armitage, Associate Editor

ACS Archaeological Chemistry Symposium

Jim Burton, from the T. Douglas Price Laboratory for Archaeological Chemistry, and I are your co-organizers for the 12th Archaeological Chemistry Symposium. The Symposium will be held, as always, during the American Chemical Society National Meeting, this time in New Orleans, Louisiana on April 8-9, 2013 (Monday and Tuesday of the meeting). The 12th symposium will consist of both invited and contributed presentations – talks and posters – from researchers in the fields of archaeological science, with emphasis on chemical analysis of cultural heritage materials. The presentations will range from a poster session to a keynote talk from one of the leaders in the field of archaeological chemistry. Watch for further details (by email on SASnet, or follow us on Twitter @12thArchaeoChem) and a list of invited speakers. Please share this information with colleagues who may also be interested in attending. The window for abstract submissions closed on October 29, 2012. The Symposium is being sponsored by the ACS Division of

the History of Chemistry and by the SAS. If you have questions, please contact Jim (jhburton@wisc.edu) or me (rarmitage@emich.edu) directly.

As with previous ACS Archaeological Chemistry Symposia, we are planning an ACS Symposium Series book based on papers from the meeting. Those interested in contributing a paper should bring a rough draft to the meeting in New Orleans. Further details will be provided as we have them.

Collaborative Endeavors in the Chemical Analysis of Art and Cultural Heritage Materials

As I noted in the Spring *Bulletin*, Patricia Lang from Ball State University and I recently co-edited a book that may be of interest to the SAS membership. Part of the ACS Symposium Series (which you may know best for the Archaeological Chemistry volumes mentioned above), this book covers both art and archaeological materials, as well as recent developments in interdisciplinary college courses that bring together chemistry and art. The book is currently available electronically from ACS Publications at <http://pubs.acs.org/isbn/9780841227309>. If your institution has a subscription to the ACS journals collection, you may have free access to the book and to the past Archaeological Chemistry volumes as well. The print version is coming out soon. While I'll leave any review of the book to the Book Reviews Editor, here is the table of contents:

- What's Wrong with this Picture? The Technical Analysis of a Known Forgery: Smith, Gregory D.; Hamm, James F.; Kushel, Dan A.; Rogge, Corina E.
- Scientific Examination and Treatment of a Painting by Gijsbert Gillisz d'Hondecoeter in the Mauritshuis: Bradley, Lauren Paul; Meloni, Sabrina; Uffelman, Erich Stuart; Mass, Jennifer L.
- Handheld XRF Analyses of Two Veronese Paintings: Uffelman, Erich Stuart; Court, Elizabeth; Marciari, John; Miller, Alexis; Cox, Lauren
- Characterization of the Binders and Pigments in the Rock Paintings of Cueva la Conga, Nicaragua: Li, Ran; Baker, Suzanne; DeRoo, Cathy Selvius; Armitage, Ruth Ann
- Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry Analysis of Lower Pecos Rock Paints and Possible Pigment Sources: Russ, Jon; Bu, Kaixuan; Hamrick, Jeff; Cizdziel, James V.

- Identification of Organic Dyes by Direct Analysis in Real Time-Time of Flight Mass Spectrometry: Geiger, Jordyn; Armitage, Ruth Ann; DeRoo, Cathy Selvius
- Characterizing Organic Residues on Ceramics by Direct Analysis in Real Time Time-of-Flight Mass Spectrometry: Hopkins, John; Armitage, Ruth Ann
- New Developments in the 'Nondestructive' Dating of Perishable Artifacts Using Plasma-Chemical Oxidation: Armitage, Ruth Ann; Ellis, Mary Ellen; Merrell, Carolynne
- The Roles of Chemistry and Culture in the Origins and Legacy of Crucible Damascus Steel Blades: Feuerbach, Ann
- Elemental Composition of a Series of Medieval Korean Coinage via Energy-Dispersive X-ray Fluorescence Spectrometry: Garshott, Danielle M.; MacDonald, Elizabeth; Spohn, Stephanie; Attar, Hana; Shango, Jennifer; Ellis, Irice; Murray, Meghann N.; Benvenuto, Mark A.
- Chemical Composition of a Series of Siamese Bullet Coins: A Search for Contemporary Counterfeits: Garshott, Danielle M.; MacDonald, Elizabeth; Murray, Meghann N.; Benvenuto, Mark A.
- Analysis of the 'Archaic Mark' Codex: Barabe, Joseph G.; Quandt, Abigail B.; Mitchell, Margaret M.
- Developing a Community of Science and Art Scholars: Hill, Patricia; Simon, Deberah
- The Chemistry of Artists' Pigments: An Immersive Learning Course: Lang, Patricia L.
- Bridging the Gap of Art and Chemistry at the Introductory Level: Gaquere-Parker, Anne; Parker, Cass D.
- Technical Examination of Cultural Heritage Objects Associated with George Washington: Uffelman, Erich Stuart; Fuchs, Ronald W.; Hobbs, Patricia A.; Sturdy, Lauren F.; Bowman, Danielle S.; Barisas, Derek A. G.
- The Spectroscopic Analysis of Paints Removed from a Polychrome Wood Sculpture of *Male Saint*: Lang, Patricia L.; Leary, Shawn P.; Carey, Rebecca F.; Coffey, Melissa N.; Hamilton, Rick E.; Klein, Amber L.; Short, Randall T.; Kovac, Philip A.

in *AC*, Wilson et al. (1) describe a MALDI mass spectrometric method for estimating the extent of bone collagen degradation by measuring the amount of deamidation that glutamine residues have undergone in archaeological samples. Understanding the extent of collagen degradation is an important consideration in radiocarbon dating of bone, and can indicate the survival of DNA in such samples as well. Since my last report here, Frank et al. (2) published a report in *AC* on the characterization of the wood from a 2300-year-old speaking platform (rostrum) from a shipwreck off the coast of Sicily. GC-MS, utilizing both pyrolysis and extraction/derivatization, confirmed the presence of pine pitch waterproofing on a pine wood substrate, while synchrotron X-ray absorbance spectra of the sulfur K-edge indicated that the sulfur compounds present in the rostrum wood were primarily consistent with the sulfate-reducing bacteria present in the underwater, anoxic environment. While not specifically addressing the analysis of archaeological materials, De Laender et al. (3) present an interesting study of the impact of human activities related to copper mining and production on biodiversity in the natural environment. Somewhat surprisingly, the results indicated that increased metal exposure resulted in greater biodiversity, though this may be related to other environmental conditions such as changes in climate and land cover.

1. Wilson, J., van Doorn, N.L., Collins, M.J., 2012. Assessing the extent of bone degradation using glutamine deamidation in collagen, *Analytical Chemistry*, ASAP Article, DOI: 10.1021/ac301333t.
2. Frank, P., Caruso, F., Caponetti, E., 2012. Ancient Wood of the Acqualadrono Rostrum: Materials History through Gas Chromatography/Mass Spectrometry and Sulfur X-ray Absorption Spectroscopy, *Analytical Chemistry* 84, 4419. DOI: 10.1021/ac3001258.
3. De Laender, F., Verschuren, D., Bindler, R., Thas, O., Janssen, C.R., 2012. Biodiversity of Freshwater Diatom Communities during 1000 Years of Metal Mining, Land Use, and Climate Change in Central Sweden, *Environmental Science & Technology* 46, 9097.

Papers of interest from ACS Journals

Three papers of interest in archaeological chemistry have recently been published in ACS journals, two in *Analytical Chemistry*, and one in *Environmental Science and Technology*. In the "As Soon as Publishable" papers

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. Theses; 4) Forthcoming Meetings; 5) Previous Meetings; and, 6) Web-Based Information.

New Books

Métallurgie du fer et Sociétés africaines : Bilans et nouveaux paradigmes dans la recherche anthropologique et archéologique, edited by Caroline Robion-Brunner and Bruno Martinelli, 2012, BAR International Series 2395, Cambridge Monographs in African Archaeology 81, Archaeopress, Oxford, 258 p. : ill., maps, 30 cm, includes bibliographical references, Language: French/English, ISBN: 9781407309880 (pbk.), 1407309889 (pbk.), Price: £40.00. This book represents proceedings from a colloquium of the same name held April 23-24, 2010, at the Centre d'études des mondes africains (CEMAf), Maison Méditerranéenne des Sciences de l'Homme, Université de Provence, Aix-en-Provence, France. Contributions consist of "Avant-propos" (pp. 1-4), "De l'apparition et de l'expansion des groupes de spécialistes endogames en Afrique : essai d'explication" (T. Tamari; pp. 5-32), "L'endogamie des forgerons dans les monts Mandara: origine et réification d'un concept nomade" (O. Langlois; pp. 33-46), "Smith and society: patterns of articulation in the Mandara mountains (Northeast Nigeria and Northern Cameroon)" (N. David, J. Sterner; pp. 47-60), "Les forgerons des Toubou: vers un nouveau regard sur l'endogamie des forgerons en Afrique" (C. Baroin; pp. 61-72), "The Bassar chiefdom in the context of theories of political economy" (P. de Barros; pp. 73-96), "Entre four et forge ou jusqu'à quel point efficacité magique et savoir technique sont-ils conciliables? (Bassar du Togo)" (S. Dugast; pp. 97-124), "Lecture historique, économique et spatiale de la production sidérurgique: les sites de réduction du village de Wol (pays dogon, Mali)" (C. Robion-Brunner; pp. 125-140), "Woody resource exploitation for iron metallurgy of the Fiko Tradition: Implications for the environmental history of the Dogon Country, Mali" (B. Eichhorn; pp. 141-152), "Analyse de la répartition spatiale de bas fourneaux d'un territoire sidérurgique au sud-ouest du Niger (4^e-14^e siècle ap. J.-C.)" (R. Guillon, C. Petit, J.-L. Rajot, V. Bichet, O. A. Idé, Z. Garba, D. Sebag & A. A. Touré; pp. 153-164), "Données archéologiques et ethnographiques: une confrontation parfois difficile. L'exemple du district sidérurgique de Markoye (Burkina Faso)" (J.-M. Fabre;

pp. 165-176), "La paléoméallurgie du fer dans la province du Bam (Burkina Faso): identité des acteurs et mobilité des techniques" (S. N. Birba; pp. 177-184), "Bilan de recherche sur la siderurgie directe dans la province du Bulkiemde au Burkina-Faso: un exemple d'approche pluridisciplinaire" (H. Kiénon, K. Timpok; pp. 185-194), "The Bloom Refining Technology in Ufipa, Tanzania (1850-1950)" (E. C. Lyaya, B. B. Mapunda, T. Rehren; pp. 195-208), "The role of iron in foraging societies of northern Namibia in the 15th to the 20th century AD" (E. Kose; pp. 209-216), "Technological Variability in Iron Metallurgy: the case of two Oromo traditional smelting sites in Wollega, Ethiopia" (T. Burka; pp. 217-226), "La réduction métallurgique: des sens aux savoirs transmis" (P. Andrieux; pp. 227-244), "Anthropologie, ethnohistoire, ethnoarchéologie et archéologie du fer: quelle place accorder au discours des acteurs?" (A. Gally; pp. 245-258).

Indian Zinc Technology in a Global Perspective, by J. S. Kharakwal, 2011, Infinity Foundation series, Pentagon Press, in association with Infinity Foundation, New Delhi, xxxvii, 340 p. : ill. (some col.), maps (some col.) ; 24 cm. Includes bibliographical references (p. [258]-282) and index, Language: English, ISBN: 9788182744912; 8182744911. This book attempts to document the history of zinc and brass technology in India against the backdrop of evidence from different parts of the world, particularly Asia, Africa and Europe. Based on his deep analysis of the available archaeological, archaeometallurgical and literary data, the author provides some new and interesting insights into the evolution and growth of Zinc processing and manufacturing technology in India. The book delineates how India was the first country to achieve the production of pure distilled zinc and how it established its primacy in producing and refining this important metal. It also covers the historical aspects of trading in zinc and the transfer of zinc and brass technology from India to the West. A rich bibliography and a set of appendices providing technical data and information for the use of specialists are other notable features of the book. Being volatile it is one of the most difficult metals to smelt as it forms vapor in the furnace when heated to around 1000 C. Though various claims have been made regarding its remote antiquity across Asia and Europe, only Zawar in India has the oldest archaeological record of pure zinc production on commercial scale. Pure zinc distillation was perhaps derived from Ayurvedic preparations. More than 800 years ago the Indians designed brinjal shaped retorts, condensers and special furnaces with downward distillation to obtain pure zinc. This was a unique achievement which is the ancestor of all high temperature distillation techniques in the world and it has no parallels.

The Zawar zinc industry is the most unusual phenomenon, a full-fledged technology with neither antecedents nor successors. It was a great innovation taking place on a major scale away from Europe, the Mediterranean and the Middle East. The Zawar metallurgists brought about a breakthrough in non-ferrous metal extraction around the 12th century, thus adding a glorious chapter of India's contribution to the world in the history of science and technology. The book presents the story of this glorious chapter of zinc technology in a global perspective but is aimed at the lay reader. Technical data for the specialists are given in three appendices. The book chapters and sections consist of: "1. Introduction" (p. 1), "2. Antiquity of Zinc and Brass" (p. 8), "3. Zinc and Brass in an Archaeological Perspective in Europe, West Asia and Africa" (p. 17), "4. East Asia (China)" (p. 48), "5. Zinc and Brass in South Asia" (p. 64), "6. Early Mining of Lead-Zinc Ores in Rajasthan" (p. 125), "7. Zawar: An Archaeological and Historical Perspective" (p. 176), "8. Early Zinc Smelting at Zawar" (p. 191), "9. Transmission of Zinc and Brass Technology" (p. 226), "10. Early Evidence of Distillation" (p. 239), "11. Conclusion" (p. 251), "Bibliography" (p. 258), "Appendices" (p. 283), and "Index" (p. 325).

Actas del Quinto Congreso Internacional sobre Minería y Metalurgia Históricas en el Suroeste Europeo (León - 2008) : libro en homenaje a Claude Domergue, edited by Josep M. Mata-Perelló, Lisard Torró i Abat, and María Natividad Fuertes Prieto, 2011, Sociedad Española para la Defensa del Patrimonio Geológico y Minero (SEDPGYM), Madrid, 852 pages, illus., maps, graphs; 24 cm, bibliographical references, Language: Spanish, Portuguese, French and English, ISBN: 9789992017906; 9992017902, Price: €20. This book represents proceedings of the 5th *International Symposium on Historical Mining and Metallurgy in Southwest Europe: Tribute to Claude Domergue*, held from June 19-21, 2008, at the Universidad de León, Spain. The book is organized by chronological themes. Contributions from the introductory session and keynote include "Prólogo a las Actas del V Congreso Internacional sobre Minería y Metalurgia Históricas en el suroeste europeo" (E. Orche; pp. 3-4), "Apuntes biográficos de Claude Domergue" (O. Puche Riart; pp. 5-50), "Formación y desarrollo del concepto de "patrimonio minero", considerado desde el punto de vista de la Antigüedad" (C. Domergue; pp. 51-56), and "L'établissement romain de las Rubias, dans la sierra del Teleno (Corporales, province de León, España)" (Ch. Dieulafait, F. Dieulafait, C. Domergue, M. Fincker, V. Picard; pp. 59-98).

The section *Minería y metalurgia en la prehistoria [Mining and Metallurgy in Prehistory]* included "Las minas prehistóricas del norte de España en el contenido de la paleominería del cobre del occidente de Europa" (M.A. De Blas Cortina; pp. 101-129), "Indicios de explotación en época megalítica del criadero cuprífero de Huidrobo (Burgos)" (J. Basconillos Arce, G. Delibes de Castro, J. Fernández Manzano, J.I. Herrán Martínez, M.A. Moreno Gallo; pp. 130-142), "Nuevas aportaciones para el estudio de la explotación de cobre durante la Prehistoria de las Islas Baleares" (B. Lluïl Estarellas, L. Perelló Mateo, B. Salvà Simonet; pp. 143-150), "Los inicios de la metalurgia en el Alto Algarbe oriental/Andévalo occidental onubense" (M.V. Abril Cassinello; pp. 151-158), "Tecnología metalúrgica prehistórica en el nordeste de la Península Ibérica: el caso de las "Hachas Planas"" (P. Balaguer, E. Hinojo, C. Oliart, I. Soriano; pp. 159-168), "Moldes de fundición prehistóricos de la Península Ibérica: concepto y aspectos terminológicos" (A. Fraile Vicente; pp. 169-178), "Copper isotopes on artifacts from Fraga dos Corvos habitat site and nearby occurrences: an approach on metal provenance" (F. Geirinhas, M. Gaspar, J.C. Senna-Martínez, E. Figueiredo, M.F. Araújo, R.J.C. Silva; pp. 179-186), "La minería del cobre en época prehistórica en el Alto Guadalquivir" (F. Contreras Cortés, A. Moreno Honorato; pp. 187-196), "La procedencia de los recursos minerales metálicos en el poblado de la Edad del Bronce de Peñalosa (Baños de la Encina, Jaén)" (M.A. Hunt Ortiz, F. Contreras Cortés, L. Arboledas Martínez; pp. 197-208), "Relaciones de género y organización del trabajo metalúrgico en la Edad del Bronce del sureste peninsular" (E. Alarcón García, M. Sánchez Romero; pp. 209-220), "El poblado de Vincamet (Fraga, Huesca): nuevos datos de la actividad metalúrgica de un asentamiento del grupo Segre-Cinca II (1250-950 CAL A.N.E.)" (J. Gallart i Fernández, A. Moya i Garra; pp. 221-246), and "Algunas cuestiones sobre la metalurgia del Bronce Final en Andalucía oriental: estado actual de la investigación" (S. Carpintero Lozano; pp. 247-256).

The section *Minería y metalurgia prerromanas [Pre-Roman Mining and Metallurgy]* included "Las explotaciones mineras de la Península Ibérica en época prerromana: nuevas aportaciones" (M. Genera i Monells; pp. 259-284), "A propos des mines antiques d'Ibiza et de Majorque (Baleares)" (J.F. Marechal; pp. 285-292), "Mineração e metalurgia pré-romana em Trás-os-Montes ocidental (norte de Portugal)" (J. Fonte, F. Sande Lemos, G. Cruz, C. Braz Martins; pp. 293-303), "Minas de explotación de hierro en la "Serra de les Ferreres", Gavà (Baix Llobregat)-Barcelona" (A. Bordas Palarea, J.C. Megarejo Draper, S. Lehib Nayem, R. Molinas Amorós, M. Saa Besteiro; pp. 305-314), "Estudios de procedencia

del metal en monedas prerromanas” (I. Montero Ruiz, M. Santos Retolaza, P. Castanyer, M. Hunt Ortiz, E. Pons Brun, C. Rovira Hortala, S. Rovira Llorens; pp. 315-328), and “Minería y metalurgia prerromana en el Alto Guadalquivir” (L. Arboledas Martínez; pp. 329-342).

The section *Minería y metalurgia Romanas [Roman Mining and Metallurgy]* included “L’espace minier romain. Le cas des mines d’or et d’argent d’Alburnus Maior en Dacie romaine (Rosia Montana, Roumanie)” (B. Cauuet; pp. 345-382), “El plomo en las manufacturas de base cobre: una visión diacrónica en el noreste peninsular” (N. Morell y Cortés; pp. 383-394), “Plinio y la minería aurífera romana: nueva traducción e interpretación del PLIN.Nat.33.66-78 con ejemplos ilustrados” (M. Pérez González, R. Matías Rodríguez; pp. 395-412), “Os scaurarii de Vipasca (Aljustrel-Portugal)” (J.A. Pérez Macías, J.X. Matos, A. Martins; pp. 413-428), “La minería romana en Córdoba: estudios. El protagonismo del profesor Claude Domergue” (J.L. Hernando Fernández, R. Hernando Luna; pp. 429-439), “Implicaciones en el análisis de la ingeniería de explotación de la mina romana de Las Médulas considerando la nueva hipótesis genética sobre la formación del yacimiento aurífero” (R. Matías Rodríguez, M.P. Hacer Rodríguez, J.L. Pagés Valcarlos, A. Alonso Millán; pp. 441-454), “Estratigrafía e arqueológica dos depósitos auríferos continentais neogénicos de Vila de Rei (Portugal central). Correlação e equivalência com os depósitos da “Cuenca de El Bierzo” e do “Vale de Duerna” em León (Espanha)” (B.P. Barbosa, C.A.M. Batata; pp. 455-466), “A mineração romana no concelho de Paredes (Portugal)” (A. Lima, N. Félix, A. Dias, M.A. Silva; pp. 467-474), “Três Minas. Quelques remarques a propos du pilier dans la “Galeria do Pilar”” (R. Wahl-Clerici; pp. 475-484), “Novos datos sobre o complexo mineiro romano de Três Minas e Jales” (C. Batata; pp. 485-494), “Dois exemplos de mineração aurífera no Conventus Bracarense: Monte Furado. Vila Nova de Cerveira (Minho), e área mineira de Montealegre e Boticas (Trás-os-Montes ocidental)” (C.M. Braz Martins; pp. 495-502), “Civitates e exploração aurífera romana no noroeste da Península Ibérica” (F. Sande Lemos, C.M. Braz Martins; pp. 503-512), “Nuevos hallazgos em la mina romana de Llamas de Cabrera (León-España) y su relación con la cronología de la actividad minera en Las Médulas” (R. Matías Rodríguez; pp. 513-528), “El complejo minero romano de Lapis Specularis de Valparaíso de Abajo (Campos del Paraíso-Cuenca)” (M.J. Bernárdez Gómez, J. Crespo Martín, J.C. Guisado di Monti, G. Medina Cordero, A. Navares Martín; pp. 529-540), “El distrito minero romano de Oiasso; la minería romana de Aiako Harria y el coto de Arditurri (Oiartzun, Gipuzkoa)” (M. Urteaga, T. Ugalde; pp. 541-560),

“Fragmentos de un tejido romano hallado en la mina de Arditurri, Oiartzun (Irún)” (C. Alfaro Giner; pp. 561-566), and “Roman slag distribution in the Portuguese sector of the Iberian pyrite belt” (J.X. Matos, A. Martins, M. Rego, A. Mateus, A. Pinto, J. Figueiras, E. Silva; pp. 567-576).

The section *Minería y metalurgia en la edad media [Mining and Metallurgy in the Middle Ages]* included “La minería medieval en el noroeste peninsular” (M. Durany Castrillo; pp. 579-606), and “El azabache en el León bajomedieval: fuentes documentales y datos arqueológicos” (R. Martínez Peñín; pp. 607-616).

The section *Minería y metalurgia en las edades moderna y contemporánea [Mining and Metallurgy in the Modern and Contemporary Ages]* included “La minería del mercurio en Asturias: rasgos históricos” (C. Luque Cabal; pp. 619-634), “Las mineralizaciones de antimonio del cerro de Las Cogollas (Losacio, Zamora). Revisión histórica y nuevas aportaciones” (O. Fadón Loro, J.L. Crespo; pp. 635-641), “Las fraguas de hierro en el Alt Urgell (Pirineo catalán): menciones documentales y evidencias arqueológicas, siglos VX-XIX” (Ll. Obiols Perearnau; pp. 643-658), and “Las fargas: introducción al conocimiento de su desarrollo y de su evolución en Iberoamérica. El caso de la farga en Brasil, Colombia y Venezuela” (J.M. Mata-Perelló, C. Restrepo Martínez; pp. 659-666). The book closes with *Epílogo [Epilogue]* “Breve crónica del V Simposio Internacional de Minería y Metalurgia Históricas en el suroeste europeo” (A. Neira Campos, M.N. Fuertes Prieto; pp. 847-850).

Minería y metalurgia antiguas : Visiones y revisiones : homenaje a Claude Domergue, edited by Almudena Orejas and Christian Rico, 2012, Collection de la Casa de Velázquez no 128, Casa de Velázquez, Madrid, 310 p. : 21 x 29.7 cm, includes bibliographical references (pp. 273-297), Language: Spanish and French, ISBN: 978-8496820685 (pbk.); ISSN: 1132-7340, Price: €49. Over the past 25 years, knowledge of ancient mining and metallurgy has made significant progress. This is due both to the increase of archaeological programs of local or regional scope and to the implementation of new forms of approaches, methods and techniques. This book essentially is devoted to the Iberian Peninsula - one of the largest metal producing regions in antiquity - but also offers two articles on Laurion (Greece) and Romania. It brings together several studies that show recent achievements in research on ancient mining and metallurgy, research in which Claude Domergue, to whom the book is dedicated, not only was a pioneer but also an indispensable reference. The book is organized into two main section following two brief introductory

presentations, “Presentación” (A. Orejas, C. Rico; pp. vii-viii), and “Introducción” (F.J. Sánchez Palencia; pp. 1-5).

The section *Arqueominería y arqueometalurgia en proyectos regionales. métodos, técnicas y casos de estudio* [*Archaeomining and Archaeometallurgy in regional projects, methods, techniques and case studies*] includes “Les mines antiques du Laurion (Grèce): techniques minières et stratégies d’exploitation” (D. Morin, A. Photiadès; pp. 9-26), “Metalurgia y explotación de recursos minerales en el entorno de la ciudad-estado celtibérica de Segeda I (Mara, Zaragoza)” (S. Rovira, F. Burillo Mozota, R. López, J. Ibáñez; pp. 27-42), “Minería y siderurgia antigua en Sierra Menera (Teruel-Guadalajara): Nuevos avances de la explotación del hierro en época antigua (siglos II a. C. - II d. C.)” (J.-M. Fabre, C. Polo Cutando, C. Rico, C. Villagordo Ros; pp. 43-62), “Centros de producción y administración en el territorio minero de Carthago Nova: a propósito de los hallazgos documentados en El Gorguel (sierra de Cartagena)” (J.A. Antolinos Marín; pp. 63-79), “Retour sur les lingots de plomb de Comacchio (Ferrara, Italie) en passant par l’archéométrie et l’épigraphie” (C. Domergue, P. Quarati, A. Nesta, P. Renato Trinchèrini; pp. 81-103), “Arqueología del paisaje minero en el sector oriental de Sierra Morena” (L.M. Gutiérrez Soler; pp. 105-128), “El paisaje minero antiguo de la comarca de Almadén (Ciudad Real): nuevas aportaciones sobre el territorium de Sisapo” (M. Zarzalejos Prieto, C. Fernández Ochoa, G. Esteban Borrajo, P. Hevia Gómez; pp. 129-150), “Minería y metalurgia antiguas en Munigua. Estado de la cuestión” (T.G. Schattner, G. Ovejero Zappino, J.A. Pérez Macías; pp. 151-168), “Análisis de isótopos de plomo. Aplicaciones en la investigación arqueológica de la minería prehistórica e histórica del sudoeste hispano” (M. Hunt Ortiz; pp. 169-182), “El distrito minero romano de lapis specularis de Castilla - La Mancha” (M.J. Bernárdez Gómez, Juan Carlos Guisado di Monti; pp. 183-199), “La minería romana en Gipuzkoa y el distrito de Oiasso (Irún)” (M.M. Urteaga Artigas; pp. 201-218), and “Les travaux miniers antiques de Roşia Montană (Roumanie). Apports croisés entre archéologie et géologie” (B. Cauuet, C. Tămaş; pp. 219-241).

The second section, *Marcos jurídicos y administrativos de la explotación minera antigua* [*Legal and administrative frameworks of ancient mining*], included “Nuevas reflexiones sobre el régimen jurídico minero romano” (A. Mateo Sanz; pp. 245-254), “Las zonas mineras auríferas en el sistema provincial altoimperial: el caso del Noroeste Hispano” (I. Sastre Prats; pp. 255-259), and “Alcance e impacto de la minería en la economía provincial hispanorromana” (F.J. Sánchez Palencia, A. Orejas; pp. 261-272). More information about the book

can be obtained at the publisher’s website at: <http://www.casadevelazquez.org/es/publicaciones/libreria-en-linea/libro/mineria-y-metalurgia-antiguas/>

New Book Chapters/Articles

From the book *Social, Economic and Symbolic Perspectives at the Dawn of Metal Production*, edited by Cecilia Conati Barbaro and Cristina Lemorini, 2012, BAR International Series S2372, Archaeopress, Oxford, come the chapters “The Beginning of Metallurgical Production and the Socioeconomic Transformations of the Sardinian Eneolithic” (M. Grazia Melis, R. Cappai, L. Manca, S. Piras; pp. 13-32), and “Functional Variability and Activity Areas in Prehistoric Mining Operations in Northern Chile” (D.S. Salazar, H.W. Salinas, D.D. Órdenes, J.N. Parra; pp. 65-81).

From the *Journal of Archaeological Science* (2012, Vol. 39, No. 10) comes “Late medieval copper alloying practices: a view from a Parisian workshop of the 14th century AD” (David Bourgarit, Nicolas Thomas; pp. 3052-3070) while from *Archaeometry* (2012, Vol. 54, No. 5) comes “A Geological Perspective on the Use of Pb Isotopes in Archaeometry” (F. Albarède, A.-M. Desauty, J. Blichert-Toft; pp. 853-867) and from *Meteoritics & Planetary Science* (2012, Vol. 46, No. 9) comes “Buddha from space – An ancient object of art made of a Chinga iron meteorite fragment” (Elmar Buchner, Martin Schmieder, Gero Kurat, Franz Brandstätter, Utz Kramar, Theo Ntaflos, Jörg Kröcher; pp. 1491-1501).

From *American Antiquity* (2012, Vol. 77, No. 2) comes “Tracing social interaction: perspectives on archaic copper exchange from the Upper Great Lakes” (Mark A. Hill; pp. 279-292), while from the *Bulletin of the American Schools of Oriental Research* (2012, No. 367) comes “A New Chronological Framework for Iron Age Copper Production at Timna (Israel)” (Erez Ben-Yosef, Ron Shaar, Lisa Tauxe, Hagai Ron; pp. 31-71), and from *Paléorient* (2011, Vol. 37, No. 2) comes “Bronze Age Kfar Monash, Palestine – A Chemical and Lead Isotope Study into the Provenance of Its Copper” (A. Hauptmann, S. Schmitt-Strecker, F. Begemann; pp. 65-78).

From *Norwegian Archaeological Review* (2012, Vol. 45, No. 1) come reviews of “Nils Anfinset: *Metal, Nomads and Culture Contact: The Middle East and North Africa*. Equinox Publishing, London, 2010, 241 pp., ISBN 978-1-84553-253-6. Jonathan M. Golden: *Dawn of the Metal Age: Technology and Society during the Levantine Chalcolithic*, Equinox Publishing, London, 2010, 234 pp., ISBN 978-1-904768-99-9.” (Ianir Milevski; pp. 115-123).

Ph.D. Theses

Metals for the Inka: Craft Production and Empire in the Quebrada de Tarapacá, Northern Chile, Colleen Marie Zori (Doctoral dissertation, Department of Anthropology, The University of California, Los Angeles, California), 2011, xxxiii+1209 pages, 339 figures, 17 tables, 5 appendices.

This dissertation studies the economic impact of imperialism in provincial societies, in particular the transformations in local craft production economies attendant upon a region's incorporation into an ancient empire. Specifically, I focus on the changes in copper and silver production that occurred in the Quebrada de Tarapaca, one of the transverse Pacific watershed valleys of northern Chile, between the Late Intermediate Period (AD 1000-1450) and the valley's conquest and integration into the Inka Empire in the Late Horizon (AD 1450-1532). Although ethnohistoric accounts from the early Colonial Period suggest that gaining access to mineral wealth was one of the primary motivations for the Inka conquest of the South Central Andes, there have been few studies specifically aimed at investigating the organization or technology of metal production in northern Chile during the pre-Inka period, nor whether or how it changed after the region was incorporated into the Inka empire.

I take a multi-scalar approach in addressing the myriad changes in metal production across the shift from segmentary chiefdoms to control by an outside imperial power. I integrate data from a full-coverage survey of the lower Quebrada de Tarapaca, targeted excavations at the site of Tarapaca Viejo-an important pre-Inka settlement that became a key Inka administrative center- and a fine-grained characterization of metallurgical technology using a range of chemical analyses. I document a shift from small-scale, dispersed and independent production of copper during the Late Intermediate Period to a greater degree of state involvement in the production of copper, bronze, and silver after the Inka incorporated the valley. Indigenous wind-driven furnaces known as huayras or huayrachinas were used in the production of copper and, during the Late Horizon, probably lead. This lead was subsequently used in refining silver-bearing ores from the near-by Inka mine of Huantajaya through the process of scarification.

This research contributes to our understanding of how the organization of craft production both responded to and structured sociopolitical change in the ancient world, and provides insights into how the social relations of craft

production were transformed by imperial expansion and provincial integration. [Abstract from dissertation author.]

Forthcoming Meetings and Conferences

Historical Metallurgy Society (HMS) Research in Progress 2012 meeting is to be held Tuesday, November 6, 2012, at the Research Beehive Room 2.21, Newcastle University, Newcastle, England. There currently are a very small number of places remaining for speakers at the HMS Research in Progress 2012 conference. Please see below for details. This meeting is aimed at a wide variety of contributors both in the UK and internationally, from historical and archaeological metallurgists to excavators, historians and economists. If you are working, or have just finished working, on a project related to archaeological or historical metallurgy, they would like to hear from you. They are particularly interested in bringing together contract and public sector archaeologists with academic researchers, and in fostering links between the different disciplines studying metallurgy and related activities. They also would like to encourage international co-operation on archaeometallurgical research and encourage contributions from researchers globally. Whether you are a graduate student, an archaeometallurgical expert, an interested non-specialist or a professional excavator, they invite you to meet others working in this field and present your research to an interested community. Proposals for 10-15 minute oral papers are welcomed from anyone undertaking work in any area of historical metallurgy/archaeometallurgy, and from other researchers whose focus is of relevance to this subject. The Historical Metallurgy Society is also holding its annual Best Student Research prize at the conference this year and we ask all students submitting proposals who wish to be considered for the prize to indicate this when submitting their abstract. More details can be found at: <http://www.hist-met.org/rip2012.html>.

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. A tentative program follows:

April 22nd: Noon - registration; Afternoon - guided visit to Timna; Evening - opening session, lecture by keynote speaker 1.

April 23rd: Academic session (Eilat Regional Council auditorium).

April 24th: Academic session (Eilat Regional Council auditorium); Afternoon - closing session, lecture by keynote speaker 2; Evening - farewell party.

April 25th: Bus tour to the ancient mining sites in Feinan area, Jordan, guided by the excavators; Afternoon - return to Israel.

The international conference *Archeometrie 2013, XIX^e Colloque du GMPCA* will be held from April 22-26, 2013, at the Université de Caen Basse-Normandie, France. One of the conference themes, entitled “Restitution des échanges : de la production à la diffusion” [Return of the exchange: from production to distribution], will include presentation and discussion of archaeometallurgical topics. French is the principal language of the conference with English being a secondary language. Inquires for more information can be directed to colloque.archeometrie@unicaen.fr and further information can be found at the conference website at: www.unicaen/archeometrie2013.

The *Historical Metallurgy Society (HMS)* will hold its *50th Anniversary Conference* on June 14-16, 2013, at the Quakers Friends House, Euston, London, England. This international academic conference is the culmination of a series of events marking the 50th Anniversary of the Historical Metallurgy Society and will provide a high-level 'state of the art' profile of current and future developments in the various disciplines which HMS represents. The four themes of this meeting are: 1) Origins of metallurgy. Chairs Paul Craddock & Thilo Rehren; 2) Innovation and change. Chairs David Bourgarit & Justine Bayley; 3) Society and metalworkers. Chairs Marcos Martín-Torres & Vincent Serneels; and, 4) The future of historical and archaeological metallurgy. Chairs David Killick & David Dungworth. Offers of papers or posters are welcome on any of these themes, from academics and students, commercial archaeologists at all levels of seniority, and independent researchers including local study groups and community archaeology programs. There will be facilities available for posters and time will be allocated for a poster session. The maximum size for posters is A0 (841 x 1189mm - upright/portrait format). Abstracts for papers and posters should be submitted by November 22, 2012. Please indicate which session you think would be most appropriate. For more information or to submit an abstract please contact Eleanor Blakelock (Eleanor.Blakelock@archaeomaterials.co.uk) or by post

to Eleanor Blakelock, Studio Flat, 616 Green Lanes, London, N8 0SD, United Kingdom. Abstracts should be no longer than 250 words. Please include the name and affiliation of all authors and indicate the presenting author in bold letters. You can download a Call for Papers poster at: <http://hist-met.org/hms2013confcallv2.pdf>. Booking forms will be available on the 5th of November. For more information please contact Eleanor Blakelock

The *18. Internationaler Kongress über antike Bronzen = 18th International Congress on Ancient Bronzes* will be held September 3-7, 2013, at the University of Zurich and the Paul Scherrer Institute in Villigen. The aim of the conference is to give an update, especially on the many issues facing bronze research which have been employed in recent years. That is why they have invited eight internationally recognized experts for keynote speeches on specific topics, who will each give an introduction to the state of research. The following topics are intended: 1) Greek and Italian bronzes in the Iron Age in Central Europe; 2) Greek bronzes in the Mediterranean region; 3) Large bronzes; 4) Roman statuettes; 5) Roman toreutic; 6) Manufacturing technology, restoration; 7) Analytics; and, 8) Written sources. All lectures - the keynotes and the contributions of each participant - will be delivered from Wednesday, to Friday, 4-6 September. A poster session also is scheduled to complement the above mentioned thematic sessions. On Saturday, 7 September, there will be excursions to an art foundry in St. Gallen (www.kunstgiesserei.ch/ueber-uns/sitterwerk.html) or to Augusta Raurica (www.augustaurica.ch). The abstract deadline is March 31, 2013. For more information please see the International Congress on Ancient Bronzes at: www.prehist.uzh.ch/bronzekongress2013.

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 was founded in 1981 by two eminent archaeometallurgists Prof. Robert Maddin in Philadelphia USA and Prof Tsun Ko in Beijing, China, and strong support of late Professors Cyril Stanley Smith (MIT) and Yunoshin Imai (Tohoku University) from the second Conference on. From Beijing in 1981 BUMA has traveled to Zhengzhou, China (1986), Sanmenxia, China (1992), Matsue, Japan (1998), Gyeongju, Korea (2002), Beijing, China (2006) and Bangalore, India (2009). 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.

The Conference will cover the following themes:

1. Iron and Steel Technology
2. Copper and Bronze Technology
3. Precious Metals and Coinage
4. Casting Technology of Bronze and Iron
5. Swords and Iron Artifacts
6. History of Alloys (Brass, Paktong and Shiromé)
7. Ores and Metal Production
8. Illustrated Technology of Mining and Metallurgy
9. Experimental Metallurgy, Survey Methods and Conservation
10. Poster Session

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.

Some important deadlines include:

- Abstract submission Deadline: April 1, 2013
- Abstract Acceptance: April 30, 2013
- Advance registration Deadline: May 31, 2013
- Final Program: July 31, 2013
- Conference: September 10-15, 2013

More information can be found at the conference website <<http://buma8.wiki.fc2.com/>>, and updates on the calls for papers, abstract submissions, and more will be included in Archaeometallurgy section of future *SAS Bulletins*.

Previous Meetings and Conferences

The 54th *International Congress of Americanists: “Building Dialogues in the Americas”* was held in Vienna, Austria, from July 15-20, 2012. This conference included a session entitled “*Minería y metalurgia en los Andes*”, organized by Luis Gonzalez and Diego Salazar. Presented papers included “La transición metalúrgica. Objetos y metales entre los indígenas coloniales” (Roberto Lleras), “Prácticas minero-metalúrgicas y vida cotidiana en un centro minero colonial: Pan de Azúcar, Puna de Jujuy (Argentina)” (Carlos Angiorama, Florencia Becerra, María Josefina Pérez Pieroni), “An archaeometallurgical study of Prehispanic metal objects from the fishermen’s graves from Coastal Atacama Desert (Northern Chile)” (Benoit Mille, Valentina Figueroa, Mechtild Freudenberg), “Evidencias de producción metalúrgica indígena en el distrito Miño-Collahuasi, norte de Chile (siglos XIV a XVII)” (Diego Salazar, Valentina Figueroa, José Berenguer, Benoit Mille, Gabriela Vega), “Las figuras votivas de los Muisca (Colombia, 600-1600 D. C.) del musée du quai Branly: producción industrial, aleaciones a base de cobre y talleres orfebres de la Cordillera Oriental” (Maria Filomena Guerra, M. Martín-Torres, M. A. Uribe, C. Moulherat), “Las joyas femeninas mapuche-tehuelche del siglo XIX: tecnología, morfología y procedencia regional de las colecciones de Paris y Berlín” (Paz Núñez-Regueiro, Richard Haas, Leonor Adán, Julio Vezub), “Los aros de Patagonia (siglos XV-XIX): estudio tecnológico de los upules mapuche-tehuelche y antecedentes arqueológicos e históricos” (Maria Filomena Guerra, P. Núñez-Regueiro, R. Haas, D. Munita, R. Mera, S. Urbina), “Pre-Columbian metallurgy of the Atacama region, northern Chile” (Blanca Maldonado, Thilo Rehren, Ernst Pernicka, Lautaro Núñez).

The symposium *The Rise of Iron Technology in East and West Asia*, was held October 11-13, 2012, at Harvard University, Cambridge, Massachusetts. Papers presented in the Thursday and Friday session included “Welcome and Introductory Remarks” (C.C. Lamberg-Karlovsky), “Transitional or Traditional? The Technology and Organization of Late Bronze and Early Iron Age Metal Production in Western Asia” (Nathaniel Erb-Satullo), “Production of Commodities and the Rise of Iron Economy in Early China: A Case Study of an Iron Foundry in the Capital Area of the Western Han Dynasty” (Wengcheong Lam), “Archaeological Approaches to Metallurgical Landscapes: a Case Study from Western Georgia” (Brian Gilmour), “The Discovery of Early Iron Artifacts in China and the Spread of Iron Technology in East Asia” (Jianli Chen), “Variability in African Blooming Processes: Some Lessons for Global

Archaeometallurgy” (Shadreck Chirikure), “In Search of Technological Evidence for Interactions with Near and Distant Neighbors in the Rise of Iron Technology in Korea” (Jang-Sik Park), “Physical, Chemical and Technological Barriers to Iron Production (or Why it Took 3500 Years to Get from Copper to Iron)” (Dave Killick), “The Appearance and Spread of Iron Technology in Xinjiang, Northwest China” (Jianjun Mei), “Early Iron technology in Southeast Asia” (Kwan-tzue Chen), “Towards a Prosopography of Archaeometallurgy in the Eurasian Bronze Age” (Mark Pollard), “The Spread of Iron Technology in China in the Warring States period” (Donald Wagner). An excursion on the Saturday following the symposium visited the historic Saugus Iron Works, and included guided tours of the Iron Works House and the Industrial Site. After the excursion the symposium closed with a “Concluding Discussion”.

Web-Based Information

A new website, *Archaeometallurgy Forum*, has been established by Bastian Asmus and can be found at: <http://www.forum.archaeometallurgie.de/>. As his welcome to this new web-forum, Bastian provides us with this: “Why is there yet another place for archaeometallurgy? First of all, because there is no forum yet, and second because there is no place where practitioners, scientists and archaeologists can meet and discuss. This I would like to change. Why? Because archaeometallurgy is more than a science or a thesis project. It is concerned with practical metallurgical processes of production and therefore the usually theoretical archaeological/archaeometrical reconstructions should face a re-examination in practical terms. Too often the reconstructions possess a by far too schematic nature. They need to be tested in real life. This is something that is traditionally not done in the archaeological disciplines, although with the advent of the experimental archaeology this seems to gradually change.”

BIOARCHAEOLOGY

Katy Meyers, Associate Editor

Climate undergoes long term shifts in temperature and weather conditions, which can drastically change our interpretations of the past. There have been numerous cooling and warm periods throughout history, sometimes linked to catastrophic natural events, such as volcanic eruptions, that must be examined as part of the broader archaeological context. It is easy to forget that the environment in which we excavate is not necessarily the

one experienced by the people who were alive in that period. Increasing awareness and incorporation of climate is apparent in recent bioarchaeology and mortuary studies. During my own research (Meyers 2010), I examined the rise of rickets prevalence in skeletal collections from post-modern London during the Little Ice Age. This was a global cooling period that lasted from 1550 to 1850 CE, with a particularly bad era between 1650 and 1770 CE. This change in weather patterns correlates with a pre-industrial rise in vitamin D deficiency. By looking at the broader environmental changes it was possible to see how this disease, which is thought to be one of industrialization, had a considerable environmental component.

Recently, bioarchaeological and mortuary studies are utilizing this broader environmental perspective in their research to produce innovative interpretations of the past. Three studies in particular are of note, the first is by Marquet et al. (2012) on the correlation between environmental and mortuary behavior change, the second is by Kusaka et al. (2012), and lastly are the investigations done by the Museum of London’s Archaeological Services (MoLAS) in re-interpreting a mass burial from London in light of new environmental evidence.

The goal of the study by Marquet et al. (2012) was to examine the emergence of artificial mummification among the Chinchorro of the Atacama Desert in Northern Chile and Southern Peru. From 7,500 to 4,500 years ago, this complex mortuary practice existed among a hunter-gatherer group, which argues the question why this specific type of behavior and why only for this distinct period of time? Based on recent models of technological and cultural evolution, they hypothesize that the complexity in the Chinchorro was brought about by an increase in population size driven by beneficial changes in the environment that led to increased resources, which in turn led to increased innovation and accelerated cultural evolution. They also argue that this particular innovation, artificial mummification, manifested due to the same environmental change that created a hyperarid climate.

The evidence used to test these hypotheses includes prehistoric environmental conditions, estimations of population sizes, and archaeological evidence of mortuary practices. Using geological and hydrological surveys of the area they are able to determine that there was increased rainfall from 7,300 to 6,700 years ago, and using ice cores from the Andes suggests that the weather was more stable during this period. Based on 460 Chinchorro archaeological sites and the years of

occupation they are able to estimate population size in this area. Their calculations show that the period between 7,000 and 4,000 years ago was a period of growth and high population density. There is a dramatic spike at 7,000 years followed by a sharp decline around 4,800 years ago. Why did these conditions lead to changes in mortuary practices?

Marquet et al. (2012) argue that the complexity that manifested in mortuary practices was due to the hyperarid environment of the Atacama Desert. They note that little to no decomposition occurs in the desert, so over time it is possible that the accumulation of the deceased became a major presence in the landscape. Chinchorro deceased prior to 7,000 years ago primarily were placed in shallow graves in the desert. It is highly likely that wind, erosion and human activity would expose the burials, causing continued visual interaction with the dead. It is possible that natural mummification was seen as the appropriate method of disposal and with increasing complexity became an artificial practice. As the population increased there was increased technological and cultural innovation. One of these innovations was elaboration of a mortuary process that had previously occurred naturally.

A new study by Kusaka et al (2012) sought to include similar types of changes by looking at migration during a period of population increase in Japan due to improving weather conditions. The study tested two hypotheses: first, that there was an increase in immigrants to Japan from the middle to late Jomon period, (5000-4000 to 4000-2300 years ago, and second that ritual tooth ablation is a feature that can be used to distinguish immigrants from locals. Analysis of climate in this region has revealed a warming period from 7000-4000 years ago, followed by a cooling period from 4000 to 1500 years ago. During the warming era there was an increase in large settlements based on archaeology and a focus on marine and faunal resources based on isotope analysis. In contrast, during the cooling period these large settlements were disbanded, and an increase in caries prevalence shows a changing focus on plant resources. It is this period of increased immigration that they wish to examine through ritual tooth ablation patterns and strontium isotope analysis.

Ritual tooth ablation is removal of specific teeth for ceremonial purposes or rites of passage. Analyses of these activities in this period have determined there are a number of types of ablation connected with the social identity and origins of the individual. Since acceptance after migration into a group meant a specific type of tooth ablation it should be possible to use this as an indicator of increased immigration. By doing strontium isotope

analysis they are not only able to test their migration hypothesis, they are also able to correlate whether patterns in tooth ablation can be used to determine whether an individual is an immigrant or a local. The sample consists of individuals from two sites in the Sanyo region of Japan. The first includes 55 individuals from the Ota shell mound in Onomichi City and date to the Middle Jomon (5000-4000 BP). 23 tooth enamel and 5 rib samples were taken from this group. The second includes 72 individuals from the Tsukumo shell mound in Kasaoka City, and dates to the Late-Final Jomon period (ca. 4000–2300 years BP). 37 tooth enamel and 7 rib samples were taken from this group. Sex and age are well-documented for all individuals, and the preservation is extremely good.

Strontium isotope analysis revealed that only one individual from the Ota site was an outlier and all individuals from the Tsukumo site were within the same distribution. This means of the entire sample only one individual was identified as a potential immigrant based on isotopic analysis. Based on these results, the authors argue that either people weren't moving as much as previously thought or they were moving to areas with similar strontium isotope signatures. Comparing types of ritual tooth ablation with strontium isotope levels shows that there is no clear correlation between the ritual and migration. The site contained a number of individuals with a type of tooth ablation thought to be a sign of immigration; however, these had the same strontium ratios as the types of ablation thought to be associated with locals.

Based on their analysis, Kusaka et al (2012) argued that there was not a correlation between ritual tooth ablation and immigration, and that movement of people in this region during the Jomon period needs to be re-assessed. Previous studies have argued the migration increased throughout Japan, but Kusaka et al (2012) posit that it may be restricted to movement in specific regions and not in the region they studied. It is possible then that the change in weather patterns did not have a major effect on the individuals living in this area, and may have led to changes in diet rather migration.

Archaeologists from MOLAS in London have been examining a mass burial that was recovered during the 1990's and thought to date to the early 14th century CE. The initial explanation attributed the mass grave to the Black Plague, which swept through London in this period, or the Great Famine from 1314-1317 CE. However, radiocarbon dating has placed the site at the mid-13th century, and related geological data shows that it may be due to a massive environmental shift caused by

a volcanic eruption. Geologists studying the eruption determined that it would have been the most catastrophic one in the past 10,000 years. The extent of the gas and ash plume would have blocked out sunlight, altered the atmospheric circulation patterns and drastically cooled the Earth's surface by 4 degrees centigrade. The result would have meant a decline in crops, a rise in famine, increased prevalence of rickets, and increased morbidity.

A passage from a London monk in 1258 reads: "The north wind prevailed for several months... scarcely a small rare flower or shooting germ appeared, whence the hope of harvest was uncertain... Innumerable multitudes of poor people died, and their bodies were found lying all about swollen from want... Nor did those who had homes dare to harbour the sick and dying, for fear of infection... The pestilence was immense – insufferable; it attacked the poor particularly. In London alone, 15,000 of the poor perished; in England and elsewhere thousands died." This evidence supports their re-interpretation of the site as a mass burial due to famine caused by weather changes, rather than a plague burial. These types of re-assessments of evidence change our perception of the past, and show how sensitive humans are to these types of environmental changes.

Each argument is well supported by the environmental, biological and cultural evidence, and is stronger due to these correlations in disparate data sets. Each article takes a different approach to incorporating the environmental data, and the changes in weather effect the populations in different ways. The Chinchurro appear to have changed their mortuary practices in response to increased aridity, while the Jomon seem to not have changed despite worsening weather conditions. These broad environmental changes are important to incorporate, but as we see from the London excavation, it is also important to assess the damage done during catastrophic events. While they do have their issues, they are able to create more nuanced interpretations about the past that take into account a broad archaeological context. While not every study will be able to know the exact environmental conditions experienced in the past, acknowledging a changing environment and taking this into account is important.

References

- Kusaka, S., T. Nakano, W. Morita, & M. Nakatsukasa (2012). Strontium isotope analysis to reveal migration in relation to climate change and ritual tooth ablation of Jomon skeletal remains from western Japan. *Journal of Anthropological Archaeology* 31(4).
- Marquet, P, C.M. Santoro, C. Latorre, V.G. Standen, S.R. Abades, M.M. Rivadeneira, B. Arriaza, & M.E.

Hochberg (2012). Feature Article: Emergence of social complexity among coastal hunter-gatherers in the Atacama Desert of northern Chile. *Proceedings of the National Academy of Sciences of the United States of America* 109(37).

Alberge, D. (2012) The Guardian. Mass grave in London reveals how volcano caused global catastrophe. *Electronic Document*.
guardian.co.uk/uk/2012/aug/05/medieval-volcano-disaster-london-graves

BOOK REVIEWS

David Hill, Associate Editor

Understanding Pottery Function, James M. Skibo. 2013. Manuals in Archaeological Method, Theory and Technique series. Springer, New York. ix + 192 pp., 60 illustrations, 10 in color. US\$129.00 (cloth). ISBN 978-1-4614-4198-4.

Reviewed by Charles C. Kolb, Division of Preservation and Access, National Endowment for the Humanities, Room 411, 1100 Pennsylvania Avenue, NW, Washington, DC 20506, USA.

Jim Skibo is Distinguished Professor of Anthropology at Illinois State University, Normal IL, USA and is the author of more than a half dozen books on ethnoarchaeology and ceramics. The current volume builds on the research presented in *Pottery Function: A Use-alteration Perspective* (New York: Plenum Press, 1992, xv +, 205 pp., 65 monochrome figures, 8 tables). A brief review of that seminal publication (8 chapters and 3 appendices) provides context for the current volume which is, in spite of its title, quite a different treatise on pottery function. The 1992 volume, a revision of his dissertation at the University of Arizona was, of course, influenced by his committee: Michael B. Schiffer and William A. Longacre (co-chairs), Carol Kramer, and David Kingery, but also by Frederick R. Matson (Penn State) who wrote The "Foreword" to the Plenum Press volume. Following the "Introduction" (pp. 1-8) in which Skibo discusses Matson's (1965) approach termed "ceramic ecology," he discusses in turn "Ethnoarchaeology and Experimental Archaeology Defined," "Pottery Use-Alteration," "The Pottery Use-Alteration Study" (the Kalinga of the Philippines), "Absorbed Residues," "Use-Alteration: Surface Attrition," and "Use-Alteration: Carbon Deposition" prior to a "Conclusion," a single-set of "References" (pp. 187-201, n = 262), and an "Index." Appendix B is on "Fatty Acid Identification," coauthored with Jeffrey Clark. This

1992 publication applied ethnoarchaeological data collected among the Kalinga (Longacre's "Kalinga Ethnoarchaeology Project" 1987 ff.) and field and laboratory experiments, often conducted with Michael Schiffer, to establish principles for the considering pottery use-alteration traces (residue, carbonization, and abrasion). Skibo's study, analogous to lithic use-wear analysis, focused on method and theory and proposed connections between pottery use traces and function.

After two decades and much more ceramic research and numerous high-quality publications, Skibo decided it was time to reassess his 1992 volume and evaluate what has been done and learned. The focus of *Understanding Pottery Function* is on how practicing archaeologists can infer function from their ceramic collections. One of the concerns of those working in pottery analysis is that they are unsure how to "do" use-alteration analysis on their collection. The second is being able to comprehend the users and potter's intended pottery function, including connections between technical choices and function. Skibo's 2013 volume is designed to answer these questions using case studies from the author's own work and that of and others who are applying use-alteration analysis to infer actual pottery function.

The 2013 volume would initially appear to be shorter in length in comparison to the 1992 monograph (201 versus 220 pages) but this is not the case since the recent publication has a smaller font and tightened line-spacing so, in spite of the cost, the reader is getting much more text and a more comprehensive bibliography (564 references versus 262 in the 1992 edition), but slightly fewer illustrations (60 versus 65, although 10 in the 2013 volume are in color). Each of the five chapters has its own references. The author makes an initial statement that characterizes his approach in the new edition: "My ethnoarchaeological experience among the Kalinga changed forever the way I look at pottery" (p. 1).

In the first chapter, "Understanding Pottery Function" (pp. 1-25, 160 references), Skibo discusses "The Joys of Pottery" and characterizes actual versus intended pottery function and the performance-based life-history approach, as well as differentiating and commenting on similarities among "life history," *chaîne opératoire*, and "behavioral chain" approaches. He further considers behavioral activities and interactions among these three, comments on performance characteristics. A brief summary of his approach to researching and writing this volume is a real-life story about pottery and people and the origins of pottery making using an examples from his own research on Grand Island located on the southern shore of Lake Superior. Chapter 2, "Intended Function: Inferring

Manufacturing Performance" (pp. 27-62, 5 figures, 2 tables, 153 references) focuses on understanding technical choices and performance characteristics, notably vessel shape (morphology) and the recording morphological variability and the relationships of morphology to performance characteristics. Skibo also discusses paste composition: the types, sizes, shapes, and quantities of temper and the types and chemistry of clays. Case studies of Late Archaic and Early woodland period pottery from the eastern United States and Late Woodland/Early Mississippian shell tempered pottery from eastern North America are presented. Firing temperatures and their estimations and surface treatments and their characteristics are also reviewed, and a case study of Thule Culture pottery from the Arctic is presented. Lastly, he considers the problem of inferring intended primary and secondary functions; the Kalinga use of metal vessels for cooking rice but clay pots for cooking vegetables and mean provides a relevant case study.

The core of Skibo's new book is Chapters 3 through 5, in which he considers three types of use-alteration traces associated with pottery function: sooting and carbonization, attrition, and residue. In the third chapter, "Sooting and Carbonization" (pp. 64-114, 20 figures in black-and-white and 10 in color), focuses on the deposition of external soot and internal carbonization but begins with a review of the Kalinga ethnoarchaeological project research on these topics. The author provides a very interesting, thoughtful discussion on the principles of external sooting, defines "soot," soot patches, and relationships of fire temperatures and distance from cooking fire, and modes of cooking. He also provides a case study on Late Archaic pottery and exterior sooting before moving to a characterization of the principles of internal carbonization, mode of cooking and related factors. A case study on the origins of pottery on the Colorado Plateau precedes a discussion on recording external and internal carbonization on prehistoric collections, documenting use carbonization and sooting patterns on whole vessels and sherds, recording use-alteration traces on sherds, "trickery" (fire clouds many mimic sooting), and drawing inferences about cooking activities.

Chapter 4, "Attrition" (pp. 115-159, 22 monochrome figures) begins with defining and identifying ceramic attrition and the Northern Tucson Basin Project. Skibo details use-attrition in terms of abrasive and nonabrasive processes, and differentiates marks and patches --the latter implies repetitive activities. Using a Kalinga case study, he examines use-attrition on exterior bases, lower exterior sides, mid-exterior sides, upper exterior sides, rims, interior rim and neck, upper interior sides, mid-interior sides, and lower interior sides and bases. Other

case studies are included: Griffiths and Bray on Mimbres Black-on-White pottery from the American Southwest, Hardin and Mills (2000) on Zuni ceramics, López Varela et al (2002) on Sherds as Tools, and McGovern et al. (2004) on Alcohol Fermentation. Skibo also references John Arthur's work on the Gamo of Ethiopia, calling *Living with Pottery: Ethnoarchaeology among the Gamo of Southwest Ethiopia* (2006) and "instant classic in ceramic ethnoarchaeology. (p. 155), reviewed in *SAS Bulletin* 31(1):19-21 (2008). Skibo also considers recording attritional traces on prehistoric pottery and recommends that traces be recorded as batches of sherds are processed. Chapter 5, "Residue" (pp. 161-189, 3 black-and-white figures, 1 table), is co-authored by Mary Malainey. The authors review data on fatty acid ratios for a variety of foods (following Skibo 1992:92-97) and the work of Evershed et al. (1990) as well as Malainey et al (1999). Approaches to lipid residue analysis, sample selection, processing techniques using gas chromatography, and lipid residues are documented. Issues about diagenesis and compound-specific stable isotope analysis are characterized through GC-C-IRMS and the value of IR and Raman spectroscopy are detailed. Four case studies are presented: Origins of pottery in the Upper Great Lakes, Late Prehistoric pottery function from Western Canada, finding evidence of maize processing in North American Mississippian sites, and the origins of pottery in southeastern Arizona. As a "final recommendation," Skibo states that "the first and probably the most important recommendation is that we must do our best to understand the life history of the sherds being tested" (p. 183) and as a "concluding comment" reminds us that "archaeological reconstruction and explanation is not easy, and it gets progressively more difficult as we continually try to extract more information from the archaeological record to piece together past lives. Pottery is in some ways the ideal artifact..." (p. 185). The volume concludes with "References" and a detailed "Index (pp. 191-192) two-column index incorporating proper nouns and topics.

This is a splendid reassessment of pottery function and valuable to all who attempt to understand the life histories of sherds and pots. We are grateful that Jim Skibo has taken the time to reflect upon studies over the past two decades and provide us with a thoughtful and compelling discussion on an important topic. Skibo acknowledges the influence of Michael Schiffer in his own research and writing and the reader will observe the long collaboration between Schiffer and Skibo in helping us better understand ceramic materials.

UPCOMING CONFERENCES

Rachel S. Popelka-Filcoff, Associate Editor

2012

- 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>
- 5-7 November. 17th International Conference on Cultural Heritage and New Technologies. Vienna, Austria. General information: http://www.stadtarchaeologie.at/?page_id=3109
- 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>
- 19-21 November. VAST2012: The 12th International Symposium on Virtual Reality, Archaeology and Cultural Heritage, Brighton, UK. General information: <http://www.vast2012.org/>
- 27-30 November. 13th Colloquium of the West African Association of Archaeology, Côte d'Ivoire General information: <http://www.aoaa-waaa.org/>
- 6-10 December. AGU Fall Meeting, San Francisco, CA USA. General information: <http://www.agu.org/meetings/>.
- 9-13 December. Australian Archaeological Association Annual Conference, Australia. General information: <http://conference.australianarchaeology.com.au/>

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&page_Label=PP_MULTICOLUMN_T5_33&node_id=644&use_sec=false&sec_url_var=region1&uuid=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>

22-26 April. GMPCA Archaeometry Conference, Caen, France. General information: <http://www.unicaen.fr/archeometrie2013/index.htm>

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>

29 May-June 2. International Conference on Archaeological Prospection, Vienna, Austria. General information: <http://ap2013.univie.ac.at/>

25-28 June. 10th Conference on Hunting and Gathering Societies (CHaGS). Liverpool, UK. General information: <http://www.liv.ac.uk/sace/CHAGS/index.htm>

5-9 August. 62nd Annual Denver X-Ray Conference. Westminster, CO, USA. General information: <http://www.dxcicdd.com/>

18-21 August. CANQUA-CGRG Biannual Meeting Edmonton, Alberta, Canada. General information: <http://www.canqua.com/meetings>. Abstract deadline: March 30, 2013

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

4-8 September. European Association of Archaeologists. Pilsen, Czech Republic. General information: <http://www.eaa2013.cz/>

8-12 September. 246th National Meeting and Exposition, American Chemical Society. Indianapolis IN, USA. General information: <http://portal.acs.org/portal/acs/corg/content>.

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

17-19 October. Paleoamerican Odyssey. Santa Fe, NM, USA. General information: <http://paleoamericanodyssey.com/index.html>

Dept. of Sociology & Anthropology
Indiana University South Bend
1700 Mishawaka Ave
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